

**For discussion
on 24 November 2014**

Legislative Council Panel on Environmental Affairs

**5054DP – Further enhancing quality
of coastal waters of Victoria Harbour**

PURPOSE

This paper seeks Members' support for the proposal to upgrade **5054DP** to Category A at an estimated cost of \$ 89.6 million in money-of-the-day (MOD) prices, to carry out a study on further enhancing quality of coastal waters of Victoria Harbour (the Study).

PROJECT SCOPE AND NATURE

2. The scope of the Study, which we propose to upgrade to Category A, comprises –
 - (a) field surveys, environmental monitoring and investigations^[1];
 - (b) data analysis, preliminary impact assessments^[2], review of best practices and current arrangements to tackle near shore pollution; and
 - (c) formulation of recommendations and programmes to reduce near shore pollution and improve the environment of popular waterfront areas of Victoria Harbour.

A plan showing the study area is at **Enclosure 1**.

JUSTIFICATION

3. With the development of new waterfront promenades on both sides, Victoria Harbour has become increasingly accessible to the public. Public aspiration for a pleasant

¹ Field works include but are not limited to storm water pollution survey, expedient connection survey, manhole inspection, non-point source pollution survey, olfactometry odour assessment, sediment analysis, etc.

² Preliminary impact assessments on environmental, sewerage, drainage, geotechnical, waterworks, traffic and other aspects necessary for preliminary design shall be made.

harbourfront will only increase. The 2014 Policy Address has announced the commissioning of a consultancy study to enhance the quality of coastal waters of Victoria Harbour, with the long-term objective of enhancing its leisure and amenity value. Under the Study, we will explore various practicable options to effectively reduce near shore pollution with a view to improving the environment of both sides of the harbour. The removal of aesthetic and odour problems is our main target in enhancing quality of coastal waters. All District Councils (DCs) consulted have urged us to proceed with the study as soon as possible.

4. The Government is committed to improving the water quality of Victoria Harbour. In the past two decades, the Government has been implementing the Harbour Area Treatment Scheme (HATS) to restore the water quality of Victoria Harbour (see **Enclosure 2** for details). The commissioning of HATS Stage 1 in 2001 has brought an increase of 10% in dissolved oxygen (DO) and a decrease of 16% in total inorganic nitrogen from 2002-2003. Upon commissioning HATS Stage 2A in 2015, we anticipate that the bulk of Victoria Harbour will comply with the applicable Water Quality Objectives (WQOs)^[3] such as DO and un-ionised ammonia. HATS Stages 1 and 2A have improved and will further improve the water quality of the main water body of Victoria Harbour. Yet, these improvements will be away from coastal waters and hence will not result in obvious improvement of the quality of coastal waters. Indeed, there are still residual pollution discharges from various activities^[4] in densely populated urban areas into the coastal waters. These discharges originate from various pollution sources, including overland polluted storm water flow and wastewater from mis-connections^[5], causing odour and visual problems along the coastal areas of Victoria Harbour. Other possible sources of odour include marine refuse, grease and oil at sea, decaying algae, sediments and deposit at drainage outlets and seabed sediments. These problems remain subjects of concerns by the local community.

5. As there are diverse sources of pollution discharge into the shore, how odour is generated is a complicated matter to be studied. Odour formed at different locations may be due to different mechanisms requiring different solutions. Nuisance caused by odour also varies with seasons, weather conditions, wind directions, wind speeds and water

³ WQOs serve as the benchmarks to describe the physical, chemical and biological properties of the marine environment and are designed 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), while water bodies with less sensitive uses require a relatively lower level of protection (i.e. with less stringent WQOs).

⁴ The pollution is caused by activities such as roadside shops or business operators, on-street markets, improper car washing, street cleansing and littering.

⁵ Examples include polluted flow from damaged foul sewers, mis-connection between foul sewers and storm drains, building down pipes or terminal manholes mis-connected to storm drains, wastewater from shops discharged into storm drains.

current. In particular, odour problem is often found to be more severe in semi-enclosed water bodies such as typhoon shelters.

