本署檔號
OUR REF.: EP193/07/J/02
來函檔號
YOUR REF.:
電話
TEL. NO.: 2872 1750
圖文傳真
FAX NO.: 2872 0376
網址
HOMEPAGE: http://www.epd.gov.hk

Environmental Protection Department
Environmental Infrastructure Division

88 Victoria Road,
Kennedy Town,
Hong Kong.

環境保護署
環境基建科

香港西環
堅尼地城
域多利道88號

Public Works Subcommittee
Financial Committee
Legislative Council Complex
1 Legislative Council Road
Central, Hong Kong

By Email
18 January 2019

(Attn: Ms Doris LO, Clerk to Public Works Subcommittee)

Dear Ms LO:

Enquiry on the "Block Allocations of the Capital Works Reserve Fund in 2019-20"

The Hon Fernando CHEUNG Chiu-hung wrote to the Chairman of the Public Works Subcommittee on 16 January 2019, enquiring on the "Block Allocations of the Capital Works Reserve Fund in 2019-20". Item (1) (Head 701 Subhead 1100CA) of the enquiry has been referred to this Department for follow up action. Our response is provided in the following paragraphs.

Response to the items 1.1 and 1.2:

The relevant block allocation involves the provision of compensation due to the land resumption for the development of the Northeast New Territories Landfill Extension (NENTX) according to the established mechanism. The Finance Committee (FC) approved the funding for the proposed NENTX project in December 2014. The relevant FC Paper No. FCR(2014-15)32A is in Annex 1.

The relevant information about the environmental impact and mitigation measures for the development of the NENTX has been set out in the above FC Paper. Upon the commissioning of the NENTX project, the collection and treatment of landfill leachate will be implemented, with environmental monitoring and auditing to ensure compliance with the

statutory requirements. There was one incident of leachate leakage from the North East New Territories (NENT) Landfill on 27 July 2013. The details of the incident, the immediate mitigation measures and follow up actions taken, the long-term improvement measures etc. have been set out in the papers for the Panel on Environmental Affairs in September 2013 (Annex 2: Paper No. CB(1)1774/12-13(01)) and January 2014 (Annex 3: Paper No. CB(1)797/13-14(01)).

Response to the item 1.3:

The details of public consultation and district liaison work for the development of NENTX are set out in the FC Paper No. FCR(2014-15)32A (Annex 1).

Response to the item 1.4:

During the land resumption process, Lands Department will handle the compensation in accordance with the established procedures under the relevant ordinances.

To take forward the NENTX project, this Department will continue to closely liaise with the North District Council, the local community and other relevant stakeholders, and carry out appropriate environmental improvement works and actively assist in the implementation of local enhancement works.

Your Sincerely,

(Keith YEUNG Kwok-on)
for Director of Environmental Protection

Enclosures

Annex 1: FC Paper No. FCR(2014-15)32A

Annex 2: EA Panel Paper No. CB(1)1774/12-13(01)

Annex 3: EA Panel Paper No. CB(1)797/13-14(01)

c.c.

Secretary for financial Services and the Treasury (Attn: Ms. Terri KWONG)

Director of Lands (Attn: Ms. Alice CHEUNG)

For discussion **FCR(2014-15)32A**
on 17 October 2014

SUPPLEMENTARY NOTE TO

ITEM FOR FINANCE COMMITTEE
[FCR(2014-15)32]

PURPOSE

This note provides an update on the programme, estimated cash flow and estimated project cost for **163DR** "Northeast New Territories Landfill Extension".

JUSTIFICATION

2. The funding proposal seeking to upgrade **163DR** to Category A at an estimated cost of $7,317.8 million in money-of-the-day (MOD) prices was originally scheduled for Finance Committee (FC)'s consideration on 4 July 2014 but has to be deferred beyond the summer recess.

3. The project scope for **163DR** as detailed in FCR(2014-15)32 remains unchanged. However, due to the lapse of time, we need to make the following necessary revisions to the funding proposal –

(a) adjusting the project cost estimate to $7,510 million in MOD prices due to changes in price level (from September 2013 to September 2014) and cash flow requirement;

(b) updating the deferred programme of the project;

(c) adjusting the estimates for consultants' fees and resident site staff costs based on latest estimations; and

(d) updating the cost of land resumption and clearance based on latest ex-gratia rates.

/The …..

Encl. The paper at the Enclosure has incorporated the above revisions. The revisions are shaded in grey for easy reference.

PROPOSAL

4. We invite FC to consider FCR(2014-15)32 in conjunction with FCR(2014-15)32A and to approve the upgrading of **163DR** to Category A at an estimated cost of $7,510 million in MOD prices.

Environment Bureau
October 2014

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 $7,510 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 $7,510 million in money-of-the-day (MOD) prices for the design, construction and restoration of the proposed NENT Landfill Extension 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) …..

[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.

(c) provision of landfill liner system[2];

(d) provision of leachate collection and treatment system[3];

(e) provision of landfill gas (LFG) collection and management system[4];

(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 aftercare[5] facilities.

A plan showing the location of the proposed works is at Annex A.

4. Subject to the funding approval of the Finance Committee (FC), we plan to start the tendering process in late 2014 and commence the proposed works in mid-2016 with a view to commencing waste intake in mid-2018 for completion in mid-2030 (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 2013[6], 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. …..

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[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.

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

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 landfills[7] 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.

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 $7,510 million in MOD prices (please see paragraph 10 below), broken down as follows –

/$ million …..

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

[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.

			$ million	
(a)	Landfill design and site formation (including utilities provision and drainage diversion)			1,416.7
	(i)	landfill design	24.6	
	(ii)	initial works	37.0	
	(iii)	site preparation[10]	1,355.1	
(b)	Infrastructure			470.7
	(i)	provision of infrastructure (including relocation of existing landfill infrastructure)	174.0	
	(ii)	surface water management system	296.7	
(c)	Landfill liner system			922.3
(d)	Leachate management system			540.5
	(i)	leachate collection system	336.9	
	(ii)	leachate treatment system	203.6	
(e)	Landfill gas collection and management system			347.8
(f)	Mitigation measures and EM&A for construction works			35.5
(g)	Continuous enhancement and associated works and implementation of local improvement works			29.5
(h)	Restoration and aftercare facilities			506.2

/(i) …..

[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		
(i)	Consultants' fees for			6.8	
	(i)	contract administration	5.7		
	(ii)	management of resident site staff	1.1		
(j)	Remuneration of resident site staff			13.8	
(k)	Contingencies			404.8	
		Sub-total		4,694.6	(in September 2014 prices)
(l)	Provision for price adjustment			2,815.4	
		Total		7,510.0	(in MOD prices)

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

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

Year	**$ million (Sept 2014)**	**Price adjustment factor**	**$ million (MOD)**
2016 – 2017	123.6	1.12360	138.9
2017 – 2018	309.0	1.19102	368.0
2018 – 2019	370.8	1.26248	468.1
2019 – 2020	370.8	1.32876	492.7
2020 – 2021	370.8	1.39519	517.3
2021 – 2022	370.8	1.46495	543.2
2022 – 2023	370.8	1.53271	568.3

/2023 …..

Year	$ million (Sept 2014)	Price adjustment factor	$ million (MOD)
2023 – 2024	370.8	1.60168	593.9
2024 – 2025	370.8	1.67376	620.6
2025 – 2026	370.8	1.74908	648.6
2026 – 2027	345.5	1.82778	631.5
2027 – 2028	313.4	1.91003	598.6
2028 – 2029	272.2	1.99599	543.3
2029 – 2030	214.6	2.08580	447.6
2030 – 2031	122.8	2.17967	267.7
2031 – 2032	27.1	2.27775	61.7
	4,694.6		7,510.0

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 2016 to 2024. For the remaining year or so beyond 2024, an assumed annual rate of increase of 4.5% has been adopted as a working assumption. 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.

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 …..

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. …..

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 (PWSC) 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 $35.5 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. …..

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 wastewhere 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 facilities[11]. 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. …..

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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.

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 tonne[12] for disposal at landfills).

HERITAGE IMPLICATIONS

27. The construction activities associated with the site formation for the 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.

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 $40.23 million to **Head 701 – Land Acquisition**. A breakdown of the land resumption and clearance costs is at Annex C.

/BACKGROUND …..

[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 m^3), nor the cost to provide new landfills (which is likely to be more expensive), when the existing ones are filled.

BACKGROUND

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".

31. On 2 July 2013, PWSC recommended that **163DR** be upgraded to Category A at an estimated cost of $7,026.9 million in MOD prices for the extension of the NENT Landfill vide PWSC(2013-14)20. At the meeting of FC on 12 July 2013, when considering the PWSC recommendation, a motion to adjourn the discussion of the project was passed. We re-submitted the funding proposal at an updated estimated cost of $7,317.8 million in MOD prices vide FCR(2014-15)32 for FC's consideration on 4 July 2014. Unfortunately, the proposal has been deferred beyond the summer recess.

32. 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 trees[13]. We will incorporate planting proposals as part of the project, including estimated quantities of about 148 100 trees and 36 ha of grassland and shurbland.

/33. …..

