For discussion on
28 April 2025

Legislative Council
Panel on Environmental Affairs

District Cooling Systems

Purpose

This paper reports and consults Members' views on the latest positions of developing district cooling systems ("DCS") in various New Development Areas (NDAs), and the review results of their way forward.

Background

2. DCS is a large-scale centralised air-conditioning system. It produces chilled water at central chiller plants for distribution to user buildings through underground chilled water distribution pipes for air-conditioning purpose. Comparing with individual traditional air-cooled air-conditioning systems and individual water-cooled air-conditioning systems, DCS consumes about 35% and 20% less electricity respectively. In addition to significant energy savings, DCS, being an effective energy-saving and carbon-reducing infrastructure, will also bring about the following benefits –

(a) achieve economies of scale and reduce cost for construction and operation. With a reduced space demand for the required plant room than that for traditional air-conditioning systems, DCS may save the upfront construction costs for installing chiller plants in buildings;

(b) attain higher energy efficiency through the adoption of large-scale high-efficiency chiller plants and automated control, as well as centralised management of the system according to the needs of individual buildings, to achieve synergy and further enhance

overall energy efficiency; and

(c) reduce heat island effect and noise by obviating the need to install chiller plants and heat rejection equipment in individual buildings. Flexible building designs may also be achieved by freeing up rooftop spaces, which may be used for recreational area and installation of renewable energy installations, such as solar panels, to further increase green area of the building and improve energy efficiency.

3. Matters related to the operation and charges of district cooling services by the Government need to comply with the relevant provisions of the District Cooling Services Ordinance (Cap. 624) (the "Ordinance"). Currently, the DCS at Kai Tak Development ("KTD DCS") was completed and is in operation (see paragraphs 9 and 10 below); while the DCS at Kwu Tung North New Development Area ("KTN DCS") and Tung Chung New Town Extension (East) ("TCE DCS") are under construction (see paragraphs 11 and 12 below). As for DCS projects in the planning stage, they include DCS at Hung Shui Kiu/Ha Tsuen New Development Area ("HSK/HT DCS") Phase 1 and San Tin Technopole ("STT DCS") (see paragraphs 13-16 below for details).

4. While the Government's lead to develop and operate DCS in KTD has demonstrated the viability of developing DCS in Hong Kong, having regard to the experience gained from implementing KTD DCS and the development progress of various NDAs, the Government considers it opportune to review the various DCS projects, with a view to promoting sustainable development while taking into account cost-effectiveness. In this connection, the Financial Secretary has announced in the 2025-26 Budget that, "the Government is reviewing the scale and mode of delivery of DCS in NDAs, such as HSK/HT and STT, to tie in the development of the area with greater cost-effectiveness. The preliminary estimate of savings in terms of works expenditure is at least $40 billion."

Considerations of the review

5. Currently, the construction of large-scale DCS in Hong Kong are initiated and funded by the Government in full. Users are required to repay the capital and operation costs incurred by installments within a period of 30 years based on their cooling consumption. Based on the experience gained from the implementation of KTD DCS, given the primary service targets of DCS are non-domestic buildings and facilities, the former's development plan and overall effectiveness will be inevitably affected by the development progress or change of land use of the non-domestic sites. We have made reference to DCS projects in different places and the other local smaller-scale projects not led by the Government. The various modes of implementation of DCS in different places, depending on local policies, market demand and characteristics, and energy structure, are summarised as follows –

By institutional arrangements

(a) Public-Private Partnership: A joint venture is to be co-established by the Government and private enterprises. The Government provides land, policy support and shares part of the cost, while the private enterprises are responsible for financing, constructing and operating the DCS, as well as recovering the costs by charging users and sharing the profits with the Government.

(b) Private development: Private enterprises invest in and operate their own DCS or smaller-scale centralised multi-building cooling systems, and maintain the projects through fees determined by market supply and demand and other financing arrangements.

By mode of financing

(a) User charges: To combine fixed and floating charges, or incorporate connection charges, pre-payment, long-term supply contracts and cooling consumption charges into the basic rent, and charge consumers based on actual consumption to recover the capital cost of developing DCS.

(b) Financing through the capital market: To raise funds from environmental, social, and governance (ESG) investors through green bonds, syndicated loans and the establishment of real estate investment trusts, etc. for the development of DCS.