6. At present, a multi-pronged approach has been adopted by government departments concerned to deal with the near shore pollution problems mentioned in paragraphs 4 and 5. For example, the Environmental Protection Department (EPD) takes enforcement actions to stop illegal discharge from buildings to storm drains, and will request the Buildings Department to step in if necessary; the Food and Environmental Hygiene Department (FEHD) takes enforcement actions against food premises conducting scullery activities at rear lanes; and the Drainage Services Department (DSD) replaces broken sewers, rectifies mis-connections between foul sewers and storm drains, desilts storm drains and culvert outlets as well as upgrades or installs dry weather flow interceptors (DWFIs) .

7. Despite the concerted efforts of the departments, it is difficult to eliminate the problem of mis-connections 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. We therefore need to carry out the Study to identify the specific causes of near shore pollution through evidence-based reviews and various analyses. The Study will then identify targeted solutions through prevention at source and pollution control measures. To this end, the following major tasks are required for the successful completion of the Study –

- (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 near shore 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 mis-connections, manhole inspection and non-point source pollution survey;
- (c) regional environmental investigation including olfactometry odour assessment, headspace analysis, sediment analysis, etc., to assess the

nuisance such as aesthetic and odour arising from the near shore water pollution;

- (d) review of overseas experience, best practices and current arrangements in combating near shore water pollution;
- (e) exploring practicable measures to prevent pollution at source (e.g. rectify any mis-connections in the sewerage and drainage systems, land use planning, recommendations to increase enforcement efficacy, public education, operation and maintenance of the sewerage/ drainage systems, etc.) and to reduce pollution discharges with pollution control measures (e.g. clean up actions, engineering solutions such as installation or upgrading of DWFIs, bioremediation treatment, innovative odour removal from storm drains, etc.); 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, etc.

9. In view of inadequate in-house resources, we propose to engage consultants to undertake the Study and to supervise the associated field surveys, environmental monitoring and investigations. Meanwhile, the implementation of HATS Stage 2B will be kept under review taking into account the water quality situation and the latest technological development in biological treatment.

10. We plan to submit the funding proposal for the Study to the Public Works Subcommittee for support in early 2015 with a view to seeking funding approval of the Finance Committee (FC) subsequently. Subject to funding approval of the FC, we plan to commence the Study in August 2015 for completion in July 2017.

11. Management of the Study will involve concerted efforts of all departments concerned. A Study Steering Group will be formed with members from EPD and relevant departments such as DSD, FEHD, Home Affairs Department, etc., to see through the Study.

FINANCIAL IMPLICATIONS

12. We estimate the cost of the Study, including the associated environmental monitoring and investigations, to be \$89.6 million in MOD prices, broken down as follows –

		\$ million	
(a) Consultants' fee for		30	
(i) data analysis, preliminary impact assessments, review of best practices and current arrangements	11.5		
(ii) formulation of recommendations and programmes	11		
(iii) supervision of field survey, environmental monitoring and investigations	7.5		
(b) Field surveys, environmental monitoring and investigations		43	
(c) Contingencies		7	
	Sub-total	80	(in September 2014 prices)
(d) Provision for price adjustment		9.6	
	Total	89.6	(in MOD prices)

PUBLIC CONSULTATION

13. Since the promulgation in the 2014 Policy Address of our initiative to enhance quality of coastal waters of Victoria Harbour, we have from March to May 2014 met with academics from local universities, professional bodies including the Hong Kong Institution of Engineers, Chartered Institution of Water and Environmental Management Hong Kong, Association of Engineering Professionals in Society, and advocacy bodies including World Wide Fund for Nature Hong Kong and Green Council, on the scope of the Study. From June to August 2014, we have also consulted relevant Committees of nine DCs on both sides of Victoria Harbour (see **Enclosure 3** for details), the Advisory Council on the Environment and the Harbourfront Commission.

