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Panel on Environmental Affairs

Meeting on 19 December 2017

Background brief on improving water quality in Hong Kong and related issues prepared by the Legislative Council Secretariat

Purpose

This paper provides background information on the Government's measures to improve the water quality in Hong Kong and related issues including control of marine pollution. It also gives a brief account of the views and concerns expressed by Members when these issues were discussed by the relevant committees of the Legislative Council ("LegCo") since the 2012-2013 legislative session.

Background

2. Under the Water Pollution Control Ordinance (Cap. 358) ("WPCO"), the Environmental Protection Department ("EPD") is responsible for monitoring the water quality of coastal areas and rivers and controlling pollution of these water bodies. Hong Kong is divided into 10 Water Control Zones, and each zone has a set of Water Quality Objectives ("WQOs") established under WPCO to lay down water quality requirements for the water body.[1] The rates of annual compliance with the key WQOs (i.e. dissolved oxygen, unionized ammonia, total inorganic nitrogen and Escherichia coli ("E. coli")) of marine waters are assessed based on the data collected at 76 monitoring stations during a year.

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[1] WQOs include parameters to describe the physical, chemical and biological properties of the marine environment, and serve as the benchmarks to measure the "environmental health" of a water body. In general, waters with more sensitive uses require a higher level of protection, i.e. with more stringent WQOs.

Harbour Area Treatment Scheme

3. For the purpose of improving the water quality of Victoria Harbour, the Administration has been implementing the Harbour Area Treatment Scheme ("HATS") in phases to collect and treat the wastewater from both sides of Victoria Harbour. With the commissioning of HATS Stages 1 and 2A in 2001 and 2015 respectively, all sewage generated in the Victoria Harbour catchment (about 2 million cubic metres per day) is now transferred to the Stonecutters Island Sewage Treatment Works ("SCISTW") for chemically-enhanced primary treatment ("CEPT") and disinfection.

4. In June 2010, EPD commissioned a consultancy study to review the implementation of HATS Stage 2B which is to provide for an underground secondary (biological) treatment facility adjacent to the existing SCISTW. The review found that HATS Stage 2A had already provided adequate capacity to handle the projected sewage flow and the bulk of Victoria Harbour would be in compliance with WQOs upon its commissioning, while the upgrading of treatment level from CEPT to biological treatment would not result in an observable improvement of the water quality of coastal waters. The review thus concluded that the implementation of HATS Stage 2B was not critical in terms of WQOs compliance. According to the Administration, it would keep under review the implementation of HATS Stage 2B taking into account the water quality situation and the latest technological development in biological treatment.

Nearshore pollution problems

5. Although the implementation of HATS can improve the water quality of the main water body of Victoria Harbour, [2] such improvement is mainly found in the western part of Victoria Harbour/around the HATS outfall area, which is away from the coastal waters. There are still residual pollution discharges from various activities in densely populated urban areas into the coastal waters and are not collected by the public sewers network. These discharges originate from various pollution sources, including overland polluted storm water flow and wastewater from misconnections,[3] causing odour and visual problems along the coastal areas of Victoria Harbour. Other possible sources of odour include

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[2] According to the Administration, in terms of the key water quality parameters, the annual average level of dissolved oxygen and annual geometric mean E. coli density increased by 14% and dropped by 93% respectively in 2016 compared with 2000-2001 before HATS Stage 1 was implemented, while unionized ammonia nitrogen level also dropped by 60%.

[3] Examples include polluted flow from damaged foul sewers, misconnections between foul sewers and storm drains, building down pipes or terminal manholes misconnected to storm drains, and wastewater from shops discharged into storm drains.

marine refuse, grease and oil at sea, decaying algae, sediments and deposit at drainage outlets, and seabed sediments.

6. The tackling of nearshore pollution problems falls within the ambits of several government departments. For example:

(a) EPD, the Buildings Department ("BD") and the Drainage Services Department ("DSD") jointly follow up and rectify foul water pipe misconnection cases;

(b) DSD carries out inspections, repair and clearing of sediments for the public sewers and storm drainage systems on a regular basis. It also replaces broken sewers, desilt storm drains and culvert outlets, and upgrades/installs dry weather flow interceptors ("DWFIs");[4]

(c) the Food and Environmental Hygiene Department ("FEHD") and the Highways Department provide routine rubbish cleanup services in public places and streets, as well as regular clearing of sediments in gully traps to reduce the amount of pollutants discharged into the storm drainage systems; and

(d) the Marine Department ("MD") cleans up floating refuse and provides free refuse collection service for vessels on a daily basis.