(c) Government subsidies and partial support for infrastructure: The Government to provide tax concessions, subsidies at initial stage of the project, and partial support to the infrastructural works for mitigating the risks borne by private enterprises.

Examples of the above-mentioned implementation modes of DCS and centralised multi-building cooling systems are listed at **Annex A**.

Major conclusion of the review

6. Taking into account the modes of implementation of DCS mentioned above, it is considered that the capacity and flexibility of the private market should be able to provide DCS that better meets individual user requirements, particularly in NDAs, while the Government-led approach for commissioning and operating DCS seems not to be the mainstream. The major reasons of are summarised below –

(a) Guided by market forces, DCS / centralised multi-building cooling system led by private enterprises can better meet the different needs of different users, flexibly apply innovative technologies, exercise cost control and introduce more flexible charging arrangements, to facilitate rational allocation of resources and improve service quality;

(b) The approach of initiating DCS development through considerable capital investment on the part of the Government and quasi-governmental organisations may not be able to relieve the financial burden on the Government and alleviate the risks pertained; and

(c) If small-scale DCS / centralised multi-building cooling systems are to be implemented in NDAs (such as certain industrial parks, areas concentrated with industrial sites, and non-domestic sites with multiple buildings developed by a single developer[1]), the risks borne by the relevant private enterprises will be more manageable, allowing them to utilise their internal and external resources (such as raising funds from ESG investors) more flexibly, which may make the commissioning of such systems more synchronised to the actual needs and pace of the development projects.

7. Based on the above-mentioned reasons, it is worthwhile for exploring different ways to harness market forces, such as providing sufficient incentives and support to encourage the private developers to participate and invest in implementing small-scale DCS / centralised multi-building cooling systems, with a view to enhancing the attractiveness and popularity of DCS. In this regard, it is recommended to –

(a) revise the scale of HSK/HT DCS Phase 1 by reducing the two central cooling plants originally planned to be built by the Government to one;

(b) take forward STT DCS through encouraging private participation in lieu of Government-led development; and

(c) explore with the Financial Services and Treasury Bureau to enhance the existing preferential tax arrangements, and EMSD to provide technical support, such as additional detailed design and operation guidelines, to encourage non-governmental organisations and private developers to participate in the commissioning of DCS and centralised multi-building cooling systems. In terms of floor area arrangements, the Development Bureau confirmed that the floor area occupied by DCS and associated facilities will continue to be exempted in full. It is

[1] Examples include Hong Kong Science Park, Hong Kong-Shenzhen Innovation and Technology Park in the Loop, Advanced Manufacturing Centre at Tseung Kwan O InnoPark, and the Lee Gardens in Causeway Bay.

worth mentioning that there is no upper limit on the floor area that can be exempted for district cooling facilities, which is more relaxed than the 5% upper limit on the floor area that can be exempted for traditional air-conditioning systems. This will help encourage sectors to consider commissioning DCS.

8. According to the Government's crude estimation, the saving in terms of works expenditure is not less than $40 billion for recommendations (a) and (b) above. As for the KTN DCS and TCE DCS, the Government will continue the implementation of these two projects and to revise the relevant schedules of the Ordinance to authorise EMSD to charge non-Government users of the DCS and to offset the capital and operating costs with the fees collected.

Way forward of DCS projects in various areas

District Cooling System at Kai Tak Development

9. KTD DCS is the first-of-its kind DCS in Hong Kong. It has commenced operation in phases since 2013. The system is supplying chilled water for air conditioning to 19 user buildings at KTD, including the sports park, hotels, the cruise terminal, a hospital, MTR stations, schools, Government organisations, and private commercial development projects, etc. with a total air-conditioned floor area of about 750 000 m^2. Currently, the three operating plants at KTD account for 60% of the installed cooling capacity. With the new acute hospital scheduled for completion by end-2025, the utilisation rate of KTD DCS will be further increased. According to the actual operational data, the energy efficiency of KTD DCS is higher than some multi-storey commercial buildings using individual traditional air-cooled air-conditioning systems, by at least 35% of the average annual energy efficiency performance. By the end of 2024, KTD DCS had saved up to about 78 million kilowatt-hours (kWh) of electricity, equivalent to the annual electricity consumption of about 23 800 typical three-member households, as well as a reduction of 50 000 tonnes of carbon emission.

