

TASK FORCE ON LAND SUPPLY

Reclaiming the Reservoirs

PURPOSE

Some members of the public suggested releasing and reclaiming reservoirs for large-scale housing development. This paper provides Members with the background information about the water supply in Hong Kong, and the potential challenges in taking forward this suggestion (“the suggestion”).

BACKGROUND

Water Supply in Hong Kong

2. Hong Kong does not have large rivers or lakes. Its annual rainfall averages around 2 400 mm and takes place mainly in the summer months. Coupled with Hong Kong’s hilly terrain, collection of rain water for potable uses has always been a challenge in the water supply history of Hong Kong. Catchwaters and reservoirs are constructed to deal with the uneven distribution of rainfall. With the continuous urbanization and economic development, the Government has been adopting a multi-barrier approach to control the risk of pollution of our valuable water resources. This includes designating about 30% of the territories as water gathering grounds within which developments are under strict control and adopting advanced water treatment technology before distributing the treated water for consumption by the citizen.

3. Since the first reservoir system was built in 1863, Hong Kong now has a total of 17 reservoirs¹ (**Figure 1**) which altogether have a storage capacity of 586 million cubic metres (MCM) collecting on average an annual yield of around 246 MCM. Among these reservoirs, the High Island Reservoir (HIR) and the Plover Cove Reservoir (PCR) with storage capacity of 281 MCM and 230 MCM respectively are the two largest reservoirs, accounting for 87% of the total storage capacity. The average annual yields from the HIR and PCR systems amount to about 45 MCM and 62 MCM respectively.

4. The yield collected from reservoirs (local yield) fluctuates from 103 MCM to 385 MCM in the past ten years. Currently, the local yield accounts for 20% to 30% of the fresh water consumption in Hong Kong while the rest is provided by importation of Dongjiang (DJ) water from Guangdong². Some reservoirs also serve as buffer or transient storage³ for the DJ water. The storage level in reservoirs is normally maintained at four to six months' consumption as strategic water resources to deal with unanticipated events.

5. Raw water from reservoirs is transferred by water mains and tunnels to water treatment works (WTWs) for treatment. Treated water is then pumped to the service reservoirs and distributed by gravity to consumers via the distribution network.

The Suggestion

6. The considerations involved and the potential challenges anticipated in reclaiming any sizeable reservoirs for development into new towns will likely be similar. To facilitate more focused discussions,

¹ There are seven reservoirs on Hong Kong Island (Aberdeen Lower Reservoir, Aberdeen Upper Reservoir, Pok Fu Lam Reservoir, Tai Tam Byewash Reservoir, Tai Tam Intermediate Reservoir, Tai Tam Tuk Reservoir, Tai Tam Upper Reservoir), one on Lantau Island (Shek Pik Reservoir) and nine in the New Territories (High Island Reservoir, Kowloon Byewash Reservoir, Kowloon Reception Reservoir, Kowloon Reservoir, Lower Shing Mun Reservoir, Plover Cove Reservoir, Shek Lei Pui Reservoir, Shing Mun Reservoir and Tai Lam Chung Reservoir).

² Hong Kong also uses salt water for flushing. In 2016, the salt water consumption for flushing was 260 MCM while the fresh water consumption was 987 MCM.

³ In most cases, DJ water will be conveyed to WTWs directly or route through the PCR to WTWs on the east side (e.g. Ma On Shan WTW and Pak Kong WTW). The surplus, if any, will also go to some reservoirs including the PCR for storage.

we have conducted a broad technical assessment based on the suggestion of reclaiming about 600 hectares (ha) of the PCR⁴ for development into a new town, namely the Plover Cove New Town (PCNT), housing a population of about 0.8 to 1.2 million. The remaining area of the PCR will be reserved for open space and water storage. A copy of the suggestion is at [Annex](#).

DEVELOPMENT POTENTIAL

7. Reclaiming a sizable reservoir can provide a relatively large piece of land for developing into a new town through comprehensive planning. However, from a strategic planning perspective, “Hong Kong 2030+: Towards a Planning Vision and Strategy Transcending 2030” (Hong Kong 2030+) has proposed a sustainable conceptual spatial framework for the whole territory focusing on several development axes and nodes which have been derived in accordance with a number of principles⁵. The PCNT, which is located at an area of relatively high ecological and conservation value and away from major transport infrastructures, does not conform with this conceptual spatial framework. Besides, the development scale of 300 000 flats on 600 ha of land as proposed in the suggestion is very much on the high side⁶, and the resultant dense form of development is not compatible with the surrounding natural environment, nor is it conducive to engendering a quality living and working environment similar to that of planned new development areas.

⁴ The PCR has a surface area of about 1 200 ha.

⁵ These principles are (i) conserving high ecological and conservation value areas; (ii) promoting the agglomeration of economies; (iii) leveraging the strategic locations and new development opportunities to be brought by the new transport infrastructure and Boundary Control Points (BCPs); and (iv) enhancing the spatial distribution of population and jobs.

⁶ For reference, the newly planned Hung Shui Kiu New Development Area, which comprises about 441 ha of developable land accommodating 61 000 flats with a new population of 176 000, has a net population density of about 39 900 persons/sq. km. New towns with the highest net population density are Tin Shui Wai (about 88 700 persons/sq. km) and Tseung Kwan O (about 73 500 persons/sq. km). The net population density of the proposed PCNT (about 130 000 to 200 000 people/sq. km) is more than twice as high as that of these two new towns. It is also higher than some of the densely populated districts in the urban area such as Wong Tai Sin (about 85 800 persons/sq. km) and the Eastern District (about 79 600 persons/sq. km).

CONSIDERATIONS AND POTENTIAL CHALLENGES IN TAKING FORWARD THE SUGGESTION

From the perspective of water supply

8. The PCR, accounting for about 40% of the total reservoir storage capacity, plays a strategically important role in the water supply of Hong Kong. Its key functions include:

- (i) acting as one of the two major contributors of the strategic reserve⁷ for sustaining the water supply in Hong Kong for four to six months (see paragraph 4 above) during unforeseen crisis situations of prolonged suspension of DJ water supply (which is the major fresh water source for Hong Kong) due to, for instance, damage of the Dongjiang-Shenzhen Water Supply System, or due to the occurrence of extreme drought events;
- (ii) collecting and storing rainwater for water supply in Hong Kong, accounting to about 25 % of the average yield in Hong Kong; and
- (iii) acting as buffer or transient storage for DJ water and regulating raw water supply to major WTWs with its water supply network directly connected to these WTWs (**Figure 2**). It is the major source of raw water supply to these WTWs during the annual shutdown of the DJ water supply system for maintenance in December of each year.

9. The suggestion proposed reclaiming a part of the PCR (about 600 hectares) for housing development whilst keeping the remaining part of the reservoir for open space and water storage. The suggestion is against the Government's multi-barrier approach in protecting our water resources. Development of such scale in close proximity to the reservoir will pose significant risks of pollution to the water resource in the reservoir due to a considerable amount of human activities (i.e. non-point source pollution) which is difficult to mitigate. The quality of water stored in the PCR cannot be properly safeguarded and the strategic role of the PCR as mentioned in paragraph 8 above will simply be lost. The

⁷ The other major strategic reserve is the High Island Reservoir.

impacts on the raw water supply in Hong Kong in the absence of the PCR are as follows:

- (i) The total reservoir storage capacity in Hong Kong will be significantly reduced by 40% from 586 MCM to 356 MCM. The water storage and hence the strategic reserve of Hong Kong will drop from a level of four to six months' consumption to a level of three to four months' consumption⁸. This will inevitably affect the resilience of Hong Kong to cater for prolonged suspension of the DJ water supply in unforeseen crisis situations. With the reduced strategic reserve, the risk of our failure to maintain a reliable water supply system will significantly increase;
- (ii) It will result in reduction of local yield and storage and hence system reliability which has to be mitigated by use of other water sources, e.g. desalinated water and/or additional intake of the DJ water. However, the feasibility and/or desirability of using desalinated water to compensate the reduction of local yield and storage capacity as well as system reliability has yet to be ascertained thoroughly with due considerations given to, amongst other things, availability of seafront sites, seawater quality at intake, ecological impacts at the outfall, water supply networks and its operation mode, sustainability in terms of high electricity demand for production of desalinated water and the associated environmental impacts, and the security of power supply. As for the option of increasing the reliance of DJ water, this has to be dealt with care as DJ water resources are already nearly fully utilized; and
- (iii) The operational functions of serving as buffer or transient storage for the DJ water, regulating raw water supply to major WTWs and being a major source of raw water supply to these WTWs during the annual shutdown of the DJ water supply

⁸ It should however be noted that water rationing may have to start when the total reservoir storage drops to an alarming level which could be well before the total depletion of the reservoir storage.

system will have to be taken up by other reservoirs. Since the existing massive raw water supply network is well connected with the PCR rather than other reservoirs, substantial reconfiguration of the entire raw water supply network with additional water infrastructure is required.

10. In view of the above, the implications on water supply reliability and operation of the raw water supply system and the corresponding mitigation measures have to be carefully assessed in a prudent manner before a decision can be made to take forward with this suggestion.

From engineering perspectives

11. The potential concerns and the major engineering challenges identified with respect to the suggestion are highlighted below:

Environmental and Ecological Concerns

12. The entire PCR and its surrounding hillsides are within the Plover Cove Country Park, the Pat Sin Leng Country Park and the Hong Kong UNESCO Global GeoPark. Three Sites of Archaeological Interest (SAI), namely the Wang Leng Tau SAI, the Tai Kau SAI and the Sun Leung Tam Trackway SAI are located within or in the fringe of the PCR⁹. Outside the dam of the PCR is the Tolo Harbour which is a shallow semi-enclosed body with low water exchange rate. It is essentially landlocked and its marine water quality is very sensitive to pollution with many water sensitive receivers including fish culture zones¹⁰, Sites of Special Scientific Interest (SSSIs)¹¹, a bathing beach¹², corals, mangroves, typhoon shelter, water sports areas, water intakes, etc. The northern shore of the Tolo Channel connecting to the subsidiary dams of the PCR, is an SSSI for its special geological features and an important asset of the

⁹ The 1998 Antiquities and Monuments Office territory-wide archaeological survey revealed that a large part of the Wang Leng Tau SAI and Tai Kau SAI have been submerged in the PCR.

¹⁰ Yim Tin Tsai (East), Yim Tin Tsai and Lo Fu Wat Fish Culture Zones

¹¹ Yim Tin Tsai and Ma Shi Chau SSSI, Ting Kok SSSI, Tolo Channel (Northern Coast) SSSI, Sham Chung Coast SSSI and Lai Chi Chong SSSI

¹² A bathing beach at Lung Mei, Tai Mei Tuk.

