LC Paper No. CB(1)222/20-21(04)

For discussion on
24 November 2020

LEGISLATIVE COUNCIL
PANEL ON DEVELOPMENT

PWP Item No. 51CG –
District Cooling System at the
Kwu Tung North New Development Area

PURPOSE

This paper briefs Members on the funding application for the proposed upgrading of **5051CG** to Category A for the District Cooling System (DCS) at the Kwu Tung North New Development Area (KTN NDA).

DCS at KTN NDA

2. DCS is a large-scale centralised air-conditioning system which produces chilled water at central chiller plants for distribution to user buildings for air-conditioning purpose. It is a major infrastructure in support of low-carbon development. The 2018 Policy Address stated that the feasibility of providing DCS at KTN NDA would be studied. To promote energy efficiency and conservation, we propose to construct a DCS at KTN NDA to serve a total of about 1.1 million square metres of non-domestic air-conditioned gross floor area, with about 190 megawatt of refrigeration cooling capacity.

PROJECT SCOPE

3. The scope of works under the DCS at KTN NDA comprises –

(a) chiller plants;
(b) chilled water distribution pipes;
(c) electrical and mechanical equipment at chiller plants; and

(d) connection facilities at user buildings.

4. An outline of the scope of works and a layout plan of the DCS chiller plants with the pipe network are at **Annex 1** and **Annex 2** respectively.

5. The construction of the proposed DCS will be carried out in two phases (Phases 1 and 2) to tie in with the development programmes of infrastructure and building projects at KTN NDA. The construction of the DCS will have to match with the programme of ongoing and upcoming road construction under First Phase development (**7747CL**)[1] and Remaining Phase development (**7828CL**)[2] of the KTN NDA as far as possible to minimise the need for road excavation and diversion of completed utility services and roads. This coordinated approach will also save project costs.

6. The works for the chiller plants, including construction of the plant buildings, installation of electrical and mechanical equipment and associated pipes, will be implemented under a Design-Build-Operate ("DBO") contract. Tasking a contractor with both detailed design and construction works will help expedite the project to tie in with the current and planned implementation programmes of the infrastructure works and building developments at KTN NDA. It will also allow incorporation of the operating requirements into the design of DCS to facilitate smooth commissioning and operations as well as subsequent management and maintenance of the facilities.

7. The installation of connection facilities will be implemented through separate contracts in due course as the design and construction can only be worked out after the relevant developers or building owners have finalised their building designs.

8. To tie in with the infrastructure works, subject to funding approval being available in early 2021, we plan to commence the construction of the proposed works in phases and to substantially complete the main works of DCS by 2031.

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[1] Public Works Programme Item No. 7747CL – Advance Site Formation and Engineering Infrastructure Works at Kwu Tung North New Development Area and Fanling North New Development Area

[2] Public Works Programme Item No. 7828CL - Remaining Phase of Site Formation and Engineering Infrastructure Works at Kwu Tung North New Development Area and Fanling North New Development Area

JUSTIFICATION

9. Implementation of the DCS at KTN NDA will bring about significant environmental benefits. Owing to better energy efficiency, the maximum annual saving in electricity consumption upon full utilisation of the DCS is estimated to be 42 million kilowatt-hour, with a corresponding reduction of about 29 400 tonnes of carbon dioxide emission per annum.

10. Apart from energy saving, the DCS will also bring about the following benefits –

(a) reduction in users' upfront capital cost, as chiller plants are not required at user buildings. The reduction is about 5% to 10% of the total building cost;

(b) more flexible building designs for user buildings;

(c) reduced heat island effects at KTN NDA, and no noise and vibration arising from the operation of heat rejection equipment and chillers of air-conditioning plants in user buildings; and

(d) a more adaptable air-conditioning system as compared to individual air-conditioning systems. Individual buildings can adjust their cooling capacity to meet air-conditioning demands without having to carry out extensive modification or retrofitting works.

FINANCIAL IMPLICATIONS

11. The estimated capital cost of the proposed works is about $5,787.7 million in money-of-the-day ("MOD") prices.

12. Following the practice of the existing DCS at the Kai Tak Development, private non-domestic developments will be required by their land lease to connect to the DCS. The tariff for using DCS at KTN NDA will be set at a competitive level, comparable to the cost of using individual water-cooled air-conditioning systems using cooling towers (WACS), which is one of the most cost-effective air-conditioning systems available in the market. Our preliminary assessment shows

that the proposed DCS is financially viable, as the capital and operating costs for the DCS can be recovered through charges collected from DCS consumers over the project life of 30 years. The estimated unit cost of air-conditioning provided by DCS for all types of buildings is lower than that of WACS. EMSD plans to propose amendments to the District Cooling Services Ordinance (Cap. 624) in due course to promulgate the tariff level.

