For discussion **PWSC(2018-19)32**
on 14 November 2018

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 705 – CIVIL ENGINEERING
Environmental Protection – Refuse Disposal
173DR – Organic Resources Recovery Centre Phase 2

Members are invited to recommend to the Finance Committee the upgrading of **173DR** to Category A at an estimated cost of $2,453 million in money-of-the-day prices.

PROBLEM

Currently, some 3 600 tonnes of food waste is generated every day in Hong Kong. However, the daily food waste treatment capacity of the Organic Resources Recovery Centre (ORRC) Phase 1 (ORRC1) in Siu Ho Wan of Lantau Island is only 200 tonnes, falling far behind food waste generation. The practice of disposing of large amount of surplus food waste at landfills is neither sustainable nor environmentally desirable. We need to continue to develop modern recovery centres to recycle and convert source-separated food waste into useful resources including energy.

PROPOSAL

2. The Director of Environmental Protection, with the support of the Secretary for the Environment, proposes to upgrade **173DR** to Category A at an estimated cost of $2,453 million in money-of-the-day (MOD) prices for the design and construction of the ORRC Phase 2 (ORRC2).

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PROJECT SCOPE AND NATURE

3. The project is located at Sha Ling of the North District and occupies an area of approximately 2.5 hectares. The proposed scope of works under **173DR** comprises –

(a) design and construction of the ORRC2 with a capacity of 300 tonnes per day;

(b) design and construction of associated architectural, building, civil and landscape works;

(c) design and construction of heat recovery, power generation and surplus renewable energy export facilities; and

(d) provision of pollution control and environmental monitoring facilities.

A plan showing the location of the ORRC2 and a conceptual layout plan showing the proposed works are at Enclosures 1 and 2 respectively.

4. Subject to funding approval of the Finance Committee (FC), we plan to commence the proposed works in the first quarter of 2019 for commissioning of the ORRC2 in the fourth quarter of 2021.

JUSTIFICATION

5. Among the 10 345 tonnes of municipal solid waste disposed of at landfills every day in 2016, about 3 600 tonnes (35%) are food waste, of which some 1 274 tonnes are generated from commercial and industrial (C&I) sector such as restaurants, hotels, wet markets, food production and processing industries. The current practice of disposing of most of the biodegradable waste at landfills waste is neither sustainable nor environmentally desirable and also depletes the limited landfill space.

6. The Government has adopted a multi-pronged approach to tackle Hong Kong's food waste problem and published "A Food Waste & Yard Waste Plan for Hong Kong 2014-2022" (Food Waste Plan) in 2014 to set out four strategies for the reduction of food waste, namely reduction at source, reuse and donation, recyclable collection, and turning food waste into energy.

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7. Under the Food Waste Plan, the Government plans to build a network of five to six ORRCs in the territory to recycle food waste into renewable energy, such as biogas and electricity, to alleviate climate change. The Food Waste Plan will also extend the life span of landfills and alleviate potential associated environmental nuisance. Treated food waste will be turned into quality compost as by-product, which can be used for landscaping or agricultural applications. Completed and commissioned in July 2018, the ORRC1 in Siu Ho Wan of Lantau under the Food Waste Plan treats source-separated food waste generated by the C&I sectors and collected mainly from Lantau, Kowloon and Hong Kong Island with a daily capacity of 200 tonnes.

8. As mapped out in the Food Waste Plan, we propose to construct the ORRC2 in Sha Ling of the North District. About 2.5 hectares in area, the selected site was formerly used as a livestock waste composting plant which has ceased operation. The ORRC2 will adopt anaerobic digestion and composting technologies that are similar to those of the ORRC1, and will treat source-separated C&I food waste mainly collected from districts such as Sheung Shui, Fanling, Yuen Long and Sha Tin with a daily capacity of 300 tonnes.