7. According to the Administration, despite the above efforts, it is difficult to eliminate the problem of misconnections of drains and malpractices of illegal discharge, particularly in densely populated areas with many old private buildings. Furthermore, albeit resource intensive, enforcement actions are unable to comprehensively prevent the various daily activities in the streets from polluting the coastal waters. Desilting of storm drains and culvert outlets and the construction of DWFIs are only ad hoc mitigation measures. Besides, the installation of DWFIs is subject to space constraints at strategic locations.

8. In 2014, the Administration proposed to carry out a consultancy study to identify the specific causes of nearshore pollution through evidence-based reviews and various analyses, and identify targeted solutions through prevention at source and pollution control measures. The funding proposal for the consultancy study was approved by the Finance Committee of LegCo on 26 June 2015, and the study was scheduled for completion by the end of 2017. The major tasks of the study are set out in **Appendix I**.

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[4] DWFI is a device that intercepts and diverts polluted dry weather flow from storm drain/channel into the sewerage system during non-rainy days for treatment.

Controlling marine pollution caused by oil spillage and marine refuse

9. The Administration has put in place a number of legislative and administrative measures to control the discharge of polluting matters into the marine environment, such as:

(a) various subsidiary legislation made under the Merchant Shipping (Prevention and Control of Pollution) Ordinance (Cap. 413) for implementing the requirements of the International Convention for the Prevention of Pollution from Ships (now universally known as "MARPOL");[5]

(b) the Merchant Shipping (Local Vessels) Ordinance (Cap. 548) and the Shipping and Port Control Ordinance (Cap. 313) which control the discharge of oil into Hong Kong waters from local and non-local vessels respectively;

(c) the Summary Offences Ordinance (Cap. 228) which provides for the offence and penalties on depositing of litter into Hong Kong waters;

(d) the Maritime Oil Spill Response Plan developed in 2000 based on the requirements and guidelines of the International Convention on Oil Pollution Preparedness, Response and Co-operation; and

(e) the Regional Maritime Oil Spill from Ship Response Plan formulated with the maritime authorities of the adjacent ports to combat major oil spills in Pearl River Estuary.

10. The Administration set up an interdepartmental Working Group on Clean Shorelines in November 2012. In support of the Working Group, EPD commissioned in 2013-2014 a consultancy study titled "Investigation on the Sources and Fates of Marine Refuse in Hong Kong" (commonly known as the "Marine Refuse Study"), which has drawn up a list of priority sites more prone to refuse accumulation, and recommended improvement measures to enhance the cleanliness of Hong Kong's shorelines.

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[5] Hong Kong has implemented MARPOL and its six annexes. Annex I and Annex II are related to the prevention of oil pollution and noxious liquid substances respectively. The other annexes are related to the prevention of harmful substances in packaged form, sewage, garbage and air pollution from ships.

Major views and concerns expressed by Members

11. The Panel on Environmental Affairs ("EA Panel") discussed issues related to enhancing the water quality in Hong Kong at a number of meetings since the 2012-2013 legislative session. The Public Works Subcommittee considered the Administration's proposal to conduct the consultancy study on further enhancing quality of coastal waters of Victoria Harbour at its meeting on 9 June 2015. Questions on the water quality of Victoria Harbour, Tolo Harbour in Tai Po, and Shing Mun River in Sha Tin were raised by Members at various Council meetings. The major views and concerns expressed by Members at the above meetings are summarized in paragraphs 12 to 17. EA Panel also discussed issues related to marine pollution caused by oil spillage and marine refuse at its meetings on 22 June 2015 and 22 May 2017. The major issues raised by Members at these two meetings are summarized in paragraphs 18 to 22.

Nearshore pollution caused by illegal discharge of wastewater and misconnections of drains

12. Members considered that the Administration should step up efforts in controlling nearshore pollution caused by illegal discharge of wastewater and misconnections of drains, including strictly enforcing WPCO to rectify misconnections, formulating measures to reduce pollution caused by roadside activities (such as discharge of effluents by food establishments), and strengthening the regulation of minor works carried out by property owners.

13. The Administration responded that there were many causes of sewer misconnections in buildings, and those misconnections were usually unintended. Therefore, the Administration's focus was to assist owners or occupants in resolving sewage disposal problems of their buildings. In some densely populated areas with many old private buildings, assistance from the Home Affairs Department and respective District Offices would be sought to help rectify misconnections through owners' corporations. If illegal discharge of wastewater into storm drains was found, EPD would conduct follow-up investigation and take enforcement actions in accordance with WPCO, and initiate interdepartmental enforcement actions if necessary. From 2013 to 2015, EPD conducted over 7 000 inspections of potential sources of illegal discharge in the Victoria Harbour Water Control Zone, and successfully prosecuted 22 cases for violation of WPCO. EPD would continue its enforcement efforts to improve the quality of the coastal waters of Victoria Harbour. FEHD would also continue to arrange inspections at restaurants and take enforcement actions to stop the malpractice of scullery activities at rear lanes.