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[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 –

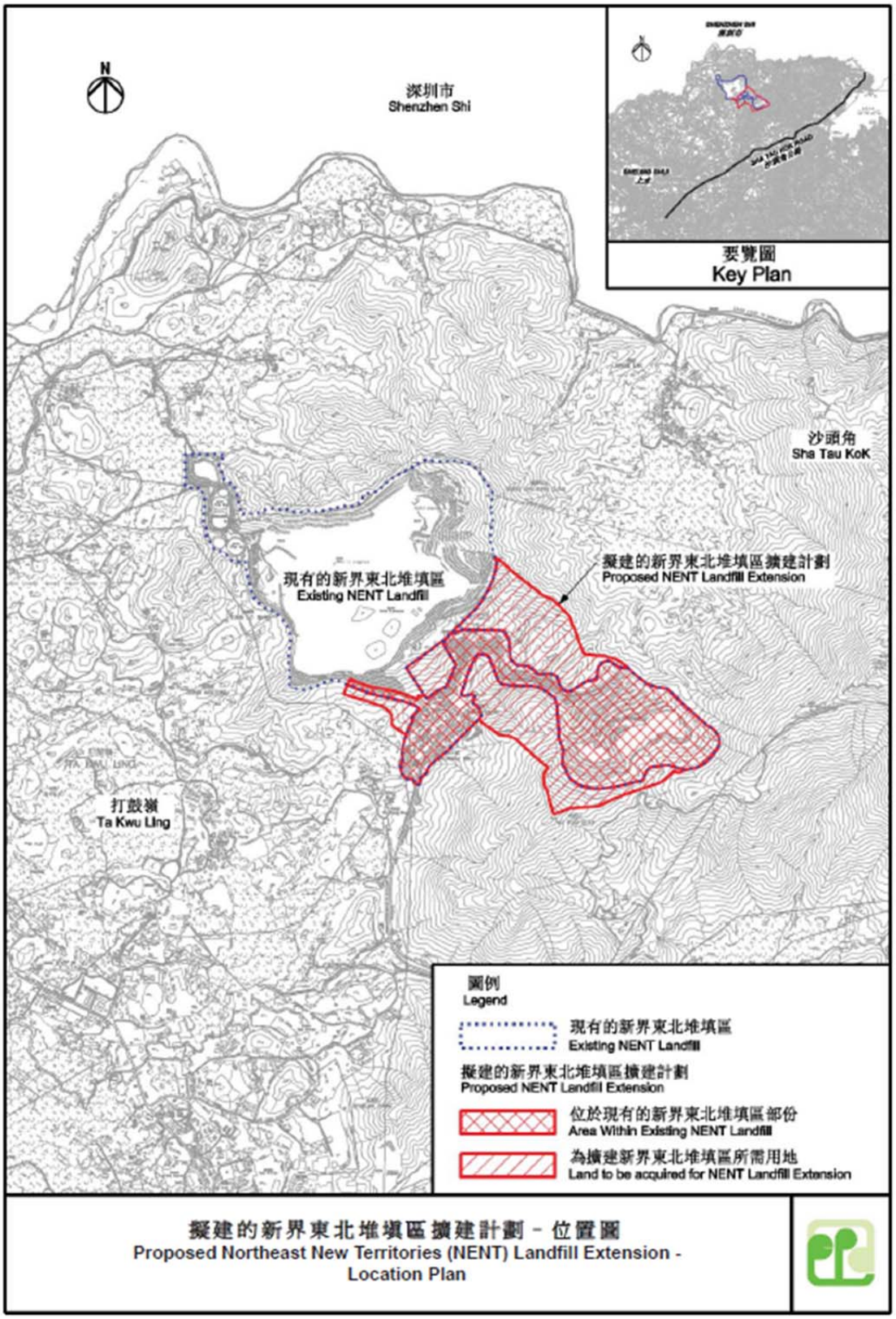
(a) trees of over 100 years old or above;
(b) trees of cultural, historical or memorable significance e.g. Fung Shui tree, tree as landmark of monastery or heritage monument, and trees in memory of an important person or even;
(c) trees of precious or rare species;
(d) trees of outstanding form (taking 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.

33. 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
October 2014

Annex A
附錄 A

163DR – Northeast New Territories Landfill Extension
163DR – 新界東北堆填區擴建計劃



Annex B

163DR – Northeast New Territories Landfill Extension

Breakdown of estimates for consultants' fees and resident site staff costs (in September 2014 prices)

			Estimated man-months	Average MPS* salary point	Multiplier (Note 1)	Estimated fee ($million)
(a)	Consultants' fees for contract administration (Note 2)	Professional	-	-	-	3.8
		Technical	-	-	-	1.9
					Sub-total	5.7
(b)	Resident site staff costs (Note 3)	Professional	48	38	1.6	5.5
		Technical	240	14	1.6	9.4
					Sub-total	14.9
Comprising -						
(i)	Consultants' fee for managmeent of resident site staff				1.1	
(ii)	Renumeration of resident site staff				13.8	
					Total	**20.6**

* 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. (Subject to approval of the Finance Committee, MPS salary point 38 = $71,385 per month and MPS salary point 14 = $24,380 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.

Annex C

163DR – Northeast New Territories (NENT) Landfill Extension

Breakdown of the land resumption and clearance costs

		$ million	
(I)	**Estimated resumption cost**		**28.39**
(a)	Agricultural land ex-gratia compensation 10 agricultural lots (with a total area of 117 100 square feet (ft^2)) will be resumed 117 100 ft^2 x \$242.40 per ft^2 (Zone D) [See Notes 1 and 2]	28.39	
(II)	**Estimated clearance cost**		**8.18**
(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	4.15	
(d)	Ex-gratia allowance for "Tun Fu"	0.02	
(III)	**Contingency payment**		**3.66**
(a)	Contingency on the above costs	3.66	
		Total	**40.23**

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. 5692 dated 24 September 2014 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 \$808 per square foot. Hence the ex-gratia compensation rate used for estimating the resumption cost of the ten lots affected by **163DR** is \$242.40 per ft^2.

For discussion on
17 September 2013

The Legislative Council
Panel on Environmental Affairs

Incident of Leachate from North East New Territories Landfill

Purpose

This paper briefs Members on the incident of leachate leakage from the North East New Territories (NENT) Landfill and the associated measures taken.

The Incident

2. The three strategic landfills in Hong Kong, including the NENT Landfill, are operated under a design-build-and-operate (DBO) contract managed by the Environmental Infrastructure Division of the Environmental Protection Department (EPD). More details on the DBO contract and its management are provided in **Annex A1**. All three landfills have purposely designed and built comprehensive systems to manage the wastewater[Note 1] and leachate[Note 2] produced to ensure that the impact to the environment is properly managed. Details of the different systems to manage leachate, surface water and groundwater at the NENT Landfill are provided in **Annex A2**. A typical section layout of a landfill is given in **Annex B1**.

Note 1 Wastewater includes sewage, wash water from site activities including vehicle washing facilities.

Note 2 Leachate is the liquid that has percolated through solid waste. It is generated by the moisture content in the waste, decomposition of waste, and rainwater infiltration into the waste mass. The leachate management system comprises leachate collection network, pump sumps, storage lagoons, rising mains and treatment plants for handling and treating leachate.

3. On 27 July 2013, leakage of leachate from a recently commissioned temporary leachate storage lagoon at the NENT Landfill was detected. Leachate leaking from the toe of the temporary lagoon was observed. The landfill contractor was informed immediately to take action to rectify the leaking problem. The contractor took immediate measures to contain the leachate within the landfill boundary but due to the heavy rainstorm, some leaked leachate mixed with a large amount of rainwater entered the surface water system serving the landfill and discharged into the nearby Kong Yiu Channel (the Channel). A map showing the location of the NENT Landfill, the Channel and its vicinities is in **Annex C**.

4. Operation of the NENT Landfill is subject to environmental legislation. The contractor has been licensed by the Environmental Compliance Division of EPD and the conditions include controls imposed under the Water Pollution Control Ordinance (WPCO). The Division was notified of the incident on 28 July 2013 and the staff of the Division went to the site in the late afternoon on the same day. During inspection, leakage of leachate from a temporary storage lagoon was observed. Some leaked leachate mixed with rainwater entered the surface water system serving the landfill and discharged into the Channel. The contractor was carrying out remedial measures. EPD advised the contractor that the situation should be rectified as soon as possible. Legal sample of wastewater discharged from the NENT Landfill was collected on 29 July from the storm drain at the boundary of the NENT Landfill. Analysis result was received from the Government Laboratory on 20 August. The pollutant levels in the sample collected on 29 July, though higher than normal unpolluted water, were within the legal standards.

5. Staff of the Environmental Compliance Division had been monitoring the situation and collected further legal samples on wastewater discharged from the landfill. Analysis results of the legal sample collected on 7 August 2013 was received from the Government Laboratory on 23 August 2013, which showed that the pollutant levels in the sample exceeded the legal standards. On the basis of the analysis results, EPD is considering taking legal actions under the WPCO with the contractor. Further analysis results received showed that samples collected on 23 and 30 August and 2 September also exceeded the legal standards.

6. The repairing work was completed and the damaged lagoon resumed its service on 31 August 2013. EPD continues to keep the operation of the landfill under close supervision. The Environmental Compliance Division may collect further legal samples in case any abnormal situation is observed.

Environmental Impacts of the Incident

7. The section of the Channel receiving the leachate is not a natural stream. It is a man-made, concrete lined channel, draining into the Shenzhen River. No village houses extract water from the river for potable use. There are a few small farms located along the watercourse. The landfill has been providing fresh water to one of the farmers even before the incident at times when the channel is dry. Following the incident on 27 July, the landfill contractor has also liaised with another farmer to provide him with fresh water when required. There is no known record of plant/animal species of significant ecological value along the Channel. Since the leachate leaked into a concrete channel without overland flow, significant ecological impact is thus unlikely. During EPD's field inspections, no noticeable ecological impact was observed. Nonetheless, water tanks have been provided to the farmers.

8. EPD has been conducting water quality monitoring at the junction of the Channel and Shenzhen River as well as the downstream stretch of Shenzhen River and Deep Bay. The monitoring results indicate that the leachate overflowed from NENT Landfill did not cause adverse impact to the water quality of Shenzhen River and Deep Bay.