10. In response to the change in land use at KTD in early years, EMSD is adopting multi-pronged approach to cope with the change, including purchasing chillers and associated equipment in phases according to the demand, and using artificial intelligence and big data analyses to optimise the operation and maintenance of chillers, to ensure the efficiency of the DCS and reduce operating costs. It is also proposed to amend Schedule 1 to the Ordinance to revise the service area of the KTD DCS for serving more non-domestic buildings in the vicinity. The proposed new service area of KTD DCS is at **Annex B**.

DCS at Kwu Tung North New Development Area and DCS at Tung Chung New Town Extension (East)

11. In 2021, the Government commenced the construction of the two new DCS at KTN and TCE, which are expected to be completed in 2026 and 2027 respectively[2]. The funding approved for the projects are $5.8 billion and $3.9 billion respectively. It is estimated that, upon full commissioning, KTN DCS will save up to 42 million kWh of electricity annually, equivalent to reducing carbon emission by about 29 400 tonnes per year. As for TCE DCS, it is estimated to save up to 31 million kWh of electricity annually, equivalent to reducing carbon emission by about 21 500 tonnes per year. As the two projects have already entered the main construction phase and the development plan of their potential users are relatively more certain, we will continue to implement these two DCS projects. If the projects were to be suspended now, not only would the completed processes be rendered abortive, it would also give rise to claims from contractors and users of the district cooling service, which would incur unnecessary expenses.

12. To ensure that district cooling services at KTN and TCE can be provided to users as scheduled, we propose to amend Schedule 1 to the Ordinance to include the KTN DCS and TCE DCS, and the corresponding capacity charge rate and the consumption charge rate for the KTN DCS and TCE DCS in Schedule 2 to the Ordinance. The proposed plans of the service areas of the KTN DCS and TCE DCS are at **Annexes C** and **D** respectively.

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[2] Users of the two DCS include MTR stations, schools, Government organisations, community facilities, private commercial developments and commercial portion on the residential sites.

DCS Phase 1 at Hung Shui Kiu/Ha Tsuen

13. The entire project of HSK/HT DCS Phase 1 is divided into two stages, with the first stage of works mainly comprising the laying of underground chilled water pipes, and the second stage for the construction of central cooling plants and connection facilities in user buildings. $3.2 billion was approved for Phase 1 works by the Finance Committee ("FC") of the Legislative Council ("LegCo") in May 2024.

14. In view of the development progress of the area, we will revise the scope of HSK/HT DCS Phase 1 by reducing the two central cooling plants originally planned to be built by the Government to one, so that the DCS covers only the private non-domestic sites and the Government, Institution and Community sites in the vicinity of HSK town centre, and within Phase 2 private non-domestic sites of the area where works have already commenced, to improve the cost-effectiveness of DCS therein. The estimated total air-conditioned floor area will therefore be reduced from about 2 700 000 m^2 to 700 000 m^2, with details set out at **Annex E**. In view that the development programme of the relevant lots is relatively more certain, and the Government has already awarded some works contracts for and commenced some preliminary works of this project (such as ground investigation works), it is recommended that the Government continues taking the lead in commissioning and operating HSK/HT DCS. Depending on the implementation progress of the development programme of the area, our tentative plan is to seek approval from the FC of LegCo on the resources required for the commissioning of the central cooling plant and connection facilities by end-2026. Furthermore, we will construct the associated equipment in phases to dovetail with the implementation of development projects and achieve better cost-effectiveness. Subject to the LegCo's funding approval for the related public works, the cooling plant is expected be put into operation in around 2030. As for the arrangement of cooling service for the remaining areas, the Government will, base on the measures mentioned in paragraph 7 above, to explore the possibility for non-governmental organisations or private developers to commission smaller-scale DCS/centralised multi-building cooling systems on their own in parallel.

DCS at San Tin Technopole

15. The total development area of STT (excluding the Loop) is approximately 540 hectares. The originally proposed STT DCS comprised six cooling plants, underground chilled water pipes and connection facilities in user buildings of STT. The entire project was planned to be implemented in two stages.