9. The ORRC2 is expected to produce around 30 000 cubic metres of biogas, a form of renewable energy, on a daily basis. To provide electricity and heat for its own facilities would consume about 9 000 cubic metres of biogas daily. The surplus biogas can be converted to about 5 million cubic metres of bio-methane or 24 million kilowatt-hours of electricity annually (approximate to the electricity demand for 5 000 households of three-persons in one year). We intend to export the surplus electricity for use by the nearby government facilities where feasible. Any surplus biogas will be converted to bio-methane for production of town gas or electricity and fed into the power grids of the power companies.

10. With the commissioning of ORRC2, the decrease in use of fossil fuel for electricity generation together with the reduced amount of organic waste landfilled will prevent the emission of some 67 000 tonnes of greenhouse gases each year. The ORRC2 will also produce nearly 10 000 tonnes of compost by-products annually. We will reserve some for use by government departments, farmers and members of the public for free. Besides, the commissioning of ORRC2 can reduce about 110 000 tonnes of food waste to be disposed of at landfills in Hong Kong annually.

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11. Assuming the food waste collection and recycling services provided to the C&I sector under the pilot scheme next year by government is successful, and it can be extended gradually to all over Hong Kong, we have a more pressing need to develop the remaining phases of the ORRCs so as to encourage the public to separate food waste at source and prevent mixing with the domestic waste. Such move will help various sectors to reduce their expenses under the forthcoming Municipal Solid Waste Charging Scheme.

FINANCIAL IMPLICATIONS

12. We estimate the capital cost of the proposed works to be $2,453 million in MOD prices, broken down as follows –

			$ million (in MOD prices)
(a)	Site formation, geotechnical, drainage and civil works		89.4
(b)	Architectural, building and landscape works		836.2
(c)	Organic resources recovery facilities		626.1
	(i) Waste receiving system[1]	92.7	
	(ii) Pre-treatment system[2]	94.1	
	(iii) Anaerobic digestion system[3]	96.5	
	(iv) Composting system[4]	66.2	

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[1] Item (c)(i) is for the design, construction and installation of the food waste receiving system. The works involve the provision of waste reception, monitoring, measurement, storage and feeding, and vehicle registration and washing facilities.

[2] Item (c)(ii) is for the design, construction and installation of the food waste pre-treatment system. The works involve the provision of conveying, screening and grit removal, metal separation, shredding, crushing and mixing equipment.

[3] Item (c)(iii) is for the design, construction and installation of the anaerobic digestion system. The works involve the provision of anaerobic digesters, dewatering system, pressure relief safety device, biogas sampling facilities, pumps and pipe-works.

[4] Item (c)(iv) is for the design, construction and installation of the composting system. The works involve the provision of mixing drums, composting tunnels, maturation area, final screen, and storage and bagging facilities.

		$ million (in MOD prices)	
	(v) Biogas cleaning and storage system[5]	81.5	
	(vi) Associated electrical, control and instrument installations	195.1	
(d)	Ancillary works and facilities[6]		158.5
(e)	Wastewater treatment system[7]		56.8
(f)	Heat recovery, power generation and surplus renewable energy export systems		190.0
(g)	Pollution control and environmental monitoring facilities		112.0
(h)	Environmental mitigation measures and environmental monitoring and audit (EM&A) for construction works		22.1
(i)	Furniture and equipment		0.4
(j)	Consultants' fees for		21.6
	(i) contract administration	11.2	
	(ii) management of resident site staff (RSS)	6.3	
	(iii) operational performance reviews	4.1	

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[5] Item (c)(v) is for the design, construction and installation of the biogas cleaning and storage system. The works involve the provision of biogas cleaning facilities, biogas storage tanks and standby flaring gas units.

[6] Item (d) is for the design and construction of ancillary works and facilities. The works involve the provision of temporary office and site accommodation, temporary roads, maintenance workshop and utility yard during construction.

[7] The ammonia nitrogen concentration in the wastewater is around 100 times higher than domestic sewage so the wastewater needs to be properly treated by the wastewater treatment system of ORRC2 to the statutory discharge standard prior to being discharged into communal sewer for further treatment at the sewage treatment works.