14. The Administration's proposal to carry out the Study to tackle aesthetic and odour problems at coastal waters of Victoria Harbour was welcomed by all. There was no objection to selecting West Kowloon, Kowloon East, the New Central Harbourfront and

Wanchai/Causeway Bay as the priority areas for improvement. DCs consulted all supported effective solutions to tackle odour and other pollution issues of their respective coastal waters. Some DCs further considered that joint departmental efforts with clear demarcation of responsibilities among government departments were necessary to effectively tackle near shore pollution. Also, short-term measures as mentioned in paragraph 6 would be necessary before formulation of medium and long-term solutions under the Study. Government departments will continue with the necessary short-term measures in parallel to the Study.

ENVIRONMENTAL IMPLICATIONS

15. The Study and the associated environmental monitoring and investigations are not designated projects under the Environmental Impact Assessment Ordinance (Cap. 499) and will not cause any adverse environmental impact. We will implement suitable mitigation measures to control any short-term environmental impacts arising from environmental monitoring and investigation. The Study will not include any works and will not generate construction waste.

HERITAGE IMPLICATIONS

16. The Study and the associated environmental monitoring and investigations will not affect any heritage site, i.e. all declared monuments, proposed monuments, graded historic sites/buildings, sites of archaeological interest and Government historic sites identified by the Antiquities and Monuments Office.

LAND ACQUISITION

17. The Study and the associated environmental monitoring and investigation will not require any land acquisition.

BACKGROUND

18. We included **5054DP** in Category B in September 2014.

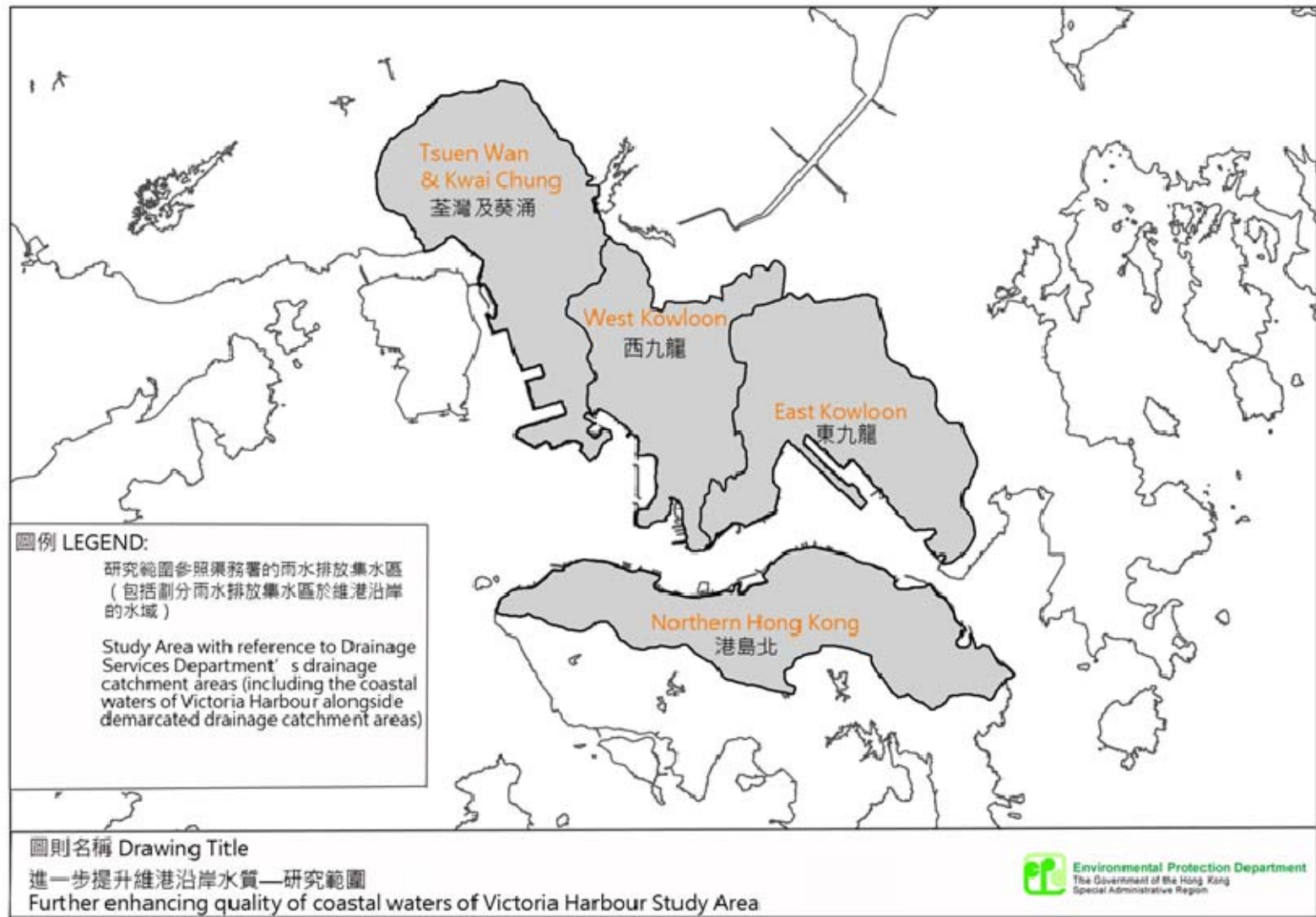
19. The Study and the associated environmental monitoring and investigation will not involve any tree removal or planting proposal.

