

MANAGEMENT OF RESTORED LANDFILLS

Executive Summary

1. Today, there are 16 landfill sites in Hong Kong, of which 3 large strategic landfills are operating and used for final waste disposal and 13 relatively small landfills (commissioned during 1960 to 1988) were closed between 1975 and 1996. According to the Environmental Protection Department (EPD), the 13 closed landfills were not designed with contemporary environmental standards as imposed on the current 3 strategic landfills, and these 13 closed landfills demand dedicated and effective efforts of restoration over a very long aftercare period (30 years or more). Since the landfilled waste is continuously undergoing biodegradation and generating landfill gas and leachate, they present environmental and safety hazards to the surrounding areas, and the landfills are subject to differential ground settlement during the process. Restoration of the 13 closed landfills (which were not installed with proper leachate and landfill gas management system at the time when they were in operation) comprises two stages: (a) Stage 1: Restoration works which include construction and installation of restoration facilities; and (b) Stage 2: Aftercare work which would commence after completion of restoration works to ensure that the landfill is maintained in a safe condition and is environmentally acceptable for appropriate future beneficial uses (i.e. afteruse of restored landfills).

2. The EPD has used a design-build-operate (DBO) form of contract for the restoration and management of the 13 closed landfills. Under the DBO contract arrangement, a contractor is responsible for the design and construction of restoration facilities (e.g. leachate treatment plant (LTP) and landfill gas flaring plant (LGP)) and the aftercare of a landfill for 30 years after completion of the restoration facilities. The EPD awarded 5 DBO contracts (hereinafter referred to as “landfill restoration contracts”) through open tendering to 2 contractors during 1996 to 2004. The EPD’s contractors completed the construction and installation of restoration facilities at the 13 landfills between 1997 and 2006 at a total capital cost of \$1,317.7 million and such facilities have been commissioned. The total actual operating cost of the aftercare work was \$67.9 million in 2016-17.

Executive Summary

3. The 13 restored landfills occupy a total area of 320 hectare (ha) (equivalent to over 15 times the size of the Victoria Park). According to the EPD, in light of the many development restrictions (e.g. differential ground settlement) at restored landfills, recreational use (e.g. public parks and sitting-out areas) is considered the most suitable afteruse option at these landfills. The EPD has indicated that, except for areas occupied by restoration facilities required for aftercare work, all the remaining areas would in principle be available for afteruse as long as the nature of afteruse projects could fulfil the specified conditions and constraints at the remaining area. As of February 2018, the current and planned afteruse at the 13 restored landfills occupied a total area of about 113 ha (35% of 320 ha). The development of afteruse projects at restored landfills is implemented by the Government or non-governmental bodies.

4. The Audit Commission (Audit) has recently conducted a review to examine the Government's efforts in the management of restored landfills.

Aftercare of restored landfills

5. The EPD's landfill restoration contractors need to comply with the statutory requirements stipulated under the relevant environmental legislations (e.g. Water Pollution Control Ordinance (WPCO) — Cap. 358) and the contractual requirements in various major environmental parameters (e.g. total nitrogen level of leachate discharge) as stipulated in the landfill restoration contracts. According to the EPD, in the past 5 years from 2013 to 2017, of the 13 restored landfills, only the landfill restoration contractor (i.e. Contractor A) of the Pillar Point Valley Landfill (PPVL) in Tuen Mun District had since December 2015 failed to meet the statutory requirements under the WPCO and the contractual requirements. Audit selected the PPVL in Tuen Mun District as a case study for examination of the EPD's monitoring of contractors' aftercare work at restored landfills. In August 2004, the EPD entered into a landfill restoration contract with Contractor A for the design and construction of restoration facilities at PPVL and the aftercare of the landfill for 30 years after completion of the restoration facilities. In July 2006, the construction works of restoration facilities at PPVL were completed and the aftercare work commenced in the same month. The actual capital cost for the design and construction of the restoration facilities at PPVL was \$199.2 million. In 2016-17, the actual operating cost of the aftercare work was \$10.7 million (paras. 2.4, 2.6 and 2.7).