14. Regarding the regulation of minor works, the Administration advised that designated minor works involving the erection, repair, alteration or removal of any drain should be carried out by a qualified and experienced Prescribed Building Professional and Prescribed Registered Contractor in accordance with the Buildings Ordinance (Cap. 123) and Building (Minor Works) Regulation (Cap. 123N). BD had issued relevant technical guidelines to the professionals and contractors, and would carry out random audit checks to ensure that the minor works complied with the legal requirements.

Water quality of Tolo Harbour and Shing Mun River

15. Referring to the occurrence of severe red tides in Tolo Harbour, and massive fish deaths in the fish culture zones ("FCZs") there as well as along Shing Mun River since December 2015, Hon TANG Ka-piu and Hon Steven HO raised questions at the Council meetings of 20 January 2016 and 23 November 2016 respectively on the causes of the incidents and the Administration's follow-up actions. Hon Steven HO and Dr Hon Elizabeth QUAT also wrote to the Chairman of EA Panel in March and October 2016 respectively suggesting that the Panel discuss issues related to the water quality of Tolo Harbour and Shing Mun River.

16. In response to Members' concerns, the Administration advised that red tide was a natural phenomenon caused by rapid growth of algae which led to discolouration of seawater. Its formation and duration were determined by various factors such as sunlight intensity, water temperature, salinity, trace elements in seawater, water flow and whether the seawater is polluted. It was believed that the fish kill incident in the waters of Tolo Harbour was highly likely caused by the red tides formed by Karenia mikimotoi. To monitor the planktonic algae in water and the water quality in FCZs, the Agriculture, Fisheries and Conservation Department ("AFCD") had been collecting samples in different areas of Hong Kong waters. In 2016, about 10 000 marine water samples were tested, with over 5 000 samples from Tolo Harbour and the vicinity. The monitoring results showed that all FCZs in Hong Kong, including those in Tolo Harbour, met WQOs and were suitable for fish culture. AFCD would study ways to further enhance its red tide monitoring mechanism and technologies, with a view to forewarning mariculturists of red tides as soon as possible and helping minimize their losses.

17. The Administration also advised that FEHD was responsible for removing floating refuse (including floating dead fish) found in nullahs, rivers, watercourses and natural river beds. On average, about 260 cleaning operations were carried out at Shing Mun River by FEHD's contractor each year. In response to referrals from the relevant departments and public complaints or enquiries, FEHD would strengthen the cleaning service where necessary. When

notified of the presence of dead fish in Shing Mun River in December 2015, EPD and AFCD had conducted site inspections, collected river water samples for testing, and carried out fish pathogen analysis of fish samples collected from the river. The test results and analytical reports did not show any abnormality in the water quality of the river, sign of red tide or toxic algae along the water course, or parasitic infection in the fish samples. Based on the above, it was believed that water quality was not related to the death of the fish.

Cleanup of marine refuse and oil spillage

18. Members opined that the Administration should formulate a comprehensive plan with specific targets and policies to address the marine refuse problem in Hong Kong, and remove marine refuse more frequently to minimize refuse accumulation in the marine environment. They enquired whether the Administration would consider strengthening its cooperation with non-governmental organizations ("NGOs"), District Councils and other relevant stakeholders for organizing beach cleanup activities.

19. The Administration advised that it had adopted a three-pronged strategy (which included reducing waste generation at source, reducing the amount of refuse entering the marine environment, and removing refuse from the marine environment) recommended in the Marine Refuse Study to tackle the marine refuse problem. It would enhance the cleanup frequency at priority sites which were prone to refuse accumulation due to their geographical locations. Apart from the Government's efforts, different organizations had also been organizing cleanup operations at shorelines or beaches, particularly in the summer seasons, and EPD staff had participated in such operations to promote beach cleaning. EPD would consider further strengthening interdepartmental efforts and cooperation with NGOs and District Councils on removal of marine refuse.

20. Members sought details about the Administration's measures to tackle oil spills in Hong Kong waters. Following a spate of media reports in 2016 and 2017 about marine pollution in Hong Kong waters caused by illegal dumping of refuse by Mainland vessels and a marine accident in neighbouring waters,[6] Members asked about the mechanisms for responding to similar emergency situations, and suggested that EA Panel should follow up to discuss relevant issues.

