

**For discussion  
on 27 October 2003**

**Legislative Council Panel on Environmental Affairs**

**PWP Item 5161DR – Restoration of Shuen Wan Landfill –  
post-completion environmental monitoring work**

**Purpose**

This paper briefs Members of the Administration’s proposal to submit PWP Item **5161DR** “Restoration of Shuen Wan Landfill – post-completion environmental monitoring work” to the Public Works Subcommittee for upgrading to Category A the continuation of the environmental monitoring works at the Shuen Wan Landfill for a further period of seven years at an estimated cost of \$27.5 million in money-of-the-day (MOD) prices.

**Background**

2. All landfills produce landfill gas and leachate<sup>1</sup>. Landfill gas, which is a product of refuse decomposition, is malodorous and potentially asphyxiating, flammable and explosive. Leachate is highly polluting and, if not properly controlled, may result in serious contamination of water bodies due to infiltration or direct discharge of leachate.

3. Municipal solid waste, when disposed of at landfills, does not exhibit homogenous geotechnical properties, as it is subject to a continuing biological degradation process. This results in differential settlement of the landfill’s surface and may lead to slope instability problems. We therefore need to monitor and improve slope stability at landfills. For some landfills, we also need to stabilise the natural slopes adjacent to the top platform of landfills to prevent possible boulder falls or soil debris flows.

4. The Shuen Wan Landfill is located in Tai Po. A site plan is at Annex. It commenced operation in 1973 and was closed in 1995. To minimize the adverse environmental impacts and to put the land to productive use, we sought funding approval from the Finance Committee

---

<sup>1</sup> “Leachate” is the water which has permeated through the waste mass.

(FC) in 1995 to fully restore the closed landfill under PWP item **5154DR**. Paper PWSC(95-96)15 is relevant. **5154DR** covered the construction of the restoration facilities<sup>2</sup> as well as seven years' post-completion work to maintain the facilities and monitor the landfill gas migration and leachate pollution.

5. In approving funding for **5154DR**, the FC agreed that we should carry out an environmental review every five years, starting from the commencement of the environmental monitoring work, to determine if the landfill site has been completely restored and if further monitoring is needed. If further monitoring work is required, funding approval from FC would have to be sought again.

6. In late 1997, the construction of the restoration facilities was completed, and the post-completion environmental monitoring work commenced<sup>3</sup>. In 1999, a temporary golf driving range began to operate at the site.

7. In late 2002, the Environmental Protection Department (EPD) carried out an environmental review of the landfill site as required by the FC. The review was completed in April 2003. It confirmed that further monitoring work at the landfill is necessary. Although the amounts of landfill gas and leachate generated have substantially decreased since 1997, they are still of significant quantity and require continuous control and treatment.<sup>4</sup> Also, site settlement is expected to continue and regular maintenance work will be required to maintain the surface drainage, slopes and internal roads. Hence, it is necessary to continue on-site monitoring to ensure that the site poses no threat to the safety of the public and has minimal adverse environmental impacts, and that the existing golf driving range can continue to operate in a safe environment.

---

<sup>2</sup> The restoration facilities include (a) a landfill gas management system to control gas emission and prevent off-site gas migration; (b) a leachate management system to control surface and groundwater infiltration into the landfill and to extract, collect, treat and dispose of the landfill leachate; (c) an engineered capping layer (with low permeability) and a surface water drainage system to reduce infiltration of rain water into the waste mass thereby reducing the amount of leachate to be treated; and (d) improvements to the slope stability and landscaping of the landfill site and other ancillary engineering works.

<sup>3</sup> Funding for the first seven years' post-completion environmental monitoring work will expire in December 2004.

<sup>4</sup> For example, the landfill gas generation rate has reduced from 2 500 cubic metres per hour (m<sup>3</sup>/hour) in 1997 to 650 m<sup>3</sup>/hour in 2003. However, such a volume still requires monitoring. Moreover, the concentration level of total nitrogen (a major contaminant) in the leachate has decreased by 40%, but the leachate still needs to be treated before it can be safely discharged to the public sewer.

## **Proposal**

8. We propose to continue with the environmental monitoring work at the Shuen Wan Landfill for a further period of seven years (from December 2004 to December 2011).

9. The scope of the environmental monitoring work comprises –
- (a) operation and maintenance of a landfill gas management system to control gas emission and to prevent off-site gas migration;
  - (b) operation and maintenance of a leachate management system to control surface and groundwater infiltration into the landfill and to extract, collect, treat and dispose of the landfill leachate;
  - (c) environmental monitoring and auditing; and
  - (d) maintenance of landscape and site infrastructure.