Executive Summary

6. ***Long period of non-compliances with statutory and contractual requirements.*** From January to April 2016, the EPD received complaints on suspected malpractice of Contractor A in the operation of some restoration facilities at PPVL. The EPD's subsequent investigations found that: (a) between May 2016 and July 2017, Contractor A had contravened various statutory requirements of the licence issued by the EPD under the WPCO for the PPVL, and Contractor A was convicted and fined a total of \$208,000 for 21 offences under the WPCO; and (b) between December 2015 and November 2017, Contractor A had committed various non-compliances with the contractual requirements, and up to November 2017, payments totalling about \$7.7 million had been deducted from Contractor A (paras. 2.8, 2.11 and 2.13).

7. ***Need to ensure compliance with statutory and contractual requirements.*** In June 2016, in light of complaints received from January to April 2016, the EPD completed a review on the robustness of environmental monitoring practices at the EPD's waste facilities (hereinafter referred to as "2016 EPD Review"), including restored landfills. The 2016 EPD Review recommended, among others, the installation of advanced equipment (e.g. upgrading data monitoring systems and installing surveillance cameras) at PPVL and 4 other restored landfills installed with both LTP and LGP with a view to automating the monitoring work and detecting cases of non-compliance in a more timely manner. Audit found that, as of March 2018: (a) the installation dates of certain advanced equipment items were later than the target dates as set in the 2016 EPD Review, and the data monitoring systems at 2 restored landfills installed with both LTP and LGP had not yet been upgraded. The EPD needs to expedite the progress of installing such equipment; and (b) apart from these 2 landfills (where the data monitoring systems were yet to be upgraded), there were 3 other landfills for which the EPD considered it unnecessary to upgrade the data monitoring systems for their LTP and/or LGP. Before automated data monitoring systems are in place, the EPD needs to strengthen its monitoring actions on the landfill restoration contractors' compliance with the statutory and contractual requirements and the related record-keeping requirements (paras. 2.14 and 2.20 to 2.25).

8. ***Need to improve Leachate Treatment Plant at Pillar Point Valley Landfill.*** In early 2016, the EPD found that the LTP at PPVL was not functioning properly and could not treat leachate in an efficient manner. Subsequently, the EPD instructed Contractor A to carry out overhaul works for the LTP to remedy the problem. Between May 2016 and January 2017, owing to the LTP overhaul works at PPVL and the forecast increase of leachate inflow in the wet season, the EPD instructed Contractor A to suspend the LTP operation and arrange direct transfer of

Executive Summary

leachate by vehicles to the Government's other facilities for off-site treatment. Moreover, between July and November 2017, mainly due to very heavy rainfall, the leachate inflow at PPVL far exceeded the LTP treatment capacity and reached the alert level of leachate storage tanks. As a result, with the EPD's consent, Contractor A directly transferred leachate by vehicles from PPVL to the Government's other facility for off-site treatment. In February 2018, a hydrogeological survey for PPVL was completed, which recommended mitigation measures (including installation of groundwater pumps) to resolve the leachate inflow/overflow problem. The EPD needs to take measures to ensure early implementation of mitigation measures (paras. 2.26, 2.30 and 2.31).

9. *Scope for improving demerit point system.* The 5 landfill restoration contracts adopt a demerit point system for the deduction of monthly payments from the related contractor for specified non-compliances with contractual requirements. Audit notes that while the 5 contracts require contractors to comply with the requirements of any licences issued under the WPCO, apart from total nitrogen limit, the demerit point system does not cover other non-compliances with the licence requirements under the WPCO, including cases where the stipulated maximum daily discharge limit of leachate is exceeded and the 24-hour notification requirement is not observed. The EPD needs to review the feasibility of incorporating non-compliances with the relevant statutory environmental requirements in the demerit point system of a landfill restoration contract in future (paras. 2.12, 2.33, 2.35 and 2.37).

