

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

Head 705 – CIVIL ENGINEERING Environmental Protection – Refuse Disposal 163DR – Northeast New Territories Landfill Extension

Members are invited to recommend to the Finance Committee the upgrading of **163DR** to Category A at an estimated cost of \$7,026.9 million in money-of-the-day prices for the extension of the Northeast New Territories Landfill.

PROBLEM

The existing Northeast New Territories (NENT) Landfill is anticipated to be exhausted in 2016-17 and there is a need to maintain a continuous waste disposal outlet for the north-eastern part of the territory.

PROPOSAL

2. The Director of Environmental Protection, with the support of the Secretary for the Environment, proposes to upgrade **163DR** to Category A at an estimated cost of \$7,026.9 million in money-of-the-day (MOD) prices for the design, construction and restoration of the proposed NENT Landfill Extension project.

/PROJECT

PROJECT SCOPE AND NATURE

3. The proposed scope of works under **163DR** comprises all works necessary for the development of NENT Landfill Extension including –

- (a) landfill design ¹ and site formation (including utilities provision and drainage diversion);
- (b) provision and relocation of landfill infrastructure and surface water management;
- (c) provision of landfill liner system²;
- (d) provision of leachate collection and treatment system³;
- (e) provision of landfill gas (LFG) collection and management system⁴;
- (f) implementation of measures to mitigate environmental impacts and environmental monitoring and auditing (EM&A) for construction works;
- (g) engagement of community stakeholders; and
- (h) construction of restoration and aftercare⁵ facilities.

———— A plan showing the location of the proposed works is at Enclosure 1.

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¹ The landfill is designed as a secure containment system, which primarily consists of multilayer impermeable composite liners to contain landfill gas and leachate generated, so that the waste is deposited and treated under a controlled environment.

² The landfill liner system consists of multilayer impermeable composite liners installed at the formation level of the landfilling area to contain landfill gas and leachate produced during the degradation process and prevent them from leaving the landfill to the surrounding environment.

³ Leachate is the liquid that has percolated through solid waste. The source of the liquid is primarily the water already present in the waste and any water induced from an external source such as rain water and ground water. The leachate management system comprises leachate collection network, pump sumps, storage lagoons, rising mains and treatment plants for handling and treating leachate.

⁴ LFG is produced during the waste degradation process. It is made up of several gases such as methane which are potential flammable and harmful to health. The LFG management system comprises collection network, gas extraction system and flaring unit for handling and treating landfill gas.

⁵ Restoration and aftercare facilities include the installation of the capping system, sub-surface drainage system, monitoring facilities and landscape works.

4. Subject to the funding approval of the Finance Committee, we plan to start the tendering process in early 2014 and commence the proposed works in late 2014 with a view to commencing waste intake in late 2016 for completion in late 2028 (including about two years of restoration works after its exhaustion).

JUSTIFICATION

5. We released the “Hong Kong Blueprint for Sustainable Use of Resources 2013-2022” (the “Action Blueprint”) on 20 May 2013⁶, which maps out a comprehensive strategy with targets, policies and action plans for waste management for the coming ten years to tackle the imminent waste challenge. The Action Blueprint has illustrated that, even if measures and facilities are taken forward as planned, and waste reduction targets are achieved as set, there will still be about 10 000 tonnes of waste that require disposal every day in 2017.

6. Landfills are an essential and ultimate part of the waste management chain everywhere in the world and the same applies to Hong Kong. No matter how hard we work to reduce waste, there will still be inert materials, non-recyclables, construction waste and post-treatment residues that need to be disposed of, and in the case of Hong Kong, municipal solid waste that could not be otherwise treated due to lack of modern waste treatment facilities. With the three existing landfills⁷ to be exhausted one by one by 2019, while large scale waste-to-energy facilities have yet to come on stream by then, we have no means to tackle such waste apart from extending the landfills in time. Without the three landfill extension projects, we cannot provide adequate disposal outlets to serve the whole territory nor maintain a continuous waste disposal service to the public upon the exhaustion of the existing landfills.

7. We anticipate that the NENT Landfill will be exhausted in 2016-17. Timely extension of the landfill is crucial as it is an integral part of Hong Kong’s waste management strategy as set out in the Action Blueprint. The NENT Landfill Extension project could provide additional landfill capacity to maintain a continuous waste disposal service to the public in the north-eastern part of the territory.

