

立法會
Legislative Council

LC Paper No. CB(1)650/14-15(06)

Ref: CB1/PL/DEV

Panel on Development

Meeting on 24 March 2015

**Background brief on the proposed construction of a desalination plant
at Tseung Kwan O**

Purpose

This paper provides background information on the proposed construction of a desalination plant at Tseung Kwan O and summarizes the views and concerns expressed by Members on the subject at the meetings of the Legislative Council and its committees since the 2011-2012 legislative session.

Background

2. At present, about 20% to 30% of Hong Kong's fresh water supply is collected from rainfall and the remaining 70% to 80% is imported from Dongjiang ("DJ") to make up the shortfall. With the fast pace of economic development of other cities in the Guangdong Province ("GD"), Hong Kong has to compete with these cities for the scarce fresh water resources of DJ. Moreover, climate change will bring about more frequent extremely dry weather and increase the likelihood of the occurrence of consecutive droughts. This will not only affect the local yield collected in Hong Kong, but also impact on the water resources in DJ¹.

¹ Sources: (a) The Administration's paper on "345WF -- Planning and Investigation Study of Desalination Plant at Tseung Kwan O" (LC Paper No. CB(1)1514/11-12(03)); and (b) the Administration's supplementary information paper on "345WF -- Planning and Investigation Study of Desalination Plant at Tseung Kwan O" (LC Paper No. CB(1)1855/11-12(01))

3. To minimize the risk of water shortage, the Administration has implemented various water demand and supply management measures under the Total Water Management Strategy promulgated in 2008. On water demand management, the Administration has been taking steps to promote water conservation through public education, encourage the use of water saving devices, increase the use of seawater for flushing and reduce water main bursts and leaks. On water supply management, the Administration has been exploring new water resources which are insensitive to climate change, such as seawater desalination.

Seawater desalination

4. The concept of seawater desalination is not new to Hong Kong. In 1975, a multi-stage flash desalination plant with an output capacity of 182 million litres per day ("Mld") was commissioned at Lok On Pai, Tuen Mun. Due to high operation cost, the Lok On Pai desalination plant was decommissioned in 1981².

5. In 2007, the Administration completed a pilot study on the development of desalination facilities in Hong Kong with pilot plants located in Ap Lei Chau and Tuen Mun. The pilot study confirmed the technical feasibility of desalination using reverse osmosis³ under local conditions to produce potable water complying with the World Health Organization guidelines for drinking water quality.

6. In view of the technical feasibility of seawater desalination, the Chief Executive announced in the 2011-2012 Policy Address that a detailed planning and investigation study would be conducted to investigate the feasibility and cost-effectiveness for the construction of a medium-sized desalination plant at Tseung Kwan O. The location of the proposed desalination plant is shown in **Appendix I**.

² Source: Desalination Plant at Tseung Kwan O -- Feasibility Study released in December 2013 (<http://www.epd.gov.hk/eia/register/profile/latest/esb266/esb266.pdf>)

³ Unlike the energy intensive multi-stage flash distillation process used in the Lok On Pai desalination plant, reverse osmosis is a mature and preferred technology dominating the market due to its reliability and progressive reduction in cost as the technology advances. (Source: Desalination Plant at Tseung Kwan O -- Feasibility Study)

Proposed construction of a desalination plant at Tseung Kwan O

7. According to the Administration⁴, a 10-hectare site at Tsueng Kwan O Area 137 has been reserved for the construction of a desalination plant. The output capacity of the plant will amount to 135 Mld at its first stage with provisions for future expansion to an ultimate capacity of 270 Mld, accounting for 5% (10% if expanded) of the total fresh water consumption in Hong Kong.

8. The Administration proposed to carry out a planning and investigation study on the proposed desalination plant and the associated fresh water transfer facilities. The Panel on Development ("DEV Panel") was briefed on the proposal on 17 April 2012. The funding for the proposal, at an estimated cost of \$34.3 million, was endorsed by the Public Works Subcommittee ("PWSC") on 16 May 2012 and approved by the Finance Committee ("FC") on 8 June 2012.

