

# **The 2022 Annual Report on Drinking Water Quality in Hong Kong**

**Development Bureau  
Drinking Water Safety Unit  
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## Foreword

1. This report gives an account of the work of the Development Bureau (“DEVB”) and the Water Supplies Department (“WSD”) in assuring and enhancing drinking water safety in Hong Kong in 2022.

### Monitoring of Drinking Water Safety in Hong Kong

2. In Hong Kong, WSD is the sole water supplier supplying fresh water to over 99.99% of the territory’s population, while the Food and Environmental Hygiene Department (“FEHD”)<sup>1</sup> monitors regularly the water quality of streams and wells<sup>2</sup> where water is taken for potable use by the remaining less than 0.01% of the population living in remote areas without mains water supply.
3. The Government attaches great importance to drinking water safety with the prime objective of supplying at all times clean and wholesome drinking water that complies with the Hong Kong Drinking Water Standards (“HKDWS”). The Government also exercises regulatory control of plumbing works and materials to safeguard drinking water quality.
4. A dedicated team in DEVB, viz. the Drinking Water Safety Unit (“DWSU”), oversees and monitors the performance of WSD in respect of drinking water safety by: –
  - (a) examining the results of WSD’s water quality monitoring programme;
  - (b) monitoring the implementation of WSD’s Water Quality Incident Management Plan (“WQIMP”); and

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<sup>1</sup> Three other Government Departments, viz. WSD, the Department of Health (“DH”) and the Government Laboratory, provide technical advice and support to FEHD in monitoring the water quality of streams and wells.

<sup>2</sup> Most of the stream and well systems are under the maintenance of the Home Affairs Department. Unlike drinking water supplied by WSD, the stream/well water has not undergone thorough treatment process. Local villagers are advised by FEHD to boil the stream/well water before drinking, and to disinfect stored stream/well water.

- (c) conducting audits on WSD's Drinking Water Quality Management System ("DWQMS").
5. DWSU's observations on WSD's performance in 2022 are summarised in paragraphs 12 to 17, 20 to 28, 31 to 37, and 47 to 48 of this report.
  6. The main duties and responsibilities of DEVB, WSD and FEHD in monitoring drinking water safety in Hong Kong are listed in **Annex 1**.
  7. In January 2018, the Government set up the Drinking Water Safety Advisory Committee ("DWSAC")<sup>3</sup> with members comprising academics and experts of related fields to advise DEVB on drinking water safety issues and to examine the Government's efforts in safeguarding drinking water safety.

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<sup>3</sup> The terms of reference of DWSAC can be found in DEVB's website: [www.devb.gov.hk/en/boards\\_and\\_committees/drinking\\_water\\_safety\\_advisory\\_committee/terms\\_of\\_reference](http://www.devb.gov.hk/en/boards_and_committees/drinking_water_safety_advisory_committee/terms_of_reference). DWSAC commenced its third term in January 2022.

## Hong Kong Drinking Water Standards

8. HKDWS was first established in 2017 based on the World Health Organization (“WHO”)’s Guidelines for Drinking-water Quality (“GDWQ”) and was subsequently updated in 2021 upon studying the new developments in practices/guidelines in two international organisations and seven overseas nations<sup>4</sup> with due regard to our local context. The prevailing HKDWS consists of 60 chemical, radiological and microbiological parameters.
9. In addition to HKDWS, the Government also maintains the Surveillance List<sup>5</sup>, Watch List<sup>6</sup> and Aesthetic Guidelines<sup>7</sup> (“the Lists and the Guidelines”). In March 2022, the aesthetic guideline value for manganese in the Aesthetic Guidelines was updated after considering the then developments of overseas drinking water standards. The prevailing HKDWS, the Lists and the Guidelines can be found in DEVB’s and WSD’s websites<sup>8</sup>.

### Review of HKDWS

10. In line with international practices, the Government will assess from time to time the need to trigger review of HKDWS based on new international developments in drinking water standards. In 2022, WHO updated its GDWQ<sup>9</sup> while various jurisdictions including Australia, New Zealand, USA and the Mainland China updated their

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<sup>4</sup> viz. WHO, the European Union, the United Kingdom, the United States of America (“USA”), Canada, Australia, New Zealand, Singapore and Japan.

<sup>5</sup> It includes parameters subject to surveillance monitoring, such as (i) chemical parameters with low or even undetectable levels in the drinking water of Hong Kong, and are far below a level that would cause adverse health risk; and (ii) microbial parameters which serve to indicate the sanitary of drinking water supply systems.

<sup>6</sup> It serves to keep in view of international development and includes parameters with their potential health risk not fully established scientifically yet.

<sup>7</sup> It serves to ensure the aesthetic quality of the drinking water in Hong Kong.