16. STT is mainly used for the purpose of I&T and R&D, and these buildings have specific cooling needs, such as the need for providing precisely controlled temperature and humidity round-the-clock for supercomputing centres. Site formation works for the first batch of I&T sites has commenced in end-2024 and is expected to be completed by end-2026, with a view to gradually launching approximately 20 hectares of new I&T sites from 2026-27 for development and operation by the Hong Kong Science and Technology Parks Corporation. Seen in this light, compared with the Government's continued lead in commissioning STT DCS, a more cost-effective and pragmatic approach would be to utilise the above-mentioned incentive measures according to the actual development progress of the area, so as to encourage non-governmental organisations and private developers to build their own DCS for better meeting the cooling needs of the relevant buildings.

Proposed amendments to the Schedules to the Ordinance

17. The Government proposes to amend the Schedules to the Ordinance to revise the service scope of KTD DCS, and to facilitate the commencement of operation of KTN DCS and TCE DCS. The details are set out as follows –

(a) to update the service area of KTD DCS, according to the proposed plan at **Annex B** to cover the redevelopment area surrounded by To Kwa Wan Road and Mok Cheong Street and the site adjacent to Plant 1, so that KTD DCS may serve more non-domestic projects nearby;

(b) to include KTN DCS and TCE DCS into the service scope of the Ordinance in accordance with the proposed plans at **Annexes C** and **D** respectively; and

(c) to include the capacity charges and consumption charges of the KTN DCS and TCE DCS according to the "user pays" principle. The charging mechanism is based on capacity charge[3] and consumption charge[4] to cover the capital cost and operating cost. Currently, the two charges are proposed as follows, which will be adjusted annually according to the changes in the Composite Consumer Price Index and electricity tariff respectively -

	Capacity charge	**Consumption charge**
KTN DCS (new)	$146.13	$0.2546
TCE DCS (new)	$145.15	$0.2451
KTD DCS	$139.35	$0.2451

Calculated per kilowatt (refrigeration) per month

18. As the charges for DCS in various NDAs are affected by multiple factors, including the composition of user buildings, cooling demand, development schedule, construction method, design and number of chiller plants, and the arrangement of water pipe network, etc., the charging for KTN DCS and TCE DCS are considered to be competitive, with their costs comparable to the commissioning and operating of individual water-cooled air-conditioning systems using fresh water cooling towers, based on calculations using the same financial model.

19. Since February 2025, we have consulted relevant stakeholders to DCS, including trade associations, property management sector,

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[3] The capacity charge is to recover capital cost of DCS (including the plants, pipes and heat exchanges for individual consumers of buildings) and operation and maintenance cost to be paid to the contractor. It will be levied according to the contract cooling capacity (*i.e.* an estimation of the maximum cooling capacity for the building) as agreed between the consumers and the Director of Electrical and Mechanical Services before the provision of district cooling services.

[4] The consumption charge is to cover costs that vary with the actual consumption of district cooling services by occupiers / tenants. The major part of the charge is the cost of electricity used to provide district cooling services.

construction sector, professional bodies and public service organisations, etc. on the proposed amendments through consultation sessions. Stakeholders generally had no objections to the proposed amendments.

20. We have also commenced the drafting work for the proposed amendments, and aim to submit an Amendment Order to the LegCo in June - July 2025 by way of negative vetting, with a view to implementing the amended Ordinance within 2025 to provide cooling services to buildings in NDAs in a timely manner.

Next step

21. Apart from the implementation the above amendments, the Government will continue to oversee the operation of KTD DCS, and the projects of KTN DCS and TCE DCS. Regarding the HSK/HT DCS Phase 1 project, we will follow up with the relevant policy bureaux and departments on the development plan of revised scale of DCS, and continue to explore ways of encouraging non-governmental organisations / private developers to participate in the commissioning of DCS.