Development of government recreational facilities at restored landfills

10. Since the early 2000s, the Government has planned/implemented projects for developing recreational facilities (parks and gardens) at 7 restored landfills. Audit noted that the implementation of 5 of these projects was that one project's development progress was slow (still at preliminary planning stage) and four projects had increases in costs and the actual project completion dates were later than the original target completion dates. Audit selected three projects (namely, Kwai Chung Park at Gin Drinkers Bay Landfill, Wan Po Road Pet Garden at Tseung Kwan O Stage I Landfill and Jordan Valley Park at Jordan Valley Landfill) as case studies with a view to identifying room for improvement, focusing on issues relating to development of government facilities at restored landfills. In these case studies, Audit notes that the special nature of restored landfills (including differential ground settlement, potential landfill gas hazards and buried restoration facilities (e.g. leachate and landfill gas

Executive Summary

pipes)) warrants more attention and actions of departments and non-governmental bodies in developing facilities there. Such actions include ascertaining technical feasibility of proposed developments and up-to-date site conditions for design work before tendering, and allowing sufficient time for seeking the EPD's advice on design and layout plans before inviting tenders (paras. 1.10, 3.2, 3.3, 3.7, 3.28, 3.37, 3.47 and 3.57).

11. ***Kwai Chung Park: Need to expedite actions to develop the Park.*** The slow progress in developing the Kwai Chung Park (covering an area of about 25.5 ha) had been covered in Report No. 60 of the Director of Audit of March 2013. The Leisure and Cultural Services Department (LCSD) has agreed with the audit recommendations. However, Audit's follow-up review revealed that the development progress of the Park was still less than satisfactory. In 2013, a committee under the Kwai Tsing District Council endorsed the LCSD's proposed project scope of the Park (including a golf driving range with 30 golf driving bays). In May 2014, the Home Affairs Bureau (HAB) issued a Project Definition Statement for the Park to the Architectural Services Department (ArchSD) for the latter to prepare a Technical Feasibility Statement in order to confirm the technical feasibility of the proposed project and facilitate bidding for the necessary government resources for implementing the proposed works. In July 2014, the ArchSD informed the HAB and the LCSD that the site could not physically accommodate the proposed golf driving range, and requested the HAB to revise the Project Definition Statement by removing the proposed golf driving range from the project scope of the Park. With commitment to take forward this project, the Kwai Chung Park was included in the Policy Address of January 2017 as one of the 26 projects in the five-year plan for sports and recreation facilities targeted to be launched in or before 2022. In September 2017, the District Council endorsed the LCSD's proposal to develop the Kwai Chung Park by two stages. As of February 2018, 17 years had elapsed since the completion of restoration facilities by the EPD in September 2000, the HAB had not revised the Project Definition Statement of May 2014 for the ArchSD to prepare a Technical Feasibility Statement for the Kwai Chung Park (paras. 3.4 to 3.7, 3.10, 3.12 and 3.15).

12. ***Wan Po Road Pet Garden.*** In 2007, a working group under the Sai Kung District Council proposed to develop a 1.2-ha pet garden at Tseung Kwan O Stage I Landfill. The LCSD was the lead department to work with the Sai Kung District Council in implementing the project. The Home Affairs Department (HAD) appointed a term consultant to provide consultancy services for the project (para. 3.22). Audit found that:

Executive Summary

- (a) *Need to ascertain up-to-date site conditions before tendering.* In April 2009, a consultant of the HAD engaged a land surveyor to conduct a topographical survey at the works site. In December 2010, the LCSD awarded the works contract to a contractor at \$15.1 million. From January to March 2011, the works contractor conducted another topographical survey and found that the actual site levels were significantly lower than those shown on the contract drawings. In August 2011, the HAD's consultant provided the revised design drawings to the works contractor, who resumed the works in the same month. As a result, the contractor was entitled to an extension of time for 3.5 months and an additional cost of \$1.1 million was incurred for the works arising from the above re-design. According to the HAD, the continuous ground settlement at the project site was unusual, and in hindsight, the extent of design revisions during the construction stage could have been reduced if the HAD's consultant had conducted another topographical survey to ascertain the site levels before tendering for the works (paras. 3.22, 3.26, 3.27 and 3.30); and
- (b) *Need to enhance the accuracy in estimating project cost and time allowed for tender stage.* In March 2010, the HAD's consultant estimated that the tender price for the works contract was \$11.7 million and the HAD invited tenders for the contract. In April 2010, seven tenders were received and the prices of the returned tenders ranged from \$15.1 million to \$23.5 million, exceeding the pre-tender estimate by 29% to 101%. According to the HAD, regarding the under-estimation of tender price, the Pet Garden project was a pilot project under which no separate quantity surveyor was engaged to offer advice on the cost estimate provided by the HAD's consultant. Moreover, Audit noted that the feasibility study by the HAD's consultant had only allowed 3 months for the tender stage which would normally take 6 months to complete, leading to under-estimation of 3 months for the tender stage (paras. 3.30 and 3.31).