<sup>8</sup> [www.devb.gov.hk/en/issues\\_in\\_focus/hkdws](http://www.devb.gov.hk/en/issues_in_focus/hkdws) and [www.wsd.gov.hk/en/core-businesses/water-quality/my-drinking-water-quality/hong-kong-drinking-water-standards](http://www.wsd.gov.hk/en/core-businesses/water-quality/my-drinking-water-quality/hong-kong-drinking-water-standards)

<sup>9</sup> GDWQ: fourth edition incorporating the first and second addenda.

drinking water standards. Having assessed these new international developments in drinking water standards or guidelines, DWSU initiated a review of HKDWS, the Lists and the Guidelines. The review was being carried out by WSD with the assistance of an external consultant and was expected to be completed by early 2024.

## Drinking Water Quality in Hong Kong

11. In 2022, WSD continued to submit water quality testing reports under its routine monitoring programme to DWSU on a quarterly basis, with the drinking water quality monitoring data published on its website<sup>10</sup> half-yearly.
12. In the year, WSD adopted revised frequencies for the monitoring of certain parameters in HKDWS<sup>11</sup>, and made over 27 100 sampling visits to different locations of the territory to collect drinking water samples. A total of over 280 000 tests were conducted with breakdown shown in Table 1 below. All test results complied with HKDWS.

**Table 1 - Number of Drinking Water Samples taken in 2022**

	Water Treatment Works	Service Reservoirs and Water Tanks	Connection Points <sup>12</sup>	PACTs <sup>13</sup>	Total
Chemical & Physical	16 355 (57 158)	7 590 (23 421)	967 (3 562)	17 814 (63 174)	42 726 (147 315)
Bacteriological	879 (2 637)	7 576 (22 728)	950 (2 850)	17 793 (53 379)	27 198 (81 594)
Biological	54 (100)	0 (0)	0 (0)	0 (0)	54 (100)
Radiological	760 (2 579)	12 (24)	36 (72)	613 (2 346)	1 421 (5 021)
Trace Organics	1 923 (14 503)	196 (1 143)	576 (3 408)	2 167 (16 071)	4 862 (35 125)
Trace Inorganics	953 (8 422)	28 (428)	72 (1 008)	73 (1 013)	1 126 (10 871)

Figures in the parentheses indicate number of test conducted.

<sup>10</sup> [www.wsd.gov.hk/en/core-businesses/water-quality/my-drinking-water-quality](http://www.wsd.gov.hk/en/core-businesses/water-quality/my-drinking-water-quality)

<sup>11</sup> More details can be found in paragraph 17 of the 2019 Annual Report on Drinking Water Quality in Hong Kong at [www.devb.gov.hk/filemanager/en/content\\_1178/The\\_2019\\_Annual\\_Report\\_on\\_Drinking\\_Water\\_Quality\\_in\\_Hong\\_Kong\\_Eng.pdf](http://www.devb.gov.hk/filemanager/en/content_1178/The_2019_Annual_Report_on_Drinking_Water_Quality_in_Hong_Kong_Eng.pdf).

<sup>12</sup> Connection points are strategic water sampling points in WSD's water mains located at or close to the lot boundary of building developments.

<sup>13</sup> PACTs refers to "publicly accessible consumers' taps" which are consumers' taps used for drinking or food preparation purposes in non-domestic premises such as shopping centres, community facilities, clinics, management offices, government offices, etc. that are accessible for sampling by WSD without the need to obtain prior written consent.

13. In addition to the sampling visits mentioned in paragraph 12 above, WSD also collected drinking water samples at consumers' taps in 460 randomly selected premises<sup>14</sup> under the Enhanced Water Quality Monitoring Programme ("Enhanced Programme") to monitor the levels of antimony, cadmium, chromium, copper, lead, nickel, residual chlorine and *E. coli*. The test results of the Enhanced Programme for year 2022 had been uploaded to WSD's website, with a summary given in Table 2 below.

**Table 2 - Monitoring Results in 2022 under the Enhanced Programme**

Parameter	Minimum	Maximum	Average	95 <sup>th</sup> Percentile	HKDWS Standard Value	Compliance Rate with HKDWS*
Antimony (µg/L)	<1	<1	<1	<1	≤20	100%
Cadmium (µg/L)	<1	<1	<1	<1	≤3	100%
Chromium (µg/L)	<1	<1	<1	<1	≤50	100%
Copper (µg/L)	<3	750	30	100	≤2 000	100%
Lead (µg/L)	<1	30	<1	1	≤10	99.8% <sup>#</sup>
Nickel (µg/L)	<1	62	2	4	≤70	100%
Residual Chlorine (mg/L)	<0.1	1.2	0.5	0.9	≤5	100%
<i>E. coli</i> (cfu/100mL)	0	0	0	0	0	100%

Note: µg/L = microgram/litre; mg/L = milligram/litre; cfu = colony forming unit

\* Compliance with HKDWS for the six metal parameters is based on the two-tier sampling protocol<sup>15</sup>.

