(ACE-EIA Paper 9/2003)

For advice

Extensions of Existing Landfills and Identification of New Waste Disposal Sites

Purpose

This paper presents the key findings and recommendations of the study for the Extension of Existing Landfills and Identification of Potential New Waste Disposal Sites commissioned by the Environmental Protection Department (EPD).

Need for the Study

2. At present, over 6 million tonnes of wastes are disposed of in our three landfills (i.e. West New Territories (WENT) Landfill, Northeast New Territories (NENT) Landfill and Southeast New Territories (SENT) Landfill) each year. When planned in the 1980s, they were expected to serve our waste disposal need till 2020. However, as the amount of waste requiring disposal has been increasing, the landfills have been filling up much faster than planned. By the end of 2002, we only had a remaining landfill capacity of around 110 million tonnes. We project that the existing landfills would only last 8 to 12 years if waste continues to grow at the current trend. The landfills may be saturated even earlier if we fail to prevent construction and demolition materials from being dumped there or if we fail to achieve our recycling target of 40% for municipal solid waste by 2007.

3. Waste prevention and recycling has been our main focus in tackling the waste problem. However, we cannot count on waste reduction and recycling alone in dealing with this problem since clearly not all wastes are recyclable. Our estimate is that even if we are able to reduce waste as much as possible, and meet our target recycling rate of 40% by 2007, there will still be over 4 million tonnes of unrecyclable wastes that need to be handled. While we are examining the appropriate technologies for the development of large-scale waste treatment facility(ies) to reduce the volume of unrecyclable waste that requires disposal, the existing landfills would have to be extended or new ones developed to serve as final repositories for residual waste emerging from large-scale waste treatment facility(ies) and waste that cannot be treated.

4. As the three landfills will be filled up soon and a long lead time would be required to develop new landfills, there is an urgent need to find new sites for landfills to cater for Hong Kong's waste disposal needs. Hence, we commenced a study in February 2000 to examine the extension of the existing landfills and identify potential sites for new landfills. The study was completed in January 2003. The findings and recommendations of the Study are presented in the Final Report at Attachment 1.

Description of the Study

5. The Study aims to identify potential extensions to the existing landfills and potential new sites that are suitable for landfill development to meet Hong Kong's waste disposal needs until 2050. To this end, the study has reviewed and established waste arising forecast for forward planning. It has also explored various technologies and working systems (e.g. landfill void space utilization, mechanical/biological pretreatment and accelerating biodegradation to pre-treat or accelerate the biodegradation of waste) to extend the lives of the existing landfills. However, the study has concluded that none of the technologies can extend the life of the existing landfills in any significant way.

Site Selection under the Study

6. The Study has identified potential extension and new sites for landfill development through a site selection process. To begin with, "areas of absolute exclusion"[1] where landfills would not be permitted were first mapped out. The sites available within the "unconstrained areas" were further screened at a broad-brush level under four disciplines (i.e. planning, lands and social factors; environmental; engineering and accessibility). The Study has screened 13 extension sites near three existing landfills and 15 new sites. It also reviewed 31 sites identified taking into consideration the findings of other studies[2]. A long list of 3 potentially available extension sites and 13 (12 offshore and 1 land-based) new sites was then identified for possible development of landfill sites. The potential new sites are shown at Attachment 2.

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[1] The major areas identified for exclusion included (a) existing and proposed areas of residential, commercial and industrial use; (b) existing and proposed areas for port and airport use; (c) existing and proposed areas for Government, Institution or community use; (d) existing and proposed village areas; (e) existing and proposed country parks, marine parks and marine reserves; (f) sites of special scientific interest; (g) ramsar sites; (h) water gathering grounds; (i) major infrastructure areas; and (j) fairways and shipping lanes.

[2] These studies include the Waste Disposal Plan (1989), Planning and Development Study on Northwest New Territories, Planning and Development Study on North East New Territories, South East New Territories Development Strategy Review and South west New Territories Development Strategic Review.