9. Although no noticeable ecological impact had been observed, the laboratory analysis result received on 23 August showed that the levels of pollutant in the sample collected on 7 August had exceeded the legal standards. In the light of the potential offence, in parallel we issued a press release and conducted a press briefing on 28 August 2013 to keep the public informed of the incident, findings of the environmental monitoring and the remedial actions. EPD will continue to monitor the environmental water quality and the Agriculture, Fisheries and Conservation Department would follow up to offer advice to the nearby farms where necessary.

Mitigation Measures Taken

10. Once the leak was detected, the contractor took the following immediate measures to rectify the problem:

(a) provision of temporary soil bunds for interception and containment of leaked leachate;

(b) recirculation of the leachate back into the waste mass within the landfill;

(c) pumping the leachate stored at the damaged lagoon to other temporary leachate storage lagoons as far as possible;

(d) carrying out the emergency repairing works at the damaged lagoon which was completed and resumed its service on 31 August 2013;

(e) deploying road tankers to transport pretreated leachate[Note 3] direct to the Shek Wu Hui Sewage Treatment Works; and

(f) close inspection and checking of all the lagoons in the landfill and associated facilities to ensure their efficient and safe operation.

11. Moreover, the Drainage Services Department took emergency measures to stretch its sewerage network on a temporary basis to receive more pretreated leachate from NENT Landfill so as to reduce the risk of overflowing of untreated leachate off-site.

12. In parallel, EPD has asked contractors of the West New Territories (WENT) Landfill and the South East New Territories (SENT) Landfill to check the conditions of the leachate lagoons in their sites given the heavy rainfall during the period. The lagoons have all been found to be in normal operation.

Note 3 Leachate generated by the NENT Landfill is treated by an on-site treatment works to a standard suitable for discharging to public sewers for final treatment at the Shek Wu Hui Sewage Treatment Works.

Follow Up Actions and Progress

13. The DBO contracts of the three strategic landfills are performance based contracts which specify the necessary performance and environmental requirements for the contractors to comply with. The environmental performance requirements include wastewater discharge standards, air emission standards, noise emission standards, as well as operational aspects including waste examination, waste disposal performance standards, flow control of waste vehicles.

14. The NENT Landfill contractor is the Far East Landfill Technologies Ltd. The Environmental Infrastructure Division of EPD has requested the contractor to provide an incident report which will cover the causes of the incident, measures taken on site during the incident period as well as interim and longer term measures to improve the management of leachate on site and prevent the reoccurrence of similar incidents. We will study the report and determine the appropriate actions under the provisions of the contract in consultation with the Department of Justice where necessary and appropriate.

15. From the law enforcement angle, landfills are subject to control of applicable environmental legislation as well as the relevant licences and permits enforced by the Environmental Compliance Division of EPD. For the NENT Landfill, the contractor holds an Effluent Discharge Licence under the WPCO and Construction Noise Permit under the Noise Control Ordinance. As some samples of wastewater discharge collected exceeded the legal standard, the Environmental Compliance Division is conducting follow up work to collect further evidence and statements from the contractor. Advice from the Director of Public Prosecution will also be sought. In accordance with the law, a decision on prosecution will be made within 6 months from the date of suspected offence.

Related Background Information

The Sewerage Network Serving the Area

16. The pretreated leachate from the NENT Landfill is pumped through a sewerage network to the Shek Wu Hui Sewage Treatment Works. The sewerage network also serves the dual purpose of pumping domestic sewage from villages in the Ta Kwu Ling/Ping Che area to the Shek Wu Hui Sewage Treatment Works for treatment. A schematic drawing showing the sewerage network in the area is in **Annex D**.

17. The sewerage network has a total carrying capacity of 3,800m^3/day. The pipeline can handle up to about 1,300m^3/day of pretreated leachate from the NENT Landfill. Due to the anticipated population increase in the area, a review of the sewerage network was initiated in 2009 and completed in 2012. Improvement works to the sewerage network is being planned to increase its total carrying capacity to around 10,000 m^3/day. The capacity will be sufficient for serving the projected population increase as well as the planned extension of the landfill.

18. The improvement works will be carried out in two stages. The initial stage comprises upgrading of a section of pipeline that serves the NENT Landfill and the diversion of some of the domestic sewage flow to another sewerage network with a view to increasing the quantity of pretreated leachate that can be accepted by the sewerage network. We aim to complete these works within three years. The latter stage comprises the upgrading of the remaining sewers and pumping stations to receive the ultimate projected flow from the catchment. Due to the complexity of the works and need to coordinate with other public works in the area such as the Lin Ma Hang Road widening project, we aim to complete these works within six years. A schematic drawing showing the proposed improvement/upgrading works in the area is in **Annex E**.

Other Complaints on Wastewater Discharge from Landfills

19. Since 2008, there have been a total of 22 complaints received against wastewater discharge from landfills in Hong Kong. Of them 7 were about the SENT Landfill, 12 were about the WENT Landfill and 3 were about the NENT Landfill. Investigations carried out by the Environmental Compliance Division of the EPD found that 3 complaint cases concerning the WENT Landfill involved discharge of muddy rainwater after heavy rainstorms. There was also one case where prosecution was initiated against the contractor as a result of EPD's routine site inspections, although subsequently the prosecution did not proceed because the additional evidences proved that the wasterwater did not contain any leachate. The discharge was surface runoff caused by the extremely heavy rainstorm associated with a typhoon before the inspection. For the rest, no evidence could be found that there was wastewater discharged from landfills.

20. In June 2013 there was a complaint that the Ping Yuen River was polluted by wastewater discharged from the NENT Landfill. EPD conducted an investigation and carried out a joint site visit on 28 June 2013 together with Hon Fernando Cheung and Hon Frederick Fung. There was no sign of wastewater generated from the NENT Landfill. Given the topography and the water catchments in the area, it would not be possible for any wastewater discharged from the NENT Landfill into Ping Yuen River. The location of Ping Yuen River relative to the NENT Landfill can be found in **Annex C**.

Environment Bureau
Environmental Protection Department
September 2013

Annex A1

The Design-Build-and-Operate Contract

1. To achieve cohesion between the responsibilities of design, construction, operation and maintenance of the landfills, the Environmental Protection Department (EPD) has adopted a form of contract aimed at achieving unity of responsibility, namely the Design-Build-and-Operate (DBO) contract, for the development of the three strategic landfills and other waste disposal facilities in Hong Kong.

2. The DBO contract period covers the whole operational life of the landfill up to its closure together with an aftercare period of 30 years for maintenance of the closed landfill.

3. Under the DBO approach, the Landfill Contractor is allowed the flexibility to choose and adopt appropriate design and construction to meet the operational and environmental performance stipulated in the Contract. This contractual approach could therefore enable the Contractor, under the close supervision and monitoring of EPD and the Independent Consultants (IC), to use modern waste management technologies to minimize environmental impacts and enhance its operation.

4. The Environmental Infrastructure Division of EPD administers the DBO Landfill Contract, manages the Landfill Contractor, conducts regular and routine operational and environmental monitoring and auditing works to ensure the efficient, cost-effective, safe and environmentally satisfactory operation of the landfill to meet the contractual requirements.

5. At the NENT Landfill, the Environmental Infrastructure Division of EPD has a group of 10 site staff, led by a professional officer stationed on site. The essential duties of the EPD site staff are to carry out various kinds of daily inspection and monitoring of contactor’s performance to ensure that they are in compliance with the operational and environmental requirements, such as monitoring of treated leachate, surface water and groundwater, measurement of air (including odour,

dust, volatile organic compounds, etc.) and noise emissions, monitoring of ecological survey, waste examination and vehicle management, data compilation of waste disposed of (including payment verification), monitoring of site works progress and timely submission of documents, monitoring of safety and occupation health practices, etc.

6. During the full duration of the Contract period, the IC with the appropriate professional, engineering and environmental expertise was appointed as an independent third party to be responsible for providing advice, examining the performance and certifying the design and construction (including permanent and temporary works under the Contract) undertaken by the Contractor. It also covers the vetting of environmental monitoring performance and safety matters from the construction and operation stages up to the end of the aftercare period. An IC agreement was signed amongst EPD, the Landfill Contractor and the IC upon the commencement of the Landfill Contract.

7. In addition to management of contractors under the contracts, landfill operation is also controlled by the relevant environmental legislation, e.g. the Water Pollution Control Ordinance. The Environmental Compliance Division of the EPD enforces the laws and pledges to inspect each landfill not less than 4 times a year.

Annex A2

Management Systems of Wastewater, Surface Water and Groundwater at the North East New Territories Landfill

Containment Design

1. The North East New Territories (NENT) Landfill is designed as a secure containment system, which primarily consists of multi-layer impermeable composite liners at the formation level to contain landfill gas and leachate generated, so that waste is deposited and treated under an engineering controlled environment. Such containment system will avoid the adverse environmental impact to its surrounding areas, in particular the risk of causing contamination of underground water. A typical section layout is given in **Annex B1**.

Leachate Management System

2. Leachate is generated by the moisture content in the waste, decomposition of waste, and rainwater infiltration into the waste mass. The leachate management system at the NENT Landfill essentially comprises a leachate collection network, pump sumps, storage lagoons, rising mains and treatment plants to:

    (a) control the direction and rate of flow of any leachate generated within the waste;

    (b) minimize the generation of landfill leachate by separation of clean surface water from the landfill leachate; and

    (c) enable the efficient collection and treatment of leachate to the required standards for discharge into the public sewerage and sewage treatment system (i.e. the Shek Wu Hui Sewage Treatment Works in this case) before final disposal.

3. The contractor is required to design and construct all components of the leachate management system, which are capable of coping with the volume of leachate generated during all stages of landfill development, operation, restoration and aftercare. The contractor is also responsible for projecting leachate generation rates at all stages with due account to the high rainfall rates which can occur in Hong Kong. To meet these requirements and if necessary during the wet seasons, the leachate gravitated into the leachate collection network is transferred to the temporary storage lagoons before treatment by the leachate treatment plant. A schematic layout showing the operation of the leachate management system and the role of the temporary storage lagoons is shown in **Annex B2**.