13. *Jordan Valley Park: Need to allow sufficient time to consult EPD before inviting tenders.* In November 2005, the EPD requested the ArchSD to provide the detailed design and layout plans of the Jordan Valley Park Project for its comments when available. The ArchSD issued the tender document (which included the design and layout plans of 13 blocks of buildings and a model car circuit) in mid-August 2007 and awarded the works contract to a contractor at \$137.7 million in December 2007. According to the ArchSD, due to time constraint, the ArchSD could

Executive Summary

only consult the EPD of the design and layout plans after issuing tender documents in mid-August 2007. In the event, in May 2008, the ArchSD revised the design, including raising the external ground level of the 13 blocks of buildings with imported fill. The revision of the design had resulted in variation works of \$9.4 million (paras. 3.46 to 3.50).

Monitoring of non-governmental bodies' afteruse facilities at restored landfills

14. With delegated authority from the Lands Department under the Land (Miscellaneous Provisions) Ordinance (Cap. 28), the EPD grants land licences to applicants (mainly non-governmental organisations and National Sports Associations) to develop and operate recreational facilities at restored landfills. As of December 2017, the EPD had granted five land licences to five licensees for developing and operating recreational facilities at 4 restored landfills (as two land licences were issued for one landfill) on a self-financing basis for use by the general public and/or members of the licensees in order to better utilise the vacant land at restored landfills (paras. 4.2 and 4.3).

15. *Non-compliances with conditions of land licences.* As of December 2017, 3 licensees had opened their facilities for use while 2 licensees had not completed the development of facilities, with delays of 6 and 15 months respectively when compared with the corresponding target completion dates as stipulated in the related land licences. Furthermore, the land licence for a facility opened for use (bicycle motocross (BMX) park) requires the licensee to operate a high-quality facility and maximise the facility utilisation. However, there were complaints on the poor quality and lack of maintenance of the BMX park, and the main track of the park was closed for maintenance for over one year from October 2016 to December 2017. According to the EPD, given the diversified nature of afteruse facilities, it did not have the expertise and capacity to ensure that a licensee would operate a high-quality facility and maximise the facility utilisation. There is scope for the EPD to seek the assistance and support of the relevant bureaux and departments (e.g. HAB and LCSD) in monitoring the licensees' compliance with licence conditions (paras. 4.3, 4.5 and 4.8 to 4.10).

Executive Summary

16. ***Scope for improving conditions of land licences.*** Audit notes that some land licences contain conditions that are qualitative in nature, including operation of a high-quality facility, the need to maximise the facility utilisation, promotion and strengthening the development of relevant sports activities, and provision of intensive sports training to the community. However, quantitative/objective measures are not specified in these conditions, rendering it difficult for the EPD to assess whether the licensees meet such conditions (para. 4.12).

17. ***Need to formulate guidelines on the circumstances for requesting licensees to submit audited financial information.*** Under the land licences, for two licensees who had opened their afteruse facilities for use, upon the EPD's written request, they shall submit to the EPD the audited financial statements on their operation and maintenance of the facilities. However, Audit noted that the EPD had not requested the two licensees to submit audited financial statements (paras. 4.15 and 4.16).