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⁶ The blueprint is available at the website of Environmental Protection Department (www.epd.gov.hk).

⁷ Namely the Northeast New Territories Landfill, Southeast New Territories Landfill and the West New Territories Landfill.

8. The proposed extension site covers about 70 hectares (ha) of land, comprising mainly the stockpile and borrow area (SBA)⁸ and the waste reception area (WRA)⁹ of the existing NENT Landfill (about 38 ha) with some additional land (about 32 ha) at the north-western side and south-western side of the SBA. The NENT Landfill Extension could provide about 19 million cubic meters of additional landfill capacity to cope with the continuous need for final waste disposal in the north-eastern part of the territory. The estimated operating life of the proposed landfill extension is about 10 years, which may vary according to future development such as the extent of waste reduction. The landfill extension is currently estimated to be completed in around 2028 (including about two years of restoration works after its exhaustion).

FINANCIAL IMPLICATIONS

9. We estimate the capital cost of the proposed works to be \$7,026.9 million in MOD prices (please see paragraph 10 below), broken down as follows –

	\$ million
(a) Landfill design and site formation (including utilities provision and drainage diversion)	1,261.8
(i) landfill design	22.0
(ii) initial works	33.0
(iii) site preparation ¹⁰	1,206.8
(b) Infrastructure	419.2
(i) provision of infrastructure (including relocation of existing landfill infrastructure)	155.0
(ii) surface water management system	264.2

/(c)

⁸ The SBA is a soil borrow area for the existing NENT Landfill contract. The existing contractor can excavate material including soil and rock, and use as cover material for daily operation and capping material during restoration works.

⁹ The WRA is the area where the weighbridges are installed to facilitate the ingress and egress of waste collection vehicles. Utilities and other infrastructures including office buildings are also located in WRA for the operation of the landfill.

¹⁰ Site preparation includes site clearance, excavation works, site formation (deposition and compaction), temporary and permanent slope stabilization and construction of reinforced earth wall as buttress wall for waste slopes.

	\$ million	
(c) Landfill liner system	821.5	
(d) Leachate management system	481.3	
(i) leachate collection system	300.0	
(ii) leachate treatment system	181.3	
(e) Landfill gas collection and management system	309.7	
(f) Mitigation measures and EM&A for construction works	31.6	
(g) Continuous enhancement and associated works and implementation of local improvement works	26.3	
(h) Restoration and aftercare facilities	450.8	
(i) Consultants' fees for	6.1	
(i) contract administration	5.2	
(ii) management of resident site staff	0.9	
(j) Remuneration of resident site staff	12.7	
(k) Contingencies	360.2	
Sub-total	4,181.2	(in September 2012 prices)
(l) Provision for price adjustment	2,845.7	
Total	7,026.9	(in MOD prices)

A breakdown of the estimates for the consultants' fees and resident site staff costs by man-months is at Enclosure 2.

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

Year	\$ million (Sept 2012)	Price adjustment factor	\$ million (MOD)
2015 – 2016	220.2	1.19354	262.8
2016 – 2017	330.3	1.26516	417.9
2017 – 2018	330.3	1.34107	443.0
2018 – 2019	330.3	1.41147	466.2
2019 – 2020	330.3	1.48205	489.5
2020 – 2021	330.3	1.55615	514.0
2021 – 2022	330.3	1.63396	539.7
2022 – 2023	330.3	1.71565	566.7
2023 – 2024	330.3	1.80144	595.0
2024 – 2025	330.3	1.89151	624.8
2025 – 2026	284.0	1.98608	564.0
2026 – 2027	274.0	2.08539	571.4
2027 – 2028	211.5	2.18966	463.1
2028 – 2029	168.3	2.29914	386.9
2029 – 2030	50.5	2.41410	121.9
	<hr/> 4,181.2 <hr/>		<hr/> 7,026.9 <hr/>

11. We have derived the MOD estimate 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 2023, and an assumption of an annual growth rate of 5% between 2023 and 2030. We will deliver the proposed works and the operation of the proposed NENT Landfill Extension under a Design-Build-and-Operate contract arrangement. The contract will provide for price adjustments.