Surface Water Management System

4. Under the Contract, the contractor is required to provide a surface water management system as well as an operation plan to handle the rainstorm throughout the operation and aftercare period. An important aspect of the surface water management system is the segregation of clean surface water runoff during rainfall from contaminated fluids such as leachate. Impermeable liner is used to cover most of the non-active areas in the landfill to reduce surface infiltration. Toe and edge bunds with impermeable liners are also constructed at each active area of the landfill so as to stop the ingress of surface water to the waste mass and hence minimize the leachate generation. Any surface water discharge from the site shall meet the standards specified in the Contract with reference drawn from the "Technical Memorandum: Standards for effluents discharged into drainage and sewerage systems, inland and coastal waters".

Groundwater Management System

5. Besides surface water management, the contractor is required to design and provide a groundwater management system that includes the drains below the impermeable liner system of the landfill cells, so that groundwater below the landfill cells will not be contaminated and can be effectively collected and removed. Groundwater monitoring facilities comprising the peripheral drill holes are provided for measurement of

groundwater levels and for the collection of representative groundwater samples. The contractor is therefore able to closely monitor and manage the system in order to detect any unacceptable changes to the groundwater regime around the landfill site during landfilling operations and aftercare period. Through close monitoring of groundwater along the landfill boundary, the integrity of the impermeable liner at the base of the landfill is ensured.

Environmental and Pollution Control Requirements

6. The Contract requires the contractor, under the supervision of Independent Consultants and monitoring by the Environmental Protection Department, to undertake the necessary environmental monitoring measures as well as corrective actions for any non-compliance throughout the construction, operation and aftercare period so as to meet the contractual and statutory responsibility for protecting the surrounding environment. The scope of environmental monitoring covers a wide range of environmental parameters, including leachate, landfill gas, groundwater, surface water, noise, dust, organic emissions and odour, examination of waste, etc. A summary of groundwater quality monitoring results and surface water quality monitoring results at Ping Yuen River and Kong Yiu Channel in the past 5 years is given below. The results showed compliance with the standards required.

Table 1 – Groundwater & Surface Water Quality Monitoring at NENT Landfill (2008-2012)

(a) Groundwater Quality Monitoring

Date	Number of Samples Taken[1]	5-day Biochemical Oxygen Demand (mg/L)[2]	Chemical Oxygen Demand (mg/L)[2]	Ammonia – Nitrogen (mg/L)[2]
8-Jan-08	10	2 (<2 - 2)	3 (<2 - 6)	0.19 (<0.01 – 0.74)
13-Feb-08	7	2 (<2 - 2)	3 (<2 - 5)	0.02 (<0.01 – 0.04)
5-Mar-08	12	2 (<2 - 3)	3 (<2 - 9)	0.08 (0.02 – 0.28)
9-Apr-08	10	2 (<2 - 2)	4 (<2 - 14)	0.06 (0.02 – 0.20)
5-May-08	7	2 (<2 - 2)	6 (3 - 10)	0.07 (0.04 – 0.11)
18&19-Jun-08	12	2 (<2 - 2)	5 (<2 – 13)	0.07 (0.02 – 0.16)
8&9-Jul-08	10	2 (<2 - 2)	5 (<2 - 17)	0.07 (<0.01 – 0.24)
15-Aug-08	7	2 (<2 - 2)	3 (<2 - 4)	0.06 (0.02 – 0.12)
10-Sep-08	12	2 (<2 - 2)	4 (<2 - 8)	0.06 (0.01 – 0.14)
9-Oct-08	10	2 (<2 - 2)	2 (<2 - 2)	0.10 (0.02 – 0.54)
13-Nov-08	7	2 (<2 - 2)	2 (<2 - 4)	0.04 (<0.01 – 0.09)
3&4-Dec-08	12	2 (<2 - 2)	10 (3 - 25)	0.12 (0.03 – 0.68)
6-Jan-09	10	2 (<2 - 2)	2 (<2 - 2)	0.10 (0.02 – 0.43)
4-Feb-09	7	2 (<2 - 2)	3 (<2 - 8)	0.05 (0.02 – 0.13)
11-Mar-09	12	2 (<2 - 2)	3 (<2 - 10)	0.04 (0.01 – 0.10)
8&9-Apr-09	10	2 (<2 - 2)	3 (<2 - 5)	0.05 (0.02 – 0.14)
6-May-09	7	2 (<2 - 2)	3 (<2 - 6)	0.12 (0.02 – 0.40)
9&10-Jun-09	12	2 (<2 - 2)	3 (<2 - 9)	0.04 (<0.01 – 0.08)

Date	Number of Samples Taken[1]	5-day Biochemical Oxygen Demand (mg/L)[2]	Chemical Oxygen Demand (mg/L)[2]	Ammonia – Nitrogen (mg/L)[2]
8-Jul-09	10	2 (<2 - 2)	4 (<2 - 14)	0.13 (0.01 – 0.45)
12-Aug-09	7	2 (<2 - 2)	3 (<2 - 6)	0.07 (0.03 – 0.20)
9-Sep-09	12	2 (<2 - 2)	3 (<2 - 5)	0.04 (0.01 – 0.30)
8-Oct-09	10	2 (<2 - 2)	2 (<2 - 4)	0.08 (<0.01 – 0.34)
10-Nov-09	7	2 (<2 - 2)	3 (<2 - 6)	0.04 (<0.01 – 0.17)
7&9-Dec-09	12	2 (<2 - 5)	4 (<2 - 17)	0.05 (<0.01 – 0.27)
13-Jan-10	10	2 (<2 - 2)	2 (<2 - 3)	0.06 (<0.01 – 0.50)
10-Feb-10	7	2 (<2 - 2)	7 (<2 - 12)	0.05 (0.01 – 0.18)
10&11-Mar-10	12	2 (<2 - 2)	4 (<2 - 20)	0.04 (<0.01 – 0.10)
14-Apr-10	10	2 (<2 - 2)	2 (<2 - 3)	0.08 (<0.01 – 0.51)
12-May-10	7	2 (<2 - 2)	4 (<2 - 11)	0.04 (<0.01 – 0.13)
8&14-Jun-10	12	2 (<2 - 3)	5 (2 - 9)	0.03 (<0.01 – 0.10)
6-Jul-10	10	2 (<2 - 2)	3 (<2 - 6)	0.10 (0.01 – 0.62)
10-Aug-10	7	2 (<2 - 2)	5 (<2 - 10)	0.09 (0.02 – 0.27)
7-Sep-10	12	3 (<2 - 4)	4 (<2 - 12)	0.02 (<0.01 – 0.04)
7-Oct-10	10	2 (<2 - 2)	2 (<2 - 2)	0.14 (0.02 – 0.77)
4-Nov-10	7	2 (<2 - 2)	5 (<2 - 11)	0.06 (0.02 – 0.12)
8-Dec-10	12	2 (<2 - 2)	3 (<2 - 6)	0.01 (0.01 – 0.01)
13-Jan-11	10	2 (<2 - 2)	4 (<2 - 9)	0.04 (<0.01 – 0.14)
14-Feb-11	7	2 (<2 - 2)	2 (<2 - 3)	0.03 (<0.01 – 0.14)
8-Mar-11	12	2 (<2 - 2)	4 (<2 - 8)	0.05 (<0.01 – 0.15)

Date	Number of Samples Taken[1]	5-day Biochemical Oxygen Demand (mg/L)[2]	Chemical Oxygen Demand (mg/L)[2]	Ammonia – Nitrogen (mg/L)[2]
13-Apr-11	10	2 (<2 - 2)	2 (<2 - 2)	0.19 (<0.01 – 1.50)
11-May-11	7	2 (<2 - 2)	4 (<2 - 8)	0.07 (0.02 – 0.17)
8-Jun-11	12	2 (<2 - 2)	5 (<2 - 16)	0.05 (0.01 – 0.12)
6-Jul-11	10	2 (<2 - 2)	5 (<2 - 14)	0.13 (0.01 – 0.80)
11-Aug-11	7	2 (<2 - 2)	4 (<2 - 7)	0.02 (<0.01 – 0.03)
6-Sep-11	12	2 (<2 - 2)	4 (<2 - 10)	0.01 (<0.01 – 0.03)
19-Oct-11	10	2 (<2 - 2)	2 (<2 - 4)	0.10 (<0.01 – 0.70)
7-Nov-11	7	2 (<2 - 2)	3 (<2 - 6)	0.03 (0.01 – 0.08)
5-Dec-11	12	2 (<2 - 2)	3 (<2 - 6)	0.02 (0.01 – 0.08)
11-Jan-12	10	2 (<2 - 2)	2 (<2 - 2)	0.18 (0.02 – 1.46)
7-Feb-12	7	2 (<2 - 5)	4 (<2 - 7)	0.05 (0.01 – 0.15)
14-Mar-12	12	2 (<2 - 2)	3 (<2 - 6)	0.03 (<0.01 – 0.07)
12-Apr-12	10	2 (<2 - 2)	2 (<2 - 2)	0.13 (<0.01 – 0.77)
9-May-12	7	2 (<2 - 2)	4 (<2 - 7)	0.02 (<0.01 – 0.06)
7-Jun-12	12	2 (<2 - 2)	2 (<2 - 5)	0.05 (<0.01 – 0.12)
10-Jul-12	10	2 (<2 - 2)	2 (<2 - 2)	0.23 (<0.01 – 1.80)
7-Aug-12	7	2 (<2 - 2)	2 (<2 - 2)	0.04 (0.01 – 0.07)
11-Sep-12	12	2 (<2 - 2)	3 (<2 - 5)	0.06 (0.01 – 0.14)
10-Oct-12	10	2 (<2 - 2)	2 (<2 - 2)	0.09 (<0.01 – 0.38)
8-Nov-12	7	2 (<2 - 2)	2 (<2 - 2)	0.05 (<0.01 – 0.13)
12-Dec-12	12	2 (<2 - 2)	4 (<2 - 18)	0.04 (0.01 – 0.08)