<sup>#</sup> One case of lead exceedance was found in a private non-domestic premises due to lack of proper installation and maintenance of water using apparatus therein (see paragraphs 14 to 15 below for details).

<sup>14</sup> The Enhanced Programme was suspended during the period from 13 January to 9 May 2022 due to the COVID-19 pandemic, resulting in water samples being collected from 460 premises in 2022 instead of about 670 premises as originally planned. Making reference to overseas practices, the shortfall in sampling due to programme suspension would not be made up.

<sup>15</sup> The Enhanced Programme adopts a two-tier sampling protocol for the six metals, involving Tier 1 – unflushed Random Day Time sample and Tier 2 – 30-minute stagnation sample for verification of exceedance(s) found in the Tier 1 sample.



## A Lead Exceedance Case found under Enhanced Programme

14. One case of lead exceedance over HKDWS was found in the drinking water samples collected from a private non-domestic premises in Kwun Tong District in June 2022<sup>16</sup>. After confirming the exceedance in lead, WSD liaised with and offered advice to the parties concerned in a timely manner according to the established procedures. With WSD's assistance, an investigation of the problem had been carried out, which revealed that a water dispenser in the premises had not been equipped with a non-return valve. The backflow of substances accumulated in the filter unit (which had not been replaced for a long time) had caused contamination of the drinking water in the internal water supply system of the premises concerned and hence lead exceedance in the water samples. Subsequently, the responsible person of the premises concerned had dismantled the water dispenser and drinking water samples collected afterwards by WSD in the premises complied with HKDWS in respect of lead content.
15. DWSU observed that in the incident, WSD had continued to act in a timely manner following the established framework. WSD's assistance had enabled the premises concerned to rectify the lead exceedance problem, thereby safeguarding drinking water safety. Besides, WSD had subsequently produced an additional leaflet on how to use, install and maintain water filters and water dispensers, for distribution to premises found with such water using apparatus installations during the sampling visits under the Enhanced Programme.

## Monitoring of *Cryptosporidium* oocyst and *Giardia* cyst ("C&G")

16. As part of its routine water quality monitoring work, WSD continued to monitor the presence of C&G<sup>17</sup> in Hong Kong's raw and drinking water. In 2022, no C&G was detected in the treated water of all

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<sup>16</sup> This was the second case of lead exceedance found in both the Tier 1 and Tier 2 samples since the launching of the Enhanced Programme in December 2017, under which over 2 500 samples had been collected and tested up to the end of 2022.

<sup>17</sup> *Cryptosporidium* and *Giardia* are common intestinal protozoan parasites, which are potentially present in surface waters, ground waters and other media. They can survive for prolonged periods of time in cool and moist environments.

water treatment works (“WTW”) in the territory.

17. Following the finding of *C&G* in raw water samples collected from the High Island Main Tunnel in July 2021 (see paragraphs 23 to 24 of the 2021 Annual Report on Drinking Water Quality in Hong Kong), WSD had reviewed and increased the *C&G* monitoring frequency at the High Island Main Tunnel from half-yearly to quarterly with effect from January 2022. At the request of DWSU, WSD had also reviewed the risk assessment on the operation of lowland raw water pumping stations (“LRWPS”)<sup>18</sup>. After the review, WSD had –
- (i) updated the operation requirements that the LRWPS could only be resumed to operation when satisfactory test result on the absence of *C&G* had been obtained; and
  - (ii) tightened the water quality control in respect of the turbidity of filtered water at WTWs to ensure the removal efficiency of *C&G*.

DWSU observed that WSD had followed the above new requirements in 2022.

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<sup>18</sup> LRWPS is operated on a need basis to pump raw water from lowland areas to the High Island Main Tunnel.

## Drinking Water Quality Incidents

### Water Quality Incident Management Plan

18. WSD handles water quality incidents<sup>19</sup> according to its WQIMP which aims to help WSD: -
- (a) assess expeditiously whether the water affected is still safe for consumption and the possible impact on water supply;
  - (b) decide necessary actions to be taken before resumption of water supply; and
  - (c) disseminate important information to relevant parties and consumers affected.
19. According to WQIMP, WSD should inform DWSU of any water quality incidents classified as notifiable cases<sup>20</sup> as soon as possible, via instant message (such as WhatsApp) and through email. DWSU will then oversee WSD's responses to such incidents to ensure that appropriate follow-up actions are taken.

### Notifiable incidents

#### *Discolouration of drinking water in Ma On Shan and vicinity areas*

20. In 2022, there was one notifiable water quality incident related to the aesthetic quality of drinking water. In the end of July 2022, there

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<sup>19</sup> Water quality incidents are events that may affect water quality including aesthetic qualities which may not be related to drinking water safety; cause concerns to persons and/or give rise to impact on health of persons to whom the water is supplied; and/or likely attract media publicity on drinking water quality.