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12. We estimate that the additional annual recurrent expenditure arising from the NENT Landfill Extension is \$81 million. The capital and recurrent costs arising from the project would be taken into consideration when determining the affected fees and charges as appropriate in accordance with “polluter pays” principle.

PUBLIC CONSULTATION

13. We have adopted a continuous public involvement approach during the planning and development stages of the project, including the statutory environmental impact assessment (EIA) process. We have conducted a series of public consultation/engagement sessions through which we considered and addressed the concerns of relevant stakeholders and other interested parties on the landfill extension project.

14. We have been consulting the North District Council (NDC) since 2004 on the proposal to conduct engineering feasibility and EIA study for the project, and from time to time reported to NDC on the study progress. We consulted NDC on 12 April 2007 regarding the EIA findings and the latest development of the project, a motion objecting to the NENT landfill Extension was moved by the NDC at the meeting.

15. As the proposed NENT Landfill Extension site is located between Ta Kwu Ling and Sha Tau Kok, the Ta Kwu Ling District Rural Committee (TKLDRC) and the Sha Tau Kok District Rural Committee (STKDRC) are also key stakeholders and local objections to the project had been received from them. In response to local concerns, the North District Office and the Environmental Protection Department have taken the lead to set up a Working Group with representatives from the TKLDRC and STKDRC in early 2009. The Working Group provides a forum for stakeholders to express their views and to map out measures and betterment programmes to address their concerns. Liaison meetings under this Working Group had been held regularly to brief and update stakeholders of the latest development of the landfill extension project. Ten meetings have been held so far, with most of the requests under the betterment programmes (mainly concerning improvement to local environment like greening or community facilities) successfully met or being explored. We will continue to carry out enhancement and associated works, and consider actively the requests for implementation of local enhancement works.

16. Subsequently, in a consultation with the NDC on 9 June 2011 regarding Hong Kong's latest waste management strategy and the action plan, including the implementation of the NENT Landfill Extension project, the NDC members were generally supportive of the waste management strategy, without any motion against the NENT Landfill Extension. We will continue to maintain close liaison with the NDC, local community and other relevant stakeholders in taking forward the project.

17. The Town Planning Board (the Board) considered and approved the application under the Town Planning Ordinance (TPO) for amendment to the approved Wo Keng Shan Outline Zoning Plan (OZP) for several land parcels adjoining the NENT Landfill from "Green Belt" to "Other Specified Uses (Landfill)" for the NENT Landfill Extension project on 15 August 2008. The draft Wo Keng Shan OZP incorporating the said amendments was gazetted on 19 December 2008 and 11 valid representations were received during the public inspection period. The representations were mainly related to environmental nuisance and impact on living and natural environment. On 27 February 2009, the Board published the representations for public comments. The Board subsequently considered the representations at the hearing on 29 May 2009 and decided not to uphold the representations. The draft OZP was approved by the Chief Executive-in-Council on 6 October 2009 and was gazetted under the TPO on 16 October 2009.

18. We last consulted the Legislative Council Panel on Environmental Affairs (the Panel) on 27 May 2013 on the proposed extension. A motion against the proposed NENT Landfill Extension was not passed and the Panel did not object to the submission of the proposal to Public Works Subcommittee for consideration.

ENVIRONMENTAL IMPLICATIONS

19. **163DR** is a designated project and the EIA report was completed and approved under the EIA Ordinance (EIAO) on 20 September 2007 after consulting the general public and the Advisory Council on the Environment. The EIA report concluded that the potential environmental impacts of the project would be controlled to within the criteria under EIAO and the Technical Memorandum on EIA Process. The Environmental Permit (EP) for the construction and operation of the landfill was issued on 26 November 2007. The project would need to comply with the requirements in accordance with the EP conditions. We shall implement the measures recommended in the approved EIA report. We estimate the cost of implementing the environmental mitigation measures and EM&A for construction works to be \$31.6 million. We have included this cost in the overall project estimate.

20. For impacts during construction stages, we will control noise, dust and site run-off to levels within established standards and guidelines, through the implementation of mitigation measures such as the use of quiet construction plant to reduce noise generation, water-spraying to reduce dust emission and proper containment and treatment of site run-off. We will also carry out close site inspections to ensure that these recommended mitigation measures and good site practices are properly implemented.