Date	Number of Samples Taken[1]	5-day Biochemical Oxygen Demand (mg/L)[2]	Chemical Oxygen Demand (mg/L)[2]	Ammonia – Nitrogen (mg/L)[2]
Average Value		2	3	0.07
Maximum Value		5	25	1.8
Minimum Value		<2	<2	<0.01
Contractual Requirement Level		Not Applicable	30	5
Compliance Percentage		Not Applicable	100%	100%

Notes:-

1. *A total of 29 monitoring points are located along the perimeter of the NENT Landfill.*
2. *Figures on the top are the average values and figures in brackets are the minimum and maximum values.*

(b) Surface Water Quality Monitoring at Ping Yuen River

Date	Number of Samples Taken[1][2]	5-day Biochemical Oxygen Demand (mg/L)	Chemical Oxygen Demand (mg/L)	Suspended Solids (mg/L)	Ammonia – Nitrogen (mg/L)
3-Mar-08	1	<2	5	10	0.21
12-Jun-08	1	<2	<2	3	0.12
1-Sep-08	1	<2	<2	3	0.10
2-Dec-08	1	<2	2	6	0.11
2-Mar-09	1	<2	<2	12	0.11
1-Jun-09	1	10	27	6	0.22
1-Sep-09	1	<2	2	<3	0.05
1-Dec-09	1	<2	12	8	0.10
1-Mar-10	1	5	16	9	0.23
4-Jun-10	1	<2	2	10	0.10
1-Sep-10	1	<2	<2	4	0.13
1-Dec-10	1	<2	<2	6	0.15
1-Mar-11	1	<2	4	14	0.26
3-Jun-11	1	<2	4	9	0.18
1-Sep-11	1	<2	4	12	0.05
1-Dec-11	1	<2	3	6	0.11
2-Mar-12	1	<2	5	10	0.22
4-Jun-12	1	<2	<2	<3	0.16
3-Sep-12	1	<2	3	7	0.07
10-Dec-12	1	<2	4	18	0.16
Average Value		3	5	8	0.14
Maximum Value		10	27	18	0.26
Minimum Value		<2	<2	<3	<0.01
Contractual Requirement Level		Not Applicable	30	20	0.5
Compliance Percentage		Not Applicable	100%	100%	100%

Notes:-

1. *One water quality monitoring point is located at Ping Yuen River.*
2. *Only those monitoring with successful collection of surface water samples are counted.*

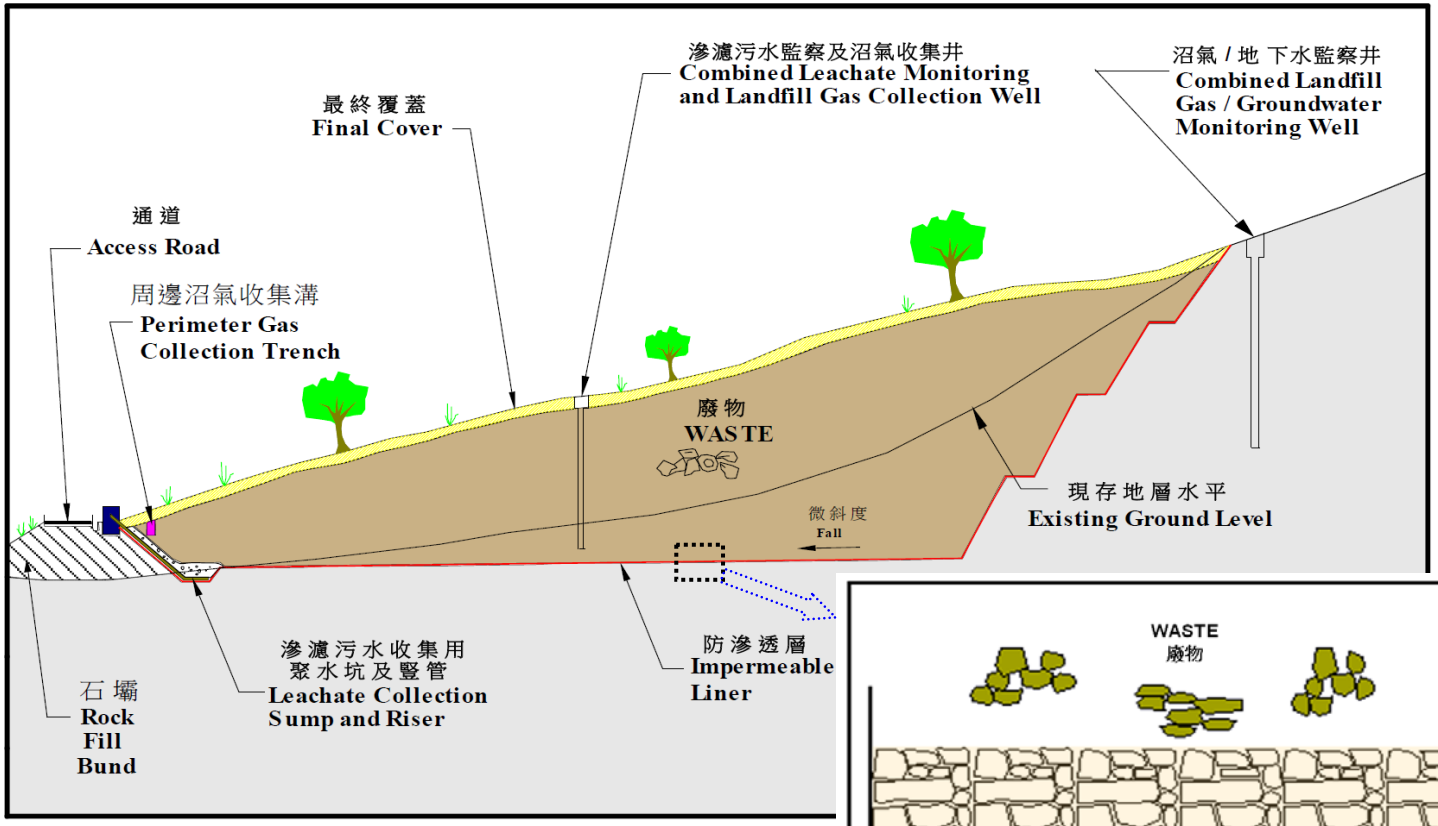
(c) Surface Water Quality Monitoring at Kong Yiu Channel

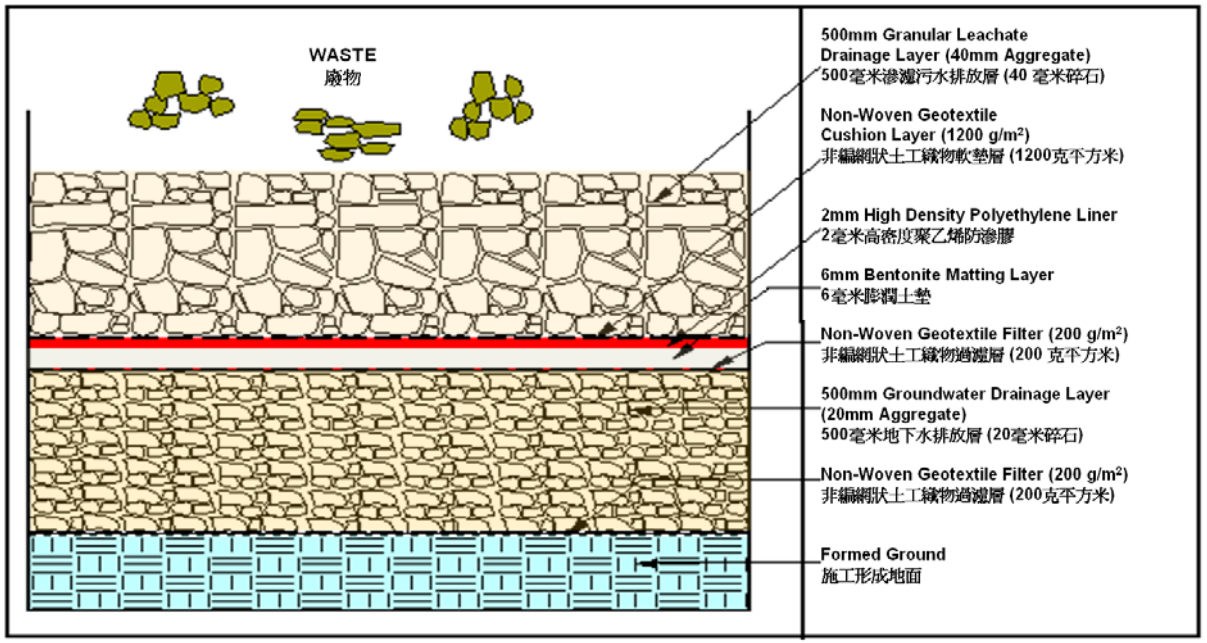
Date	Number of Samples Taken[1][2]	5-day Biochemical Oxygen Demand (mg/L)	Chemical Oxygen Demand (mg/L)	Suspended Solids (mg/L)	Ammonia – Nitrogen (mg/L)
3-Mar-08	1	<2	5	<3	0.20
12-Jun-08[3]	2	<2	<2	<3	0.24 (0.16 - 0.31)
1-Sep-08	1	<2	<2	<3	0.22
2-Dec-08	1	2	<2	<3	0.08
2-Mar-09	1	<2	<2	<3	0.07
1-Jun-09	1	<2	<2	<3	0.14
1-Sep-09	1	<2	<2	6	0.14
1-Dec-09	1	<2	4	<3	0.08
1-Mar-10	1	4	<2	4	<0.01
4-Jun-10	1	<2	<2	5	0.20
1-Sep-10	1	<2	<2	<3	0.42
1-Dec-10	1	<2	<2	<3	0.11
1-Mar-11	1	<2	<2	15	0.09
3-Jun-11	1	<2	3	<3	0.18
1-Sep-11[3]	2	<2	4 (<2 – 6)	<3	0.06 (<0.01 - 0.10)
1-Dec-11	1	<2	<2	5	0.16
2-Mar-12	1	<2	4	4	0.04
4-Jun-12	1	<2	3	5	0.35
3-Sep-12	1	<2	<2	9	0.31
10-Dec-12	1	<2	2	6	0.12
Average Value		2	3	4	0.16
Maximum Value		4	6	15	0.42
Minimum Value		<2	<2	<3	<0.01
Contractual Requirement Level		Not Applicable	30	20	0.5
Compliance Percentage		Not [illegible]	100%	100%	100%