Hong Kong UNESCO Global GeoPark where the oldest rocks in Hong Kong (deposited during Devonian about 400 to 360 million years ago) can be found. **Figure 3** shows the environmentally and ecologically sensitive areas in the vicinity of the PCR.

13. Construction works for the proposed PCNT would not be confined within the footprint of the PCR and so would the environmental impacts. As the entire PCR and its adjacent hillsides fall within the country parks, the proposed roads and railways required for connecting the PCNT to other areas would inevitably encroach upon or be constructed inside the country parks and close to the SSSIs and fish culture zones in the vicinity of the PCR. Apart from the named protected areas, there are a large number of ecologically sensitive terrestrial and marine habitats such as ecologically important streams, Fung Shui Woods, coastal area with intertidal and subtidal marine organisms and coral communities, etc. within the footprint of the conceptual transport network as proposed in the suggestion. The provision of other supporting infrastructures including water supply, drainage and sewerage systems, power supply and telecommunication cables would also involve construction works at nearby sensitive areas.

14. Given the vast site coverage of the PCNT and the number of recognised sites of conservation and archaeological interests and important habitats that may be affected, the impacts arising from the proposed development would be significant and substantial. Detailed environmental impact assessment is required to ascertain whether the potential impacts can be mitigated to an acceptable level.

15. Besides, according to the Landscape Value Map of Hong Kong, the PCR and its surrounding areas are of high landscape value. The many hiking trails in the vicinity of the reservoir, including the famous Plover Cove Country Trail stretching from Cheung Pai Tun to Wang Leng, provide hikers with scenic views of the reservoir and the Tolo Harbour beyond the dam. The reservoir is therefore a recreational hotspot of Tai Po well-known for its very high scenic value. Such landscape will be changed completely with the development of the PCNT.

16. In view of the above, it would be a great challenge for such suggestion to achieve an overall environmental acceptability. Moreover, as mentioned in paragraph 7 above, the suggestion is against the overall principle to conserve areas of high ecological and conservation value as advocated by the Hong Kong 2030+.

Transport and Traffic Issues

17. The PCR can be accessed via either Ting Kok Road from the west or Bride's Pool Road from the north. Ting Kok Road, which connects the PCR to Tolo Highway, is the main route to urban areas. Tolo Highway has limited space capacity to receive additional traffic. At the north, Bride's Pool Road links up the PCR to Sha Tau Kok Road via Luk Keng Road. This winding road between the Pat Sin Leng Country Park and the Plover Cove Country Park is close to some important wildlife habitats and there is limitation on the use of Luk Keng Road. Medium to heavy goods vehicles are not permitted to enter Luk Keng Road.

18. Housing development for accommodation of a population of about 0.8 to 1.2 million would inevitably generate enormous traffic demand for travelling to/from urban areas. It is envisaged that unless new strategic roads connecting the PCNT directly to urban areas are proposed, bottlenecks/congestion would likely occur at Tolo Highway and Ma On Shan Bypass, if the PCNT is to be connected with the road networks in the Ma On Shan area.

19. A dedicated railway connecting the PCNT to the urban areas, in complementary with road-based public transport services, should be required to serve the development. The suggestion proposed construction of both the new railway link and strategic roads connecting the PCNT to Ma On Shan across the Tolo Channel and with the railway further extended to Tseung Kwan O. However, construction of these transport infrastructures would be extremely technically challenging, not to mention the potential environmental concerns and the substantial capital costs. To avoid causing insurmountable impacts on the water quality due to marine works and the important geological resources at the northern shore of the Tolo Channel, the new road/railway running

between the PCNT and Ma On Shan is recommended to be in the form of a sub-sea tunnel spanning across the Tolo Channel. The tunnel will have to run across the Tolo Channel Fault which is one of the major faults in Hong Kong with a width up to about 750 m. It would be technically challenging to traverse such substantial fault zone.

20. Given the large development scale of the proposed PCNT, it is anticipated that having an extension or bifurcation from the existing railway network to serve the development would likely overload the existing railway network. Also, in view of the many existing and under-construction private developments surrounding the existing terminal station of the Ma On Shan Line (the Wu Kai Sha Station), complicated land issues¹³ would need to be addressed for any extension or bifurcation proposals. Similarly, the existing railway station at Po Lam is surrounded by buildings and housing estates and there is no physical space available for further extension or a new interchange station. The feasibility of constructing a railway link connecting Wu Kai Sha to Po Lam via Sai Kung and the Hong Kong University of Science and Technology is therefore in question and should be subject to critical review and detailed investigation.

21. A railway link from the PNCT to Sha Tau Kok has also been proposed in the suggestion apart from the road connection to the north. While the patronage demand and cost-effectiveness of this section of railway is subject to further examination, the need for providing a new cross-border railway station at Sha Tau Kok is doubtful with the presence of two cross-border railway stations nearby at Lo Wu and Lok Ma Chau.

Other Technical Considerations

22. Development of the PCNT will generate major construction activities for filling up the PCR, constructing the necessary supporting infrastructures as well as superstructures. Accessibility of the PCR site for transportation of construction materials and machinery during construction stage would therefore be a major concern. Unlike other near-shore reclamation sites which are readily accessible from the sea, the

¹³ Encroachment upon private developments and unavailability of land for constructing a separate station in Wu Kai Sha area for interchange.

PCR site is segregated from the sea by a reservoir dam of more than 14 m high above the sea level. This colossal physical barrier would pose significant constraints to the delivery of filling materials and machinery into the reservoir site by marine access. Special construction method and technique would be required. While the need for modifying the dam to suit the construction methods cannot be ruled out at this stage, it is anticipated that modification works, if required, would be costly and time-consuming, and may arouse public concerns as this scenic place is an attractive destination for holidaymakers.

23. It is also worth to note that the transportation route in the eastern waters of Hong Kong via Mirs Bay can be easily affected by poor weather during typhoon seasons and rough sea conditions during winter seasons. Frequent interruptions to the marine delivery process may be anticipated which would prolong the programme of the reclamation works and create uncertainty on the timing of land availability.

24. If this suggestion is to be considered further, feasibility studies should be carried out to investigate the feasibility of reclaiming the reservoir including the implications on water supply reliability and operation of the raw water supply system, and the exploration of possible construction methods as well as the key issues such as traffic and transport, geotechnical aspects and environmental impacts as discussed above. The suggestion is expected to involve very substantial costs for provision of mitigation measures to compensate the reduction of local yield and storage capacity due to filling up of a sizable reservoir, as well as transport and other infrastructures required to serve the development on the reclaimed reservoir, which will be aggravated by the high reclamation cost associated with the access constraints. More detailed assessment is required to ascertain the costs of works involved before a decision can be made to pursue this suggestion.

Lead Time for Land Provision

25. The PCR is within the published water gathering ground under the Waterworks Ordinance (Cap. 102). If the suggestion is to be taken forward, the Water Authority shall alter the limits or area on the relevant maps of the gathering ground. The proposed PCNT requires substantial

reclamation and development within the Plover Cove Country Park, which embraces the PCR. The consent of the Country and Marine Parks Authority on the development proposal involving country parks and special areas would be required in consultation with the Country and Marine Parks Board. In case the PCNT proposal is to be pursued further, it is likely that there would be hot debate on whether the area for development should be excised from the existing Plover Cove Country Park. In case of country park excision, statutory procedures as stipulated in the Country Parks Ordinance (Cap. 208) would have to be invoked.

26. Taking in account the time required for conduct of associated planning and engineering studies, preparation of statutory plans, completion of the required statutory procedures and construction of the required infrastructure, it is anticipated that the entire development process of the PCNT, if found to be feasible, would take more than two decades to complete.

27. In view of the complexity as well as the technical and environmental concerns in reclaiming reservoirs as illustrated above for the case of PCR, such suggestion can only be considered as a long-term land supply option if pursued.

ADVICE SOUGHT

28. Members are invited to offer views on this suggestion of increasing land supply having regard to the considerations and potential challenges highlighted in the paper.

**Development Bureau
Civil Engineering and Development Department
Water Supplies Department
1 December 2017**

A proposal: how to achieve abundant land reserve in Hong Kong immediately

Background

Scarcity is a realistic description of Hong Kong in view of its land development! But is Hong Kong really short of land supply?

During the 70-80's, the Government decided to launch the development plan of new towns to deal with the rapid population growth. In just 20 years, nine new towns were established (see table). At present, the total population of the nine new towns is about 3.47 million, and is expected to reach 3.63 million by 2021. Among these new towns, only Tung Chung will expand further to accommodate another 144,000 people. Therefore the saturation of these new towns will certainly be unable to solve the severe housing problem currently faced by Hong Kong. Moreover, the current development only includes smaller new areas, which would be unhelpful to the housing shortage problem. Also, the slow planning process will be outpaced by the population growth. The result is long term under-supply, leading to continual rising of property prices to levels seriously out of touch with people's income.

New Town & New Development Area			Area (Hectare)	Population ('000)		Residual Capacity	Density (/Hectare)	Year of Commencement
				Planned	Present			
1st Generation	1	Tsuen Wan	3286	866	805	7.04%	2635	70's
	2	Sha Tin	3591	771	691	10.38%	2147	70's
	3	Tuen Mun	3266	589	502	14.77%	1803	70's
2nd Generation	4	Tai Po	3006	307	278	9.45%	1021	Late 70's
	5	Fanling/Sheung Shui	667	290	261	10.00%	4348	Late 70's
	6	Yuen Long	561	185	164	11.35%	3298	Late 70's
3rd Generation	7	Tin Shui Wai	430	306	290	5.23%	7116	70 - 80's
	8	Tseung Kwan O	1718	445	396	11.01%	2590	70 - 80's
	9	Tung Chung including TC East/TC West extension (under planning)	245	268	124	53.73%	10939	70 - 80's
New Development Area	10	Kai Tak Development	318	87			2736	2007
	11	Anderson Road (under intake)	20	48			24000	2008
	12	Anderson Road Quarry Site (under planning)	40	25			6250	2016
	13	Kwu Tung North, Fanling North (under planning)	330	172			5212	2017?
	14	Hung Shui Kiu (under planning)	435	173			3977	2019?

Source of data: website of Civil Engineering and Development Department

Similar to the Linked Exchange Rate, Land Reserve needs to be backed up by adequate land supply to keep property prices at reasonable levels. That is the Government must have abundant land reserve in order to stabilize the property prices, gradually in correlation with the population's income level. If Hong Kong does not have a foreign reserve of several hundreds of billions (USD), it will be difficult to keep a stable linked exchange rate. Therefore the key to the Hong Kong property price is not the target supply for each year, but the quantity of land reserve. High land-price policy has led to many social problems in Hong Kong, including disparity, lack of upward mobility channel for the younger generation, people becoming "flat slaves", shrinking of industries, etc. The solution to most of these problems lies in an effective policy of stabilizing property price through abundant land supply.