21. During the operation phase, we will control the size of the active tipping area to minimize odour nuisance and the assessment shows that there would be no adverse impact on the nearby air sensitive receivers except Tong To Shan Tsuen which has been unoccupied for more than a decade. Impact due to odour is scarce and transient in nature. Odour nuisance will be mitigated with good site practices, including applying daily cover on waste, covering up of inactive tipping face with plastic sheets, positioning of active tipping face further away from air sensitive receivers, etc. To further minimize the odour issue, we will include a condition in the contract provisions requiring the landfill operator to cover up all (both temporary and permanent) leachate storage tanks.

22. The landfill design is a containment design and its impermeable bottom liner provides a barrier separating the waste mass from the environment. Leachate and LFG generated during biodegradation process will be contained, collected and properly treated on site in a control environment. Under the landfill extension contract, we will require the contractor to implement a LFG utilization and export scheme to make full beneficial use of all collected LFG both on site and off site. For on site utilization, LFG will be used as fuel for generating electricity for site operation and converting to heat energy for leachate treatment process. For off site utilization, LFG will be delivered off site for beneficial use such as use as alternative fuel. Leachate generated will be contained and collected by pipe networks and treated at the leachate treatment plant within the landfill before discharged to the public sewerage system for further treatment. We shall ensure that both LFG and leachate would have no adverse impact on the air and water quality of the environment respectively.

23. Among the possible layout options, we have chosen an option with total exclusion of the Lin Ma Hang Stream and its catchment area to avoid potential losses, damages and impacts to the existing flora, fauna and natural habitats. The selected option also avoids any potential impact on areas containing archaeological potential, built heritage and cultural landscape, etc.

24. At the planning and schematic design stages, we have considered adopting a balance cut and fill design 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 rock) on site or in other suitable construction sites as far as possible, in order to minimize the disposal of inert construction waste at public fill reception facilities¹¹. We will encourage the contractor to maximize the use of recycled/ recyclable inert construction waste, and the use of non-timber formwork to further reduce the generation of construction waste.

25. 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 measures 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. 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 non-inert construction waste to landfills through a trip-ticket system.

26. We estimate that the project will generate in total about 117 600 tonnes of construction waste. Of these, we will reuse about 105 840 tonnes (90%) of inert construction waste on site. We will dispose of the remaining 11 760 tonnes (10%) of non-inert construction waste at landfills. The total cost for accommodating construction waste at landfills is estimated to be \$1.5 million for this project (based on a unit cost of \$125 per tonne¹² for disposal at landfills).

HERITAGE IMPLICATIONS

27. The construction activities associated with the site formation for the NENT Landfill Extension will not impact on any areas containing archaeological potential. The Tong To Shan Site of Archaeological Interest is located outside the proposed boundary and it will not be affected by the construction works. However, small sections of two boulder paths will be directly affected by the construction activities of the proposed landfill extension. With mitigation measures to be proposed by the landfill contractor and approved by the Antiquities and Monuments Office prior to the commencement of the construction, it is expected that the proposed landfill extension will have very little adverse impact on the cultural heritage resources during construction, operation, restoration and aftercare stages.

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¹¹ Public fill reception facilities are specified in Schedule 4 of the Waste Disposal (Charges for Disposal of Construction Waste) Regulation. Disposal of inert construction waste in public fill reception facilities requires a licence issued by the Director of Civil Engineering and Development.

¹² This estimate has taken into account the cost for developing, operating and restoring the landfills after they are filled and the aftercare required. It does not include the land opportunity cost for existing landfill sites (which is estimated at \$90 per m³), nor the cost to provide new landfills (which is likely to be more expensive), when the existing ones are filled.

LAND ACQUISITION

28. We have conducted an engineering feasibility to work out a preferred layout option that meets the waste management needs on capacity as well as avoids area of ecological and archaeological values and minimizes the extent of land acquisition. We will resume a total of ten private agricultural lots (about 117 100 square feet) and clear Government land with an area of about 3 500 000 square feet for carrying out the proposed works. The land resumption and clearance will not affect any households or domestic structures. We will charge the cost of land resumption and clearance estimated at \$37.71 million to **Head 701 – Land Acquisition**. A breakdown of the land resumption and clearance costs is at Enclosure 3.

BACKGROUND INFORMATION

29. In February 2000, we commissioned a territory-wide study “Extension of Existing Landfills and Identification of Potential New Waste Disposal Sites” to identify new landfill capacity for waste disposal in Hong Kong up to 2050, at an estimated cost of \$5.1 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”. The extension of the existing NENT landfill was recommended as an integral part of the strategic plan on waste management in Hong Kong.

30. We upgraded **163DR** to Category B in October 2003. In February 2005, we engaged consultants to carry out an engineering feasibility and EIA study at an estimated cost of \$9.8 million in MOD prices. The work under the consultancy has been completed. In December 2010, we engaged consultants to conduct a study for the preparation of the contract document and procurement of the contract of the project at an estimated cost of \$10 million in MOD prices. We charged these amounts to block allocation **Subhead 5101DX** “Environmental works, studies and investigations for items in Category D of the Public Works Programme”.

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31. The proposed works will involve removal of about 825 trees including 805 trees to be felled and 20 trees to be replanted within the project site (subject to finalization of design). All trees to be removed are not important trees¹³. We will incorporate planting proposals as part of the project, including estimated quantities of about 148 100 trees and 36 ha of grassland and shrubland.

32. We estimate that the proposed works will create about 682 jobs (540 for labourers and 142 for professional/technical staff) providing a total employment of 46 770 man-months.