		$ million (in MOD prices)
(k)	Remuneration of RSS	94.6
(l)	Contingencies	245.3
	Total	2,453.0

13. We propose to engage consultants to undertake contract administration and site supervision for the proposed works, and carry out operational performance reviews for 12 months upon completion of the construction. A detailed breakdown of the estimates for consultants' fees and RSS costs by man-month is at Enclosure 3.

14. Subject to funding approval, we plan to phase the expenditure as follows –

Year	**$ million (in MOD prices)**
2018 – 2019	0.0
2019 – 2020	361.6
2020 – 2021	436.1
2021 – 2022	1,347.3
2022 – 2023	157.6
2023 – 2024	150.4
	2,453.0

15. We have derived the MOD estimates on the basis of the Government's latest set of assumptions on the trend rate of change in the prices of public sector building and construction output for the period from 2018 to 2024. We plan to implement the proposed works and the follow-on operation of the ORRC2 under a Design-Build-and-Operate (DBO) contract arrangement. The capital cost of $2,453 million will cover the design and build elements of the contract while the operation will be funded under the General Revenue Account. The contractual operation period will be 15 years. The DBO contract will provide for price adjustments for the entire contract period including the operation period.

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16. We estimate the annual recurrent expenditure arising from the proposed works at current price to be $107.92 million; mainly for the running costs and staff expenditure.

PUBLIC CONSULTATION

17. We consulted the North District Council (NDC) on 14 June 2018 on the specific content and design of the project, as well as results of the environmental and traffic impact assessments concerned. The NDC had no objection to the project.

18. We consulted the Legislative Council Panel on Environmental Affairs on 19 July 2018 on the project. The members supported the Environment Bureau to submit the project to the Public Works Subcommittee for consideration, and then to FC for funding approval. At the request of the Panel on Environmental Affairs, we have provided supplementary information after the meeting.

ENVIRONMENTAL IMPLICATIONS

19. **173DR** is a designated project under Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance (Cap. 499), and an environmental permit (EP) is required for its construction and operation. The EIA report was approved under the EIA Ordinance by the Director of Environmental Protection in December 2013, and an EP for its construction and operation was issued in December 2013. The EIA report concluded that, with the implementation of the recommended environmental mitigation measures, the environmental impact of the project could be controlled to within the criteria under the EIA Ordinance and the Technical Memorandum on EIA Process. We estimate the costs of implementing the environmental mitigation measures and the EM&A programme to be $22.1 million (in MOD prices), and these costs have been included in the overall project estimate of the proposed project.

20. At the construction stage, we will require the contractor to control construction noise, dust and site run-off to levels within established standards and guidelines through the implementation of the recommended mitigation measures such as the use of quiet construction plant and temporary noise barriers, regular water spraying on site to reduce dust emissions, as well as proper control and treatment of site run-offs during construction in the relevant contracts. We will also carry out regular site inspections to ensure that the EM&A Programme and good practices are properly conducted on site and the mitigation measures recommended in the EIA report are effective.

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21. At the planning and design stages, we will require the contractor to consider ways to reduce the generation of construction waste where possible. In addition, we will require the contractor to reuse inert construction waste (e.g. excavated soil and demolished concrete) on site or in other suitable construction sites as far as possible in order to minimise the disposal of inert construction waste to public fill reception facilities[8] (PFRF). We will encourage the contractor to maximise the use of recycled or recyclable inert construction waste, and the use of non-timber formwork to further reduce the generation of construction waste.

22. 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 day-to-day operations on site comply with the approved plan, and will require the contractor to separate the inert portion from non-inert construction waste on site for disposal at appropriate facilities. We will control the disposal of inert and non-inert construction waste at PFRF and landfills respectively through a trip-ticket system.