Advice Sought

22. Members are invited to take note of the above review results and the proposed way forward, and offer their views.

Environment and Ecology Bureau
Electrical and Mechanical Department
April 2025

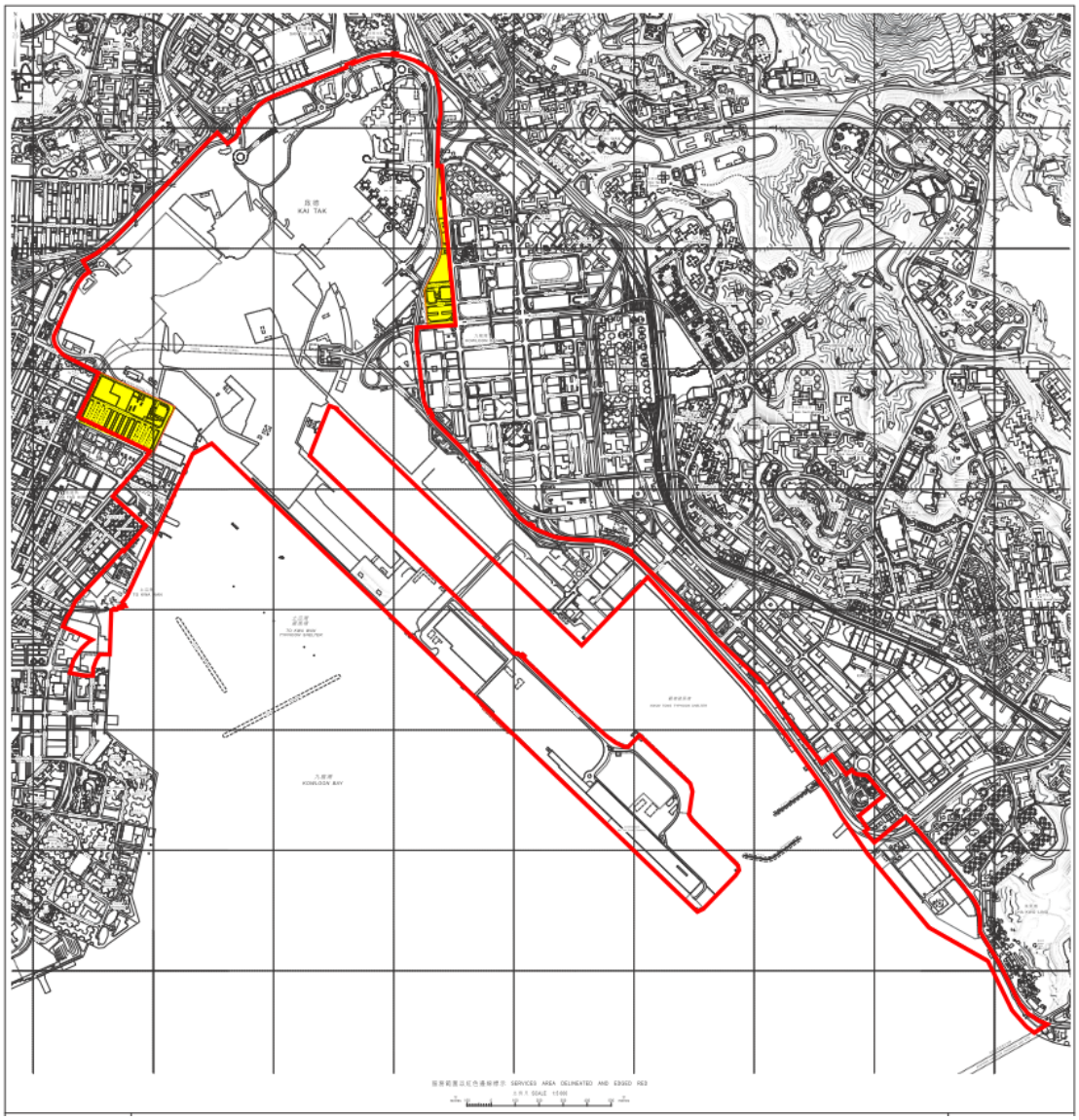
Annex A

Examples of DCS in various implementation modes

Classification	Implementation Mode	DCS
By institutional arrangement	Public-Private Partnership	• DCS at Guangzhou Higher Education Mega Center • DCS at Marina Bay, Singapore
	Private Development	• Small-scale DCS for STMicroelectronics in Ang Mo Kio Industrial Park, Singapore • Hong Kong Science and Technology Park • Lee Gardens, Causeway Bay, Hong Kong • DCS at Pearl-Qatar, Doha, Qatar
By financing mode	User charges	• KTD DCS • DCS at Marina Bay, Singapore • Hong Kong Science and Technology Park
	Financing through capital market	• District cooling and heating system in the downtown of Stockholm, Sweden • Northgate Cyberzone, Manila, the Philippines
	Government subsidies and partial support for infrastructure	• District cooling and heating system in the redevelopment project of the Forks, Winnipeg, Canada • DCS at Qianhai • DCS at Marina Bay, Singapore