18. ***Delays in implementing Restored Landfill Revitalisation Funding Scheme (Funding Scheme).*** In his Policy Address of January 2014, the Chief Executive announced that the Government had earmarked \$1 billion to launch the Funding Scheme to provide funding for developing recreational, environmental or other community facilities on restored landfill sites. One of the objectives of the Funding Scheme is to expedite the development of gainful use at restored landfills so that the community can benefit from them at the earliest opportunity. According to the EPD, the Funding Scheme covers 7 restored landfills with applications to be invited in three batches. In June 2014, the EPD informed the Legislative Council of a tentative action timetable for taking forward 10 key actions (e.g. inviting preliminary proposals and granting approval-in-principle) under Batch 1 (covering 3 restored landfills) of the Funding Scheme. Audit noted that, as of December 2017, while 4 key actions had been completed, the other 6 key actions had yet to be completed. In particular, no in-principle approval had been granted to applicants as of December 2017, giving rise to the longest delay of 28 months. Furthermore, the EPD originally planned to invite applications under Batch 2 (covering the other 4 restored landfills) and Batch 3 (covering any landfills unallocated from Batches 1 and 2) in the second quarter of 2016 and the first quarter of 2017 respectively. However, as of December 2017, the EPD was still processing the applications under Batch 1 of the Funding Scheme, and applications under Batches 2 and 3 had not been invited (paras. 4.22 and 4.25 to 4.28).

Executive Summary

Audit recommendations

19. Audit recommendations are made in the respective sections of this Audit Report. Only the key ones are highlighted in this Executive Summary. Audit has *recommended* that the Government should:

Aftercare of restored landfills

- (a) expedite the progress of installing the advanced equipment at restored landfills as recommended by the 2016 EPD Review, and keep under review the operation of the installed equipment to assess their effectiveness in monitoring of contractors' aftercare work (para. 2.42(a));
- (b) before automated data monitoring systems are in place, ensure that the contractors properly maintain the site records, and strengthen monitoring actions on the contractors' compliance with the statutory and contractual requirements and the related record-keeping requirements (para. 2.42(b));
- (c) take measures to ensure early implementation of mitigation measures to resolve the leachate inflow/outflow problem at PPVL (para. 2.42(d));
- (d) review the feasibility of incorporating non-compliances with the relevant statutory environmental requirements in the demerit point system of a landfill restoration contract in future (para. 2.42(g));

Development of government recreational facilities at restored landfills

- (e) expedite the revision of the Project Definition Statement of the Kwai Chung Park and issue it to the ArchSD for preparing a Technical Feasibility Statement for the project (para. 3.18(b));
- (f) when implementing works projects at works sites susceptible to ground settlement (e.g. restored landfills) in future, take measures to ascertain up-to-date site conditions for design work before tendering (para. 3.38(a));

Executive Summary

- (g) when implementing works projects (including those at restored landfills) in future, take measures to enhance the accuracy in estimating the project cost and time allowed for tender stage (para. 3.38(b));
- (h) conduct a review on the unusual ground settlement of the project site of Wan Po Road Pet Garden with a view to identifying whether other areas of the Tseung Kwan O Stage I Landfill have such settlement problem and ascertaining whether such settlement would lead to any adverse impacts on the EPD's restoration facilities and aftercare work (para. 3.39);
- (i) when implementing works projects at restored landfills (with specific construction requirements and restrictions) in future, allow sufficient time for seeking the EPD's advice on design and layout plans before inviting tenders (para. 3.58(a));

Monitoring of non-governmental bodies' afteruse facilities at restored landfills

- (j) keep under review the licensees' development progress of afteruse facilities with a view to completing the afteruse facilities in a timely manner (para. 4.19(a));
- (k) take measures to monitor the licensees' compliance with licence conditions, including seeking the assistance and support of the relevant bureaux and departments if necessary (para. 4.19(b));
- (l) explore the feasibility of incorporating quantitative/objective measures (e.g. Key Performance Indicators) in land licences when issuing or renewing licences in future (para. 4.19(d));
- (m) formulate guidelines on the circumstances for requesting licensees to submit audited financial information for monitoring their operations and financial viability (para. 4.19(e)); and

Executive Summary

- (n) **make additional efforts in implementing the Restored Landfill Revitalisation Funding Scheme with a view to achieving the objective of expediting the development of gainful use at restored landfills so that the community can benefit from them at the earliest opportunity (para. 4.36).**

Response from the Government

- 20. The Government agrees with the audit recommendations.