23. We estimate that the project will generate in total about 29 000 tonnes of construction waste. Of these, we will reuse about 5 000 tonnes (17%) on site and deliver 23 200 tonnes (80%) of inert construction waste to PFRF for subsequent reuse. We will dispose of the remaining 800 tonnes (3%) of non-inert construction waste at landfills. The total cost for disposal of construction waste at PFRF and landfills is estimated to be about $1.8 million for this project (based on a unit charge rate of $71 per tonne for disposal at PFRF and $200 per tonne at landfills as stipulated in the Waste Disposal (Charge for Disposal of Construction Waste) Regulation (Cap. 354N)).

HERITAGE IMPLICATIONS

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

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[8] 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 in public fill reception facilities requires a licence issued by the Director of Civil Engineering and Development.

LAND ACQUISITION

25. The proposed works do not require any land acquisition.

TRAFFIC IMPLICATIONS

26. We have carried out a traffic impact assessment (TIA) for the proposed works. It is expected that there will be about 70 round trips of food waste collection vehicles (FWCVs) between the ORRC2 and the various collection points on a daily basis upon commissioning of the ORRC2. Based on the existing patterns of food waste generation in C&I operations, FWCVs will mainly travel during non-peak hours via Man Kam To Road and Kong Nga Po Road. Findings of the TIA have concluded that all the major road junctions in the vicinity of the ORRC2 have sufficient traffic capacity. As to the specific traffic demand around the nearby Sandy Ridge Cemetery during the Ching Ming Festival and Chung Yeung Festival, special arrangement will be made for delivery of food waste to the ORRC2 outside grave-sweeping hours (i.e. after 5 p.m.) during the two festive periods to avoid causing cumulative traffic impact on the roads concerned. According to the findings of the assessment, the project will not cause significant impact on the traffic network in the area. The Environmental Protection Department (EPD) will require, through provisions in the works contract, the contractor of the ORRC2 to set up a round-the-clock hotline to handle public enquiries or complaints about the construction or operation (including traffic matters) of the ORRC2. The contractor will have to address the matters promptly and report to the EPD on its improvement efforts.

27. The Government understands that local communities are concerned about the overall traffic problem faced by the North District. In this connection, the Civil Engineering and Development Department is planning to improve a number of major road junctions in the Sheung Shui and Fanling new towns. Such measures include widening a section of Kong Nga Po Road (some 1.8 kilometres in length) between the junction of Man Kam To Road and the proposed police facilities in Kong Nga Po to not only comply with existing road standards (including the provision of additional footpaths and street lighting) but also enhance road safety and capacity. Moreover, it is predicted that the cross-boundary traffic between Hong Kong and Shenzhen via Man Kam To will be diverted to the Liangtang/Heung Yuen Wai Boundary Control Point upon its commissioning. This will help alleviate the traffic congestion currently experienced along Man Kam To Road. Meanwhile, the EPD will review the existing routes adopted for waste delivery to the North East New Territories (NENT) Landfill. Some delivery vehicles travelling from Sha Tin and Tai Po to the NENT Landfill via Tolo Highway will use the then completed Lung Shan Tunnel instead to reach the NENT Landfill directly. This will in turn reduce the daily traffic volume along Sha Tau Kok Road

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in Fanling by some 200 vehicle trips and further help relieve traffic pressure in the North District. Implementation of the traffic improvement measures proposed above will be beneficial to the traffic conditions in Sheung Shui and Fanling.

BACKGROUND INFORMATION

28. In December 2011, we engaged consultants to carry out the feasibility study, EIA and tendering exercise for the project. The total estimated cost was about $13.83 million (in MOD prices). We charged this amount to block allocation Subhead **5101DX** "Environmental works, studies and investigations for items in Category D of the Public Works Programme".

29. We upgraded **173DR** to Category B in October 2015. To dovetail with the project programme, we have initiated parallel tendering in October 2016 with a view to enable early commencement of the project. The contract will only be awarded after the funding is approved by FC.