<sup>20</sup> In general, a water quality incident is classified as a notifiable case if it leads to occurrence of any one of the following situations: -

- negative impact on health and/or public confidence in the water supply;
- exceedance of HKDWS or relevant water quality targets/criteria;
- affecting localised area (e.g. whole estate or a number of building blocks) or even more extensive areas;
- attracting significant media attention, and/or
- concerns raised by local parties.

was transient instability in the manganese oxidation<sup>21</sup> treatment process of the Ma On Shan WTW (“MOSWTW”) due to partial clogging of some fittings in the sodium hypochlorite dosing system<sup>22</sup> that led to uneven dosage of chlorine. As a result, trace amounts of manganese remained unremoved in the treatment process and entered into the drinking water distribution network. In the process, these trace amounts of manganese were oxidized by the residual chlorine in drinking water to form manganese oxide, turning the drinking water in the Ma On Shan and vicinity areas into pale yellowish during the period from the end of July to 2 August 2022. It should however be noted that the manganese level in the drinking water supplied by MOSWTW as recorded during the period was well below the WHO’s provisional guideline value which was newly promulgated in the first quarter of 2022<sup>23</sup>. In other words, the drinking water was safe for consumption in spite of having a pale yellowish colour.

21. Upon receipt of complaints from consumers in the Ma On Shan and vicinity areas about the discoloured water, WSD took swift actions to check and flush the distribution network concerned. At the same time, WSD investigated the cause of the incident and discovered the said clogging problem that had led to an uneven distribution of chlorine and hence instability of manganese oxidation. To rectify the problem, WSD arranged urgent cleansing of the clogged fittings

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<sup>21</sup> Manganese is a common, naturally occurring mineral found in soil and rocks, and trace amounts of manganese is usually present in raw water. Its oxide is a dark brown solid which, when present in drinking water, may cause discolouration. To reduce the manganese content in drinking water, ozone or chlorine is used in the treatment process to oxidise the manganese in raw water, so that the insoluble manganese oxide formed can be filtered away.

<sup>22</sup> The sodium hypochlorite dosing system is a back-up to the on-site chlorine generation plant to ensure continuous chlorination in the water treatment process. WSD’s investigation found that the partial clogging of fittings was attributed to the formation of calcium salts crystals as a result of chemical reaction between the sodium hypochlorite solution and the hydrated lime in the carrier water of the dosing system (i.e. treated water which had been dosed with hydrated lime). Such tendency of crystal formation could be minimised if a less rich-in-lime carrier water is used, e.g. filtered water abstracted before hydrated lime dosing point in the WTW. See paragraph 22 below.

<sup>23</sup> Currently, manganese is not included in HKDWS. The ongoing review of HKDWS (see paragraph 10 above) will take note of WHO’s new provisional guideline value and standards/guidelines development in other jurisdictions to consider if manganese should be included in HKDWS and any necessary update on its aesthetic guideline value.

which were subsequently replaced. Concurrently, the downstream fresh water service reservoirs (“FWSRs”) were cleansed with the associated drinking water distribution networks completely flushed. On 2 August 2022, the drinking water in the affected areas resumed clear.

22. After the incident, WSD conducted checking at other WTWs to ensure their chlorination facilities for manganese removal process were operating satisfactorily. To prevent recurrence of the clogging of fittings which had given rise to uneven chlorination and hence incomplete removal of manganese, WSD had enhanced the inspection and planned maintenance of the sodium hypochlorite dosing system since August 2022 on one hand, and would use carrier water with lesser lime content to minimise the tendency of crystal formation that could clog the fittings<sup>22</sup> on the other hand. Furthermore, WSD would conduct trials to enhance the chlorine mixing process in MOSWTW.
23. In order to detect the problem of uneven chlorination at an earlier juncture and having regard to the unique setting of MOSWTW, WSD would install on-line analysers at individual filters to strengthen the monitoring of free residual chlorine (which could indicate the effectiveness of manganese oxidation). Such improvement works would also be carried out for the Siu Ho Wan WTW which adopts similar chlorination design as MOSWTW.
24. In light of this incident, WSD had tightened their internal operational targets for manganese in treated water since early August 2022 to enhance the aesthetic quality of the drinking water.
25. DWSU was content with WSD’s swift actions taken to tackle the incident and would monitor the implementation of the proposed follow-up actions.