7. The long-listed sites were then subject to a strategic environmental assessment (SEA) to assess their preliminary environmental suitability[3]. The SEA report is at Attachment 3. As a result of the SEA, 7 new sites were considered not acceptable because of insurmountable possible ecological and/or landscape impacts. The remaining 9 short-listed sites – 3 extension and 6 new sites - were then subject to a more comprehensive site selection assessment based on the assessment criteria under the same four disciplines as stated in paragraph 6 above.

Potential Landfilling Sites Recommended by the Study

8. The assessment results of the 9 short-listed sites are summarized at Attachment 4. In view of the assessment results, the Study has recommended 5 potential sites which are considered likely feasible and environmentally acceptable for landfill development –

	Site area (hectares)	Capacity (million cubic metres)	Location
<u>Extension sites</u>			
One extension site at the NENT Landfill	70	19	Located partially on the site of the NENT Landfill Stockpile and Borrow Area formed to the east of the existing landfill (Site Plan at Attachment 5)
Two extension sites at the WENT Landfill	240	71	Located in the North West New Territories some 5 km north-west of Tuen Mun, overlooking Deep Bay. (Site Plan at Attachment 6)
<u>New sites</u>			
Pillar Point Valley North Landfill	100	65	Located in the North West New Territories some 2 km west of Tuen Mun, overlooking Urmston Road and Lantau Island. (Site Plan at Attachment 7)

[3] The assessment criteria under SEA include air quality, noise, water quality, waste management, ecology, fisheries, cultural heritage, landscape and visual, and landfill gas issues.

South Cheung Chau Landfill	850	140	Located over the existing South Cheung Chau Disposal Ground for uncontaminated mud that is located to the south of Lantau with the Soko Islands to the west and Cheung Chau to the north east. (Site Plan at Attachment 8)

The Administration's further considerations

The SENT Landfill Extension

9. A strategic plan for landfill succession was recommended in the Study. The Study recommended the NENT and WENT Landfill extensions as the succession facilities in the west and north-east New Territories. These extensions would provide the landfill capacity to meet the disposal requirements up to around the mid-2020s when new landfills will be required.

10. The Study recognized the strategic importance of SENT Landfill in waste management infrastructure [4]. Closure of SENT Landfill without other provisions would have adverse environmental, traffic, social and economic impacts due to the diversion of increased number of waste delivery vehicles from the urban area to the remote WENT Landfill and NENT Landfill. There is a strong need in maintaining a waste disposal outlet near the urban areas, in particular to meet the demand for disposal of C&D waste generated within the urban areas.

11. The Study has identified that the only potential area where an extension site could be developed at the SENT Landfill would be Tseung Kwan O (TKO) Area 137 which lies to the south of the Landfill. The extension site would occupy an area of 18 hectares with a capacity of 15 Mcum. However, at the time of the Study, TKO Area 137 had already been earmarked for other land uses and no vacant land was available for the SENT Landfill extension. In the light of that, the Study recommended the extension of the SENT Landfill to be pursued when there were changes in the planned land-uses of the area and a permanent construction waste transfer facility be provided in this region to meet the demand of the disposal/transfer of construction waste.

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[4] The SENT Landfill (located in Tseung Kwan O area) is the nearest landfill to the main urban areas, receives about 45% of all waste, main disposal point for construction waste and accepts a wide range of special waste streams. Privately collected waste has been continuously disposed of in the Tseung Kwan O vicinity for the last 20 years.

12. A recent planning review of the land uses of TKO Area 137 has identified an available site suitable for the extension of the SENT Landfill in the adjacent TKO Area 137. EPD has consequently carried out an in-house Preliminary Environmental Review (PER) on the identified site as shown at Attachment 9. The PER found that the key environmental concerns associated with an extension of the SENT Landfill as recommended under the Study on this identified site, would likely be ecological and visual impacts. We therefore propose to carry out detailed feasibility and EIA study of the site to confirm the feasibility of the landfill extension development.