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[6] In 2016, there were media reports about illegal dumping of refuse by Mainland vessels in the waters of Wanshan Qundao of Zhuhai, which is about 40 kilometres away from Lantau. After the suspected dumping activity, some Hong Kong fishermen netted large quantity of refuse when they carried out trawling activities in Pearl River Estuary. In August 2017, after a vessel collision in Pearl River Estuary, a large quantity of palm stearin was found in coastal areas and on several beaches in Hong Kong.

21. The Administration advised that ship owners were required to notify MD of any oil spillage incident in Hong Kong waters. MD's Pollution Control Unit and its contractor maintained oil spill response readiness on a 24-hour standby basis, and had set a 100% target to respond on site within two hours of reported oil spillage inside Victoria Harbour. If incidents occurred within Hong Kong waters but outside Victoria Harbour, MD's target was to respond on site within four hours of reported oil spillage as far as practicable. Since oil pollution in Pearl River Estuary might affect adjacent ports in the region, MD had formulated the Regional Maritime Oil Spill from Ship Response Plan, which comprised a three-tier response level to combat major oil spills in the region, with the maritime authorities of the adjacent ports. The Response Plan established measures in dealing with oil pollution incidents and ramped up regional cooperation in response to such incidents.

22. The Administration also advised that Hong Kong and Guangdong had agreed in September 2016 to set up the Hong Kong-Guangdong Marine Environmental Management Special Panel, which was under the framework of the Hong Kong-Guangdong Joint Working Group on Sustainable Development and Environmental Protection, to enhance exchange and communication on various regional marine environmental matters. The work of the Special Panel would include, among other things, setting up a notification and alert system on marine refuse issues and combating illegal marine dumping activities. In addition, EPD developed in 2016 a notification and alert system on marine refuse based on rainfall data in the region. The information allowed relevant departments to prepare for the likely surge of marine refuse due to heavy rain by deploying staff and taking follow-up actions for cleaning up marine refuse more promptly. The notification and alert system had been put on trial in early May 2017 when heavy rain was recorded in Guangdong province. Relevant departments were notified to strengthen patrol and get prepared for mobilization of staff to carry out cleanup operations in areas likely to have massive quantity of marine refuse drifted by wind and currents.

Council motion

23. At its meeting of 16 November 2011, the Council passed the motion on "Comprehensively improving the water quality of the Victoria Harbour" moved by Dr Hon Priscilla LEUNG as amended by Dr Hon PAN Pey-chyou. The wording of the motion and the progress report provided by the Administration are hyperlinked in **Appendix II**.

Recent development

24. At the policy briefing cum meeting of EA Panel on 30 October 2017, the Administration briefed members on its major policy initiatives, including those on improving the water quality in Hong Kong. The Panel passed a motion at the meeting urging the Administration to commence and complete HATS Stage 2B as soon as possible.

25. At the EA Panel meeting on 19 December 2017, the Administration will brief the Panel on the latest water quality improvement in the territory, including that of Victoria Harbour, Shing Mun River and Tolo Harbour, etc., progress of HATS Stage 2A, the preliminary findings of the consultancy study on further enhancing the coastal water quality of Victoria Harbour, and the arrangements for HATS Stage 1 maintenance.

Relevant papers

26. A list of relevant papers is set out in **Appendix II**.

Council Business Division 1
Legislative Council Secretariat
13 December 2017

Appendix I

Major tasks of the consultancy study on further enhancing quality of coastal waters of Victoria Harbour

The major tasks of the study are as follows:

(a) initial baseline survey (e.g. visual inspection, odour patrol, water and sediment sampling) and further investigation on site-specific pollution sources to establish overall conditions of nearshore pollution levels in Victoria Harbour;

(b) evidence-based reviews to identify pollution sources affecting regional coastal waters, e.g. storm water pollution survey such as water quality monitoring at storm water outfalls and manholes, survey on misconnections, manhole inspection, and non-point source pollution survey;

(c) regional environmental investigations including olfactometry odour assessment, headspace analysis, sediment analysis, etc., to assess the nuisance (such as aesthetic and odour nuisance) arising from nearshore water pollution;

(d) review of overseas experience, best practices and current arrangements in combating nearshore water pollution;

(e) exploring practicable measures to prevent pollution at source (e.g. rectify any misconnections in the sewerage and drainage systems, land use planning, recommendations to increase enforcement efficacy, public education, operation and maintenance of the sewerage or drainage systems) and to reduce pollution discharges with pollution control measures (e.g. cleanup actions, engineering solutions such as installation or upgrading of dry weather flow interceptors, bioremediation treatment and innovative odour removal from storm drains); and

(f) formulating recommendations and timetable to enhance the water quality of Victoria Harbour and in the long term, its leisure and amenity value. Recommendations have to take into account ongoing improvement works at waterfront areas and practical considerations such as likely reaction from the general public, preliminary environmental, traffic, sewerage and drainage impacts, and cost-effectiveness.