### Non-notifiable incidents

26. Apart from the above notifiable case, there were 48 non-notifiable incidents of minor nature in 2022. Such incidents were mostly complaints about aesthetic quality of drinking water such as discolouration or turbidity affecting only a single or a few units, which were related to the inside services of the premises concerned. In many cases, the water quality resumed normal after flushing at the water meter positions by WSD or before arrival of WSD staff at the scene.
27. There was a case of turbid water in Queen's Hill area involving Queen's Hill Estate and Shan Lai Court as the resident intake grew in these housing estates. The incident was caused by the stirring up of sediments that had settled in the plumbing systems of the two housing estates during the initial stage of resident intake with low water demand (hence low flow velocity). DWSU noted that WSD had provided advice and technical support to the management office of the two estates in tackling the incident. After the incident, WSD formulated internal guidelines to identify proactively soon-to-be occupied housing estates for early site inspection so that timely technical advice could be given to the management offices on the recommended flushing and inspection frequency of the inside services at early stage of population intake. At the same time, WSD promulgated guidelines to give similar advice to the property management sector.
28. Overall speaking, DWSU was generally satisfied with WSD's performance in handling the water quality incidents in 2022.

## **Auditing of WSD's Drinking Water Quality Management System**

29. WSD puts in place a DWQMS<sup>24</sup> to safeguard drinking water quality throughout the water supply system. DWQMS sets out the water quality policy and operational monitoring of the control measures in the drinking water supply. It also lays down a systematic plan for reviewing and auditing relevant procedures of WSD with a view to verifying conformity with documented requirements and identifying opportunity for enhancing the performance of the system continually.
30. As mentioned in paragraph 4 above, one of DWSU's duties is to audit WSD's DWQMS, and it consists of both audits by third party and surprise checks. The objectives and details of the third party audits and surprise checks are given in **Annex 2**. DWSU members also participate as observers during WSD's internal DWQMS audits.

### Third party audit

31. A third party audit of WSD's DWQMS was conducted during 1<sup>st</sup> - 16<sup>th</sup> November 2022. The audit adopted a risk-based approach to check if WSD's activities carried out in the previous 12 months were in conformity with the requirements set out in DWQMS. Review of records, site visits and staff interviews were carried out in areas covering the whole water supply chain up to consumers' taps, and the Regions/Divisions/Units selected by the audit team are shown in Table 3 below: -

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<sup>24</sup> As recommended by WHO, WSD has developed and implemented its Water Safety Plan ("WSP") since 2007. In July 2017, WSD promulgated DWQMS, a management system based on the Framework for Safe Drinking-water of the WHO Guidelines, which comprises health-based targets, WSP and surveillance to ensure drinking water safety.

**Table 3 – Scope of Third Party Audit in 2022**

<b>Water Supply Component</b>	<b>Regions/Divisions/Units Audited</b>
Water Resources	New Territories East Region, New Territories West Region
Water Treatment	New Territories East Region, New Territories West Region
Distribution	Hong Kong and Islands Region, Kowloon Region, New Territories East Region, New Territories West Region
Laboratory Operation	Water Science Division
Customer Services	Hong Kong and Islands Region, Kowloon Region, New Territories East Region
Warehouse, Workshop and Maintenance Services	Mechanical and Electrical Maintenance Division
Plumbing Material Control	Material Control Unit
Complaint Handling, Incident Reporting, Prosecution and Internal Audits	Special Duty Unit, Customer Telephone Enquiry Centre, Prosecution Unit

32. The audit revealed that WSD's DWQMS document had met WHO's recommendations in respect of WSP, with 12 Observations ("OBSs") and no Non-Conformity ("NC")/Opportunity for Improvement ("OFI") identified.
33. Key recommendations of the third party audit were as follows: -
- (a) guidelines should be devised for the allowable buffering time in switching to sodium hypochlorite dosing system upon the suspension of on-site chlorine generation plant in WTWs, within such changeover time sufficient chlorination could still be maintained;
  - (b) the risk of animal entering FWSRs/fresh water tanks via overflow pipes and the associated requirements should be reviewed; and
  - (c) protection measures of water pipes and rubber gaskets in the



contractor's warehouse should be enhanced, including increasing awareness of the impact of sunlight on such parts.

34. In gist, DWQMS had covered all significant risk areas, facilities, and activities in terms of water quality and water safety. The findings demonstrated that WSD had performed its monitoring and control in accordance with DWQMS across all relevant audit and functional areas. DWSU would monitor the progress of WSD's follow-up actions in its coming surprise checks as appropriate before the next third party audit.

#### Surprise checks

35. Three surprise checks<sup>25</sup> were conducted by DWSU<sup>26</sup> in 2022 as summarised in Table 4 below: -

**Table 4 – Surprise checks in 2022**

Month	Regions/Divisions Checked	Number of Findings		
		NC	OFI	OBS
June	Kowloon Region	0	7	6
September	Hong Kong and Islands Region	0	5	2
November	New Territories West Region	0	2	2

36. Key recommendations of the surprise checks were as follows: -
- (a) the free residual chlorine testing procedures specified by the manufacturer requiring crushing of the testing tablet should be followed;
  - (b) guidelines on interpretation/application of monitoring results should be reviewed, such as the one for jar test to enable better optimisation of alum dosage;

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<sup>25</sup> WSD completed the initial 4-year DWQMS Internal Audit cycle (from Q4 2017 to Q3 2021) and devised a new Internal Audit schedule in 2022 after consultation with all stakeholders. To synchronise with WSD's Internal Audit exercise, DWSU conducted three surprise checks (instead of four) in 2022.