Annex B

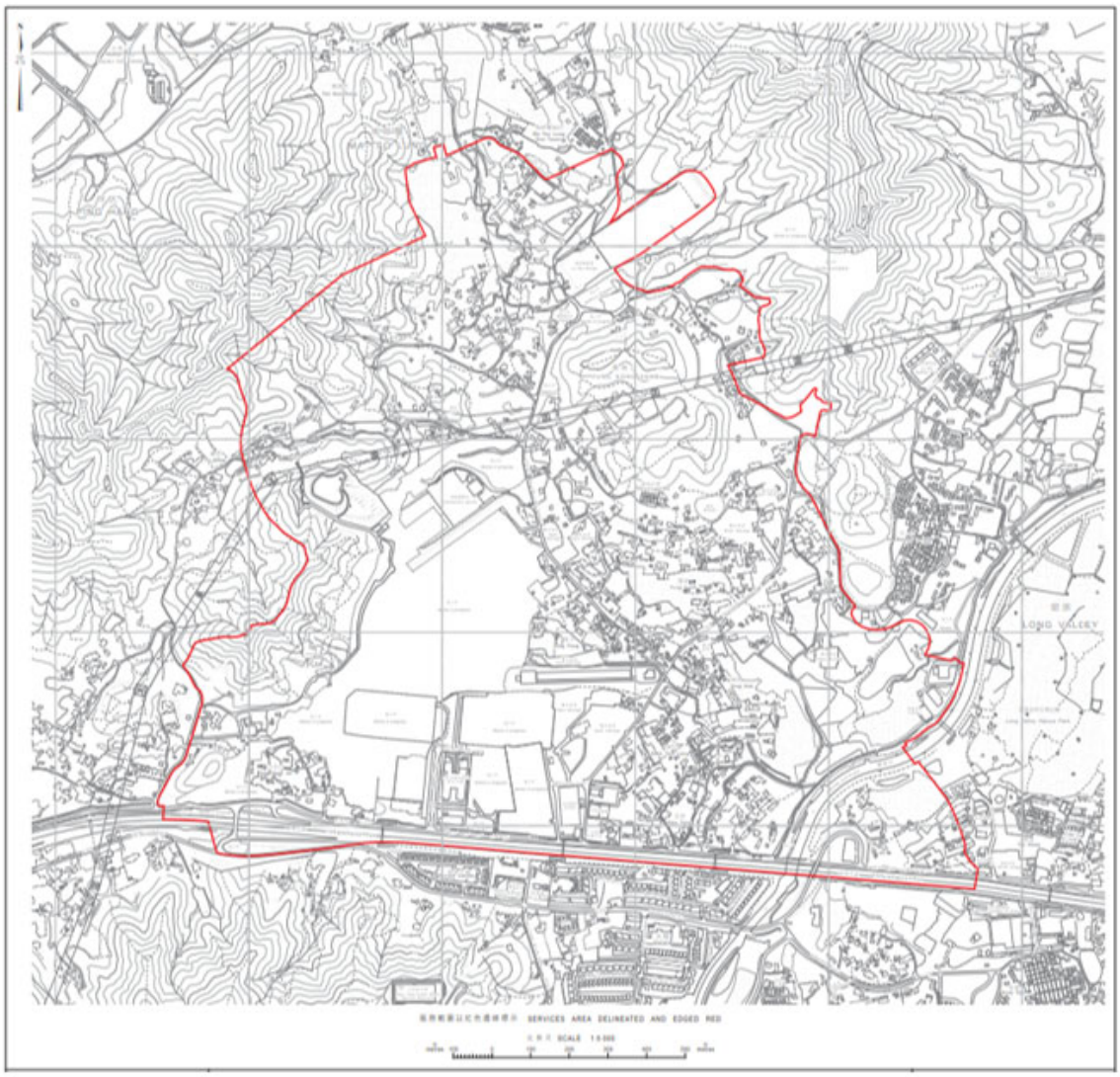
Updated Drawing for the Revised Service Area of KTD DCS (Additional service area are marked in yellow)