30. Of the 458 trees within the project boundary, 441 trees will be preserved. The proposed project will involve the felling of 14 trees and the removal of 3 dead trees. All trees to be felled are not important trees[9]. We will require the contractor to incorporate planting proposals as part of the project.

31. We estimate that the proposed works will create about 465 jobs (400 for labourers and 65 for professional/technical staff) providing a total employment of 12 400 man-months.

Environment Bureau
November 2018

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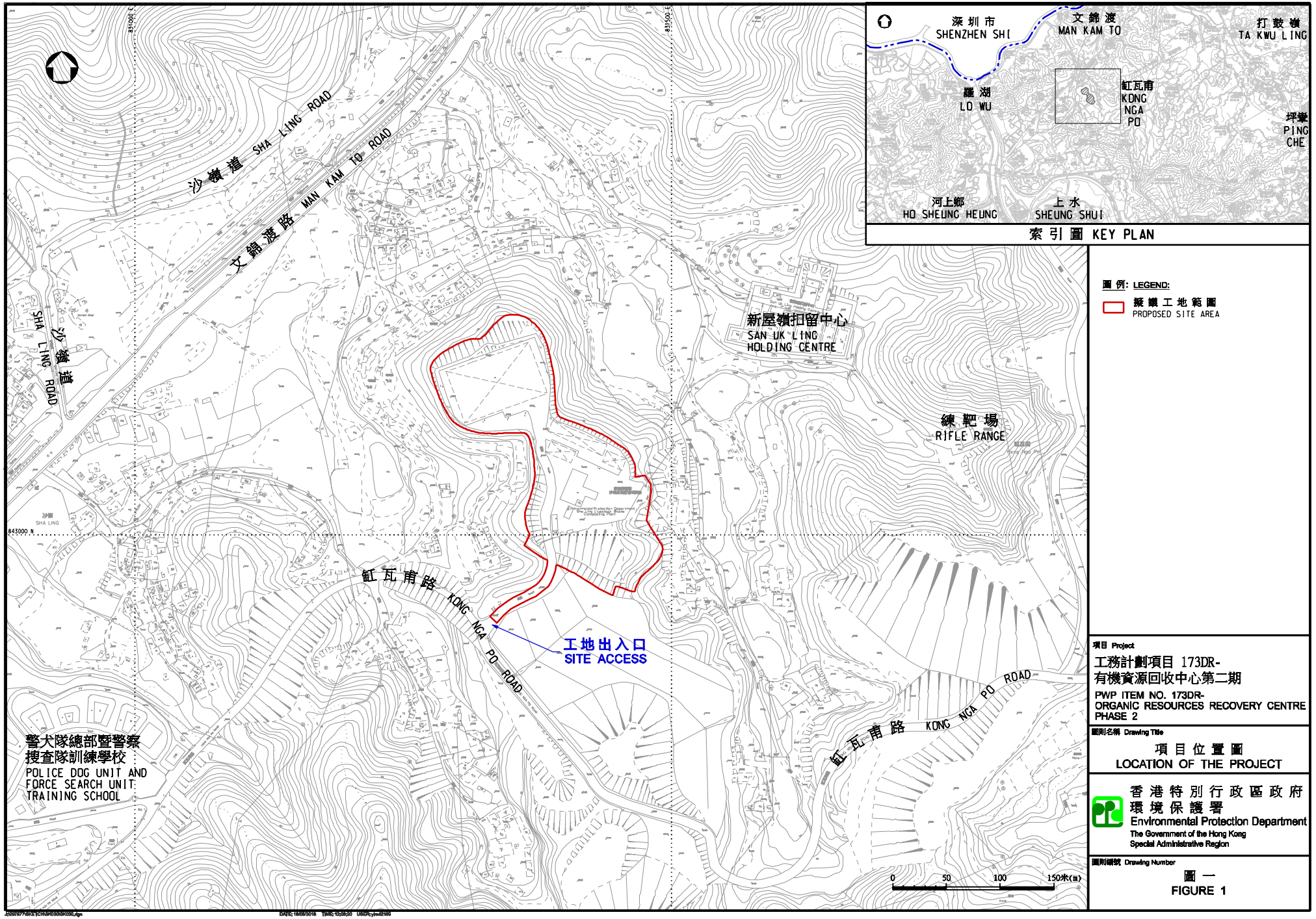
[9] "Important trees" refer to trees in the Register of Old and Valuable Trees, or any other trees that meet one or more of the following criteria -