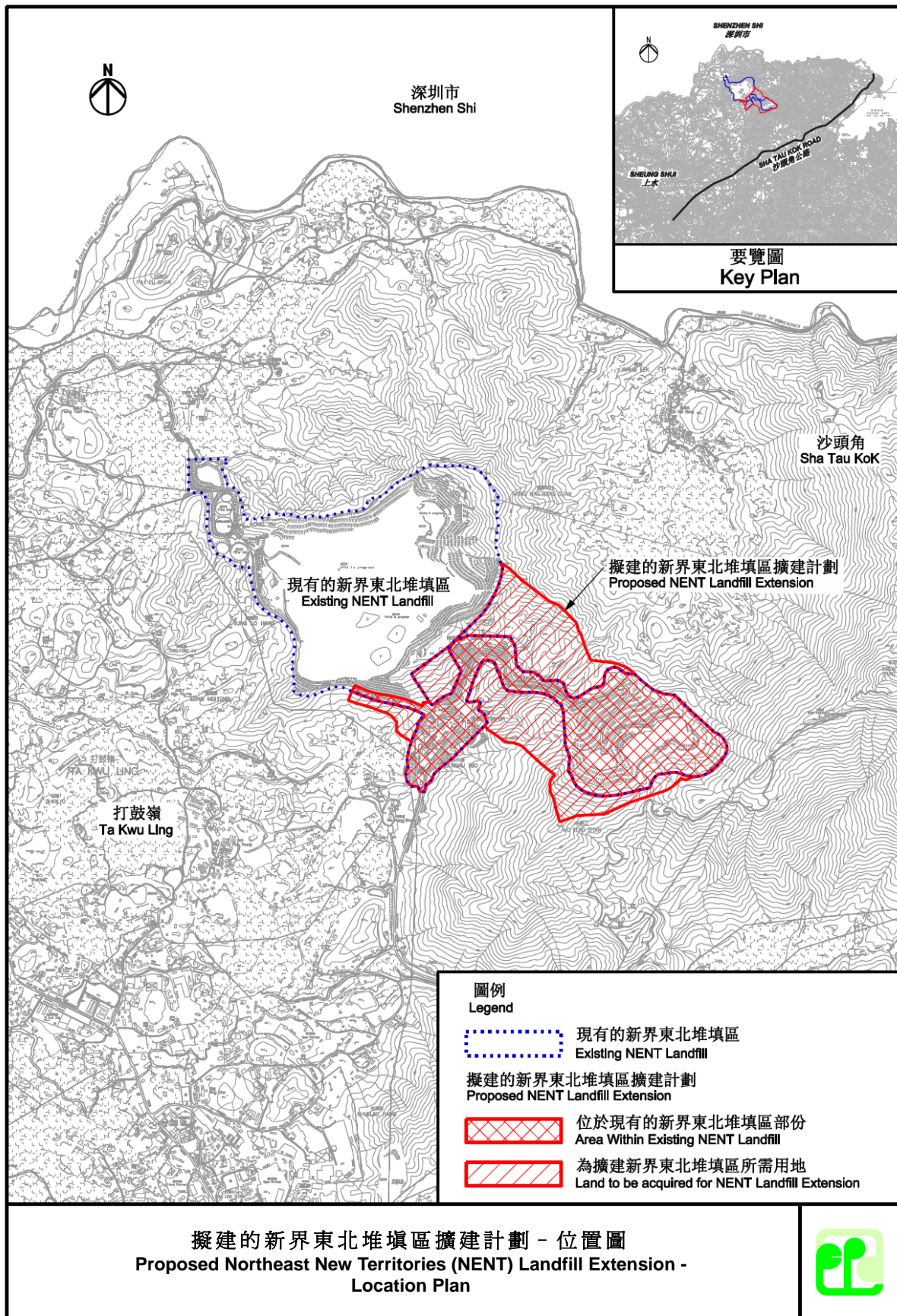
Environment Bureau
June 2013

¹³ An “important tree” refers 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 tree, tree as landmark of monastery or heritage monument, and trees in memory of an important person or even;
- (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 (measured at 1.3 metres above ground level), or with height/ canopy spread equal or exceeding 25 metres.

163DR – Northeast New Territories Landfill Extension

163DR – 新界東北堆填區擴建計劃



163DR – Northeast New Territories Landfill Extension**Breakdown of estimates for consultants' fees and resident site staff costs
(in September 2012 prices)**

			Estimated man- months	Average MPS* salary point	Multiplier (Note 1)	Estimated fee (\$million)
(a)	Consultants' fees for contract administration (Note 2)	Professional	-	-	-	3.5
		Technical	-	-	-	1.7
					Sub-total	5.2
(b)	Resident site staff costs (Note 3)	Professional	48	38	1.6	5.0
		Technical	240	14	1.6	8.6
					Sub-total	13.6
Comprising -						
(i)	Consultants' fee for managmeent of resident site staff				0.9	
(ii)	Remuneration of resident site staff				12.7	
					Total	18.8

* MPS = Master Pay Scale

Notes

1. A multiplier of 1.6 is applied to the average MPS salary point to estimate the cost of resident site staff supplied by the consultants. (As at now, MPS salary point 38 = \$65,695 per month and MPS salary point 14 = \$22,405 per month.)
2. The consultants' staff cost for contract administration is calculated in accordance with the existing consultancy agreement. The construction phase of the assignment will only be executed subject to Finance Committee's approval to upgrade **163DR** to Category A.
3. The actual man-months and actual costs will only be known after the completion of the construction works.

163DR – Northeast New Territories (NENT) Landfill Extension

Breakdown of the land resumption and clearance costs

	\$ million
(I) Estimated resumption cost	27.75
(a) Agricultural land ex-gratia compensation	27.75
10 agricultural lots (with a total area of 117 100 square feet (ft ²)) will be resumed	
117 100 ft ² x \$237 per ft ² (Zone D)	
[See Notes 1 and 2]	
(II) Estimated clearance cost	6.53
(a) Ex-gratia allowance of crop compensation	4.00
(b) Ex-gratia allowance for farm structures and miscellaneous permanent improvements to farms	0.01
(c) Ex-gratia allowance for voluntary removal of graves/urns	2.50
(d) Ex-gratia allowance for “Tun Fu”	0.02
(III) Contingency payment	3.43
(a) Contingency on the above costs	3.43
Total	37.71

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. All land to be resumed in the project **163DR** is agricultural lots currently located in Zone D.
2. In accordance with G.N. 1568 dated 15 March 2013 on the revised ex-gratia compensation rates for resumed land, the ex-gratia compensation rate of agricultural land for Zone D is 30% of the Basic Rate at \$790 per square foot. Hence the ex-gratia compensation rate used for estimating the resumption cost of the ten lots affected by **163DR** is \$237 per ft².