

**For discussion
25 October 2011**

Legislative Council Panel on Development

Management of Water Resources

PURPOSE

This paper briefs Members on the management of water resources in respect of (A) supply of Dongjiang water to Hong Kong, (B) water conservation measures and alternative water sources under the Total Water Management Strategy and (C) the improvement measures and response to the recommendations of The Ombudsman on water meter reading and billing system.

(A) SUPPLY OF DONGJIANG WATER

2. The current agreement for the supply of Dongjiang (DJ) water to Hong Kong is due to expire at the end of 2011. A proposal on the arrangement for the supply of DJ water between 2012 and 2014, its financial implications and the requirement to seek the approval of the Finance Committee (FC) for a supplementary provision of \$35.4 million to meet the additional water purchase cost in 2011-12 are provided in the ensuing paragraphs.

PROPOSAL

3. Following extensive discussions with the Guangdong (GD) authorities and taking account of Hong Kong's requirements, we propose to include the following essential features into the new agreement with GD for the supply of DJ water to Hong Kong between 2012 and 2014 ("the new agreement") -

- (a) To meet the actual needs ¹ of Hong Kong with 99%

¹ To ensure 99% reliability of water supply, the Water Supplies Department estimates that an annual quantity of 820 million cubic metres (mcm) will be required in the period from 2012 to 2014.

reliability² in water supply for the three-year period between 2012 and 2014, the package deal lump sum approach used in the current DJ water supply agreement is retained with the annual sum of water purchase cost³ for the annual supply ceiling of 820 million cubic metres (mcm) from 2012 to 2014 to be adjusted to \$3,538.70 million, \$3,743.30 million and \$3,959.34 million respectively;

- (b) The ultimate annual DJ water supply quantity of 1 100 mcm is maintained whilst the target date for achieving this objective will be subject to future review; and
- (c) The GD side will maintain the existing DJ water quality supplied to Hong Kong in compliance with the latest national standard, which is currently set for Type II⁴ waters in the Environmental Quality Standards for Surface Water (GB 3838-2002).

4. As the proposed annual sum of water purchase cost for 2012 is higher than the current sum (i.e. \$3,344 million) for 2011, the provision earmarked in the 2011-12 Estimates for the purchase of DJ water is inadequate to meet the anticipated expenditure in 2011-12. We therefore need to apply for supplementary provision of **\$35.4 million** from FC to meet the additional water purchase cost.

5. Members are invited to note the proposed essential features and financial implications of the arrangements for the supply of DJ water between 2012 and 2014, and support the application for a supplementary provision scheduled for discussion by FC in November 2011 before the new water supply agreement comes into effect on 1 January 2012.

² “99%” reliability means that water supply is maintained round-the-clock even under extreme drought condition with a return period of one in 100 years. “Return period” is the average number of years during which a certain severity of drought will occur once, statistically. A longer return period means a rarer chance of occurrence of a more severe drought.

³ The annual sum of water purchase cost for 2009 to 2011 are \$2,959 million, \$3,146 million and \$3,344 million respectively.

⁴ There are 5 types of surface water standards designated for specific functions and purposes of protection. The Type I standard is only applicable to source water and national nature reserve, whilst Type II is applicable to first class protection area for the abstraction for human consumption. As the DJ water does not fall into the category of source water nor the national nature reserve, the Type II standard is considered the highest applicable water quality standard for DJ water supplied to HK.

JUSTIFICATION

6. Since early 2011, we have commenced discussions with the GD side on the arrangements for DJ water supply between 2012 and 2014. The objective is to continue to ensure a reliable and flexible supply of DJ water to meet our needs. We aim to enter into agreement with the GD side by the end of 2011. The major considerations in arriving at the proposed water supply arrangements are detailed in paragraphs 7 to 14 below.