South Cheung Chau New Landfill

13. Separately, the proposed new site at South Cheung Chau would involve a landfill to be developed on an artificial island constructed over the existing South Cheung Chau Disposal Ground for uncontaminated mud. The development of the offshore site would be very complex and expensive as compared to the proposed land-based sites and extensions. Hence, we consider that further investigation into the feasibility and implications of the development of the site will be required.

Specific Environmental Aspects to Highlight

14. The environmental assessments under the Study have suggested that the recommended extension and new sites are likely environmentally acceptable. Specific environmental aspects of the sites are highlighted in the following paragraphs.

<u>NENT Landfill Extension Site</u>

15. Ecological and cultural heritage impacts are the main concerns of the extension site at the NENT Landfill. Other environmental impacts have been assessed to be likely acceptable in the SEA.

Ecological

16. The ecological impacts associated with the extension are potentially significant. The site is adjacent to the potential Country Park at Robin's Nest and would also be in proximity (about 200m) to the Lin Ma Hang Stream that is of high conservation value. While the site is in a sensitive location, it is still likely acceptable assuming strict protection of adjacent sensitive receivers.

17. To ensure the Lin Ma Hang Stream is afforded maximum protection, the SEA recommended that special provision be included in the contract documents for the extension development. A suitable measure that may be taken is to construct a cut-off trench or channel along the northern boundary of the site, and that would be subject to more detailed investigation at the EIA stage.

Cultural Heritage

18. An archaeological investigation conducted under the Study has identified some remains of stone features, retaining walls, paths and graves dated from the 17th to early 20th Centuries in the area. While the extent of the extension has been reduced to avoid the majority of these features, the minimum void space requirement precludes the opportunity for total avoidance. The SEA has recommended possible preservation and rescue measures for further study at the EIA stage.

<u>WENT Landfill Extension Sites</u>

19. Two extension sites at the WENT Landfill were identified i.e. WENT A (40 hectares) and WENT B (200 hectares) extension. Ecological and cultural heritage impacts are the main concerns of the extension sites. All other environmental impacts have been assessed to be likely acceptable in the SEA.

Ecological

20. A protected species, Pitcher Plant, *Nepenthes mirabilis*, has been identified in the valley of Tsang Kok Stream inside the WENT A extension site which could be lost due to the landfill development. Nonetheless, this plant species is not unique in Hong Kong and the need for significant mitigation measures is not envisaged.

21. There are no protected areas within 500 metres of the extension sites and the majority of the sites are grassland/man-made lagoons of low or no ecological value. However, there is a small area of mixed shrub-land and immature native woodland within the WENT B extension site that may be worth conserving. Nonetheless, the woodland which has developed from tall scrub habitat is not old enough to support a diverse and stable vegetation community. Furthermore, the proximity of the woodland to human activities at the existing WENT Landfill makes it most unlikely to attract sensitive birds or other wildlife. The WENT B extension will also cover part of the Tsing Tsui Ash Lagoon which is the habitat of two bird

species. The ecological value of the site and its mitigation measures will be fully investigated and defined in the EIA Study.

22. As vegetation clearance would be necessary for the proposed landfill extensions, revegetation as compensation may be required using suitable native species at appropriate locations. The revegetation programme will be formulated in the EIA stage.

Cultural Heritage

23. The WENT B extension site covers the Tsang Tsui Archaeological Site (TTAS) in which archaeological relics of late Neolithic period (2500-1500 BC) were unearthed. An archaeological investigation conducted under the Study has revealed that except for the existing TTAS, it is unlikely that any further archaeological remains would be found within the site.

24. The SEA has investigated the opportunities to revise the boundary of the extension sites to avoid the TTAS, but they are not considered practicable. It has also explored the options of preservation in-situ by burial beneath the landfill and ex-situ preservation by removal to minimize the impacts on the TTAS. Opportunities to maximize the preservation of archaeological features of the TTAS would be pursued during the EIA stage.

<u>SENT Landfill Extension Site</u>

25. The extension site has 15 hectare of land within the TKO Area 137 to the south of the SENT Landfill together with a 3 hectare encroachment upon the edge of the 615 hectare Clear Water Bay Country Park (CWBCP). Taking into consideration the findings of the Study, EPD carried out a Preliminary Environmental Review (PER) on the extension development. The review concluded that the ecological, landscape and visual impacts are likely to be the main concerns of the extension site.