[Source: Extracted from the Administration's paper (PWSC(2015-16)17) for the meeting of the Public Works Subcommittee on 9 June 2015.]

Appendix II

Improving water quality in Hong Kong

List of relevant papers

Date	Event	Paper
14 June 2013	Meeting of Panel on Environmental Affairs ("EA Panel")	Administration's paper on "Controlling the impact of dumping and dredging activities on the marine environment" (LC Paper No. CB(1)1269/12-13(03)) Minutes of meeting (LC Paper No. CB(1)1690/12-13)
24 November 2014	EA Panel meeting	Administration's paper on "5054DP – Further enhancing quality of coastal waters of Victoria Harbour" (LC Paper No. CB(1)245/14-15(05)) Minutes of meeting (LC Paper No. CB(1)452/14-15) Administration's follow-up paper (LC Paper No. CB(1)664/14-15(01))
9 June 2015	Meeting of Public Works Subcommittee	Administration's paper on "54DP – Further enhancing quality of coastal waters of Victoria Harbour" (PWSC(2015-16)17) Minutes of meeting (LC Paper No. PWSC245/14-15)
22 June 2015	EA Panel meeting	Administration's paper on "Control on marine pollution from oil spillage, marine littering and floating refuse" (LC Paper No. CB(1)995/14-15(04)) Minutes of meeting (LC Paper No. CB(1)1267/14-15)

Date	Event	Paper
26 June 2015	Meeting of Finance Committee	Minutes of meeting (LC Paper No. FC70/15-16)
23 January 2017	Policy briefing cum meeting of EA Panel	Administration's paper on "2017 Policy Address – Policy initiatives of Environment Bureau: Environmental protection" (LC Paper No. CB(1)451/16-17(01)) Minutes of meeting (LC Paper No. CB(1)683/16-17)
27 February 2017	EA Panel meeting	Administration's paper on "4394DS – Upgrading of Kwun Tong Preliminary Treatment Works and 4413DS – Enhancement works for Kwun Tong Sewage Pumping Station" (LC Paper No. CB(1)574/16-17(03)) Minutes of meeting (LC Paper No. CB(1)783/16-17)
24 April 2017	EA Panel meeting	Administration's paper on "Construction of dry weather flow interceptors to improve water quality and reduce odour in Victoria Harbour and sewer rehabilitation in Kowloon, Shatin and Sai Kung" (LC Paper No. CB(1)824/16-17(05)) Minutes of meeting (LC Paper No. CB(1)1297/16-17)
22 May 2017	EA Panel meeting	Administration's paper on "Tackling marine refuse" (LC Paper No. CB(1)949/16-17(05)) Minutes of meeting (LC Paper No. CB(1)1369/16-17)
30 October 2017	Policy briefing cum meeting of EA Panel	Administration's paper on "2017 Policy Address – Policy initiatives of Environment Bureau: Environmental protection" (LC Paper No. CB(1)75/17-18(01))

Hyperlink to relevant Council motion:

Meeting date	Motion
16 November 2011	Motion on "Comprehensively improving the water quality of the Victoria Harbour" moved by Dr Hon Priscilla LEUNG as amended by Dr Hon PAN Pey-chyou Progress report provided by the Administration

Hyperlinks to relevant Council Questions:

Date	Council Question
18 November 2015	Press release on Council question (written) raised by Hon TANG Ka-piu
6 January 2016	Press release on Council question (written) raised by Hon CHAN Yuen-han
20 January 2016	Press release on Council question (written) raised by Hon TANG Ka-piu
24 February 2016	Press release on Council question (written) raised by Hon CHAN Hak-kan
16 November 2016	Press release on Council question (oral) raised by Hon Steven HO
23 November 2016	Press release on Council question (written) raised by Hon Steven HO
14 December 2016	Press release on Council question (written) raised by Hon Kenneth LAU
15 February 2017	Press release on Council question (written) raised by Hon WU Chi-wai
26 April 2017	Press release on Council question (written) raised by Dr Hon Helena WONG