PUBLIC CONSULTATION

13. We have consulted the following parties. They all supported the provision of DCS at KTN NDA –

(a) the Subcommittee on Energy Efficiency and Conservation and Renewable Energy under the Energy Advisory Committee (15 January 2020); and

(b) the North District Council (18 May 2020).

ENVIRONMENTAL IMPLICATIONS

14. This project is not a designated project under the Environmental Impact Assessment (EIA) Ordinance (Cap. 499). The Preliminary Environmental Review (PER) for the project has concluded that the project would not cause long-term adverse environmental impacts with the implementation of the recommended environmental mitigation measures which include acoustic louvres and silencers to mitigate operational fixed plant noise.

15. For mitigating short-term construction impacts, we will implement measures recommended in the PER to control noise, dust and site run-off nuisances, in order to comply with established standards and guidelines. These measures include the use of quality powered mechanical equipment, movable noise barriers, noise enclosure and acoustic mats for noisy construction activities, frequent cleansing and watering of the site, and provisions of wheel-washing facilities. We will also carry out site inspections to ensure that these mitigation measures and good site practices are properly followed and implemented. We have included in the project estimates the costs of implementing these mitigation measures.

16. At the planning and design stages, we have considered the piping alignment, design and construction method of the proposed works to avoid generating construction waste where possible. We will require the contractors to reuse inert construction waste (e.g. excavated soil) on site or in other suitable construction sites as far as possible, in order to minimise the disposal of inert construction waste at public fill reception facilities[3]. We will encourage the contractor to maximise the use of recycled or recyclable inert construction waste, and the use of non-timber formwork to avoid generating construction waste.

17. At the construction stage, we will require the contractor to submit for approval a plan setting out the waste management measures, which will include appropriate mitigation means to avoid, reduce, reuse and recycle inert construction waste. We will ensure that the operations on site comply with the approved plan. We will require the contractor to separate the inert and non-inert construction waste on site for disposal at appropriate facilities. We will control the disposal of inert construction waste and non-inert construction waste at public fill reception facilities and landfills respectively through a trip-ticket system.

18. We estimate that the proposed works will generate about 86 410 tonnes of construction waste. Of this, we will reuse about 61 178 tonnes (70.8%) of inert construction waste on site and deliver about 24 972 tonnes (28.9%) of inert construction waste to public fill reception facilities for subsequent reuse. We will dispose of the remaining 260 tonnes (0.3%) of non-inert construction waste at landfills. The total cost for disposal of construction waste at public fill reception facilities and landfill sites is estimated to be about $2 million for the proposed works (based on a unit charge rate of $71 per tonne for disposal at public fill reception facilities and $200 per tonne at landfills, as stipulated in the Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N)).

19. The Government will continue to take the lead in promoting green building. We aim at achieving the second highest rating under BEAM Plus for the DCS plant buildings which will also incorporate green features and renewable energy systems such as photovoltaic panels. The proposed plant building roof greening ratio will be over 20% of the roof area, and the overall greening ratio will be over 30% of the overall site area.

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[3] Public fill reception facilities are specified in Schedule 4 of the Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap 354N). Disposal of inert construction waste at public fill reception facilities requires a licence issued by the Director of Civil Engineering and Development.

HERITAGE IMPLICATIONS

20. The project will not affect any heritage site, i.e. declared monuments, proposed monuments, graded historic sites / buildings, sites of archaeological interest and Government historic sites identified by the Antiquities and Monuments Office.

LAND ACQUISITION

21. For Phase 1, the proposed works does not require resumption of private land. For Phase 2, the details and scope of land acquisition will be ascertained and proceeded with as appropriate upon substantial completion of the detailed design for PWP Item No. **7828CL** "The Remaining Phase of the Kwu Tung North and Fanling North New Development Areas" .

WAY FORWARD

22. Members are invited to consider the funding application for the DCS at KTN NDA. Subject to Members' comment, we plan to consult the Public Works Subcommittee and seek the approval of the Finance Committee ("FC") in the first quarter of 2021. We will invite tenders for the pipe laying contract in parallel to enable early commencement of the proposed works after approval by FC. We will only award the contract after securing FC's funding approval.