The Proposed Project

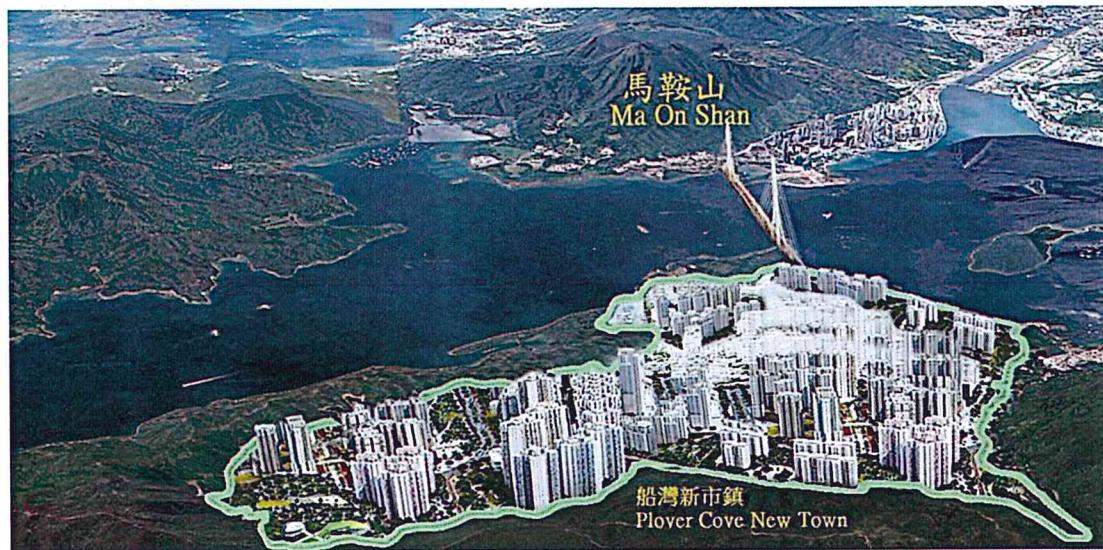
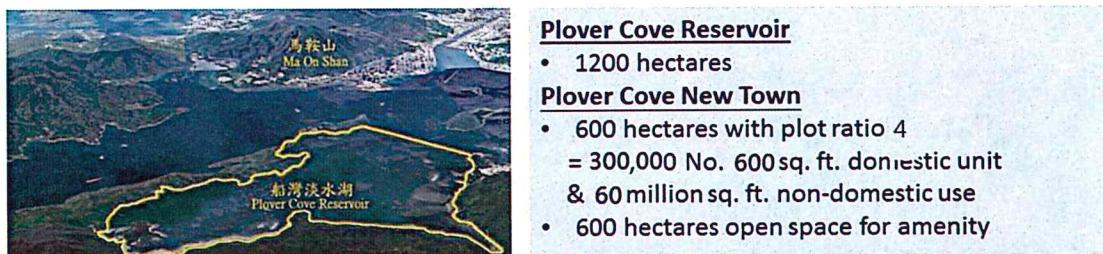
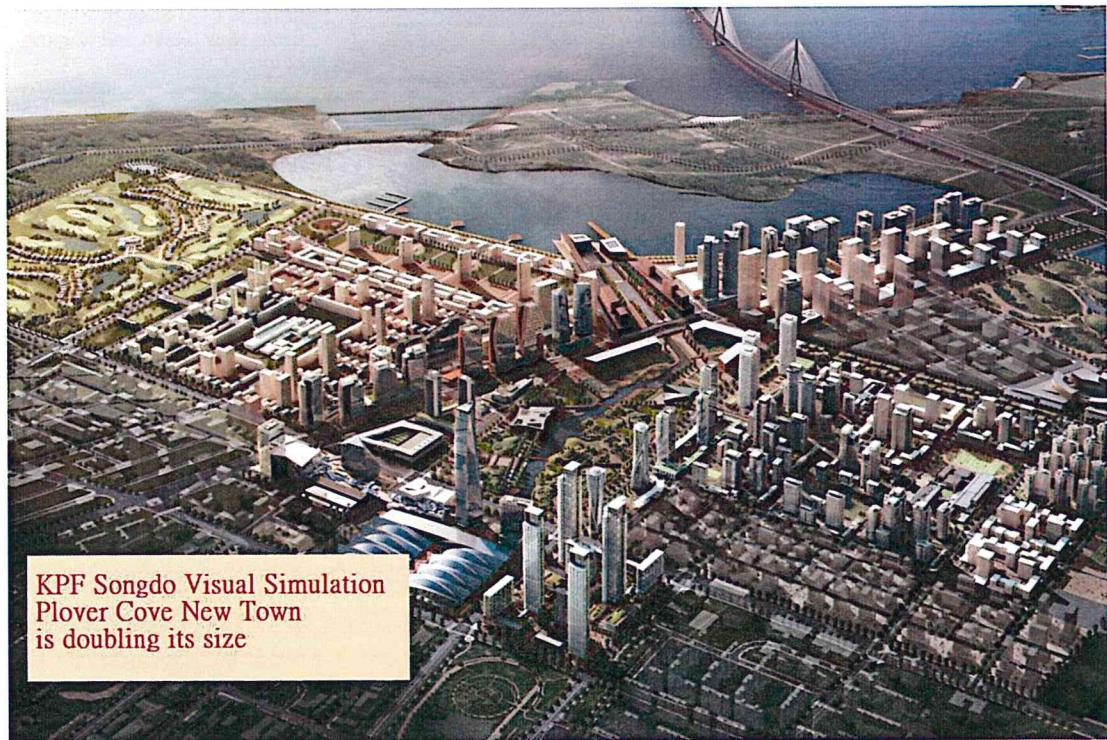
Based on the above analysis, the key to stabilizing property price is land reserve. Therefore I suggest: reclaim land from reservoirs; build affordable, dignified and comfortable homes for citizens; construct a smart, green and eco-friendly new town!

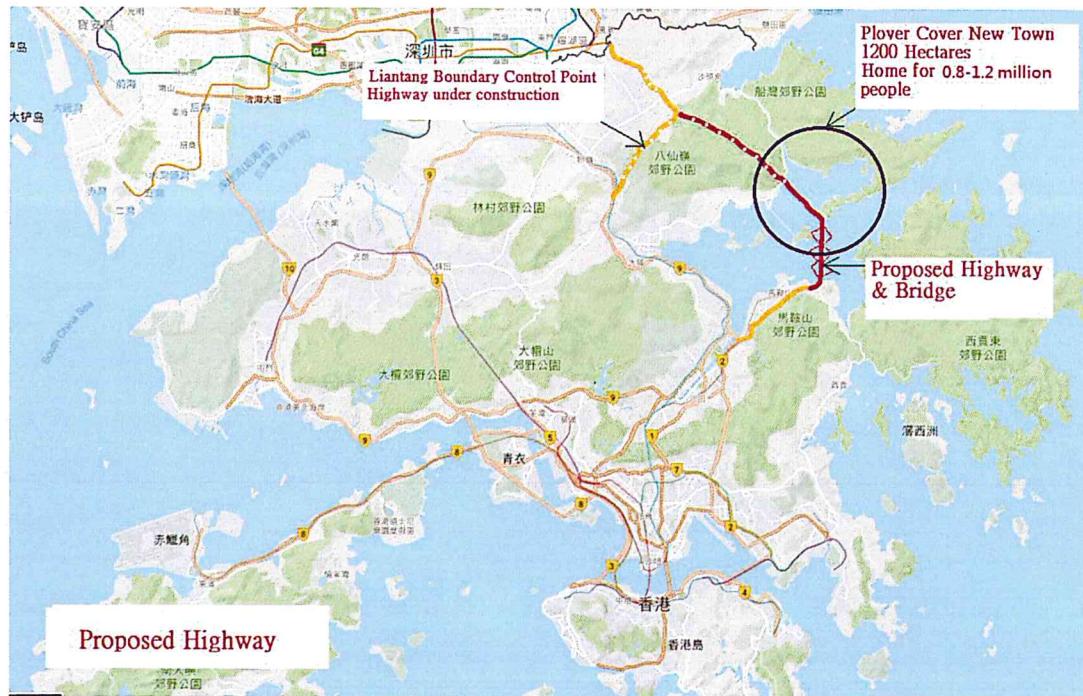
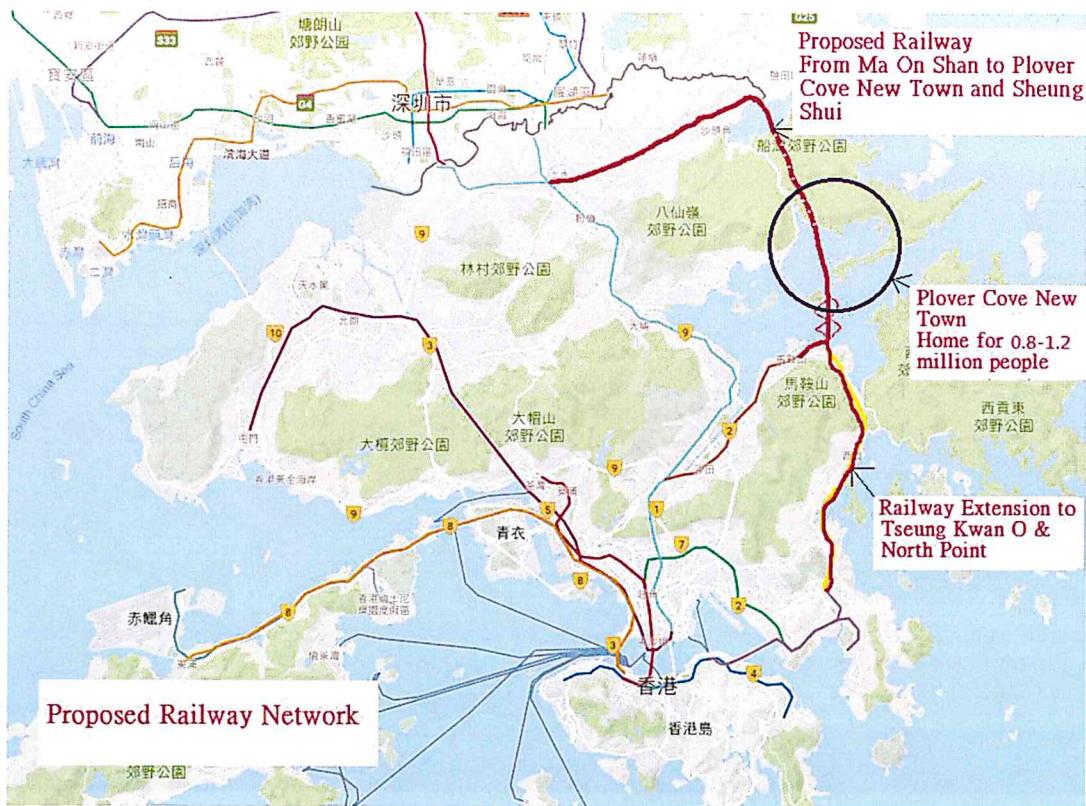
The Plover Cove Reservoir (船灣淡水湖) has an area of about 1200 hectares. Based on a plot ratio of 2, it is estimated that the reclaimed land can provide 300,000 flats of 600 sq. ft., plus 60 million sq. ft. for non-domestic purpose such as commercial buildings, public facilities, research centers, university campus, hospitals, shopping malls, etc. The income from land sales can be up to \$720 billion, assuming average land price at \$3,000 per sq. ft. The income would be sufficient to build all the necessary rails, highways, cross-sea bridge, as well as site formation works and infrastructure construction. Transportation is essential to this smart new town, which is expected to provide housing for 0.8-1.2 million people. During the first phase, a rail and a highway can be built connecting Plover Cove New Town with Wu Kwai Sha (烏溪沙), via a cross-sea bridge or tunnel. The rail can extend northward to Sha Tau Kok (沙頭角), adding an additional land crossing by train. To the west, it can connect to Lok Ma Chau Spur Line (落馬洲支線), to provide rail service for the new development at Queen's Hill (皇后山) and Fanling North New Developments Areas. The highway can extend to the northwest via Kwai Tau Leng (龜頭嶺) to Tan Chuk Hang (丹竹坑), then link up the new highway of Liantang/Heung Yuen Wai Boundary Control Point (蓮塘/鄉園圍口岸). This will complete a new north-south route.