9. Following FC's approval of the funding proposal, the Administration engaged a consultant to conduct the planning and investigation study in December 2012. The consultancy study is largely completed. The Administration has proposed that, subject to the funding approval of FC, a detailed design of the plant based on the recommendations of the planning and investigation study will be carried out between 2015 and 2017, and the construction works of the plant will take place between 2018 and 2020. The first stage of the desalination plant is expected to be commissioned in 2020⁵.

Desalination cost

10. In addition to the aforesaid meetings of DEV Panel and PWSC in 2012, Members have sought information about seawater desalination at various meetings of DEV Panel and special meetings of FC during the discussions on issues related to water supply in 2013 and 2014. Some Members enquired about the unit costs of drinking water produced from various sources. The Administration advised that the unit costs were \$4 and \$8 per cubic metre respectively for drinking water produced from local catchment and DJ water. As for seawater desalination at the proposed

⁴ Sources (a): The Administration's paper on "345WF -- Planning and Investigation Study of Desalination Plant at Tseung Kwan O" (LC Paper No. CB(1)1514/11-12(03)); and (b) The Administration's paper to the Sai Kung District Council on "Design and Construction for the First Stage of Desalination Plant at Tseung Kwan O" on 6 January 2015 (http://www.districtcouncils.gov.hk/sk/doc/en/dc_meetings_doc/SK_2015_001_EN.pdf)

⁵ Source: The Administration's supplementary information paper on "345WF -- Planning and Investigation Study of Desalination Plant at Tseung Kwan O" (LC Paper No. CB(1)1855/11-12(01))

desalination plant at Tseung Kwan O, the Administration estimated that the cost would be \$12 per cubic metre, which did not take into account land premium. Of the \$12, the capital cost of the desalination plant alone amounted to \$5, while the remaining \$7 was for the operation cost.

11. Some Members asked if Hong Kong could rely on seawater desalination for a higher proportion of fresh water supply. Some queried why the anticipated unit cost of seawater desalination in Hong Kong was three times of that in Singapore.

12. The Administration advised that it was not feasible for Hong Kong to rely on seawater desalination as a major water resource owing to the relatively high cost and difficulties in identifying suitable sites for desalination plants. The Administration considered that, with the continuous advancement in technology, such as application of large diameter membrane in reverse osmosis process, the cost of seawater desalination would be reduced over time.

13. Regarding the difference between the desalination costs in Hong Kong and Singapore, the Administration advised that the unit cost of desalinated water in Singapore was reported to be around US\$0.5. However, the components of the cost were unknown. In Hong Kong, the unit cost of desalinated water, estimated to be HK\$12, covered operation, maintenance, distribution and customer service costs as well as capital depreciation.

Need and cost-effectiveness

14. Given that the supply of DJ water was sufficient and reliable, some Members queried about the need for developing a desalination plant and whether it would be cost-effective to do so. They referred to the case of the defunct Lok On Pai desalination plant and pointed out that the high desalination cost had been a main factor hindering the application of the technology. Despite the development of desalination technology over the years, the anticipated cost of seawater desalination was still the highest compared with the costs of the other two water sources, i.e. local catchment and DJ water. As such, they urged the Administration to provide the public with information about the production costs of drinking water from various sources to dispel their misunderstanding that seawater desalination could replace DJ water in a cost-effective way. They held the view that the public should be consulted before the construction of the proposed desalination plant.

15. Meanwhile, some other Members supported the proposal of constructing a desalination plant given the huge amount of public funds spent on the purchase of DJ water. They considered that the proposal would increase the bargaining power of the Administration when negotiating the water supply agreement with the GD authorities. Moreover, the desalination cost would decrease in the long term upon the advancement of technology, while the supply of DJ water to Hong Kong might not be sustainable in the long run.