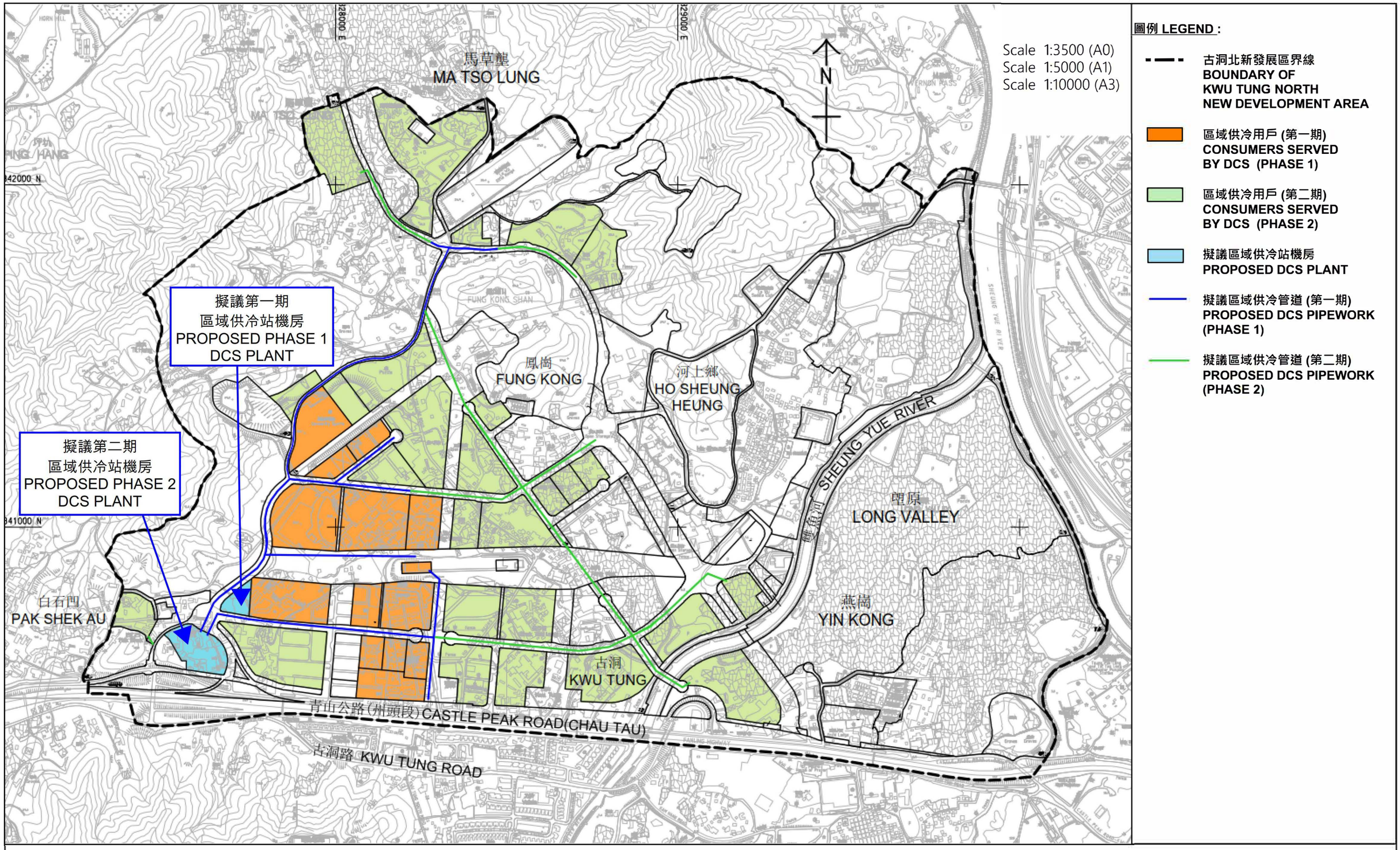
Environment Bureau
Electrical and Mechanical Services Department
November 2020

Annex 1

District Cooling System at the Kwu Tung North New Development Area

Scope of Works

Works Arrangement	Scope of Works
Pipe laying	- Laying of chilled water distribution pipes.
DCS core services under DBO arrangement	- Design for the DCS plants; - Building and engineering works of the DCS chiller plants to support the operation of DCS; - Supply and installation of electrical and mechanical equipment for meeting the cooling demand of user buildings; and - Provision of connection facilities (including heat exchangers) at user buildings. [Note: The operation period of DCS is around 10 to 15 years tentatively.]
E&M installation	- Supply and installation of electrical and mechanical equipment for meeting the cooling demand of user buildings; and - Provision of connection facilities (including heat exchangers) at user buildings.



工務計劃項目第51CG號
古洞北新發展區提供區域供冷系統 - 平面圖
PWP ITEM NO. 51CG
PROVISION OF A DISTRICT COOLING SYSTEM FOR KWU TUNG NORTH NEW DEVELOPMENT AREA - DCS LAYOUT PLAN