<sup>26</sup> The surprise check in November 2022 was grouped under the third party audit and conducted by the auditor concerned on behalf of DWSU for administrative efficiency.

- (c) the consistently lower online turbidity readings than the manual readings should be investigated and improved; and
  - (d) consistent set-points for on-line analysers for pH, turbidity and free residual chlorine in final water should be adopted.
37. In gist, the surprise checks revealed that WSD's staff members were in general found to have adequate understanding on the requirements of DWQMS, while several areas requiring improvement had been identified, in particular, the need to follow testing procedures specified by manufacturer and to review guidelines on interpretation/application of monitoring results. WSD accepted DWSU's recommendations as detailed in paragraph 36 in full, and DWSU would monitor the progress of WSD's corresponding follow-up actions.

## Water Safety Plan for Buildings

38. While the Government ensures the supply of wholesome drinking water with various regulatory measures on the internal plumbing system put in place, proper management and maintenance of internal plumbing systems remains a critical and fundamental element to ensure the safety of drinking water in buildings. Since 2017, WSD has been promoting the implementation of water safety plan for buildings (“WSPB”)<sup>27</sup> and the “Quality Water Supply Scheme for Buildings – Fresh Water (Management System)” (“QMS”). The latter is to recognise property owners’ and/or management agents’ efforts on enhancing drinking water quality through implementation of WSPB.
39. As at the end of 2022, there were over 40% of households in Hong Kong residing in buildings with WSPB implemented.
40. To further promote the implementation of WSPB in the community, the Government launched the \$440 million “Water Safety Plan Subsidy Scheme” (“WSPSS”) in July 2020 to provide financial incentive for the needed owners to implement WSPB. Details of WSPSS can be found in WSD’s website<sup>28</sup>. Up to the end of 2022, a total of about 320 applications involving about 780 eligible buildings had been received. Subsidies of about \$1.7 million had been disbursed to about 140 buildings.
41. Leading by example, the Government launched a programme in July 2020 to implement WSPB in Government buildings. Under the programme, targeted existing Government buildings would implement WSPB in three phases<sup>29</sup> by 2027. In year 2022, WSD

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<sup>27</sup> WSPB sets out a systematic and effective management framework for internal plumbing systems, which comprises (i) risk identification; (ii) implementation of control measures; (iii) monitoring of operation of control measures; and (iv) periodic internal audits and reviews.

<sup>28</sup> [www.wsd.gov.hk/en/water-safety/wspss](http://www.wsd.gov.hk/en/water-safety/wspss)

<sup>29</sup> Phase 1 buildings include staff quarters, schools, clinic, health care centres, and priority cultural and recreational buildings. Phase 2 buildings include office buildings, building used by disciplined forces and other cultural and recreational buildings. Phase 3 buildings include buildings of other categories.

continued to assist other bureaux/departments in formulating water safety plans for buildings managed by the latter. While the phase 1 work had been in satisfactory progress, the phase 2 work commenced in the second quarter of 2022 as scheduled. As at the end of 2022, 120 Government buildings had implemented WSPB and joined QMS.

## **Review of Waterworks Ordinance (Cap. 102)**

42. The Waterworks Ordinance (Cap. 102) and its Regulations (Cap. 102A) (“WWO/WWR”) had been reviewed to enhance drinking water safety and water use efficiency. The Government was preparing the related law drafting according to the views and opinions received from public and stakeholder consultations.
43. As one of the amendment proposals was to introduce the Registered Plumbing Contractor (“RPC”) system, to facilitate the trade to adapt before enactment of relevant statutory provisions, WSD had formulated a voluntary scheme to implement the RPC system in advance. The voluntary scheme was fully rolled out in 2022.

## **Raising Residual Chlorine Level**

44. It has been WSD's practice to maintain a small amount of residual chlorine in the treated water to ensure that the water is kept clean and hygienic on its journey to consumers. In 2020, WSD raised the residual chlorine level in the treated drinking water leaving WTWs from around 1.0 mg/L to around 1.2 mg/L as a prudent measure to combat the COVID-19 pandemic. In the end of September 2022, the residual chlorine level was lowered to the normal level of 1.0 mg/L when the fifth wave of the pandemic was close to its end. That said, WSD raised the residual chlorine level to 1.2 mg/L again later in the year as a prudent measure to reassure the members of the public against the melioidosis cases identified in the community, albeit there had been no evidence to suggest the infections of the cases were related to tap water. It should be noted that the raised residual chlorine level is still well below the standard value of 5 mg/L stipulated in HKDWS.
45. WSD would continue to consult the Centre for Health Protection of DH on the need for maintaining/lifting the abovementioned prudent measure of raised residual chlorine level.

## **Drinking Water Safety Advisory Committee Meetings**

46. DWSAC convened two meetings in 2022. DWSAC deliberated and offered useful comments on measures taken by the Government in safeguarding and enhancing drinking water safety in Hong Kong as well as international water quality incidents and latest developments on drinking water standards in overseas jurisdictions that were relevant to Hong Kong. In particular, DWSAC members suggested more trials be conducted to firm up the testing protocol of the 24-hour stagnation sampling that might be adopted for commissioning of new plumbing installations in Hong Kong in the future, and the public be appealed to pay attention to the importance of proper installation and maintenance of water using apparatus. Also, noting the occurrence of melioidosis cluster in Sham Shui Po area that had triggered relevant investigations at FWSRs, DWSAC had a detailed discussion on the issue including making reference to overseas cases in which linkage of melioidosis with drinking water supplies was uncommon especially in a well-maintained supply system, and considered that there had been no evidence to show that drinking water was a source of melioidosis infection in Hong Kong. As a whole, DWSAC acknowledged the Government's continued efforts in ensuring drinking water safety and was content with WSD's follow-up actions on notifiable water quality incidents.

## **Conclusion and Way Forward**

47. In conclusion, Hong Kong's drinking water in 2022 remained very safe with almost 100% compliance rate against HKDWS. The one incident of exceedance of HKDWS (see paragraph 14) was an isolated case due to improper installation and maintenance of water using apparatus in an individual premises. There was no sign of systemic problem in Hong Kong's drinking water quality.
48. WSD's efforts made in 2022 in assuring drinking water safety in the territory is acknowledged and appreciated. Their dealing with and investigation of the discolouration of drinking water in Ma On Shan and vicinity areas (see paragraphs 20 to 25) was satisfactory, with various improvement measures formulated to avoid recurrence. The department had also provided positive responses to the findings and recommendations associated with the third party audit and surprise checks conducted by DWSU in the year.
49. While 40% of households in Hong Kong are residing in buildings with WSPB implemented, it is our goal to continue promoting WSPB in private buildings. There is still a challenge to drive the general public and building owners not just to be more aware about how WSPB can help them better manage their internal plumbing system systematically, but to further turn such awareness into actual implementation. With the relaxation of social distancing measures since December 2022, we believe more owners of buildings eligible for WSPSS could be facilitated and incentivised to kick-start the implementation of WSPB in their buildings.
50. DWSU will continue to oversee WSD's performance on drinking water safety through the established monitoring mechanism, as well as to oversee the drafting work of the proposed legislative amendments to WWO/WWR in respect of drinking water safety. In particular, DWSU will continue to steer the ongoing review of HKDWS and consult professional opinions from DWSAC in due course.

~ End ~



## **Monitoring of Drinking Water Safety in Hong Kong**

1. The Development Bureau (“DEVB”), the Water Supplies Department (“WSD”) and the Food and Environmental Hygiene Department (“FEHD”) are the key government bureau/departments responsible for monitoring the drinking water safety in Hong Kong in different aspects: -

### Development Bureau

- (a) To enhance public confidence on drinking water safety in Hong Kong, DEVB has set up a dedicated team, namely the Drinking Water Safety Unit (“DWSU”) to undertake, among other aspects of work, the duties of overseeing the performance of WSD in respect of drinking water safety. DWSU operates impartially and independently from the Bureau’s housekeeping team for WSD.
- (b) DWSU oversees and coordinates matters relating to revision of the Hong Kong Drinking Water Standards (“HKDWS”), including initiating review on a need basis with WSD’s support and advice/recommendations provided by the Drinking Water Safety Advisory Committee (“DWSAC”). DWSU will seek endorsement by the Secretary for Development (“SDEV”) for any revision to HKDWS.
- (c) DWSU reviews WSD’s water quality reports, which cover Dongjiang water, raw water and treated water to ensure compliance with HKDWS at consumers’ taps, on a quarterly basis. Although the reviews mainly focus on treated water, DWSU also looks into the quality of Dongjiang water and raw water which may have bearing on the quality of treated water.
- (d) DWSU monitors the operations of WSD in respect of drinking water safety from sources to consumer taps through regular surprise checks by in-house staff and third party audits by external auditors. DWSU also keeps track of follow-up actions by WSD on the recommendations from regular surprise checks and audits, if any, including revision of the department’s Drinking Water Quality Management System (“DWQMS”).