16. The Administration advised that, to better prepare for the challenges arising from low local rainfall in recent years and the keen competition for DJ water in GD that might affect the supply of DJ water to Hong Kong, it had to explore water sources other than DJ water for Hong Kong such as seawater desalination, which would be unaffected by climate change. As such, the Administration considered it opportune to embark on a planning and investigation study to explore the feasibility and cost-effectiveness of the proposed desalination plant. The proposal of constructing a desalination plant at Tseung Kwan O was also a response to the "Vision on Expediting Seawater Desalination Industry Development" published in 2012 by the General Office of the State Council aiming at expediting the development of seawater desalination.

Target output of the proposed desalination plant

17. Members have enquired about the target output for fresh water to be produced from the proposed desalination plant. The Administration considered it a balanced approach to cope with the climate change by setting a target of producing 5% to 10% of fresh water in Hong Kong from seawater desalination. The Administration advised that it might adjust the target rate or construct another desalination plant to be located near new water demand areas or areas where the population would be increased; however, DJ water would remain the major water source for Hong Kong.

Measures to promote water conservation and reduce water loss

18. To obviate the need for the construction of a desalination plant, some Members suggested that the Administration should step up its efforts to promote water conservation and reduce water loss. The Administration advised that it had promulgated the Total Water Management Strategy in 2008 to map out the strategy for a balanced supply and demand of water. Against this background, the Administration had commenced the planning and investigation study on the proposed desalination plant as an effort to explore alternative sources of water supply.

Latest development

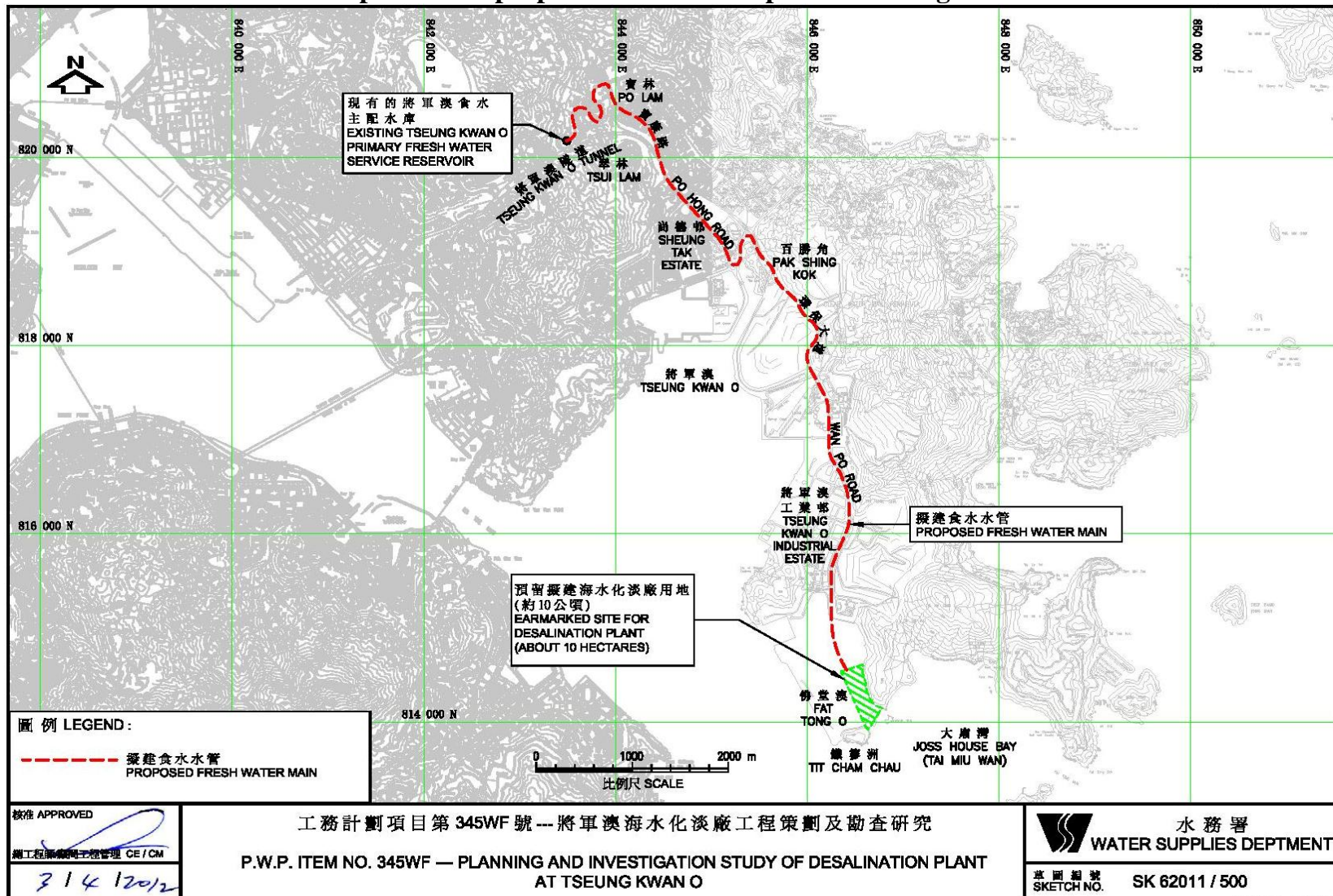
19. The Administration will seek DEV Panel's support for part-upgrading PWP Item No. 357WF to Category A for carrying out an investigation study review, design and site investigation for the first stage of the proposed desalination plant at Tseung Kwan O at the meeting to be held on 24 March 2015.