10. The environmental monitoring work for closed landfills may last more than two decades (could be up to 30 years). We propose to continue the carrying out of an environmental review every five years to determine if the monitoring work should continue.

## **Financial Implications**

11. We estimate that the cost of the environmental monitoring work for seven years from December 2004 to December 2011 would be \$27.5 million in MOD prices, made up as follows: –

|                                                               | <b>\$ million</b> |
|---------------------------------------------------------------|-------------------|
| (a) Operation & maintenance of leachate management system     | 2.9               |
| (b) Operation & maintenance of landfill gas management system | 6.0               |
| (c) Environmental monitoring and audit                        | 7.4               |

|                                        |           |                                 |
|----------------------------------------|-----------|---------------------------------|
| (d) Landscape maintenance              | 2.0       |                                 |
| (e) Maintenance of site infrastructure | 7.9       |                                 |
| (f) Contingencies                      | 2.0       |                                 |
|                                        | Sub-total | 28.2 (in September 2003 prices) |
| (g) Provision for price adjustment     | (0.7)     |                                 |
|                                        | Total     | 27.5 (MOD prices)               |

12. We estimate that the annual recurrent expenditure will be about \$0.6 million.

13. We estimate that the project will continue to provide 25 existing jobs (14 professional/technical staff and 11 labourers).

### **Public Consultation**

14. The Tai Po District Council supported the restoration works for the Shuen Wan Landfill in 1993 and 1994. In April 2001, the District Councillors visited the site and were briefed on the progress of the monitoring works.

### **Environmental Implications**

15. We completed in 1993 an initial Environmental Impact Assessment (EIA) study, covering both the restoration and post-completion environmental monitoring work, as part of the feasibility study for the restoration work of the Shuen Wan Landfill. The study indicated that the restoration and monitoring work would ensure proper control of the emission and off-site migration of landfill gas and leachate. This would ameliorate the environmental impacts of the landfill and enable the landfill site to be put to beneficial use.

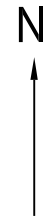
16. During the contract period, we will withhold payments to the contractor if there is any non-compliance with the required environmental standards.

17. We have given due consideration to the need to minimize the generation of construction and demolition (C&D) materials, and to reuse and recycle such materials wherever practicable. We will encourage the contractor to use non-timber formwork and recyclable materials for temporary works. We will control the disposal of C&D waste to landfills or other appropriate reception facilities through a trip ticket system and will record the disposal, reuse and recycling of C&D materials. We estimate that the project will generate about 1 050 m<sup>3</sup> of C&D materials. We would reuse about 760 m<sup>3</sup> (72%) on site, recycle or reuse 280 m<sup>3</sup> (27%) as fill materials, and dispose of 10 m<sup>3</sup> (1%), most of which is non-inert waste, at landfills.