Package Deal Lump Sum Approach

7. In the last two water supply agreements signed in 2006 and 2008, a **package deal lump sum approach** aiming to ensure a reliable and flexible supply of DJ water to meet the actual needs of Hong Kong was adopted. This approach can secure a reliable source of supply of high quality fresh water to Hong Kong and avoid wastage of precious water resources. We propose to retain this approach in the new agreement on account of the following -

(a) Reliable water supply

The local water resource mainly comes from the natural precipitation but the quantity of rainfall fluctuates. The collected rainwater is inadequate to meet the needs of the people of Hong Kong. The gap is filled by water supplied from DJ. Taking the past ten years as examples, the quantity of imported DJ water ranged from the minimum of 620 mcm to the maximum of 810 mcm to meet the actual needs of Hong Kong. The rainfall recorded between 1 January and 30 September of 2011 is only about 1 200 mm which is substantially lower than the Hong Kong average annual rainfall over the past 30 years from 1981 to 2010 of 2 399 mm. We anticipate that the supply quantity of DJ water this year will be about 818 mcm⁵. DJ water now accounts for about 70% to 80% of our local demand. Therefore, it is essential to ensure a reliable and stable water supply arrangement from DJ. As such, the annual supply ceiling of 820 mcm is not unreasonable in order to meet the variable condition due to climate change.

There has been a view that DJ water should be paid according

⁵ The quantities of DJ water supplied to Hong Kong in 2009 and 2010 were 725 mcm and 681 mcm respectively. The quantity supplied to Hong Kong from January 2011 to September 2011 is 643 mcm.

to the actual annual consumed quantity based on a unit water price to be agreed with the GD side. This is not considered to be a feasible approach because we are unable to confirm to the GD side the actual annual supply quantity which we would require when negotiating the unit water price. It is likely that the GD side will take into account such uncertainty when fixing the unit water price in order to ensure a stable return. The unit price approach will also put reliability at risk unless we are prepared to reserve a specific annual quantity and pay a retention fee for the reserved quantity to compensate for the possibility of under-utilising the DJ water supply system.

(b) Flexibility in water supply to minimize wastage

The package deal lump sum approach allows greater flexibility in the daily supply rate of DJ water to tie in with the seasonal fluctuations in the local yield. We will inform the GD side on a monthly basis of our demand for DJ water according to the actual requirements, thus resulting in no wastage of water and better control of our reservoir storage level. The approach can also enable us to minimise overflow more effectively and save pumping costs.

Reasonable Water Price

8. Similar to previous agreements, adjustment of water price is based on operation costs having regard to the exchange rate between Renminbi (RMB) and Hong Kong dollar (HKD) as well as the relevant price indices of both sides.

9. In order to assess the reasonableness of the proposed increases in the new agreement, we have looked into the projected inflation rates of GD and Hong Kong in the next three years in addition to the actual inflation rates in the past three years, which have partly been distorted by the global financial tsunami in late 2008 and 2009. The forecast increase in the Consumer Price Index (CPI) of GD is **3.2%**⁶ per annum during 2012-15 and that in the Composite CPI of Hong Kong is **3.5%**⁷ per annum over the same

⁶ Widely used and regularly updated medium term forecasts of inflation rate for GD are not available in the market. Reference is made to the latest private sector consensus forecast for the Mainland as a whole and the historical relations between inflation of the Mainland and that of GD. For reference, private sector consensus forecast for the CPI inflation of Mainland as a whole is 3.8% per annum over 2012-2015.

⁷ The figure is based on the forecast trend as promulgated in the 2011-12 Budget in February 2011.

period. As for the RMB/HKD exchange rate movement, latest private sector consensus forecast shows that RMB is expected to appreciate by **3.0%**⁸ per annum in the medium term.

10. After months of negotiation, the GD side eventually agreed on the proposed water prices set out in paragraph 3 above, giving rise to the percentage increases in the water price of **5.82%**, **5.78%** and **5.77%** for the respective years of 2012, 2013 and 2014. Taking into account the projected average inflation rate of GD and HK and the projected appreciation of RMB against HKD in the years ahead, we consider the proposed increases reasonable.

Adequate Water Quantity

11. With the fast pace of economic development of other GD cities including Heyuan, Huizhou, Dongguan, Shenzhen and Guangzhou, Hong Kong has been facing stiff competition for the scarce fresh water resources of DJ from these cities. In response, the GD authorities promulgated the “Water Resources Distribution Plan in the Dongjiang River Basin of Guangdong Province” 《廣東省東江流域水資源分配方案》 setting out the maximum amount of water which cities in the Guangdong Province, including Hong Kong, can draw from DJ.

12. Following the promulgation of the Total Water Management Strategy in 2008, we have made endeavors to contain the growth of water demand through the implementation of various water demand management initiatives. Whilst there has been steady growth in population in Hong Kong, we managed to contain the growth of our water demand in the past few years, thereby containing the demand for DJ water. The current agreement has adopted an annual supply ceiling of **820 mcm**. The Water Supplies Department (WSD) has carried out a detailed analysis based on latest water demand forecast and estimated that the current annual ceiling of 820 mcm would be adequate to meet the actual needs of Hong Kong with 99% reliability in water supply up to the end of 2014. This is to ensure that Hong Kong will have adequate and reliable DJ water supply between 2012 and 2014 to maintain round-the-clock supply even under extreme drought conditions with a return period of one in 100 years.

13. The supply quantity of 1 100 mcm reserved for Hong Kong is intended to be the ultimate annual supply level. Our latest estimate indicates that this ultimate supply quantity will be adequate to meet

⁸ Private sector consensus forecast is the average estimates by analysts from a wide range of private financial and investment institutions and is compiled by Consensus Economics, an international economic survey organisation. The forecast is based on information available up to October 2011.

the actual needs of Hong Kong beyond 2030. Given that the water demand within the region has been increasing sharply, we will retain this long-term supply capacity without committing to the time of achieving this target or paying an additional retention fee for this purpose. The 1 100 mcm represents about 3% of the annual flow of the main stream of DJ.

National Standard Water Quality

14. In the current water supply agreement, the GD side undertakes to strive to maintain the quality of DJ water supply to Hong Kong in compliance with the latest national standard, which is set out for Type II waters in the Environmental Quality Standards for Surface Water (GB3838-2002). This standard is the highest applicable water quality standard for DJ water supplied to Hong Kong. According to our water quality monitoring data, the quality of DJ water has met the relevant standard. The GD side has agreed to maintain the existing quality of DJ water supplied to Hong Kong in compliance with the latest national standard in the new agreement.

FINANCIAL IMPLICATIONS

15. We estimate that the annual purchase costs of DJ water from 2011-12 to 2014-15 (up to December 2014), on financial year basis, are as follows -

	\$ million
2011-12	3,379.40 ⁹
2012-13	3,575.90 ¹⁰
2013-14	3,782.58 ¹¹
2014-15	3,239.46 ¹²
(Up to December 2014)	

⁹ Water cost for April to December 2011 and February to March 2012 (\$3,344M x 9 / 11 + \$3,538.70M x 2 / 11). No payment is made in January because water is not drawn in December due to annual maintenance of the DJ water supply system.

¹⁰ Water cost for April to December 2012 and February to March 2013 (\$3,538.70M x 9 / 11 + \$3,743.30M x 2 / 11).

¹¹ Water cost for April to December 2013 and February to March 2014 (\$3,743.30M x 9 / 11 + \$3,959.34M x 2 / 11).

¹² Water cost for April to December 2014 (\$3,959.34M x 9 / 11).

16. The 2011-12 Estimates has included a provision of \$3,344 million for purchase of DJ water. We plan to seek a supplementary provision of \$35.4 million¹³ from FC in November 2011 to meet the additional water cost in 2011-12. The funding requirement in subsequent years i.e. 2012-13, 2013-14 and 2014-15, will be sought in the Annual Estimates Exercises.

(B) TOTAL WATER MANAGEMENT STRATEGY

17. Surface water collected locally from water gathering grounds provides 20% to 30% of water supply to Hong Kong at present. About 70% to 80% of water is imported from DJ to make up the shortfall. Importation of DJ water remains to be the only financially viable option available at the moment.

18. While there is no other more financially viable option at present, we realise the importance of introducing appropriate demand and supply management measures for enhancing the reliability of water supply. As such, we promulgated the **Total Water Management Strategy** in 2008 which maps out the strategy for a balanced supply and demand of raw water to support the sustainable development in Hong Kong.

Water Conservation Measures

19. We consider that there is possible scope for reduction in consumption and this could be achieved through various water conservation measures, including public education campaigns, promotion on the use of water saving devices and preventive measures to reduce water main bursts and leaks.

(i) Public Education Campaigns

20. Apart from stepping up public promotion and education on water conservation, we focus on water conservation education for our younger generation. We have launched a water conservation campaign entitled "Water Conservation Starts from Home" and school water audits for primary school students since 2009. Relevant reference materials have already been distributed to all the primary schools. Also, a teaching kit on water supplies is being prepared aiming at providing supplementary reference materials for secondary school teachers and students on the liberal studies curriculum. In

¹³ Additional water cost for February to March 2012 (\$3,538.70M x 2 / 11 - \$3,344M x 2 / 11).

2010, we launched a water conservation design competition calling for creative designs on water conservation from students of tertiary education institutes and practical water saving practices from property management sector and catering services industry. Moreover, we plan to set up a dedicated team in WSD to take charge of all matters related to water conservation and to establish a water conservation education centre for the public. To promote water conservation within Government, we have commissioned consultancy studies to review the water consumption practice in selected installations of government departments. Through the process, we will develop water saving guidelines for these facilities without compromising the level of services to the public.

(ii) Water Saving Devices

21. We have established technical standards for water saving devices and launched a voluntary “Water Efficiency Labelling Scheme” for selected plumbing fixtures and appliances to inform consumers of the level of water consumption and efficiency of such fixtures and appliances. In addition, we have also launched a programme for retrofitting Government buildings and schools with water saving devices since 2009.

(iii) Preventive Measures to Reduce Main Bursts and Leaks

22. We have made good progress on the staged implementation of the Water Mains Replacement and Rehabilitation (R&R) programme which aims at replacing/rehabilitating about 3 000 kilometres of old water mains. Works under stages 1 and 2 have been substantially completed while works under stage 3 and 4 are actively under way. Up to the end of September 2011 a total of 1 649 kilometres of pipes have been replaced/rehabilitated resulting in a sharp reduction in the number of bursts from about 2 500 in 2000-01 to 609 in 2010-11. In the first half of 2011-12, the number of bursts has been reduced to 212. The water mains leakage rate has also reduced from 25% in 2001 to 20% in 2011. We plan to commence the remaining phase of the R&R programme in early 2012 with a view to completing the entire programme by 2015.

23. To enhance leakage detection as a preventive measure to reduce main burst, we have migrated from the traditional waste detection based leakage detection to the proactive burst prevention based leakage detection with the advancement of technology.

24. We have been establishing pressure management schemes to optimise watermains pressure. We will continue to install flow-modulated pressure reducing valves at strategic locations in order

to help regulate pressure of our water supply network with a view to reducing water main bursts and leaks.

(iv) Further Work for Water Conservation

25. To facilitate formulation of effective water conservation measures, we consider it necessary to conduct comprehensive surveys engaging the public to collect information on water consumption pattern and habit of both domestic and non-domestic accounts. The survey for domestic accounts has already commenced and is scheduled for completion by early 2012. The survey for non-domestic accounts will follow.

26. On the other hand, water resources being precious and not unlimited, there have been opinions in the community that the Government should raise water charges as a means to curb water demand. The Government will continue to take into consideration prevailing economic conditions and public affordability when reviewing the water tariff structure.

Alternative Water Sources

(i) Seawater Desalination

27. To better prepare Hong Kong for uncertainties such as acute climate changes and low rainfall and as a responsible member of the Pearl River Delta Economic Zone, we strive to explore other sources of water supply to meet our own needs. In 2007, we completed a pilot study on development of desalination facilities in Hong Kong with pilot plants located in Ap Lei Chau and Tuen Mun and confirmed that it is technically feasible for using reverse osmosis under local conditions to produce potable water complying with the World Health Organisation (WHO) guidelines for drinking water quality from seawater. We have since kept abreast of the latest developments in desalination technology and prepared for undertaking related planning and engineering study so that such water source can be tapped in good time. In this regard, a site has been reserved in Tseung Kwan O (TKO) for building a medium size desalination plant.

28. We plan to engage consultants to undertake a detailed planning and investigation study in 2012 for completion in 2014. The purpose of the study is to investigate the feasibility and cost effectiveness for the construction of a desalination plant at TKO with a production capacity of 50 mcm per annum and a provision for future expansion up to 90 mcm per annum. A comprehensive Environmental Impact Assessment will also be conducted under the

study to assess the potential environmental impacts of the project and to recommend mitigation measures. The implementation programme is subject to the findings of the study.

29. We will consult the relevant District Council and the LegCo Panel on Development in early 2012. We will then seek the LegCo's funding approval to proceed with the study.

(ii) Water Reclamation

30. The results of the two pilot schemes in Ngong Ping and Shek Wu Hui indicated that the supply of reclaimed water would be technically feasible. We will investigate the supply of reclaimed water to Sheung Shui, Fanling and new development areas in New Territories North for flushing and other non-potable uses. We have also conducted a consultancy study to establish technical standards for recycling grey water and harvested rainwater for non-potable reuses.

31. We will continue to look for and adopt suitable measures to balance water supply and demand with a view to minimising our exposure to the risk of water shortage.

(C) IMPROVEMENT MEASURES ON WATER METER READING AND BILLING SYSTEM

32. To ensure customer satisfaction, WSD has all along been adopting various service-monitoring mechanisms to help pursue continuous improvement in customer services. WSD welcomes customers' comments on the service provided through various channels, such as Customer Liaison Group, telephone hotline, fax, Customer Enquiry Centres, the Internet, commendation and suggestion forms, and customer opinion surveys. Following the findings of these service-monitoring mechanism, WSD has over the past few years put in place the following improvement measures:

- (i) tightening up the checking mechanism of high/low water consumption bills and specification of the observation period after replacement of meters;
- (ii) speeding up replacement of suspected defective meters upon occurrence of three consecutive zero consumption cases;
- (iii) reviewing instructions on checking mechanism in billing of water accounts; and
- (iv) implementing new procedures for handling zero consumption cases.

33. Further, WSD has also been implementing a number of improvement measures in regard to meter replacement. Since the implementation of the aged meter replacement programme in 2006-07, the number of complaints regarding water bills and charges due to defective meters has been reduced by more than **50%** from 15 293 in 2006-07 to 7 360 in 2010-11, which amounts to **0.1%** of the some 7.5 million water bills issued each year. WSD will continue to expedite the implementation of the aged meter replacement programme.

34. All in-service meters are mechanical devices and will result in wear and tear after a long period of usage. This leads to some meters not meeting the accuracy requirement. Based on the results of WSD's random water meter testing programme of 2010-11, the water consumption measured by 99% of such meters is less than the actual consumption.

35. The Ombudsman completed a direct investigation on water meter reading and billing system in September 2011 and recommended a number of areas for improvement in regard to meter reading and bill adjustment procedures, staff training, monitoring of defective meters replacement, billing system enhancement and customer communication.

36. In response to The Ombudsman's recommendations, WSD has taken active steps to implement the following improvement measures:-

- (i) enhancing staff training and monitoring in meter reading and billing system;
- (ii) reviewing existing instructions and providing clear and comprehensive guidelines for staff;
- (iii) refining the billing system and taking effective measures to address deficiencies identified;
- (iv) enhancing the workflow in monitoring replacement of defective meters; and
- (v) enhancing communication with customers.

37. WSD plans to complete the implementation of the above improvement measures in 2012 and will continue its effort in improving water meter reading and billing system.