Relevant papers

20. A list of relevant papers with their hyperlinks is in **Appendix II**.

Council Business Division 1
Legislative Council Secretariat
17 March 2015

擬議將軍澳海水化淡廠位置圖
Location plan of the proposed desalination plant at Tseung Kwan O



資料來源：政府當局就"345WF —— 將軍澳海水化淡廠工程策劃及調查研究"提交的文件(立法會CB(1)1514/11-12(03)號文件)
 Source: The Administration's paper on "345WF -- Planning and investigation study of desalination plant at Tseung Kwan O" (LC Paper No. CB(1)1514/11-12(03))

Proposed construction of a desalination plant at Tseung Kwan O

List of relevant papers

Council/Committee	Date of meeting	Paper
Panel on Development	25 October 2011	<p>Administration's paper on "Management of Water Resources" [LC Paper No. CB(1)137/11-12(03)] http://www.legco.gov.hk/yr11-12/english/panels/dev/papers/dev1025cb1-137-3-e.pdf</p> <p>Minutes of meeting [LC Paper No. CB(1)600/11-12] http://www.legco.gov.hk/yr11-12/english/panels/dev/minutes/dev20111025.pdf</p>
Council meeting	9 November 2011	<p>Hansard -- written question (No. 9) on "Water Supplies in Hong Kong" (p. 1759 - 1763) http://www.legco.gov.hk/yr11-12/english/counmtg/hansard/cm1109-translate-e.pdf</p>
Panel on Development	17 April 2012	<p>Administration's paper on "345WF -- Planning and Investigation Study of Desalination Plant at Tseung Kwan O" [LC Paper No. CB(1)1514/11-12(03)] http://www.legco.gov.hk/yr11-12/english/panels/dev/papers/dev0417cb1-1514-3-e.pdf</p> <p>Administration's supplementary information paper on "345WF -- Planning and Investigation Study of Desalination Plant at Tseung Kwan O" [LC Paper No. CB(1)1855/11-12(01)] http://www.legco.gov.hk/yr11-12/english/panels/dev/papers/dev0417cb1-1855-1-e.pdf</p>