(a) trees of over 100 years old or above;
(b) trees of cultural, historical or memorable significance e.g. Fung Shui trees, trees as landmark of monastery or heritage monument, and trees in memory of an important person or event;
(c) trees of precious or rare species;
(d) trees of outstanding form (taking account of overall tree sizes, shape and any special features) e.g. trees with curtain like aerial roots, trees growing in unusual habitat; or
(e) trees with trunk diameter equal or exceeding 1.0 metre (m) (measured at 1.3 m above ground level), or with height/canopy spread equal or exceeding 25 m.



項目 Project

工務計劃項目 173DR-
有機資源回收中心第二期

PWP ITEM NO. 173DR-
ORGANIC RESOURCES RECOVERY CENTRE
PHASE 2

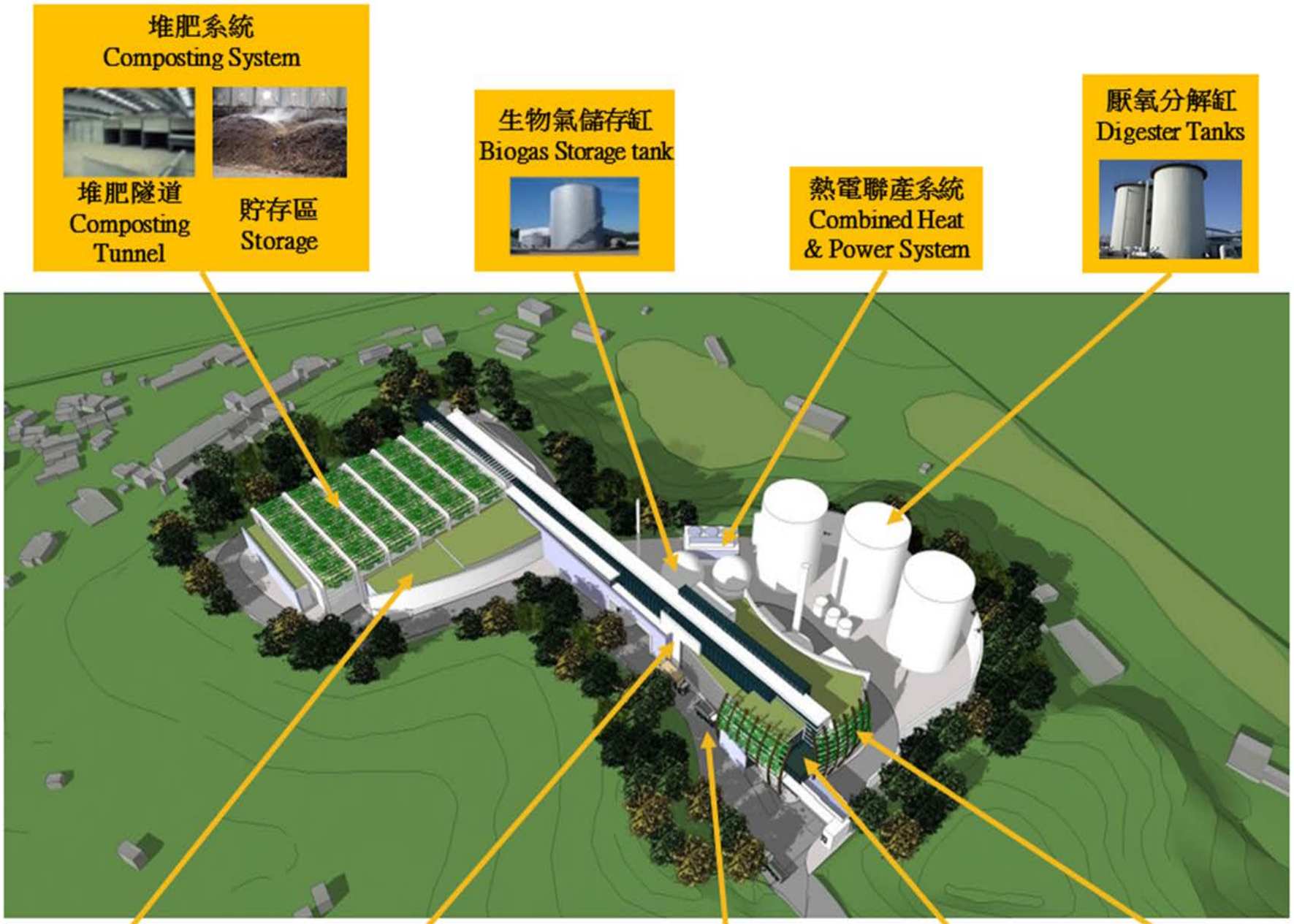
圖則名稱 Drawing Title

項目位置圖
LOCATION OF THE PROJECT

香港特別行政區政府
環境保護署
Environmental Protection Department
The Government of the Hong Kong
Special Administrative Region

圖則編號 Drawing Number

圖一
FIGURE 1



項目 Project

工務計劃項目 173DR-
有機資源回收中心第二期

PWP ITEM NO. 173DR-
ORGANIC RESOURCES RECOVERY CENTRE PHASE 2

圖則名稱 Drawing Title

設計概念圖
CONCEPTUAL DESIGN

香港特別行政區政府
環境保護署
Environmental Protection Department
The Government of the Hong Kong Special Administrative Region

圖則編號 Drawing Number

圖二
FIGURE 2

173DR – Organic Resources Recovery Centre Phase 2

Breakdown of estimates for consultants' fees and resident site staff costs (in September 2018 prices)

			Estimated man-months	Average MPS* salary point	Multiplier (Note 1)	Estimated fees ($ million)
(a)	Consultants' fees for contract administration (Note 2)	Professional	52	38	2.0	8.5
		Technical	25	14	2.0	1.4
					Sub-total	9.9 #
(b)	Resident site staff (RSS) costs (Note 3)	Professional	363	38	1.6	47.6
		Technical	893	14	1.6	41.1
					Sub-total	88.7
	Comprising:-					
	(i) Consultants' fees for management of RSS				5.5#	
	(ii) Remuneration of RSS				83.2#	
(c)	Consultants' fees for operational performance reviews (Note 2)	Professional	19	38	2.0	3.1
		Technical	9	14	2.0	0.5
					Sub-total	3.6#
					Total	**102.2**

* MPS = Master Pay Scale

Notes

1. A multiplier of 2.0 is applied to the average MPS salary point to estimate the full staff costs, including the consultants' overheads and profit, as the staff will be employed in the consultants' offices. A multiplier of 1.6 is applied to the average MPS salary point to estimate the cost of RSS supplied by the consultants (as at now, MPS salary point 38 = $81,975 per month and MPS salary point 14 = $28,725 per month.).
2. The consultants' staff cost for site supervision is based on the estimate prepared by the Director of Environmental Protection. The actual man-months and fees will only be known after the selection of consultants through the usual competitive lump sum fee

bidding system. The construction phase of the assignment will only be executed subject to the Finance Committee's approval to upgrade **173DR** to Category A.

3. The actual man-months and actual costs will only be known after completion of the construction works.

Remarks

The cost figures in this Enclosure are shown in constant prices to correlate with the MPS salary point of the same year. The figures marked with # are shown in money-of-the-day prices in paragraph 12 of the main paper.