Annex C

Drawing for the Proposed Area Served by KTN DCS

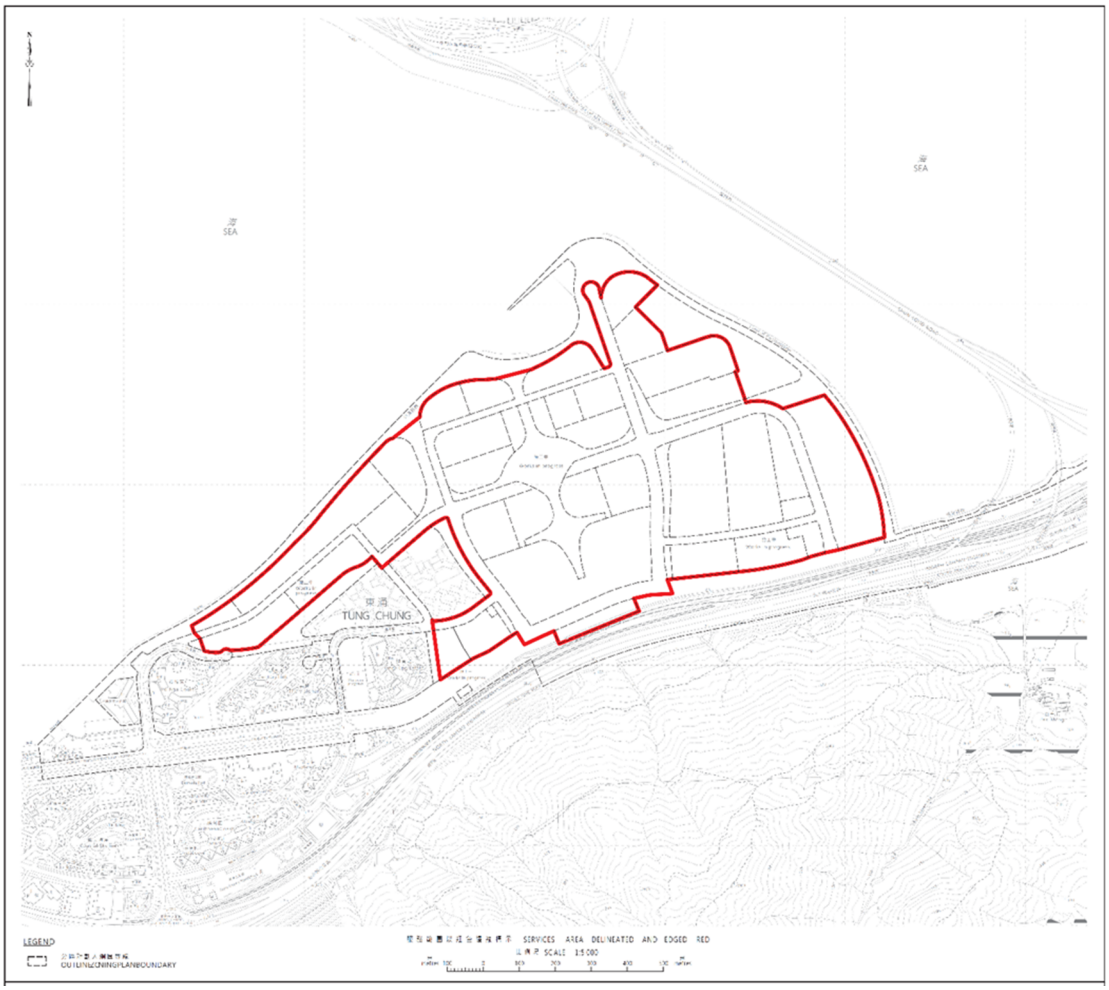
Proposed Area Served by DCS



Annex D

Drawing for the Proposed Area Served by TCE DCS

Proposed Area Served by DCS



Annex E

Details of Change of Scope for HSK/HT DCS

	Original Scope	Revised Proposal
Number of DCS plants	2	1
Total cooling capacity	470 megawatt of refrigeration	106 megawatt of refrigeration
Total air-conditioned floor area	2.7 million m^2	0.7 million m^2
DCS coverage