Council/Committee	Date of meeting	Paper
		<p>Minutes of special meeting [LC Paper No. CB(1)2565/11-12] http://www.legco.gov.hk/yr11-12/english/panels/dev/minutes/dev20120417.pdf</p>
Public Works Subcommittee	16 May 2012	<p>Administration's paper on "Head 709 -- Waterworks 345WF -- Planning and Investigation Study of Desalination Plant at Tseung Kwan O" [LC Paper No. PWSC(2012-13)18] http://www.legco.gov.hk/yr11-12/english/fc/pwsc/papers/p12-18e.pdf</p> <p>Minutes of meeting [LC Paper No. PWSC72/11-12] http://www.legco.gov.hk/yr11-12/english/fc/pwsc/minutes/pwsc20120516.pdf</p>
Finance Committee	8 June 2012	<p>Administration's paper on "Recommendations of the Public Works Subcommittee made on 16 May 2012" [LC Paper No. FCR(2012-13)36] http://www.legco.gov.hk/yr11-12/english/fc/fc/papers/f12-36e.pdf</p> <p>Minutes of meeting at 4:30 pm [LC Paper No. FC186/11-12] http://www.legco.gov.hk/yr11-12/english/fc/fc/minutes/fc20120608.pdf</p>
Council meeting	27 February 2013	<p>Hansard -- written question (No. 20) on "Water Supply for Hong Kong" (p. 7381 - 7386) http://www.legco.gov.hk/yr12-13/english/counmtg/hansard/cm0227-translate-e.pdf</p>
Panel on Development	26 March 2013	<p>Administration's follow-up paper on "Quality of Dongjiang Water and Water Quality Monitoring by the Water Supplies Department" [LC Paper No. CB(1)858/12-13(01)]</p>

Council/Committee	Date of meeting	Paper
		<p>http://www.legco.gov.hk/yr12-13/english/panels/dev/papers/dev0326cb1-858-1-e.pdf</p> <p>Minutes of meeting [LC Paper No. CB(1)1334/12-13]</p> <p>http://www.legco.gov.hk/yr12-13/english/panels/dev/minutes/dev20130326.pdf</p>
Finance Committee special meeting	10 April 2013	<p>Report on the examination of the Estimates of Expenditure 2013-2014 (Paragraphs 8.11 - 8.16 of Chapter VIII)</p> <p>http://www.legco.gov.hk/yr12-13/english/fc/fc/minutes/sfc_rpt.pdf</p>
Council meeting	22 May 2013	<p>Hansard -- oral question (No. 6) on "Water Supply for Hong Kong" (p. 12021 - 12032)</p> <p>http://www.legco.gov.hk/yr12-13/english/counmtg/hansard/cm0522-translate-e.pdf</p>
Council meeting	22 May 2013	<p>Hansard -- written question (No. 14) on "Cost for Production of Potable Water by Desalination" (p. 12058 - 12061)</p> <p>http://www.legco.gov.hk/yr12-13/english/counmtg/hansard/cm0522-translate-e.pdf</p>
Finance Committee special meeting	2 April 2014	<p>Report on the examination of the Estimates of Expenditure 2014-2015 (Paragraphs 9.15 - 9.28 of Chapter IX)</p> <p>http://www.legco.gov.hk/yr13-14/english/fc/fc/minutes/sfc_rpt.pdf</p>
Panel on Development	28 October 2014	<p>Administration's paper on "Supply of Dongjiang Water" [LC Paper No. CB(1)89/14-15(07)]</p> <p>http://www.legco.gov.hk/yr14-15/english/panels/dev/papers/dev20141028cb1-89-7-e.pdf</p>

Council/Committee	Date of meeting	Paper
		Minutes of meeting [LC Paper No. CB(1)347/14-15] http://www.legco.gov.hk/yr14-15/english/panels/dev/minutes/dev20141028.pdf
Council meeting	12 November 2014	Hansard -- oral question (No. 4) on "Water Supply for Hong Kong" (p. 1899 - 1911) http://www.legco.gov.hk/yr14-15/english/counmtg/hansard/cm20141112-translate-e.pdf