Apart from technical feasibilities, the Project also offers benefits summarized below:

1. Releasing land resources from the Plover Cove Reservoir is beneficial to the Hong Kong society as a whole and compatible with the Total Water Management Strategy. It can also accelerate the water desalination and water recycling projects in Hong Kong.
2. Provide abundant land reserve immediately, leading to stable property prices and hence solving a number of social problems.
3. Extend the Ma On Shan rail to Sha Tau Kok via the New Town, adding an additional land crossing by train.
4. The new north-south rail route has the potential to link up North Point, Tseung Kwan O, Hong Kong University of Science and Technology, Sai Kung, Ma On Shan, the Plover Cove New Town, Sha Tau Kok land crossing, Fanling and Sheung Shui.
5. The highway network can link up Ma On Shan and the new Liantang/Heung Yuen Wai Boundary Control Point, relieving the traffic burden of the Tolo Highway.
6. The Project, with an estimated income of \$720 billion from land sale, will be self-financing and able to provide funds for other social constructions, including the water desalination and recycling projects in Hong Kong.
7. The Project comes with huge scale, high flexibility and abundant capital. There is no limit to how the New Town can be built to be eco-friendly, technically smart, cozy and leisure. The only obstacle is our creativity and commitment.

Let's take a look of the visual simulation of this New Town!





Environmental Impact Assessment

Cut off water supply by the Reservoir

Is it feasible to maintain water supply by cutting off a local reservoir?

According to the 2014/15 Annual Report of the Water Supplies Department, the total water consumption in Hong Kong was 1,230 million m³ in 2014, with 59% (or 726 million m³) imported from Dongjiang in Guangdong, 22% from seawater (for toilet flushing) and only 19% (or 234 million m³) from local catchments. (see table)

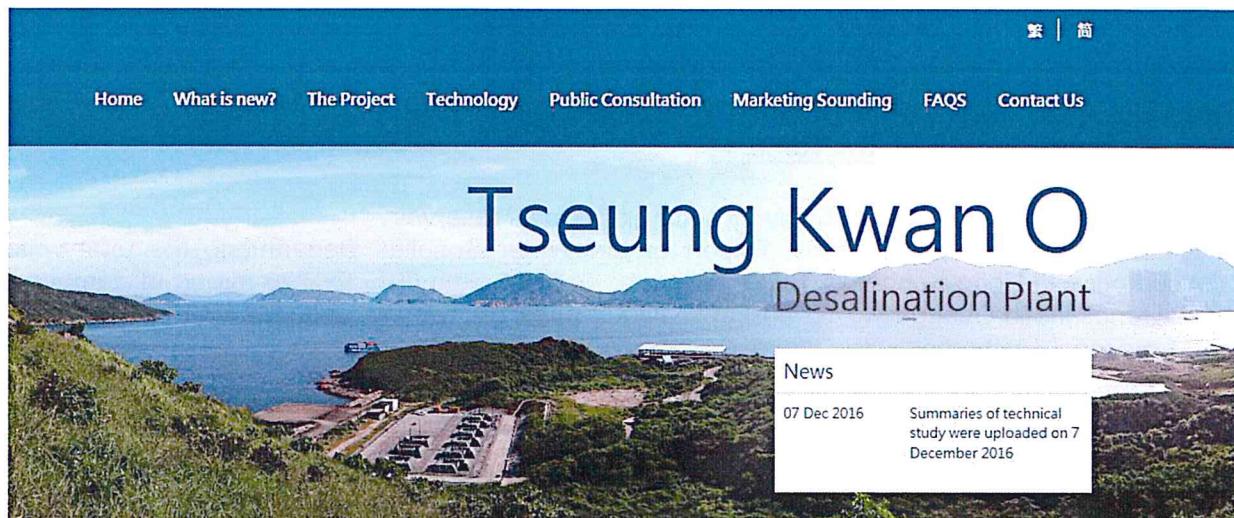
Water consumption in 2014 (million M ³)	Imported from Dongjiang	Seawater	Local catchment
1230	726 (59%)	271 (22%)	234 (19%)

As the water supply contract between Hong Kong and Guangdong is on a fixed amount of 820 million m³ per year, we only need 139 million m³ of rainwater for the balance. (see table) The total capacity of reservoirs in Hong Kong is 586 million m³, therefore taking away the Plover Cove Reservoir (capacity of 230 million m³) will have no impact on local catchment and water supply. Moreover, canceling the Plover Cove Reservoir does not lose all its ability on rainwater catchment.

Water consumption in 2014 (million M ³)	Imported from Dongjiang	Local catchment	Seawater
1230	726 (59%) ↓ 820 (67%)	234 (19%) ↓ 139 (11%)	271 (22%) 271 (22%)

The Total Water Management Strategy of the Water Supplies Department has the following description, “*increasing risk of drought events and larger variability in year-to-year rainfall due to climate change which would affect the yield both locally and in the basin of Dongjiang (DJ), and competition for DJ water resources among other major cities in Guangdong, including Huizhou, Dongguan and Shenzhen, serving altogether 40 million people. One of the key supply management initiatives is to diversify the water supply resources to develop new water resources.*

Under the Total Water Management strategy, therefore, Hong Kong should broaden its strategic investment in advanced water treatment such as the reverse osmosis (RO) technology for desalination plant, not affected by climate change. The project will provide the first stage of the proposed seawater desalination plant using reverse osmosis at Tseung Kwan O (TKO) Area 137. The plant will have a water production capacity up to 270,000 m³ per day or 98,550,000 m³ per year. The Water Supplies Department (WSD) awarded on 16 November 2015 a consultancy agreement worth \$180 million to Black & Veatch Hong Kong Limited for the investigation review, design and construction of the first stage of the proposed desalination plant at Tseung Kwan O with capacity of 135,000 cubic metres per day.” The Project of releasing land resources from the Plover Cove Reservoir is of benefits to Hong Kong as a whole and is compatible with the Total Water Management Strategy.



 Water Supplies Department
The Government of the Hong Kong Special Administrative Region

 BLACK & VEATCH
Building a world of difference.

Impact on the Ecological Environment

While the Reservoir is located within the Plover Cove Country Park, we can only access about 1/3 of its area along the lake side, i.e. road on top of the main dam and Bride's Pool Road. There is no activity on the water surface. In fact, the New Town, with 0.8-1.2 million population, can come with eco-friendly design. For example, a buffer zone can be retained along the lake side and water canals can run through the whole area. The central park can be as big as 25 hectares, comparable to the scale of the Songdo in South Korea. The buffer zone can provide a jogging track and bike trail of more than 20km. This Project can actually provide much more leisure space than the present, in terms of quantity and quality.

The Reservoir itself is not a natural site or a unique eco-system. At present, there are about 12 species or a total of 200,000 freshwater fish in the lake. Most species can be found in other ponds. Moreover, the water inflow from the Pearl River has imported the golden mussel, an invasive species, causing harm to the pipes. Therefore the foreseeable impact on the ecological environment should be minor, in terms of its lack of marine ecology and non-uniqueness of the present fish species. The benefits of the Project would be definitely out-weighing the losses.

Conclusion

The above Proposal will not involve any issue of land resumption, clearance or compensation. During the course of amending the planned use of the site, the work of drawing up the blueprint of the smart New Town can be carried out comprehensively. "Plover Cove Reservoir: Land Reclamation Project" is huge in scale and highly accommodative. It can provide sufficient capital for developing a resident area with eco-design, smart technology and leisure space. I hope the Government would be committed to this Project, which can bring about abundant land reserve to Hong Kong, hence stabilizing the land price and property price in the long term. The Plover Cove New Town, the comfort home for 0.8-1.2 million population, should be implemented without delay!

By : Frederick Lai
<https://facebook.com/fredericklai2017>

即時為香港提供大量土地儲備的建議

背景

土地發展對於香港而言，真是極為珍貴。「寸金尺土」形容香港正切合不過！香港真的再沒有土地供應嗎？

在 70-80 年代，政府決定展開新市鎮發展計劃以應付人口高速增長，短短 20 年間發展了九個新市鎮。【如表】。現時，九個新市鎮的整體人口約 347 萬，預計到 2021 年將增至 363 萬。眼見新市鎮容量已進入飽和階段再無餘力解決香港目前嚴峻的房屋問題，唯有在計劃中的東涌新市鎮發展延續並增加容納 14.4 萬人。現時，只是一些規模較細的新發展區，對房屋短缺於事無補，加上部份計劃仍處於籌劃中，未能趕上配合人口增長，形成供應不足，樓價節節上升，與市民收入嚴重脫節。

新市鎮、新發展區			發展面積 (公頃)	人口(萬)		剩餘容量	人口密度 (/公頃)	動工年代
	計劃	現時						
七一線	1	荃灣	3286	86.6	80.5	7.04%	264	70 年代初
	2	沙田	3591	77.1	69.1	10.38%	215	70 年代初
	3	屯門	3266	58.9	50.2	14.77%	180	70 年代初
七二線	4	大埔	3006	30.7	27.8	9.45%	102	70 年代後期
	5	粉領/上水	667	29	26.1	10.00%	435	70 年代後期
	6	元朗	561	18.5	16.4	11.35	330	70 年代後期
七三線	7	天水圍	430	30.6	29	5.23%	712	70-80 年代
	8	將軍澳	1718	44.5	39.6	11.01%	259	70-80 年代
	9	東涌包含東涌東/西擴展區(計劃中)	245	26.8	12.4	53.73%	1094	70-80 年代
回歸後	10	啟德發展計劃	318	8.7			274	2007
	11	安達臣道(入伙中)	20	4.8			2400	2008
	12	安達臣道石礦場(計劃中)	40	2.5			625	2016
	13	古洞北及粉嶺北(計劃中)	330	17.2			521	2017?
	14	洪水橋(計劃中)	435	17.3			398	2019?

以上資料來自土力工程拓展署網站

「土地儲備」就好像「聯繫匯率」一樣，若土地儲備充足，樓價自然會回到合理水平。所以要樓價回復平穩，慢慢與香港人收入掛鉤，政府一定要有大量土地儲備在手。如果香港沒有數千億美元的外匯儲備¹，聯繫匯率可以保持平穩嗎？所以香港的樓價不在乎每年的目標供應量，關鍵在於香港的土地儲備。高地價是現今香港各種社會問題的元兇，包括，貧富懸殊、年輕人欠缺上流機會、香港

¹ 金融管理局（金管局）於 2017 年 1 月 6 日公布，香港於 2016 年 12 月底的官方外匯儲備資產為 3,862 億美元。

人慘變樓奴、行業萎縮等。所以只要推出有效政策，可以穩定地價並提供大量土地的供應，大部分的社會問題將會迎刃而解。

項目背景資料

綜合以上的分析，我們認為土地儲備是平衡樓價的關鍵，因此我們建議填湖、造地、建家園，給市民一個買得起，坐得直，瞓得舒適的居所，構建一個智慧，綠化，環保的新市鎮！

船灣淡水湖湖面積達 1200 多公頃。以地積比 2 倍計，可以建 30 萬個 600 呎的住宅單位加 6000 萬呎商業/公共建設/教育設施/大學校園等等。以平均地價 3000 元計，賣地收益可達 7200 億元。足以支付一切所需的鐵路及公路，跨海大橋，地盤平整及基礎設施。這可提供 80-120 萬人居住的智能新市鎮，交通方面當然要妥善解決，首期可建鐵路及高速公路從馬鞍山烏溪沙透過跨海大橋或隧道伸延至船灣淡水湖，鐵路北上至沙頭角，以增加一個過境通道，然後西轉銜接落馬洲支線，為皇后山及粉嶺北新發展區提供鐵路服務。高速公路向西北經龜頭嶺在丹竹坑與正在興建的蓮塘/香園圍過境口岸高速公路銜接。組成另一南北交通幹線。這建議不但技術上可行，還有以下得益：

1. 改變船灣淡水湖的用途，釋出土地資源，完全符合香港整體利益及全面水資源管理策略。並加速推動香港環保水資源再生的工程。
2. 一下子提供大量土地儲備，足以建立一個可建 30 萬個 600 呎住宅單位及 6000 萬呎商用空間的新市鎮。
3. 將馬鞍山鐵路伸延經新市鎮至沙頭角，增加一個以鐵路過關的新口岸。
4. 提供有利條件，建構南北走向鐵路幹線，把北角，將軍澳，科技大學，西貢，馬鞍山，船灣新市鎮，沙頭角邊境口岸以及粉嶺、上水連接起來。
5. 公路幹線上可以伸延馬鞍山高速經跨海大橋至船灣新市鎮，北上經丹竹坑與正在興建的蓮塘/香園圍過境口岸高速公路銜接。組成另一南北交通幹線。
6. 透過賣地收益，初步估計高達 7200 億，項目可以自負盈虧，還有大量資金推動其他社會建設。
7. 這項目規模宏大，可塑性高，資金充裕，要這新市鎮有多環保、智能、休閒舒適都絕對沒有問題。障礙只是我們的創意與決心。

就讓我們先想像一下這新市鎮的模樣吧！



PROJECT PLOVER COVE

現時船灣淡水湖

總面積約 1,215 公頃 = 九龍半島

未來新市鎮

馬鞍山

船灣淡水湖

DO NOT COPY

環境影響評估

取消水塘的供水問題

我們缺少了一個人工建造的水塘，在食水方面可行嗎？

根據水務署 2014/15 的年報提供資料，2014 年香港每年用水量為 12.3 億立方米，59%（相當於 7.26 億立方米）來自東江水，22%來自海水（主要作沖廁用），只有 19%（相當於 2.34 億立方米）來本地雨水收集。【如表】

2014 年用水量 (億立方米)	來自東江水	來自海水	本地雨水收集
12.3	7.26 (59%)	2.71 (22%)	2.34 (19%)

由於香港與廣東省的供水協議是每年定額 8.2 億立方米，如果用盡這額度，我們只需從雨水收集方面提取 1.39 億立方米【如表】，而香港水塘的總儲水容量是 5.86 億立方米，取消船灣淡水湖（容量是 2.3 億立方米）對香港儲水和供水是沒有問題的，再者放棄船灣淡水湖並不等如完全喪失其雨水收集功能。

2014 年用水量 (億立方米)	來自東江水	來自海水	本地雨水收集
12.3	7.26 (59%) ↓ 8.2 (67%)	2.71 (22%)	2.34 (19%) ↓ 1.39 (11%)

再者，在節錄於水務署在 2008 年曾發佈的「全面水資源管理策略²」，因氣候變化影響本地及東江流域降雨量而導致乾旱風險增加及降雨量按年波幅擴大，以及面臨惠州、東莞及深圳等廣東省主要城市共 4 千萬人口對東江水資源的競爭。其中一項主要措施是開發新的水資源。

在全面水資源管理策略下，香港應該開拓先進的食水處理技術，例如發展不受氣候轉變影響之逆滲透海水淡化技術。這項目是在將軍澳 137 區興建海水淡化廠。以逆滲透技術產水，最終每日可達 270,000 立方米。年產量等如 98,550,000 立方米（約 1 億立方米）。水務署亦已於 2015 年 11 月 16 日批出將軍澳海水淡化廠³第一階段的勘查研究檢討、設計及建造顧問合約（價值 1 億 8 千萬）予博威工程顧問有限公司。因此，改變船灣淡水湖的用途，釋出土地資源，完全符合香港整體利益及全面水資源管理策略。

² http://www.wsd.gov.hk/filemanager/common/annual_report/2014_15/tc/securing_longer_term_water_supply.html

³ <https://www.tkodesal.hk/>

對環境生態之影響

雖然水塘乃郊野公園一部分，但水塘為管制範圍，市民不能享用湖泊，不能發揮休閒用途。而且水塘是人工興建，本身沒有天然或獨有的生態系統，現時水塘約有 12 個品種共超過 20 萬條淡水魚生長，包括金山鯽、藍刀、土鯪魚及鯉魚等，其中四分三為鱸魚另一方面，船灣淡水湖的水引自珠江，也無意間將河殼菜蛤引入香港，而造成引水系統的危害。⁴

結論

就上述建議，「船灣淡水湖 - 填湖工程」規模宏大、可塑性高、資金充裕，且提供一個集環保、智能、休閒舒適的居住環境。希望政府下定決心，透過此項目為香港提供大量土地儲備，長遠地穩定地價及樓價，盡快開展這個可供 80-120 萬人居住的安樂窩 – 船灣新市鎮。

船灣淡水湖面積很大，有 1200 公頃，等如九龍半島油尖旺三區，而我們可以去到的，只是湖邊約 1/3 的沿湖地方，大霸 + 新娘潭路，整個湖面是沒有任何活動。再者在這可居住 80-120 萬人的新市鎮，設計上可以很環保，沿湖週界可預留緩衝地帶，水道縱橫，其中央公園可以是 25 公頃，如韓國松島的規模。沿湖邊緩衝地帶可以提供一條超過 20 公里緩跑徑、單車徑。對現時只有大霸及沿新娘潭路旁的休憩用地，不但完全沒有影響，在湖面所加的休憩空間肯定數之不盡，比現時是大大改善，不是減少。

生態方面，影響輕微，水塘已是人工湖，沒有海洋生態，這水塘有的物種，在別的水塘一樣可以找到。我不是說這項目不需付出，不過肯定是得多於失。

⁴ <https://zh.wikipedia.org/wiki/%E8%88%B9%E7%81%A3%E6%B7%A1%E6%B0%B4%E6%B9%96>

10 分鐘講辭

首先多謝「思籌知路」舉辦今次嘅「上車有望」Dream City 實現大賽，等我哋有機會提出以下嘅方案 - 將船灣淡水湖改造成一個夢幻新市鎮 (Dream City)。

我哋熱愛香港，關心社會，對於港人置業日益困難，感同身受。

冇次去船灣淡水湖郊遊徑行山，我哋先發現哩個淡水湖規模好大，環湖一周就超過 20 公里。

雖然路途遙遠，但沿途風景美不勝收，大霸嘅一段，

更可以望到對岸大廈林立嘅馬鞍山。

忽發奇想，喺保育哩個美景嘅大前提之下，係咪可以騰出部分湖面，解決香港土地短缺嘅問題！扭轉香港人均居住平均呎數由 150 呎不停減少嘅趨勢。

今年初我哋不斷喺網上搵資料，先發現我哋將船灣淡水湖打造成一個超夢幻新市鎮嘅構思係可行。就等我哋同大家介紹一下：

發展規模與保育

⌚ 船灣淡水湖湖面面積超過 1200 公頃，比油尖旺三區仲要大。

只要以 2 倍地積比發展，足以提供三十萬個六百呎嘅住宅單位，大約可以容納 80-120 萬人口居住，同埋六千萬呎非住宅樓宇發展面積。

以 2 倍地積發展，加上我哋簡單嘅構思，可以做到啲乜野呢：

⌚ 首先，保留湖一半嘅面積 600 公頃作開放空間同湖區，包括 30 米綠化緩衝帶，繞湖一周，提供一條長 20 公里嘅單車徑同埋緩跑徑。

大壩旁嘅划艇賽道，以及各大小運動場，水上活動中心，為香港各類運動項目提供訓練基地。可以考慮將沙田體院搬入來。

喺餘下嘅 600 公頃以 4 倍地積比發展，住宅同非住宅用地比例喺 3:1。

⌚ 盡量利用淡水湖 20 米嘅深度，可以起三層地庫，將非住宅用嘅樓面擺喺裡面。

可以用嚟起公共設施/科研中心/購物中心/區域中央製冷系統/集體運輸/貨運車道/停車場/屋宇設備機房等等。

如果大廈平均以 20 層計，喺 600 公頃新市鎮嘅覆蓋率係少於 20%，加上車道已收藏喺地庫入面，路面主要喺行人專用區，四圍都喺公園，河川同綠化地。

水資源

⌚ 船灣淡水湖係香港第二大水塘，改變這水塘嘅用途喺咪可行呢？

船灣淡水湖容量係 2.3 億立方米（全港水塘係 5.86 億立方米）。過去十年，香港每年嘅雨水收集量介乎 1.03-3.85 億立方米，而 2015/16 年度係 2.68 億立方米。