Notes:-

1. *Two water quality monitoring points are located at Kong Yiu Channel.*
2. *Only those monitoring with successful collection of surface water samples are counted.*
3. *Figures on the top are the average values and figures in brackets are the minimum and maximum values.*

Annex B1
附件二 之一

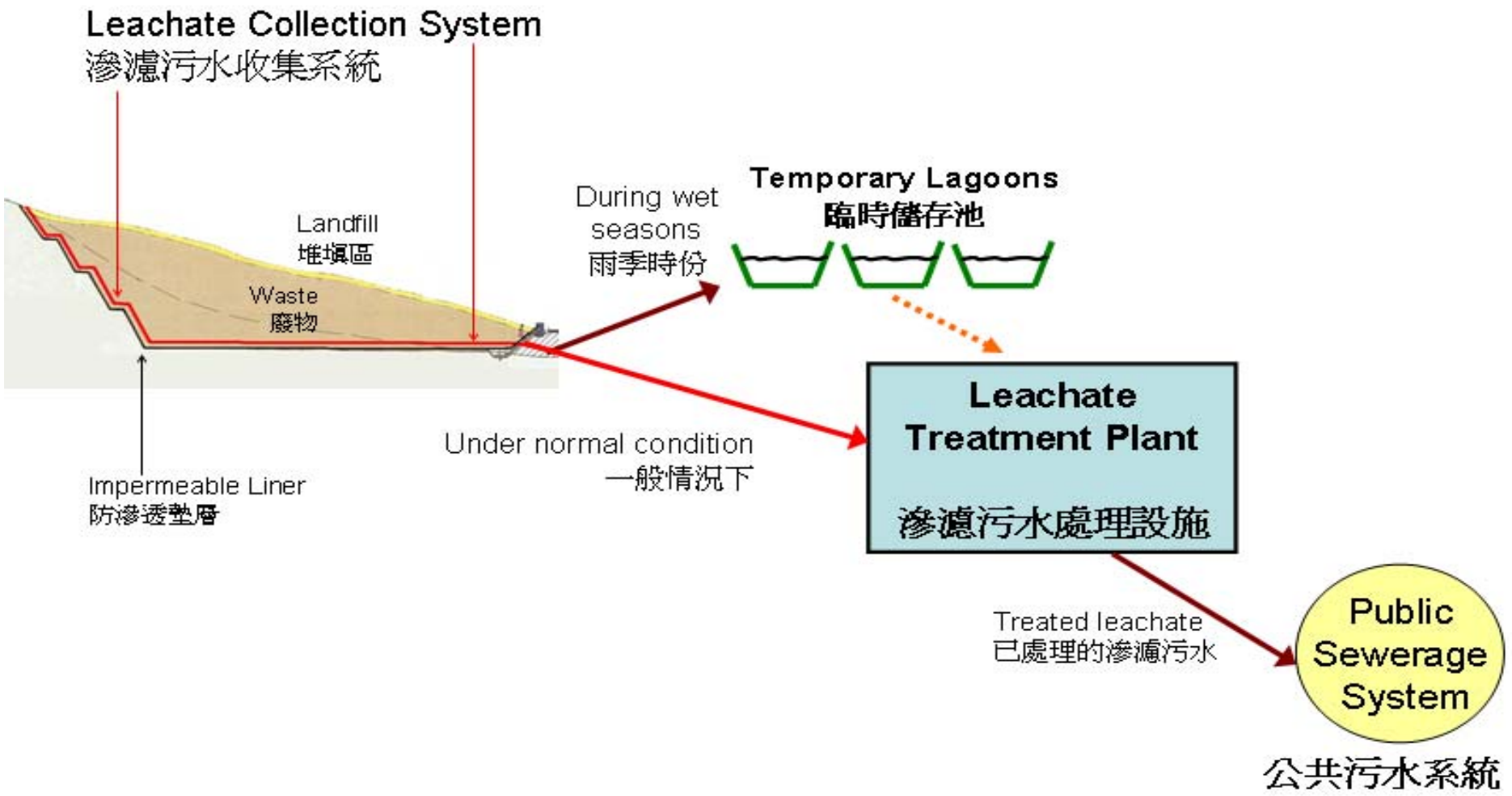


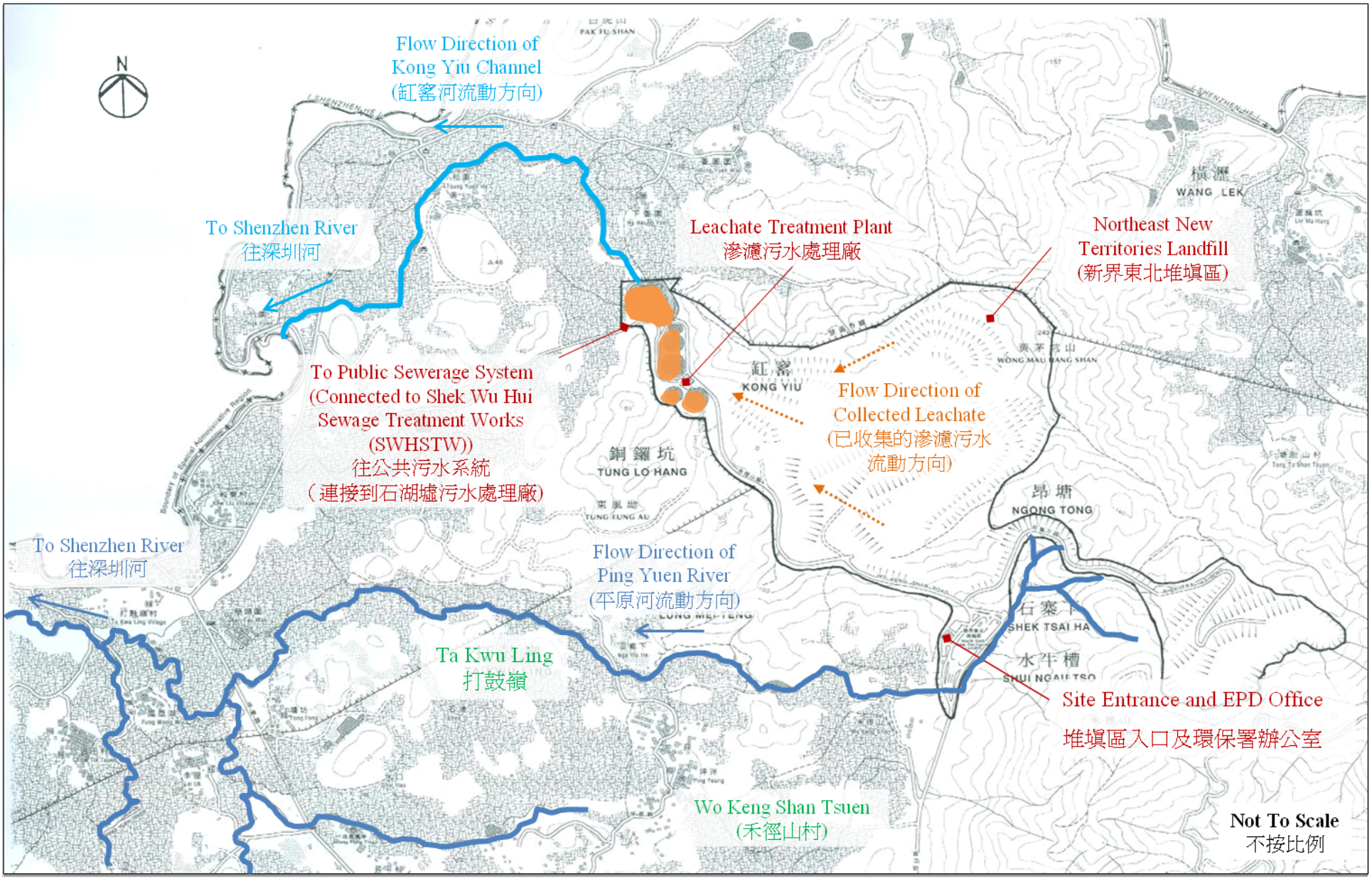


Typical Section Layout of a Landfill
堆填區典型切面圖

Not to Scale
不按比例

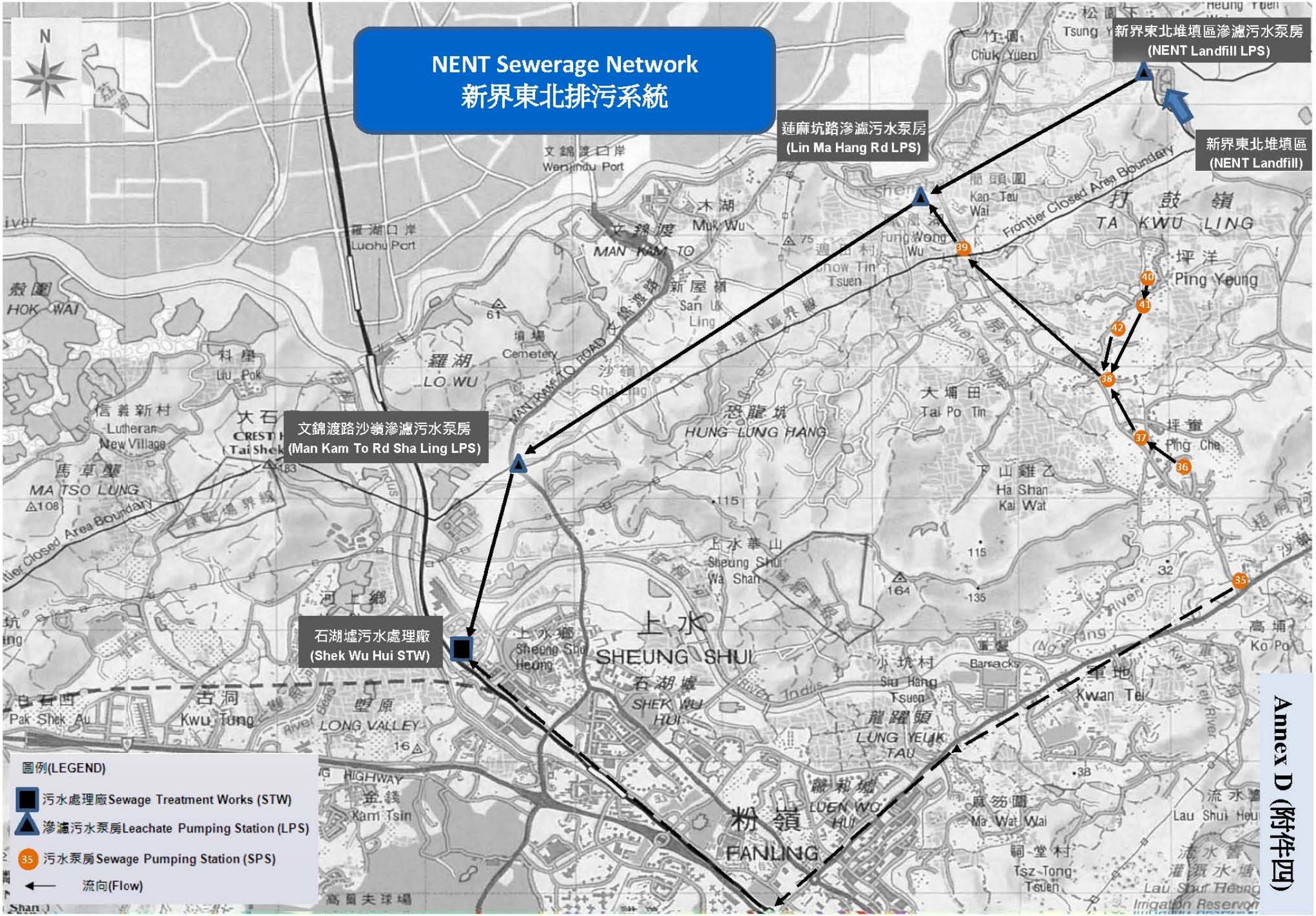
Leachate Management for NENT Landfill
新界東北堆填區 – 滲濾污水處理

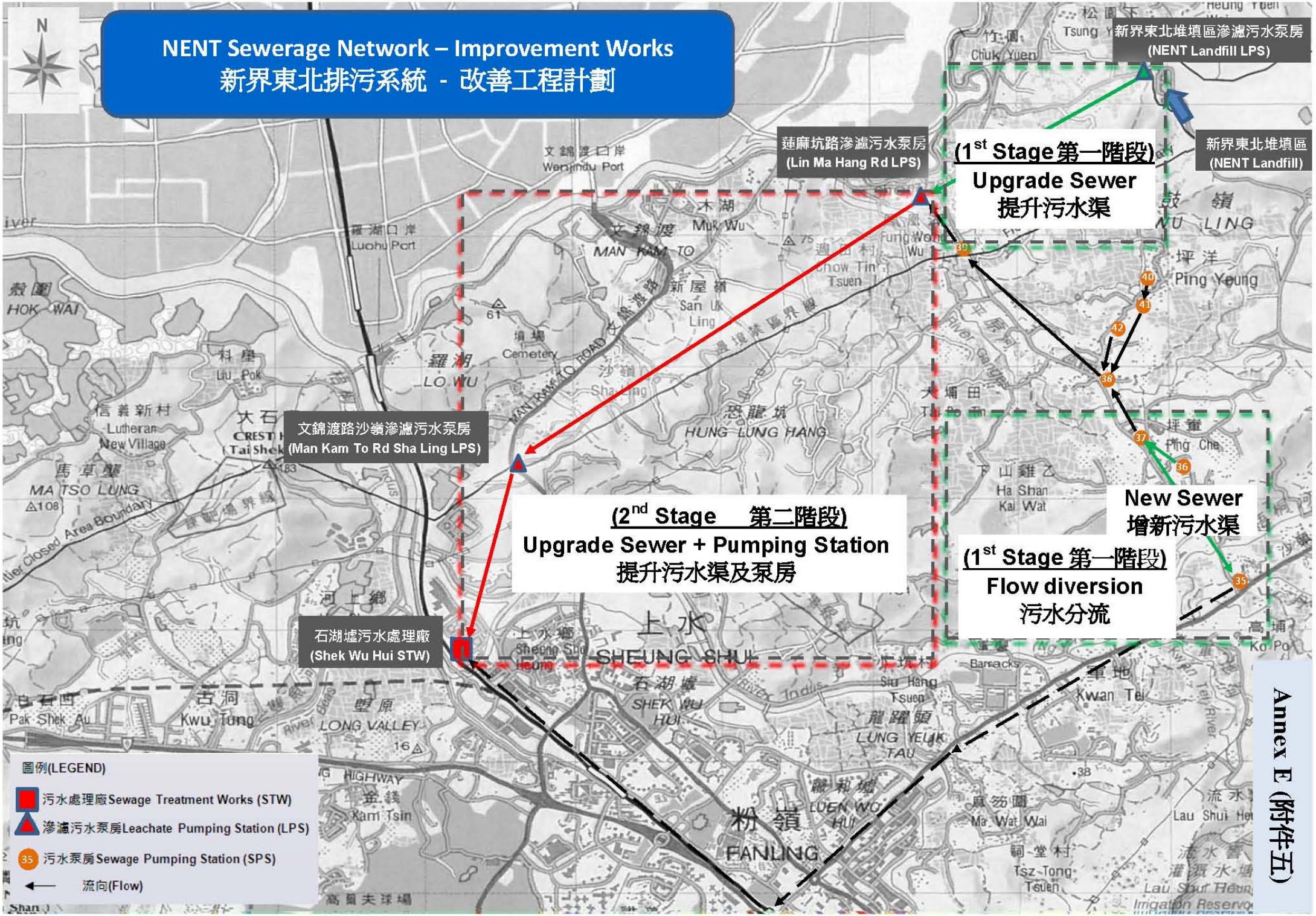




Location Map of NENT Landfill, Kong Yiu Channel and the Vicinities

新界東北堆填區、缸窰河及附近地方位置圖


NENT Sewerage Network
新界東北排污系統
新界東北堆填區滲濾污水泵房
(NENT Landfill LPS)
新界東北堆填區
(NENT Landfill)
蓮麻坑路滲濾污水泵房
(Lin Ma Hang Rd LPS)
文錦渡路沙嶺滲濾污水泵房
(Man Kam To Rd Sha Ling LPS)
石湖墟污水處理廠
(Shek Wu Hui STW)
Frontier Closed Area Boundary
圖例(LEGEND)
污水處理廠Sewage Treatment Works (STW)
滲濾污水泵房Leachate Pumping Station (LPS)
污水泵房Sewage Pumping Station (SPS)
流向(Flow)
Annex D (附件四)


NENT Sewerage Network – Improvement Works
新界東北排污系統 - 改善工程計劃
新界東北堆填區滲濾污水泵房
(NENT Landfill LPS)
新界東北堆填區
(NENT Landfill)
蓮麻坑路滲濾污水泵房
(Lin Ma Hang Rd LPS)
(1st Stage第一階段)
Upgrade Sewer
提升污水渠
文錦渡路沙嶺滲濾污水泵房
(Man Kam To Rd Sha Ling LPS)
(2nd Stage 第二階段)
Upgrade Sewer + Pumping Station
提升污水渠及泵房
New Sewer
增新污水渠
(1st Stage 第一階段)
Flow diversion
污水分流
石湖墟污水處理廠
(Shek Wu Hui STW)
圖例(LEGEND)
污水處理廠Sewage Treatment Works (STW)
滲濾污水泵房Leachate Pumping Station (LPS)
污水泵房Sewage Pumping Station (SPS)
流向(Flow)
Annex E (附件五)

For information
On 27 January 2014

The Legislative Council
Panel on Environmental Affairs

Incident of Leachate from North East New Territories Landfill
Progress Report

Purpose

Members were briefed on the incident of leachate leakage from the North East New Territories (NENT) Landfill and the associated measures taken on 17 September 2013 (CB(1)1774/12-13(01)). This paper updates Members on the progress of the improvement works and the associated measures undertaken by the Administration at the NENT Landfill.

The Cause of the Incident

2. On 27 July 2013, leakage of leachate from a recently commissioned temporary leachate storage lagoon at the NENT Landfill was detected. At the Panel meeting on 17 September 2013, the Administration briefed Members on the details of the incident including findings of our environmental monitoring, the immediate remedial actions taken by the contractor of the NENT Landfill and the Government, as well as various follow-up actions to be taken. Members also visited the NENT Landfill site on 1 September 2013 prior to the meeting on 17 September 2013.

3. The contractor of the NENT Landfill was instructed to submit an incident report which covers the causes of the incident, measures taken on site during the incident period as well as interim and longer term measures to improve the management of leachate on site and prevent the reoccurrence of similar incidents. The incident report was submitted by the landfill contractor on 4 October 2013 for review by the Environmental

Protection Department (EPD) and the independent consultants[1]. After detailed examination and assessment of the report, we are of the view that the leakage incident, as detected on 27 July 2013, was triggered by a hole that had punctured through the impermeable liner during the course of filling leachate into the temporary leachate storage lagoon. The punctured hole was believed to be caused by liner material failure, which in turn was either due to material defects or movement of the side slope wall caused by continuous heavy rain a few days before the incident[2] or a combination of both factors.

4. At present, we are pursuing the liability of the contractor under the NENT Landfill Contract and enforcement actions under the Water Pollution Control Ordinance. We are also putting in place all necessary remedial and preventive measures so as to avoid any reoccurrence of similar leakage incidents in future.

Improvement Measures

5. The following remedial and preventive measures have been or are being implemented by the landfill contractor to avoid any leakage from the temporary leachate storage lagoons, and to allow sufficient storage capacity for the leachate generated during the coming wet season as well as for longer term.

(a) <u>Temporary Leachate Storage Lagoons at NENT Landfill</u>

6. To avoid any reoccurrence of similar incidents in future, the contractor has paid extra attention to safeguard the integrity, stability and

[1] During the full duration of the Contract period, a team of independent consultants (IC) with appropriate professional, engineering and environmental expertise was appointed as an independent third party to be responsible for providing advice, examining the performance and certifying the design and construction (including permanent and temporary works) under the Contract undertaken by the Contractor. This also covers the vetting of environmental monitoring performance and safety matters from the construction and operation stages up to the end of the aftercare period. An IC agreement was signed among EPD, the Landfill Contractor and the IC upon the commencement of the Landfill Contract.

[2] According to the data recorded by the Hong Kong Observatory, there was a total rainfall of 174mm between 23 and 27 July 2013.

robustness of all temporary leachate storage lagoons at the NENT Landfill. Besides checking the stability and the serviceability of the existing temporary leachate lagoons, the contractor has safeguarded the performance of the temporary leachate storage lagoons by providing double impermeable liners with a layer of bentonite in between for all future temporary leachate storage lagoons. In addition, all the side walls of the lagoons are to be covered with impermeable liners in order to prevent any surface erosion due to rainstorm which will undermine the lagoon stability. All the lagoons are subject to close monitoring to ensure their stability and serviceability, in particular during the wet seasons.

7. In order to prevent rainfall from infiltrating into the waste mass, over 90% of the entire landfill area with the exception of the tipping platforms and access roads were already covered by impermeable liners. Similarly, to prevent rainfall from entering the leachate storage lagoons which would increase the amount of stored leachate, the contractor has taken active actions to retrofit floating covers to the existing temporary storage lagoons wherever practicable and engineering consideration allows. We will also require under the future contract for the proposed NENT Landfill extension that floating covers be provided for all the lagoons, including both temporary leachate storage lagoons and permanent lagoons at the leachate treatment works.

(b) <u>Wastewater Treatment at NENT Landfill</u>

8. We have also advised the contractor to improve the overall leachate management plan. To improve the overall treatment capacity of the wastewater management system at the NENT Landfill, the landfill contractor is now investigating the feasibility of expanding the capacity of the Ammonia Stripping Plant (ASP)[3] to increase the quantity of treated leachate that can be discharged to public sewer so as to reduce the on-site temporary leachate storage requirement. It is anticipated that expansion of the ASP will take a year to complete when the feasibility is established and detailed design of the plant is completed.

[3] The Ammonia Stripping Plant is used to strip ammonia away from the raw leachate so that the stripped leachate with low ammonia contents can be subsequently treated by the leachate treatment plant to an acceptable discharge standard for pumping to public sewer system.

9. In addition, we have required the contractor to provide on-site package treatment plants with a design capacity of 500 cubic metres per day for treating non-leachate wastewater, including those generated from general site activities and the future full-body vehicle wash facility. This treatment plant is expected to be in place by end of 2014.

10. Furthermore, we have advised the contractor to minimize the number of temporary leachate storage lagoons as far as possible, subject to ensuring adequate storage capacity for leachate generated in the coming wet session. When conditions allow, the contractor would empty and dismantle some lagoons in the near future in order to minimize the amount of rain collected by these lagoons as well as to make way for landfilling operation.

Environmental Monitoring

(a) Kong Yiu Channel

11. We have been monitoring closely the water quality of the Kong Yiu Channel, which is a concrete man-made surface water channel near the NENT Landfill which flows downstream to the Shenzhen River and Deep Bay. We have increased the monitoring frequency from every quarter to a weekly basis. The test results have been uploaded to the EPD website on a weekly basis since 4 October 2013 for public information. We have also enhanced our daily inspection of the channel and no abnormal discharge has been observed. A summary of the test results is at **Annex A.** The latest results of the sample collected on 20 December 2013 indicated full compliance with legal requirements. Since then, no sample could be collected due to the extremely low water level in the Kong Yiu Channel. We will continue to monitor the situation and keep the public informed of the progress.

(b) Shenzhen River and Deep Bay

12. EPD has also been conducting water quality monitoring at the junction of the Kong Yiu Channel and Shenzhen River as well as the downstream stretch of Shenzhen River and Deep Bay. The monitoring results indicate that the leachate overflowed from NENT Landfill as a

result of the leachate leakage incident did not cause any significant impact to the water quality of Shenzhen River and Deep Bay.

Contractual Actions against the Contractor

13. We are taking contractual actions against the contractor for non-compliance of operational and environmental performance as stipulated under the contract in relation to the incident on 27 July 2013. We will continue to monitor closely the environmental performance of the contractor and if there is any further non-compliance of discharge of wastewater exceeding the standards required under the Contract to the Kong Yiu Channel or any other water bodies, appropriate contract enforcement actions will be taken.

Notification Mechanism of Similar Incidents

14. We have also reviewed the existing emergency response plan for all waste facilities in Hong Kong including landfills and the corresponding notification mechanism to ensure prompt response in case of any similar incidents in the future.

Enforcement Action

15. The operation of the NENT Landfill is subject to all prevailing environmental legislation. The contractor is licensed by the EPD under the Water Pollution Control Ordinance (WPCO) and has to abide by the conditions contained therein. Following the leakage incident, the enforcement staff of EPD had inspected the NENT Landfill and detected the discharge of some leaked leachate mixed with rainwater into the surface drains on site which was eventually discharged into the Kong Yiu Channel. While the contractor has been taking measures to contain the leachate within the landfill site, EPD has stepped up monitoring of the NENT Landfill after the leakage incident. In addition to on-site monitoring by EPD's contract management team, random site inspections were carried out by the enforcement staff of EPD every week and water samples were collected from the storm drains near the boundary of the

NENT Landfill when contaminated discharge was suspected. Analysis results of legal samples collected in August and September 2013 indicated that there were a number of occasions where polluting discharges from the landfill were detected. Prosecution against the contractor was initiated on 21 January 2014.

District Liaison Committee

16. To enhance communication among the District Councils, local community and other stakeholders with EPD on the waste management facilities in the district as well as other related issues, we will set up district liaison committees for Tuen Mun / Yuen Long, Sai Kung and North district to better liaise with the local community and monitor the management and operation of waste management facilities, including landfills, in the district.

Conclusion

17. The Administration has taken the leachate leakage incident very seriously. While our environmental monitoring results indicate that the leachate leakage incident did not cause any significant environmental impacts and that immediate remedial actions had been taken by the contractor as well as the relevant government departments to rectify the problem and to prevent future incidents, we will continue to pursue further preventive measures as outlined above. At the same time, we will continue to closely monitor the performance of the contractor to ensure that the operation of the landfill will fully meet all of the legal and contractual standards and requirements.

Environment Bureau
Environmental Protection Department
January 2014

Annex A

Summary of water quality testing results at Kong Yiu Channel

Date of sample taken [(1)]	Weather Condition	Chemical Oxygen Demand (mg/L)	5-day Biochemical Oxygen Demand (mg/L)	Total Suspended Solids (mg/L)	Ammonia-Nitrogen (mg/L)
4/10/2013	Sunny	**12**	**2.5**	**<3**	**36**
11/10/2013	Sunny	**31**	**6.2**	**5.7**	**36**
18/10/2013	Cloudy	**9**	**6**	**<3**	**8.1**
25/10/2013	Sunny	**29**	**8.7**	**3.9**	**27**
1/11/2013	Sunny	**21**	**7.5**	**<3**	**16**
8/11/2013	Sunny	**27**	**3.9**	**3**	**5.6**
15/11/2013	Sunny	**14**	**<2**	**<3**	**2.1**
22/11/2013	Sunny	Results not available [(2)]			
29/11/2013	Sunny	**16**	**5.6**	**6.4**	**8.6**
6/12/2013	Sunny	**7**	**2.2**	**<3**	**5.7**
13/12/2013	Cloudy	**<5**	**2.1**	**<3**	**6.1**
20/12/2013	Sunny	**<5**	**<2**	**<3**	**2.7**
27/12/2013	Sunny	Results not available [(2)]			
3/1/2014	Sunny	Results not available [(2)]			
10/1/2014	Sunny	Results not available [(2)]			
17/1/2014	Sunny	Results not available [(2)]			
24/1/2014	Sunny	Results not available [(2)]			
Legal requirement (Contractual requirement in parenthesis):		**80** (30)	**20** (-)	-- (20)	**5** (0.5)

Remarks :

1. On the day of sample collection, there was no discharge from landfill to Kong Yiu Channel, and the water flow was very low. No significant ecological value is recorded along the Kong Yiu Channel, and no serious environmental impact is caused to the ecology and public health. EPD will continue to monitor the situation.

2. Water samples could not be collected due to the extremely low water level in Kong Yiu Channel.