Ecological

26. The proposed extension would encroach upon the South-west toe of the CWBP, which is a piece of steep natural cliff that falls along the edge of the country park boundary. The alternatives of extending the existing landfill to the north or to the east will result in constructing the landfill extension mostly inside the CWBCP as well as requiring extensive excavation. These two aspects made the above

alternatives prohibitive to pursue further. The west boundary of the SENT Landfill is bound by nearby developments on the Tseung Kwan O Industrial Estate. The proposed extension involving a 75 metres narrow strip encroachment along the boundary of the Clear Water Bay Country Park would thus have the least impact. It was therefore put forward for feasibility study. The PER found that avoidance of the narrow strip of the natural cliff of the CWBCP from the extension would greatly reduce the capacity (15 Mcum) of the proposed extension by some 30% because of significant loss of surface gradient of the proposed landfill.

27. The minor encroachment into the CWBCP will mainly cause the temporary loss of vegetation and alternation of topography. In the feasibility and EIA studies, the design of the proposed extension would primarily avoid any ecological important areas identified as far as practicable and devise mitigation measures to minimize any potential environmental impacts. Loss of vegetation will also be addressed through implementation of a comprehensive re-vegetation plan.

Landscape and Visual

28. The site will be visible from part of the TKO Industrial Estate, other future developments in TKO Area 137 and part of the Hong Kong Island. From landscape and visual considerations, it is proposed to blend the extension into the existing SENT Landfill at its back. The EIA would assess the additional visual impact and loss of landscape resource and character caused by the extension site.

<u>Pillar Point Valley North Landfill Site</u>

29. Except for the closed Pillar Point Valley Landfill and the closed Siu Lang Shui Landfill, there are no industrial or residential developments within 700m of this site. Ecological impacts are the main concerns of the new site. The SEA revealed that all other environmental impacts arising from the new site would be likely acceptable.

Ecological

30. The general environs of Castle Peak are of conservation value by virtue of the flora area. The Castle Peak SSSI and the Tsing Sham Tsuen SSSI are located 1.5 km northeast and 3 km to the east of the site respectively. The majority of the new site is mixed scrub and grassland, with pockets of semi-mature woodland. The area is presently undisturbed and given the ecological linkage with nearby areas of conservation importance, there is good potential that the site holds some importance

as a habitat. Development of the new site would remove all environs within the site and have potential ecological impact to the nearby environs. The acceptability of the potential impacts needs to be confirmed during the detailed EIA stage.

Public Consultation

31. A discussion forum to gauge views from the academics, green groups and other key stakeholders on landfill development was conducted in March 2001. The forum generally supported the need to extend the life of the existing landfills and identify new landfill sites.

Proposed Way Forward

32. We propose to conduct detailed feasibility studies and EIAs in accordance with the EIA Ordinance for the proposed extensions of the NENT Landfill, WENT Landfill and SENT Landfill in 2004/2005. Feasibility and EIA studies for the development of the new landfill site at Pillar Point Valley North will be carried out at a later stage.

Advice Sought

33. Members are invited to comment on the findings of the Study and the proposed way forward as stated in paragraph 32.

Attachments

Attachment 1 : Final Report of the Extension of Existing Landfills and Identification of Potential New Waste Disposal Sites (dated January 2003) in CD Rom Format
Attachment 2 : Potential Sites for New Landfill Development
Attachment 3 : Strategic Environmental Assessment Report
Attachment 4 : Summary of Detailed Assessment and Site Categorization
Attachment 5 : Proposed NENT Landfill Extension
Attachment 6 : Proposed WENT Landfill Extensions
Attachment 7 : Proposed Pillar Point Valley North Landfill
Attachment 8 : Proposed South Cheung Chau Island Landfill
Attachment 9 : Proposed SENT Landfill Extension

Environmental Protection Department
December 2003