20. We estimate that the proposed Study and the associated environmental monitoring and investigation will create about 91 jobs (91 for professional/technical staff), providing a total employment of 1,220 man-months.

ADVICE SOUGHT

21. Members are invited to support our proposal for upgrading **5054DP** to Category A.

**Environment Bureau
Environmental Protection Department
November 2014**



Harbour Area Treatment Scheme

Background

The Harbour Area Treatment Scheme (HATS) involves the implementation of an integrated sewerage system for collecting and treating sewage generated around Victoria Harbour in an efficient, effective and environmentally sustainable manner.

2. Construction of HATS Stage 1 commenced in early 1995 and was completed in 2001. Sewage generated from Tsuen Wan, Kwai Tsing, Tseung Kwan O, Kowloon and north-eastern Hong Kong Island is collected for chemically-enhanced primary treatment (CEPT) at the Stonecutters Island Sewage Treatment Works (SCISTW). HATS Stage 1 now collects 1.4 million cubic metres of sewage each day (representing about 75% of the total sewage generated from the harbour catchment) to the SCISTW via deep tunnels for centralised treatment before disposal. The SCISTW is one of the most efficient chemical treatment plants in the world, removing 70% of the organic pollutants, 80% of the suspended solids and 50% of *E. coli*. This has resulted in significant improvement in the marine environment.

3. Construction of HATS Stage 2A is underway to collect sewage generated from the northern and south-western parts of Hong Kong Island with newly constructed deep tunnels of 21 kilometres long. The sewage will then be transferred to the expanded SCISTW for CEPT and disinfection. The Advance Disinfection Facilities (ADF) under HATS Stage 2A were commissioned in March 2010 to remove at least 99% of *E. coli* from the treated effluent of the SCISTW. Since then, the bacteria level in the western part of Victoria Harbour has been largely reduced. Major works under Stage 2A is expected to be completed by end of this year. Upon the full commissioning of Stage 2A, the overall water quality of Victoria Harbour will be further improved.

4. In June 2010, EPD commissioned a consultancy study to review the implementation of HATS Stage 2B (the Review) which is to provide for an underground secondary (i.e. biological) treatment facility adjacent to the existing SCISTW. The Review reveals that HATS Stage 2A has already provided adequate capacity to handle the projected sewage flow and the bulk of Victoria Harbour will be in compliance with the Water Quality Objectives (WQOs) upon its commissioning while the upgrading of treatment level from CEPT to biological treatment will not result in an observable improvement of the water quality of coastal waters. The Review thus concludes that in terms of WQOs compliance, the implementation of HATS Stage 2B at this stage is not critical.