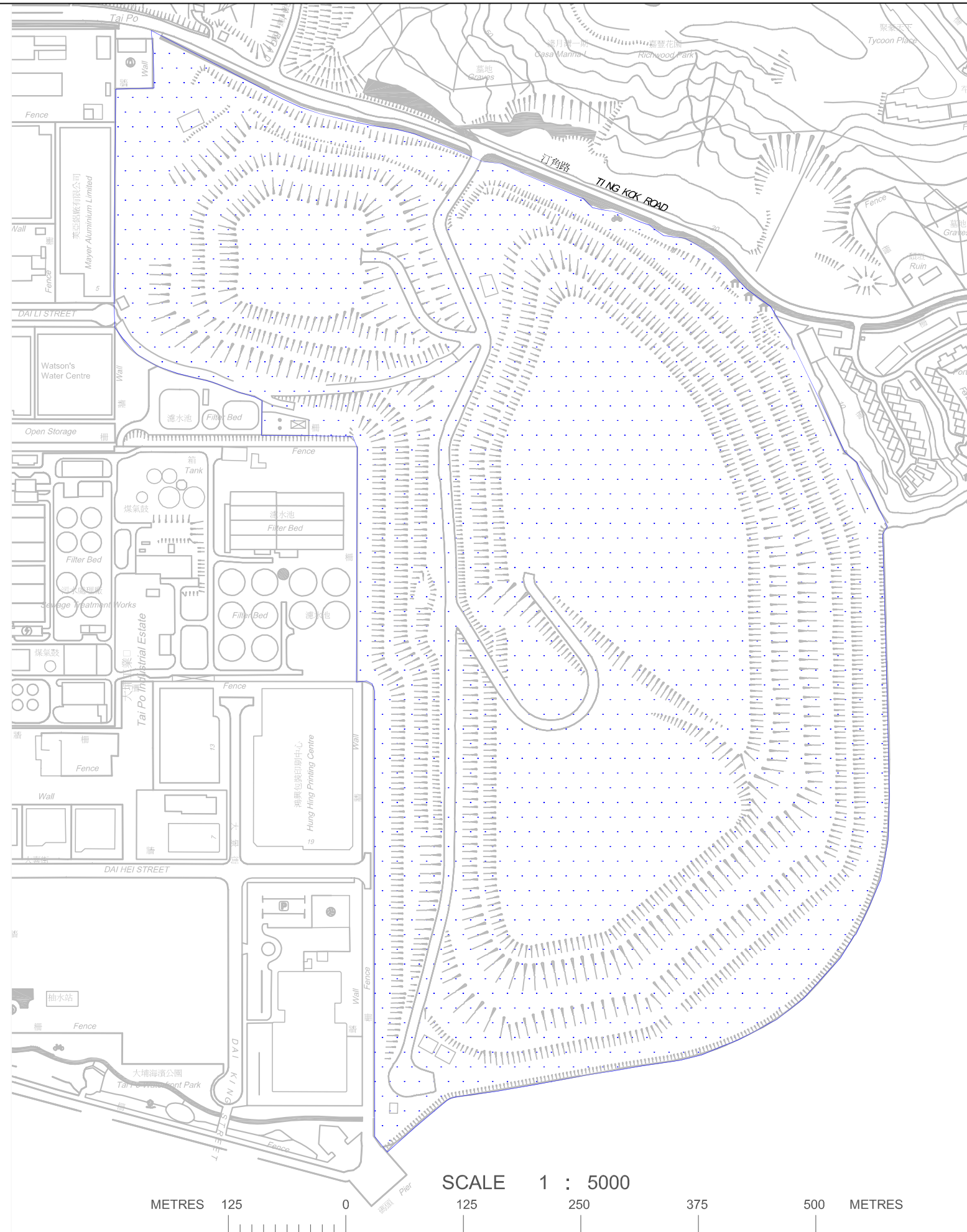
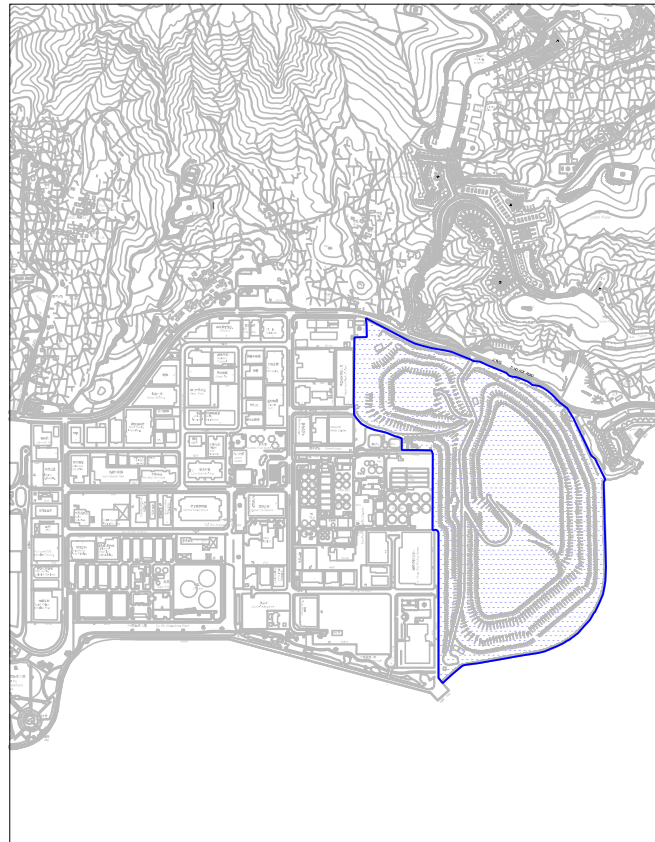
### **Advice Sought**

18. Members are invited to note our proposal of upgrading **5161DR** for consideration by the Public Works Subcommittee in November 2003 with a view to seeking funding approval by the Finance Committee in December 2003.

Environment, Transport and Works Bureau  
October 2003



LOCATION



LEGEND:  
圖例:

 LANDFILL BOUNDARY  
堆填區界線

Project  
**Restoration of Shuen Wan Landfill**  
船灣堆填區修復工程

Title  
**SITE LOCATION PLAN**  
修復工程工地範圍

SHEET 1 OF 1

Drawing No.  
**03\_28\_SWL\_SITE\_LOCATION.DWG**

 **ENVIRONMENTAL PROTECTION DEPARTMENT**  
環境保護署

Date: 23-09-2003 © Copyright Reserved

CAD File Status:

