For discussion **PWSC(2015-16)49**
on 17 February 2016

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 704 – DRAINAGE
Environmental Protection – Sewerage and sewage treatment
223DS – Yuen Long and Kam Tin sewage treatment upgrade – upgrading of San Wai sewage treatment works
235DS – Yuen Long and Kam Tin sewerage and sewage disposal

Members are invited to recommend to the Finance Committee –

(a) the upgrading of part of **223DS** and part of **235DS**, entitled "Upgrading of San Wai sewage treatment works – phase 1", to Category A at an estimated cost of $2,572.3 million in money-of-the-day prices; and

(b) the retention of the remainders of **223DS** and **235DS** in Category B.

PROBLEM

It is necessary to upgrade the existing San Wai sewage treatment works (SWSTW) to cope with the projected increase in sewage flow demand and enhance its environmental performance.

/PROPOSAL …..

PROPOSAL

2. The Director of Drainage Services, with the support of the Secretary for the Environment, proposes to upgrade part of **223DS** and part of **235DS** to Category A at an estimated cost of $2,572.3 million in money-of-the-day (MOD) prices for carrying out the phase 1 upgrading of the SWSTW.

PROJECT SCOPE AND NATURE

3. The part of **223DS** that we propose to upgrade to Category A comprises –

(a) design and construction of chemically enhanced primary treatment (CEPT)[1] facilities and ultraviolet disinfection facilities with treatment capacity of 200 000 cubic metres (m^3) per day; and

(b) design and construction of ancillary works, including an administration building[2], a maintenance workshop, access roads and landscaping works.

4. The part of **235DS** that we propose to upgrade to Category A comprises design and construction of preliminary treatment[3] facilities with treatment capacity of 200 000 m^3 per day.

5. Site plans showing the proposed works for the SWSTW and the catchment area of SWSTW are at Enclosures 1 and 2 respectively[4].

6. To match the proposed programme for commencement of works, we have invited tender for the proposed works. Subject to funding approval of the Finance Committee, we plan to commence the design and construction of the proposed works in the first quarter of 2016 for completion in the third quarter of 2020.

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[1] Under CEPT, chemicals are added during the primary sedimentation process to enhance the removal of suspended solids.

[2] The administration building will be a two-storey building with a total floor area of about 420 square metres on each storey.

[3] Preliminary treatment includes screening and removal of solids and grit which consists of sand and bone pieces, etc.

[4] As the proposed works will be implemented under a Design-Build-and-Operate contract, the layout of the proposed facilities in the SWSTW is subject to the contractor's design.

7. We will retain the remainders of **223DS** and **235DS** in Category B for future upgrading of the SWSTW to further increase its sewage treatment capacity as necessary. The remainder of **235DS** also comprises the provision of sewerage in Yuen Long and Kam Tin. Funding for the remainders of **223DS** and **235DS** will be sought at a later stage as necessary after completion of the design and preparatory work.

JUSTIFICATION

8. The existing SWSTW, serving part of the Yuen Long, Tin Shui Wai and Hung Shui Kiu areas in the Northwest New Territories (NWNT), is a preliminary treatment plant with design treatment capacity of 164 000 m^3 per day. At present, it only removes solids and grit from the sewage inflow prior to discharging the treated effluent into the northwestern waters via the NWNT effluent tunnel and then a submarine outfall.

9. Currently, the quantity of sewage flow to the SWSTW for treatment is about 130 000 m^3 per day. We estimate that the population in the catchment area of the SWSTW would increase from the existing 630 000 to 700 000[5] by 2020 and further increase by around 100 000 from 2020 onwards, due to developments under planning in the catchment area of about 1 300 hectares. By 2020, the existing SWSTW design treatment capacity will not be sufficient to meet the projected flow. We therefore need to increase the daily treatment capacity of the SWSTW by 36 000 m^3 under phase 1 to 200 000 m^3 to cater for the forecast sewage flow due to population growth in the NWNT from 2020 onwards. To reduce pollution loads to the northwestern waters, we also plan to enhance the environmental performance of the SWSTW by constructing CEPT and ultraviolet disinfection facilities. We will plan the next phase of upgrading of the SWSTW in the light of the recommendations in the study for the development of the proposed Hung Shui Kiu new development area.

10. To optimise land use and maximise cost-effectiveness, the proposed works on increasing the design capacity of the SWSTW and upgrading its sewage treatment level will be combined and implemented as an integrated project under one single contract. A Design-Build-and-Operate (DBO) contract arrangement will be adopted to allow the contractor flexibility in planning the works schedule in the design and construction stages, and to achieve reasonable construction and operation costs of the SWSTW. The phase 1 upgrading works of the SWSTW will be carried out at a site adjacent to the existing SWSTW to minimise interfacing problems. The existing service at the SWSTW will not be affected during the phase 1 construction of the upgraded SWSTW. After the commissioning of the upgraded SWSTW under phase 1, the existing SWSTW will be decommissioned and its site will be reserved for future upgrading of the SWSTW as necessary.

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[5] The population figures are estimated using 2011-based Territorial Population and Employment Data Matrices released by the Planning Department.

FINANCIAL IMPLICATIONS

11. We estimate the capital cost of the proposed works to be $2,572.3 million in MOD prices (please see paragraph 13 below), broken down as follows –

				$ million			
			223DS		**235DS**	**Total**	
(a)	Design and construction of preliminary treatment facilities, CEPT facilities, ultraviolet disinfection facilities and ancillary works		1,774.1		110.2	1,884.3	
	(i)	civil works	1,168.0		67.1	1,235.1	
	(ii)	electrical and mechanical works	606.1		43.1	649.2	
(b)	Environmental mitigation measures		5.8		0.3	6.1	
(c)	Consultants' fees for		9.1		0.4	9.5	
	(i)	contract administration	5.2		0.2	5.4	
	(ii)	management of resident site staff	3.9		0.2	4.1	
(d)	Remuneration of resident site staff		93.6		4.5	98.1	
(e)	Contingencies		136.2		6.0	142.2	
		Sub-total	2,018.8		121.4	2,140.2	(in September 2015 prices)
(f)	Provision for price adjustment		408.2		23.9	432.1	
		Total	2,427.0		145.3	2,572.3	(in MOD prices)

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12. A detailed breakdown of the estimates for the consultants' fees and resident site staff costs by man-months is at Enclosure 3.

13. Subject to funding approval, we will phase the expenditure as follows –

Year	**$ million (Sept 2015)**		**Price adjustment factor**	**$ million (MOD)**	
	223DS	**235DS**		**223DS**	**235DS**
2015 – 2016	4.0	1.0	1.00000	4.0	1.0
2016 – 2017	146.9	9.0	1.05875	155.5	9.5
2017 – 2018	520.0	35.0	1.12228	583.6	39.3
2018 – 2019	620.0	34.0	1.18961	737.6	40.4
2019 – 2020	346.0	25.0	1.26099	436.3	31.5
2020 – 2021	334.2	10.9	1.32719	443.5	14.5
2021 – 2022	47.7	6.5	1.39355	66.5	9.1
	2,018.8	121.4		2,427.0	145.3

14. 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 2015 to 2022. The capital cost of $2,572.3 million will cover the design and build elements 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 adjustment during the design and build stages, and inflationary adjustment throughout the operation stage.

15. We estimate the additional annual recurrent expenditure arising from the proposed works to be $96.5 million ($93.7 million for the part of **223DS** and $2.8 million for the part of **235DS**). The recurrent expenditure attributable to sewage charges has been taken into account in determining the sewage charges for the years 2008-09 to 2017-18 stipulated in the Sewage Services (Sewage Charge) Regulation (Cap. 463A) and the recurrent expenditure attributable to trade effluent surcharges will be taken into account in reviewing the trade effluent surcharge rates in future.

PUBLIC CONSULTATION

16. On 1 December 2011, we consulted the Ha Tsuen Rural Committee (HTRC), which in-principle supported the proposed works subject to an agreeable zonal compensation rate for land resumption. HTRC expressed concerns on land resumption-related issues which were later addressed in a follow-up meeting with the Chairman and Vice-chairman of HTRC on 12 January 2012. No further follow-up enquiries or objections about the proposed works had been raised.

17. On 12 March 2012, we consulted the Environmental Improvement Committee of Yuen Long District Council on the proposed works. Members supported the proposed works. On 31 December 2014, we updated Members in writing of the progress of the proposed works.

18. We gazetted the proposed works in accordance with the Water Pollution Control (Sewerage) Regulation (Cap.358) on 20 April 2012. A total of seven objections were received during the statutory objection period. In order to address the objectors' concerns, the land resumption boundary was amended and the Amendment to the Plan and Scheme was gazetted on 11 January 2013. One more objection was received during the statutory objection period of the Amendment Scheme. Among the eight objections received, one objection was resolved while the remaining seven objections were unresolved. The seven unresolved objections were mainly on compensation for land resumption and business loss. The Amendment Scheme was subsequently authorised by the Chief Executive-in-Council without modification and the relevant authorization notice was gazetted on 30 August 2013.

19. We consulted the Legislative Council Panel on Environmental Affairs on 23 March 2015 and Members raised no objection to the proposed works.

ENVIRONMENTAL IMPLICATIONS

20. The proposed works is a designated project under Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) (Chapter 499). In May 2003, the Environmental Impact Assessment (EIA) report for the proposed works was approved under the EIAO. The EIA report concluded that the environmental impacts of the proposed works can be controlled to within the criteria under the EIAO and the Technical Memorandum on EIA Process. We have obtained an Environmental Permit (EP) in October 2013 for the construction and operation of the proposed works after completion of a review confirming the validity of the findings of the EIA report in 2003. We shall implement the mitigation measures recommended in the approved EIA report and stipulated in the EP. We have included in paragraph 11(b) a sum of $5.8 million and $0.3 million (in September

2015 prices) in the project estimates under **223DS** and **235DS** respectively for implementation of the environmental mitigation measures.

21. At the planning and preliminary design stages, we have considered minimising the excavation for structures to reduce the generation of construction waste where possible. We will require the contractor to reuse inert construction waste, e.g. excavated soil and demolished concrete on site as far as possible, in order to minimise the disposal of inert construction waste to the public fill reception facilities (PFRF)[6]. We will encourage the contractor to maximise the use of recycled or recyclable inert construction waste, as well as the use of non-timber formwork to further minimise the generation of construction waste.

22. At the construction stage, we will require the contractor to submit for approval a plan setting out waste management measures, which will include appropriate mitigation means to avoid, reuse and recycle inert construction waste. We will ensure that the day-to-day operations on site comply with the approved plan. We 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 to PFRF and landfills respectively through a trip-ticket system.

23. We estimate that the proposed works will generate in total about 65 300 tonnes of construction waste which will be disposed of as shown below –

	223DS *(part)*	**235DS** *(part)*	**Total**
		Tonnes	
Inert construction waste to be reused on site	8 300	500	8 800 (13%)
Inert construction waste to be delivered to PFRF for subsequent reuse	50 300	3 000	53 300 (82%)
Non-inert construction waste to be disposed of at landfills	3 000	200	3 200 (5%)
Total construction waste generated	61 600	3 700	65 300 (100%)

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[6] PFRF are specified in Schedule 4 of Waste Disposal (Charges for Disposal of Construction Waste) Regulation. Disposal of inert construction waste in PFRF requires a licence issued by the Director of Civil Engineering and Development.

24. The total costs for accommodating construction waste at PFRF and landfill sites are estimated to be $1.73 million and $0.11 million for the proposed works under **223DS** and **235DS** respectively (based on a unit charge rate of $27 per tonne for disposal at PFRF and $125 per tonne at landfills as stipulated in the Waste Disposal (Charges for Disposal of Construction Waste) Regulation).

HERITAGE IMPLICATIONS

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

LAND ACQUISITION

26. We have reviewed the design of the proposed works to minimise the extent of land acquisition. We have to resume a total of 20 private agricultural lots (about 22 705.3 square metres (m^2)) and to clear about 7 500 m^2 of government land for implementation of the proposed works under **223DS**. The land resumption and clearance will not affect any household or domestic structures. Land resumption is not required for **235DS**. We will charge the cost of land resumption and clearance estimated at $187.1 million to **Head 701 - Land Acquisition**. A breakdown of the land resumption and clearance costs is at Enclosure 4.

BACKGROUND INFORMATION

27. In September 2000, we upgraded **223DS** "Yuen Long and Kam Tin sewage treatment upgrade – upgrading of San Wai sewage treatment works" to Category B.

28. In July 2001, we commissioned a consultancy to carry out the EIA, ground investigations and laboratory tests for **223DS** at an estimated cost of $8.6 million in MOD prices. We charged this amount to block allocation **Subhead 4100DX** "Drainage works, studies and investigations for items in Category D of the Public Works Programme". The consultancy was completed in October 2013.

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29. In December 2007, we commissioned a consultancy to carry out the EIA review and reference design, prepare the contract documentation and assist in the tendering process for **223DS** at an estimated cost of $9.3 million in MOD prices. We charged this amount to block allocation **Subhead 4100DX** "Drainage works, studies and investigations for items in Category D of the Public Works Programme". The consultancy commenced in December 2007 and was anticipated to complete by the first quarter of 2016.

30. In September 1998, we upgraded **215DS** "Yuen Long and Kam Tin sewerage and sewage disposal" to Category B for the provision and upgrading of sewerage facilities in the NWNT. In February 2004, we split **215DS** into **215DS** "Yuen Long and Kam Tin sewerage and sewage disposal – Kam Tin trunk sewerage phase 1 and Au Tau trunk sewers" and **235DS** "Yuen Long and Kam Tin sewerage and sewage disposal". We upgraded **235DS** to Category B in October 2005.

31. In July 2006, we upgraded part of **235DS** to Category A as **350DS** "Yuen Long and Kam Tin sewerage and sewage disposal – consultants' fees and investigations" at an approved project estimate (APE) of $28 million in MOD prices for engaging consultants to undertake detailed design and necessary investigations for the civil engineering works for provision of public sewerage facilities in the NWNT under **235DS.** The consultancy commenced in December 2006 for completion in December 2018.

32. In May 2009, we upgraded part of **235DS** to Category A as **368DS** "Yuen Long South sewerage and expansion of Ha Tsuen sewage pumping station" at an APE of $550.8 million in MOD prices for the construction of trunk sewers in the Yuen Long South and Ha Tsuen areas, a new sewage pumping station near Shui Tsiu San Tsuen Road in Yuen Long South, and expansion of the existing Ha Tsuen sewage pumping station. The main works for **368DS** were substantially completed in January 2014.

33. In June 2011, we upgraded part of **235DS** to Category A as **376DS** "Trunk sewerage at Lau Fau Shan" at an APE of $196.3 million in MOD prices for the provision of trunk sewerage at Lau Fau Shan to mitigate water pollution in the nearby watercourses and the receiving waters of Deep Bay and improving the living environment. The main works for **376DS** are anticipated for substantial completion by December 2015.

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34. In September 2012, we slightly changed the project scope of **350DS** for engaging consultants to undertake consultancy services for the investigation stage of the effluent polishing scheme, instead of the original effluent export scheme, at the Yuen Long sewage treatment works (YLSTW)[7].

35. Of the 171 trees within the project boundary, 15 trees will be preserved. The proposed works will involve the removal of 156 trees including 121 trees to be felled and 35 trees to be replanted within the project site. All trees to be removed are not important trees[8]. We will incorporate planting proposal as part of the project, including an estimated 67 trees and 1 200 m^2 of green roofscape.

36. We estimate that the proposed works under **223DS** and **235DS** will create about 440 jobs (355 for labourers and another 85 for professional or technical staff), providing a total employment of 22 000 man-months.

Environment Bureau
December 2015

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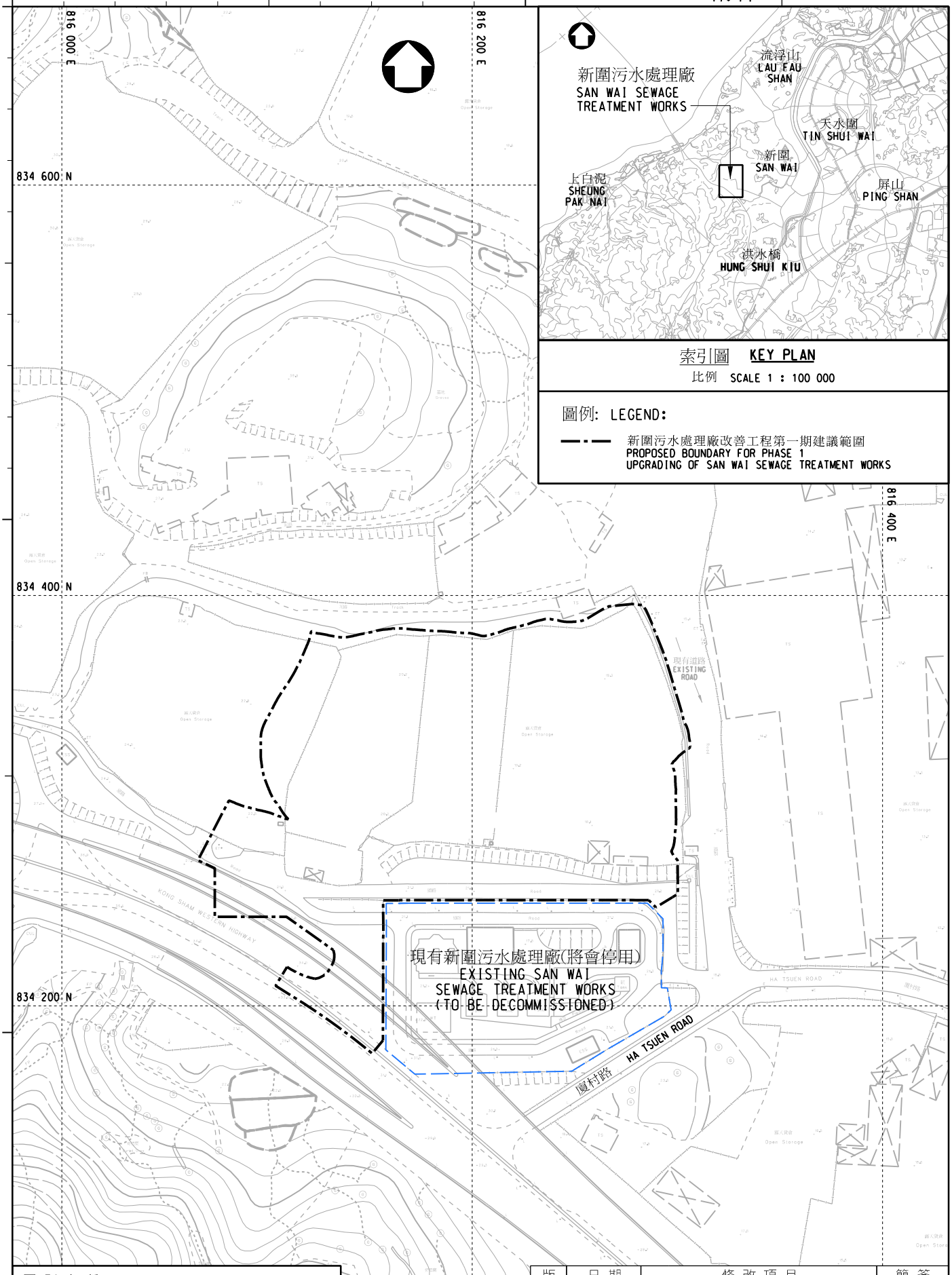
[7] Under the original effluent export scheme, treated effluent from the YLSTW will be exported to the SWSTW for subsequent discharge to the northwestern waters while under the effluent polishing scheme, the treatment level at the YLSTW will be enhanced and the treated effluent is discharged to Deep Bay.

[8] "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 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 important persons 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 m (measured at 1.3 m above ground level), or with height/canopy spread equal or exceeding 25 m.

附件一 ENCLOSURE 1



圖則名稱 drawing title	版 no.	日期 date	修改項目 description	簡簽 initial
工務工程計劃第4223DS號及4235DS號： 元朗及錦田污水處理系統改善工程 - 新圍污水處理廠改善工程及 元朗及錦田污水收集系統及污水排放計劃 PWP ITEM NO. 4223DS AND 4235DS: YUEN LONG AND KAM TIN SEWAGE TREATMENT UPGRADE - UPGRADING OF SAN WAI SEWAGE TREATMENT WORKS AND YUEN LONG AND KAM TIN SEWERAGE AND SEWAGE DISPOSAL				

繪畫 drawn	SIGNED L. L. LIU	日期 date 4 FEB 2015	圖則編號 drawing no. DSS/2015/001
核對 checked	SIGNED Ir C. K. KWOK	日期 date 4 FEB 2015	比例 scale 1 : 2500 OR AS SHOWN
批核 approved	SIGNED Ir S. C. LAU	日期 date 4 FEB 2015	
部門 office	淨化海港計劃部 HARBOUR AREA TREATMENT SCHEME DIVISION		

香港特別行政區政府渠務署
DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

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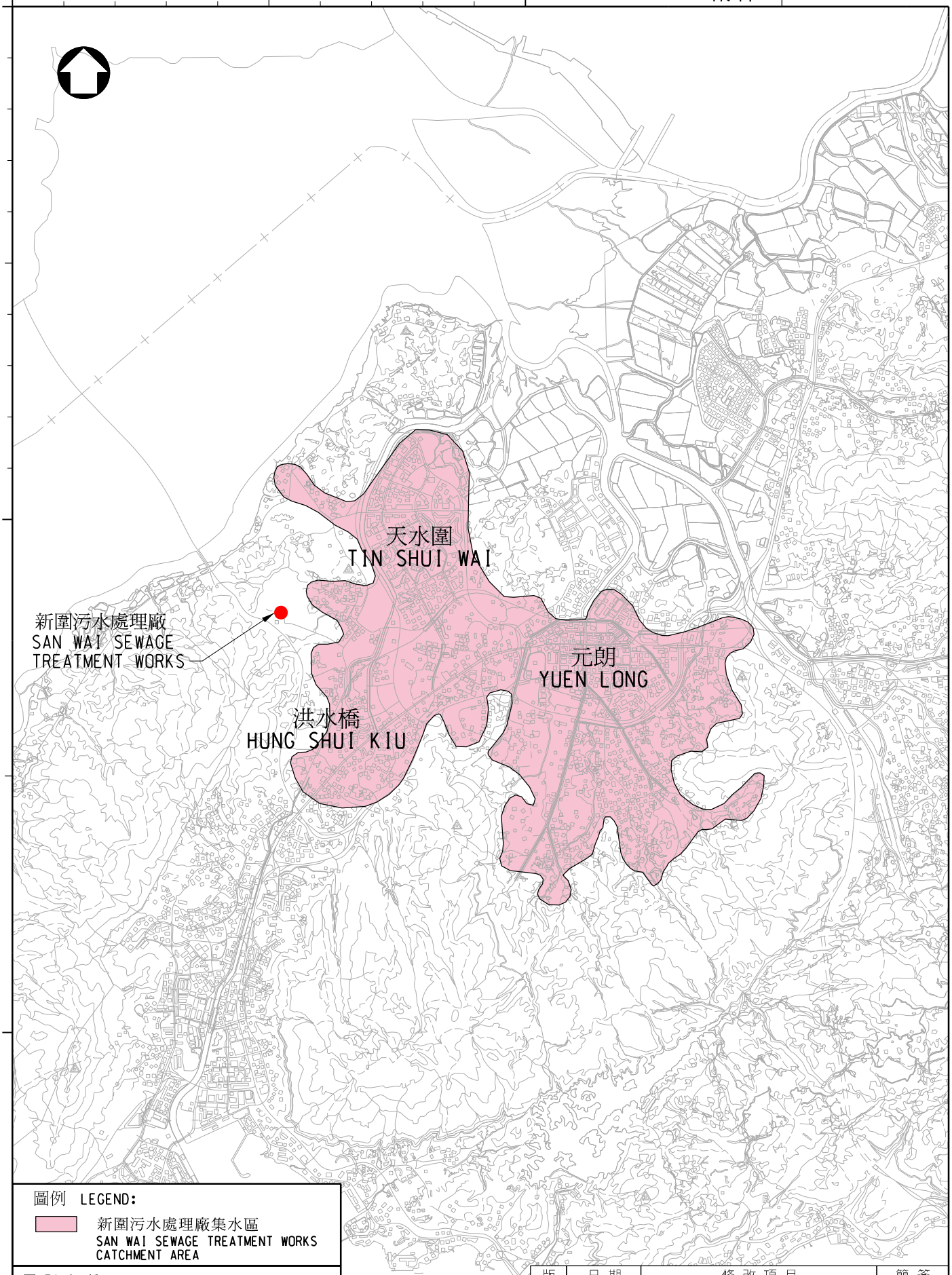
附件二 ENCLOSURE 2



圖例 LEGEND:

新圍污水處理廠集水區
SAN WAI SEWAGE TREATMENT WORKS CATCHMENT AREA

圖則名稱 drawing title

工務工程計劃第4223DS號及4235DS號：
元朗及錦田污水處理系統改善工程 -
新圍污水處理廠改善工程及元朗及
錦田污水收集系統及污水排放計劃(集水區)

PWP ITEM NO. 4223DS AND 4235DS:
YUEN LONG AND KAM TIN SEWAGE TREATMENT UPGRADE - UPGRADING OF SAN WAI SEWAGE TREATMENT WORKS AND
YUEN LONG AND KAM TIN SEWERAGE AND SEWAGE DISPOSAL(CATCHMENT AREA)

版 no.	日期 date	修改項目 description	簡簽 initial

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部門 office	淨化海港計劃部 HARBOUR AREA TREATMENT SCHEME DIVISION		

圖則編號 drawing no. DSS/2015/002

比例 scale 1 : 75000

香港特別行政區政府渠務署
DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

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223DS – Yuen Long and Kam Tin sewage treatment upgrade - upgrading of San Wai sewage treatment works
235DS – Yuen Long and Kam Tin sewerage and sewage disposal

Breakdown of the estimates for consultants' fees and resident site staff costs (in September 2015 prices)

223DS – Yuen Long and Kam Tin sewage treatment upgrade - upgrading of San Wai sewage treatment works

			Estimated man-months	Average MPS* salary point	Multiplier (Note 1)	Estimated Fee ($ million)
(a)	Consultants' fees for contract administration (Note 2)	Professional	-	-	-	3.6
		Technical	-	-	-	1.6
					Sub-total	5.2
(b)	Resident site staff (RSS) costs (Note 3)	Professional	399	38	1.6	47.4
		Technical	1 227	14	1.6	50.1
					Sub-total	97.5
	Comprising –					
	(i) Consultants' fees for management of RSS				3.9	
	(ii) Remuneration of RSS				93.6	
					Total	**102.7**

* MPS = Master Pay Scale

235DS – Yuen Long and Kam Tin sewerage and sewage disposal

			Estimated man-months	Average MPS* salary point	Multiplier (Note 1)	Estimated fee ($ million)
(a)	Consultants' fees for contract administration (Note 2)	Professional	-	-	-	0.1
		Technical	-	-	-	0.1
					Sub-total	0.2
(b)	RSS costs (Note 3)	Professional	19	38	1.6	2.3
		Technical	59	14	1.6	2.4
					Sub-total	4.7
	Comprising –					
	(i) Consultants' fees for management of RSS				0.2	
	(ii) Remuneration of RSS				4.5	
					Total	**4.9**

* MPS = Master Pay Scale

Notes

1. 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 = $74,210 per month and MPS salary point 14 = $25,505 per month).

2. The consultants' staff cost for contract administration is calculated in accordance with the existing consultancy agreement for the design and construction of the project. The construction phase of the assignment will only be executed subject to Finance Committee's approval to upgrade parts of **223DS** and **235DS** to Category A.

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

223DS – Yuen Long and Kam Tin sewage treatment upgrade - upgrading of San Wai sewage treatment works
235DS – Yuen Long and Kam Tin sewerage and sewage disposal

Breakdown of the land resumption and clearance costs

223DS – Yuen Long and Kam Tin sewage treatment upgrade - upgrading of San Wai sewage treatment works

			$ million
(I)	**Estimated resumption cost**		**169.92**
(a)	Agricultural land ex-gratia compensation	169.92	
	20 agricultural lots (with a total area of 244 399 square feet (ft^2) or 22 705.3 m^2) will be resumed. 244 399 ft^2 x $695.25 per ft^2 (Zone B) (see Notes 1 and 2)		
(II)	**Estimated clearance cost**		**0.20**
(a)	Ex-gratia allowance of crop compensation	0.06	
(b)	Ex-gratia allowance for farm structures and miscellaneous permanent improvements to farms	0.02	
(c)	Ex-gratia allowances for miscellaneous indigenous villager matters e.g. Tun Fu ceremonial fees	0.02	
(d)	Ex-gratia allowance for business undertakings	0.1	
(III)	**Interest and Contingency Payment**		**17.01**
(a)	Interest payment on various ex-gratia compensations for private land	0.01	
(b)	Contingency on the above costs	17.00	
	Total costs		**187.13** **(say, 187.1)**

Notes

1. There are four ex-gratia compensation zones, namely Zones A, B, C and D, for land resumption in the New Territories as approved by the Executive Council in 1985 and 1996. The boundaries of these zones are shown on the Zonal Plan for Calculation of Compensation Rates. The land to be resumed in the project **223DS** is agricultural land currently within Zone B. The land required is for upgrading of sewage treatment works.

2. In accordance with G.N. 7345 dated 18 September 2015 on the revised ex-gratia compensation rates for resumed land, the ex-gratia compensation rate of agricultural land for Zone B is 75% of the Basic Rate at $927 per square foot, i.e. $695.25 per square foot.