Current state of water quality of Victoria Harbour

5. For the Victoria Harbour Water Control Zone (WCZ), the compliance rate with the relevant WQOs in 2013 was 83%. Non-compliance was mainly found with regard to the Total Inorganic Nitrogen (TIN) and Dissolved Oxygen (DO) objectives at some monitoring stations. The TIN compliance rate of the Victoria Harbour WCZ was 60% in 2013. This could be due to a higher background TIN level under the influence of Pearl River discharge (as reflected in the increase in TIN levels at many stations in the north-western and southern waters of Hong Kong), the year-to-year normal range of fluctuation of the discharge from surface run-offs, and the untreated sewage discharged from the three preliminary treatment works (PTW) located between North Point and Central. After the commissioning of HATS Stage 2A, the pollution load to Victoria Harbour will be further reduced when sewage from the above mentioned PTWs is collected for treatment at the SCISTW.

6. The DO compliance rate of the Victoria Harbour WCZ was 90% in 2013. The DO level in a water body can be affected by organic pollution as well as natural factors such as temperature^[a] and stratification^[b] of the water column. Since the monitoring data, on the basis of parameters such as organic nitrogen and 5-day Biochemical Oxygen Demand, did not show any obvious sign of an increase in organic pollution in the harbour waters in 2013, the 10% non-compliance rate with the DO objective was likely related to

^a Solubility of oxygen in water is affected nonlinearly by temperature, and decreases considerably in warm water.

^b In summer, surface run-offs and river outflow increase significantly as a result of heavy rainfall. When the marine water body receives fresh water input from these sources, salinity difference between the upper layer and lower layer of the water body will lead to stratification of the water column. Stratification discourages mixing which in turn affects replenishment of DO in the water body.

the occasional hot weather experienced during the summer months.

Water quality improvements of implementing HATS

7. The commissioning of HATS Stage 1 in 2001 has resulted in significant improvement in the marine environment. Since the commissioning of the ADF in 2010, the bacteria level in the western part of Victoria Harbour has been largely reduced ^[c]. Upon commissioning of HATS Stage 2A, the bulk of Victoria Harbour will comply with the applicable WQOs such as DO and Un-ionised Ammonia (UIA).

WQOs	After HATS Stage 1 commissioned in 2001	Upon commissioning of HATS Stage 2A
DO	Increased by 10%	Further increased by 3%
UIA	Reduced by 31%	Further reduced by 12%
TIN	Reduced by 16%	Further reduced by 7%

8. The additional benefits brought about by the implementation of HATS Stage 2B to the water quality of Victoria Harbour are that the level of DO would be marginally improved and the level of un-ionised ammonia would be reduced. However, the level of total inorganic nitrogen would be increased due to the nitrification process of biological treatment.

9. Nevertheless, the improvement brought about by HATS will mainly be found in the western part of Victoria Harbour/around the HATS outfall area, which is away from the coastal waters and hence will not result in an obvious improvement of the quality of coastal waters. The residual pollution discharges into the urban coastal waters, i.e. those not collected by our sewerage system due to various factors such as drain misconnections, polluted surface run-offs from streets, etc., and the odour and visual impacts caused by near shore pollution to our urban coastal waters still remain. The implementation of HATS Stage 2B meanwhile will be kept under review taking into account the water quality situation and the latest technological development in biological treatment.

^c With the full commissioning of the ADF from March 2010, water quality at seven beaches in Tsuen Wan District has shown improvement such that all of them have become suitable for swimming and re-opened in phases.

Details of Consultation with District Councils (DCs)

<i>DC</i>	<i>Committee consulted on the Study</i>	<i>Date</i>
Wanchai District	Food and Environmental Hygiene Committee	17 June 2014
Eastern District	Food, Environment and Hygiene Committee	27 June 2014
Tsuen Wan District	Environmental and Health Affairs Committee	3 July 2014
Kwun Tong District	Environment and Hygiene Committee	10 July 2014
Sham Shui Po District	Environment and Hygiene Committee	17 July 2014
Yau Tsim Mong District	Food and Environmental Hygiene Committee	17 July 2014
Kowloon City District	Food and Environmental Hygiene Committee	17 July 2014
Central and Western District	Food, Environment, Hygiene and Works Committee	24 July 2014
Kwai Tsing District	Community Affairs Committee	29 July 2014