- (e) DWSU examines the performance of WSD in handling water quality incidents in accordance with its Water Quality Incident Management Plan (“WQIMP”) as well as the corresponding improvement measures, if any, with a view to avoiding recurrence of incidents. Where necessary, DWSU may seek views from DWSAC on such incidents or engage external party for conducting further investigation.
- (f) DWSU monitors the performance of WSD in carrying out its duties under Waterworks Ordinance (Cap. 102) (“WWO”) in ensuring drinking water safety in inside services. DWSU also oversees WSD’s performance in taking forward administrative measures to enhance drinking water safety at consumers’ taps.
- (g) DWSU also liaises with FEHD in monitoring the quality of small water supply, i.e. water drawn from streams and wells for potable use in remote areas where no mains water supply is available. When necessary, DWSU may examine the water quality data of streams and wells.
- (h) DWSU, with the advice from DWSAC and assistance of WSD, continues to review from time to time on the international development in relation to drinking water safety and steer WSD for making continuous improvement of its DWQMS.

#### Water Supplies Department

- (a) WSD strives to ensure drinking water safety from sources to taps to ensure compliance with HKDWS at consumers’ taps.
- (b) WSD adopts a risk-based management approach under the DWQMS to conduct monitoring and to implement control measures in the drinking water supply, i.e. from source through treatment, distribution to point of consumption, so as to ensure drinking water safety.
- (c) WSD reviews regularly the latest international development on drinking water standards, studies any drinking water quality incidents both locally and internationally, and makes recommendations to DWSU, when necessary.

- (d) WSD sets out the specifications for the use of materials at government's new waterworks<sup>1</sup> to ensure drinking water quality. Besides, WSD ensures that the government's new waterworks are properly constructed and installed.
- (e) WSD implements control of plumbing materials, and construction and operation of inside services in accordance with WWO and by means of administrative measures to safeguard drinking water safety in inside services.
- (f) WSD will handle water quality incidents in accordance with its WQIMP. When there is a notifiable water quality incident<sup>2</sup>, WSD will report it to DWSU promptly.
- (g) WSD regularly reviews and revises, as necessary, DWQMS and WQIMP. Besides, WSD takes appropriate measures to ensure awareness of the department's staff of the DWQMS and WQIMP.

#### Food and Environmental Hygiene Department

- (a) FEHD coordinates with other Government Departments<sup>3</sup> to monitor the water quality of streams and wells for potable use in remote areas where mains water supply is not available and to take necessary measures when there is any exceedance in accordance with the Public Health and Municipal Services Ordinance (Cap. 132).
2. Head of DWSU shall report directly to SDEV and the Permanent Secretary for Development (Works) in discharging his/her daily duties. Where the case is related to water supply from streams or wells under the purview of FEHD, DWSU will liaise with FEHD for necessary follow up action.

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<sup>1</sup> For example, government's new water treatment plant or new water mains.

<sup>2</sup> As defined in footnote 20 on page 9 of the main report.

<sup>3</sup> Three Government Departments, viz. WSD, the Department of Health and Government Laboratory, provide technical advice and support to FEHD in accomplishing the task. When necessary, these Government Departments may provide advice/information to FEHD about the latest international practices in monitoring drinking water quality of streams or wells with a view to facilitating FEHD in devising monitoring regime.

3. To maintain public confidence over drinking water safety, DWSU publishes annually a report on its work as well as its observations over the performance of WSD in relation to drinking water safety.

- End -

## **Third Party Audit and Surprise Check on WSD's Drinking Water Quality Management System ("DWQMS")**

### Third Party Audit

1. The objective of the third party audits is to verify the extent of compliance with the requirements of DWQMS across various functions and activities of the Water Supplies Department ("WSD"), and to identify areas requiring improvements.
2. To ensure the impartiality and credibility of the third party audits, external auditors with proven experience in management system and Water Safety Plan ("WSP") audits are engaged to form the audit team<sup>1</sup>.
3. The Drinking Water Safety Unit ("DWSU") arranges conducting a third party audit once a year which covers all major functions described in DWQMS. The frequency of the third party audits will be reviewed from time to time.

### Surprise Checks

4. The surprise checks provide a more focused auditing of specific critical processes as well as the progress of the follow-up action in respect of the improvement and corrective actions identified via WSD's internal audits, water quality incidents, third party audits, surprise checks, etc.
5. The checks provide further assessment on the safety of drinking water in Hong Kong, which are carried out by DWSU members with chemistry/engineering background as well as auditing knowledge<sup>2</sup>.
6. DWSU performs the surprise checks on a quarterly basis<sup>2</sup> and will review its frequency from time to time.

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<sup>1</sup> The team will comprise ISO 9001 auditors and an overseas certified WSP auditor.

<sup>2</sup> For the conduct of surprise checks in 2022, see also footnotes 25 and 26 on page 15 of main report.