東江水每年輸港上限 8.2 億立方米，一年供水 330 日，每日平均輸水約 240 萬立方米。

香港總共有 21 個濾水廠，每日處理到 502 萬立方米嘅水，所以東江水喺可以每日即時處理，而唔需要咁大個中途缸。

水務處 2008 年嘅長遠 水資源管理策略 已確認香港應該慢慢減少依賴東江水同埋雨水收集。

⌚ 現時最環保嘅海水淡化方法喺逆滲透海水淡化技術。新加坡同以色列已經大規模使用，

喺將軍澳 137 區計劃興建嘅逆滲透海水淡化廠，年產量喺一億立方米，如果喺船灣新市鎮起兩個已經可以自給自足啦！

將船灣淡水湖改造成為一個新市鎮，一定可以加快長遠水資源管理策略嘅實施。

取消水塘並唔等如無咗集水功能！集水區收集到嘅雨水可以送去萬宜水庫，或者比哩一個新市鎮嘅湖區使用。

船灣新市鎮嘅交通配套

一个有 80-120 萬人居住嘅智能新市鎮，交通方面當然要妥善處理，先至可以令居民安居樂業。

首先可以興建鐵路同埋高速公路，由烏溪沙透過跨海大橋或者隧道伸延到船灣淡水湖。

可考慮延伸鐵路北上至沙頭角，增加一個過境通道，然後銜接落馬洲支線，為皇后山、坪輦同埋粉嶺北新發展區提供鐵路服務。

新市鎮選址更加有利構建南北走向嘅鐵路幹線，將港島東、將軍澳、馬鞍山、粉嶺、沙頭角邊境口岸同船灣新市鎮接連起嚟，長遠解決東鐵線嘅擠迫。

高速公路就向西北 經丹竹坑 同起緊嘅蓮塘/香園圍過境口岸高速公路銜接。組成另一組南北交通幹線，舒緩吐露港公路嘅負擔。

哩個建議不但技術上可行，對香港整體嘅交通規劃亦都有得益。

可行性及資金

⌚ 船灣新市鎮嘅發展唔使收地、拆遷同埋賠償。

如果根據我哋千 2 公頃嘅發展計劃，以平均地價 3 千蚊嚟講，樓面地價總值可達 7 千 2 百億。

足以支付所需要嘅鐵路、公路、跨海大橋，地盤平整同埋基礎設施嘅費用。

綜合以上分析，哩個項目規模宏大，可塑性高，資金充裕。

因為有充裕嘅資金，喺設計建造過程中可以引入最新嘅科技，令到哩個新市鎮要幾環保同高科技都絕對無問題。

⌚ 呢個新市鎮只會比韓國嘅松島更先進，更智能，更環保，更靚，更切合香港人嘅需要。

獨特而貢獻遠大

⌚ 加上人工建造嘅水庫從來唔喺環境保育項目，

將哩啲珍貴嘅土地資源用嚟發展，解決市民基本嘅住屋需要，避免開發郊野公園，咁樣唔係更加環保咩！

船灣新市鎮為構建北角至沙頭角鐵路線打好基礎，亦促進咗前往香港後花園：西貢、赤門海峽、東平洲及印洲堂地質公園東北 沉積岩園區嘅旅遊及地質導賞活動。

⌚ 呢個夢幻嘅新市鎮 (Dream City) 將為香港帶來動力，重燃年輕人置業嘅希望。

最終希望哩一片新嘅土地，改善香港人嘅居住環境質素，

我哋不要納米樓，也不要劏房！

思籌知路

主辦



決賽隊伍

船灣新市鎮

團隊成員

勞美玲小姐 鍾旖霞小姐

熊翠儀小姐 黎照昌先生



從馬鞍山遙望船灣淡水湖



只用一半湖面作新市鎮發展 (可容納 80-120 萬人)

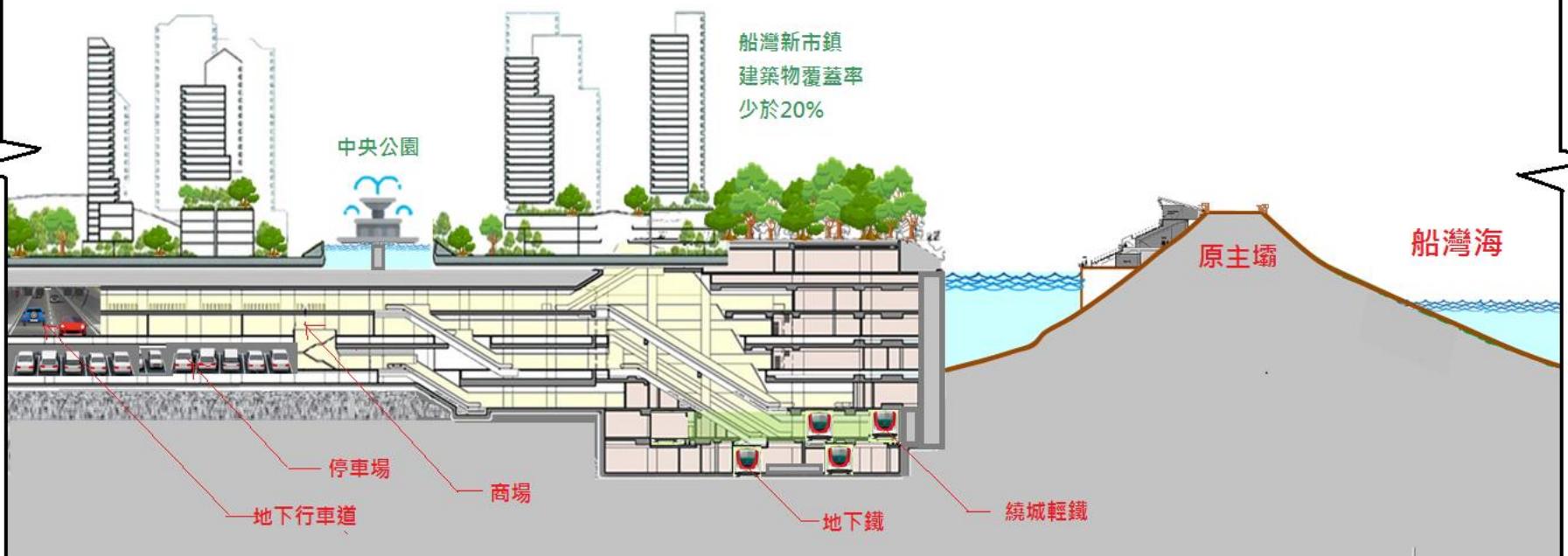


船灣新市鎮 X-X 切面圖

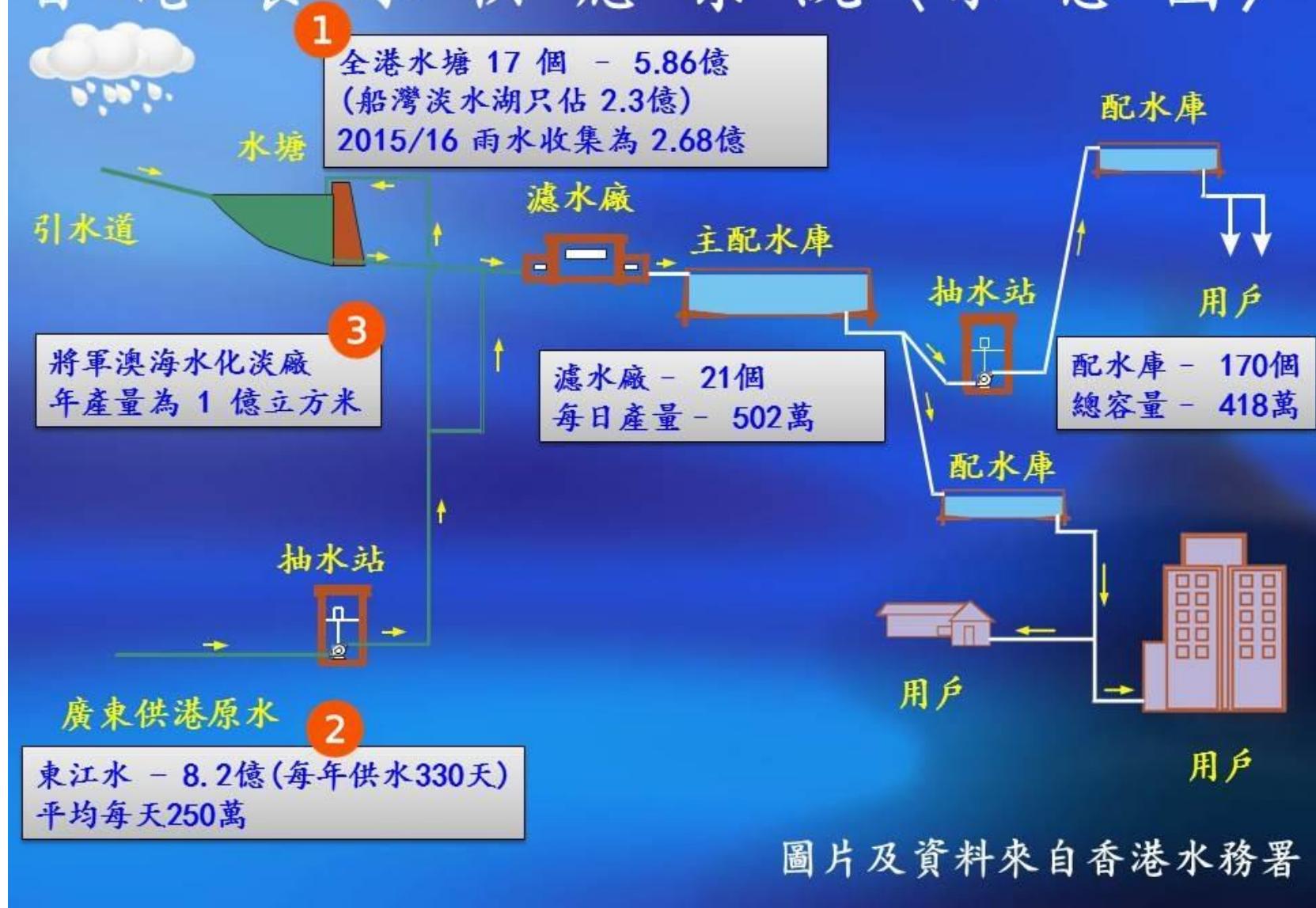
(與單車徑、緩跑徑及新娘潭路的關係)



船灣新市鎮 Y-Y 切面圖 (與原主壩及船灣海的關係)



香港食水供應系統〈示意圖〉



將軍澳海水淡化廠

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Tseung Kwan O

Desalination Plant

News

09 Jun 2017

The Industry Briefing presentation slides and Q&A summary, and the prequalification examples were uploaded on 9 June 2017

鐵路交通



高速公路



船灣淡水湖面積達1200多公頃。以地積比2倍計，可以建30萬個600呎的住宅單位加6000萬呎非住宅用樓宇。

以平均樓面呎價3000元計算，地價總值估計高達7,200億。

Songdo International Business District
Incheon, South Korea



南韓松島國際商貿區 (600 公頃)

中國香港世界地質公園 (東北園區)



船灣新市鎮..... 我們未來的理想居所



No Tree for 無棲息的樹

No Home for 無居住之所



規模與效益 Capacity & Gain

- 1,200公頃土地 1,200 hectares of land
- 劃出600公頃開放空間 Reserve 600 hectares of open space
- 以4倍地積發展600公頃 Assume Plot Ratio of 4 for remaining 600 hectares
- 提供300,000個600呎住宅單位加6,000萬呎非住宅空間 Provide 300,000 housing units of 600 sq. ft. and 60,000,000 sq. ft. for non-domestic use
- 以平均樓面呎價3000元計算,地價總值估計高達7,200億 Based on land cost of \$3,000 per sq. ft., the total value of the land is 0.72 Trillion
- 提供大量土地儲備,調控地價及樓價 Provide abundant land reserve to maintain the stability of the land value and property prices

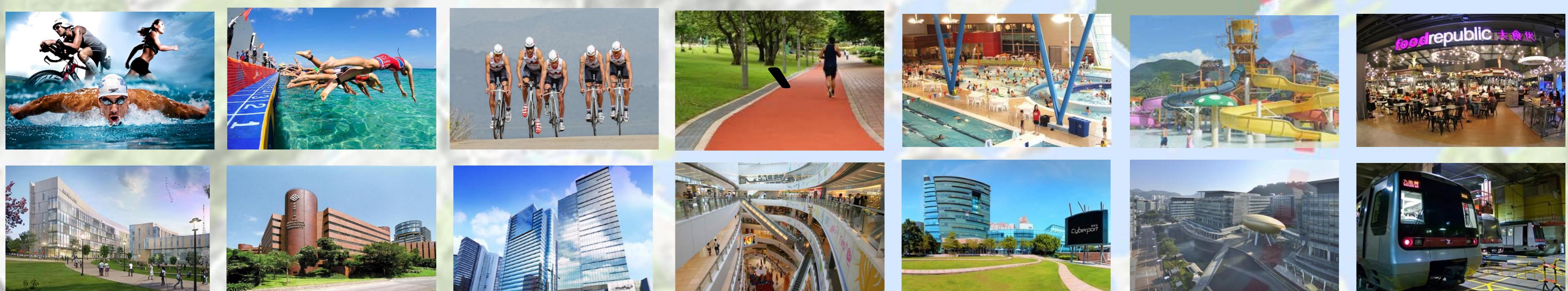
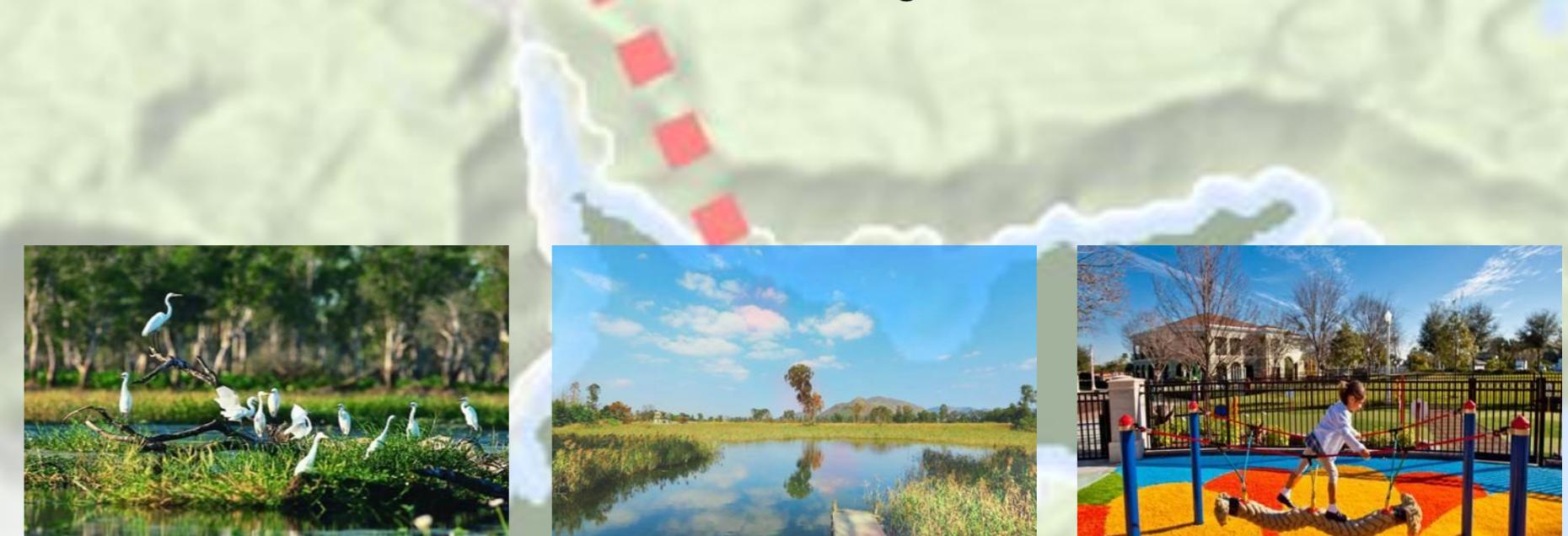
謝謝！

船灣新市鎮…… 我們未來的理想居所

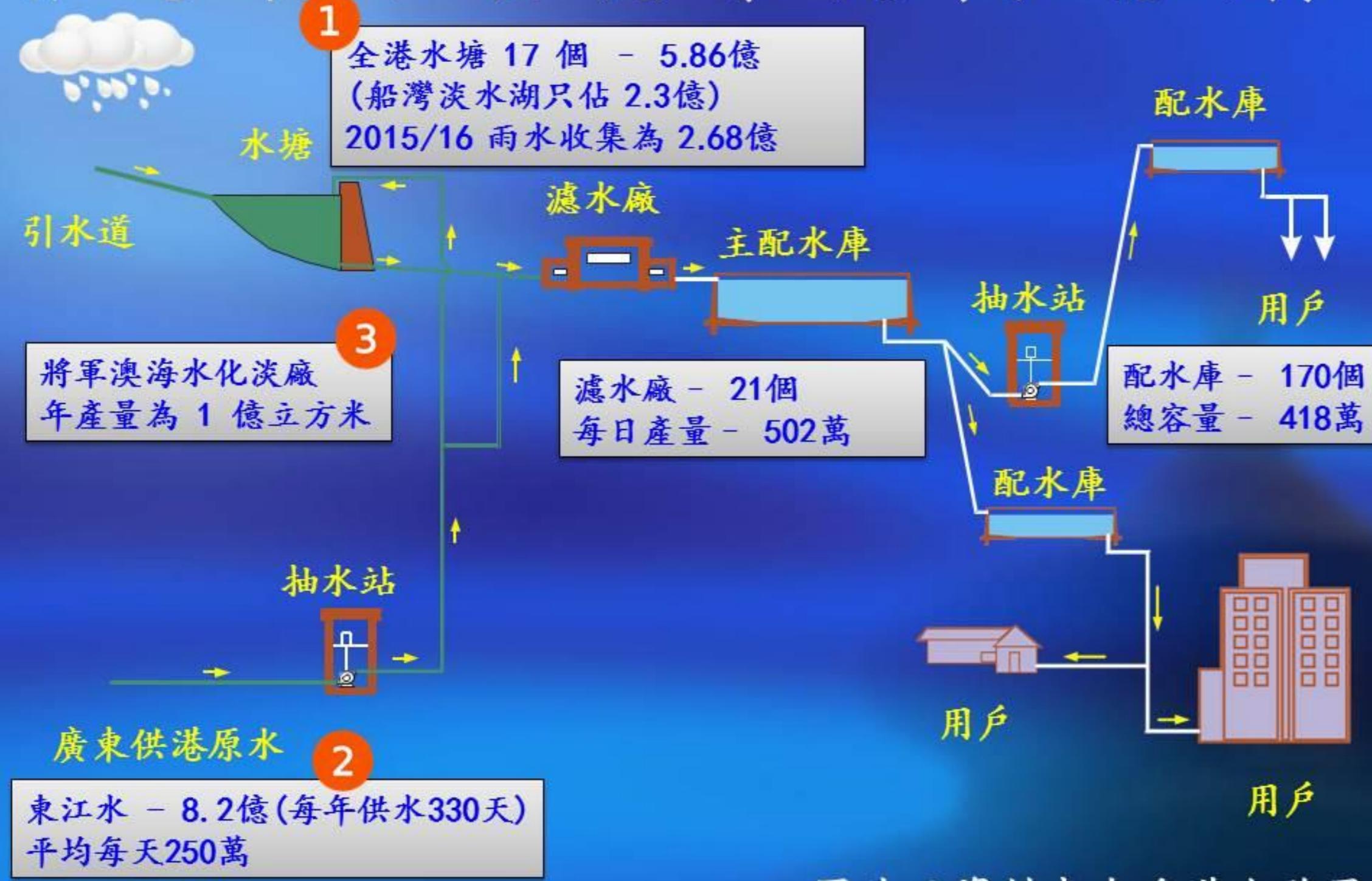


No Tree for  無棲息的樹

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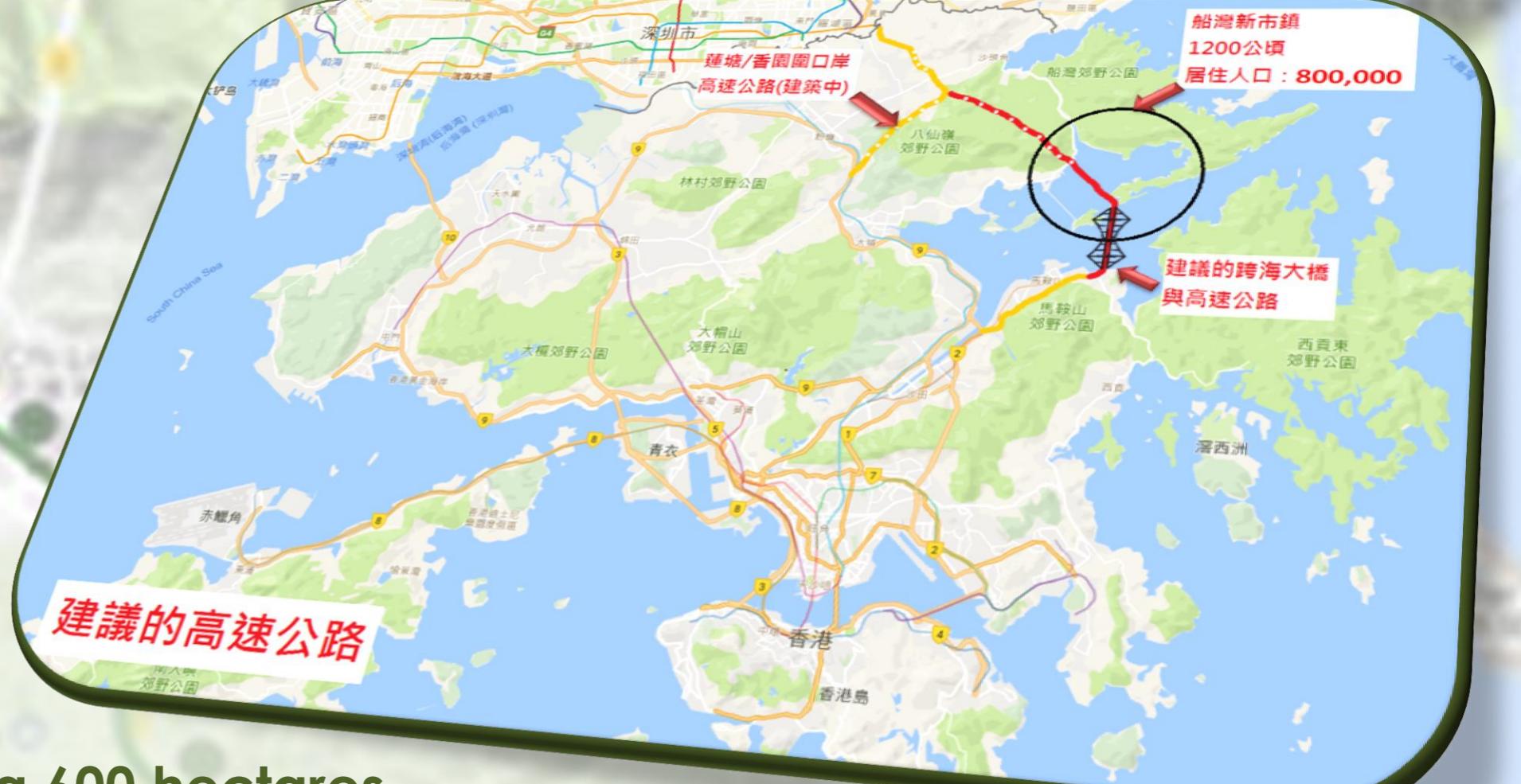
香港食水供應系統〈示意圖〉



圖片及資料來自香港水務署

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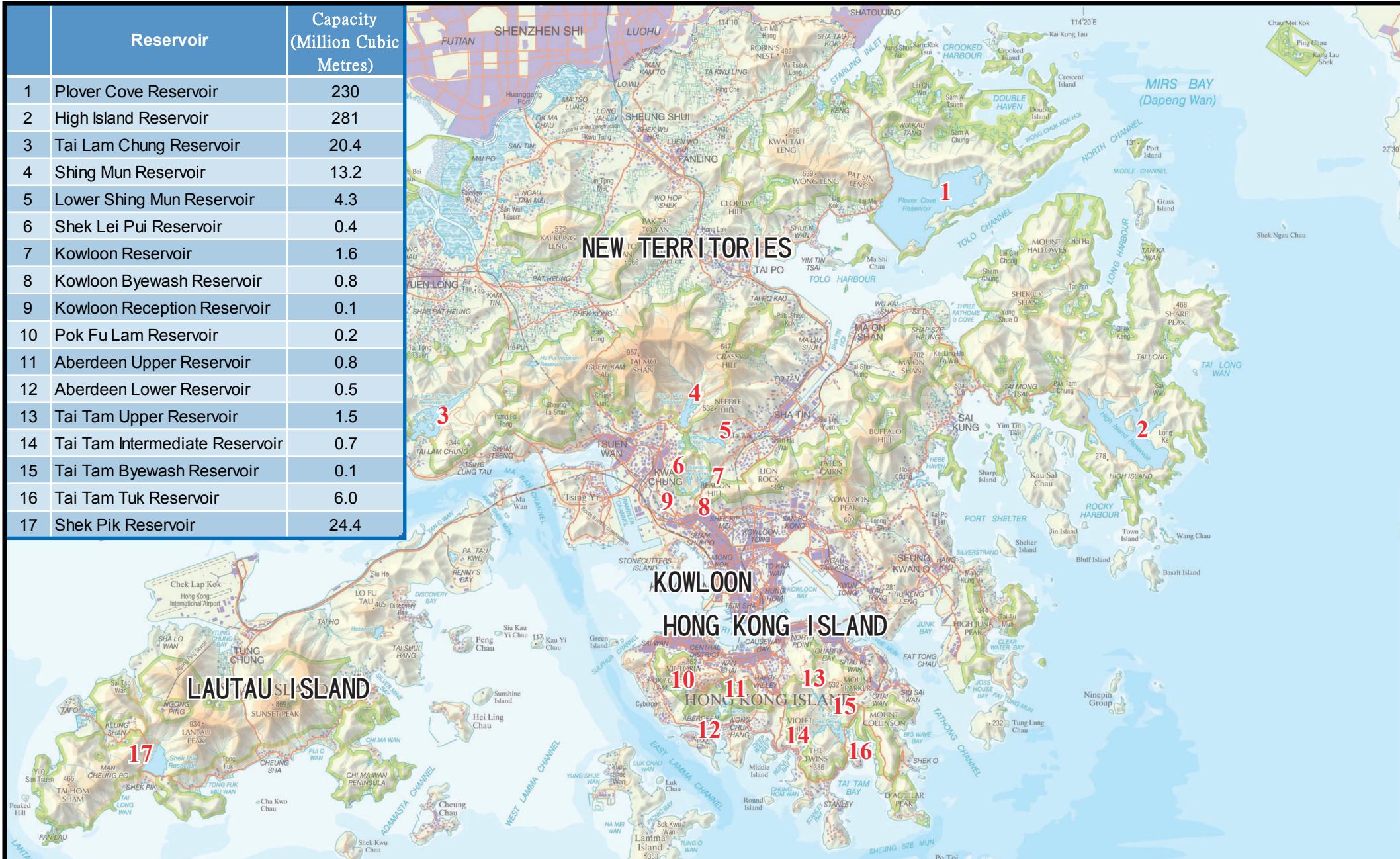
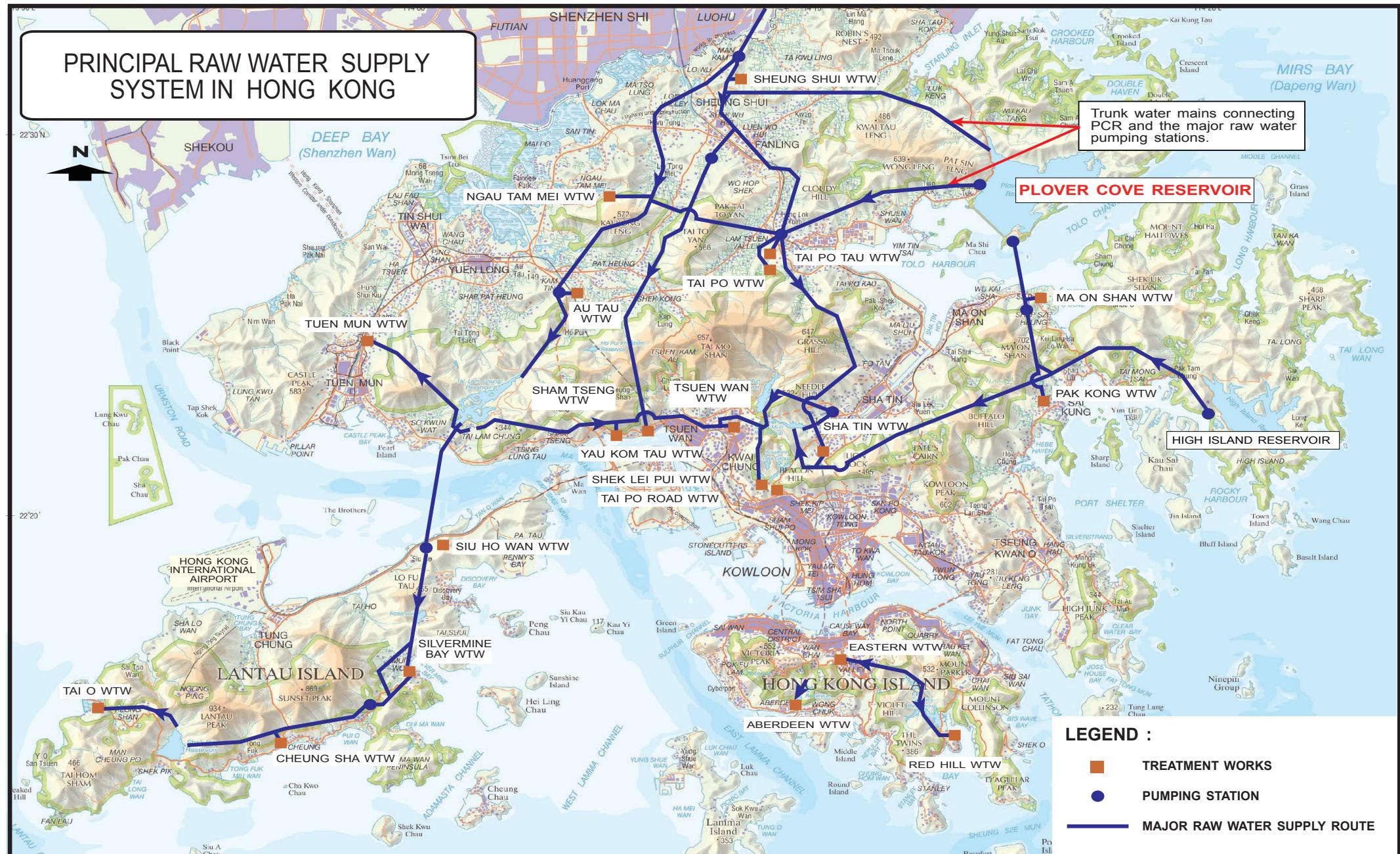


FIGURE 1 - RESERVOIRS IN HONG KONG



水務署
WATER SUPPLIES DEPARTMENT

PRINCIPAL RAW WATER SUPPLY SYSTEM IN HONG KONG



LEGEND :

- TREATMENT WORKS
- PUMPING STATION
- MAJOR RAW WATER SUPPLY ROUTE

FIGURE 2 - PRINCIPAL RAW WATER SUPPLY SYSTEM IN HONG KONG



水務署
WATER SUPPLIES DEPARTMENT

Environmentally and Ecologically Sensitive Areas in the Vicinity of

Plover Cove Reservoir

Figure 3

