CHAPTER 3

Environment and Ecology Bureau
Environmental Protection Department

Management of food waste treatment facilities by the Environmental Protection Department

Audit Commission
Hong Kong
5 November 2025

This audit review was carried out under a set of guidelines tabled in the Provisional Legislative Council by the Chairman of the Public Accounts Committee on 11 February 1998. The guidelines were agreed between the Public Accounts Committee and the Director of Audit and accepted by the Government of the Hong Kong Special Administrative Region.

Report No. 85 of the Director of Audit contains 8 Chapters which are available on our website (https://www.aud.gov.hk).

Audit Commission
6th Floor, High Block
Queensway Government Offices
66 Queensway
Hong Kong

Tel : (852) 2867 3423
Fax : (852) 2824 2087
E-mail : enquiry@aud.gov.hk

MANAGEMENT OF FOOD WASTE TREATMENT FACILITIES BY THE ENVIRONMENTAL PROTECTION DEPARTMENT

Contents

Appendices **Page**

MANAGEMENT OF FOOD WASTE TREATMENT FACILITIES BY THE ENVIRONMENTAL PROTECTION DEPARTMENT

Executive Summary

1. Lucid waters and lush mountains are invaluable assets. According to the Environmental Protection Department (EPD), about 10,900 tonnes of municipal solid waste were landfilled in Hong Kong per day in 2023, of which around 29% (i.e. about 3,200 tonnes) were food waste, constituting the largest municipal solid waste category. At present, most of Hong Kong's food waste is disposed of at landfills together with other municipal solid waste. According to the Environment and Ecology Bureau, there was a need to develop modern facilities to recycle and convert source-separated food waste into useful resources including energy.

2. As at 31 March 2025, food waste treatment facilities included two organic resources recovery centres (ORRCs), namely ORRC Phase 1 (hereinafter referred to as O·PARK1) and ORRC Phase 2 (hereinafter referred to as O·PARK2), and two pilot food waste pre-treatment facilities (FWPFs) at the Tai Po Sewage Treatment Works (TPSTW) (hereinafter referred to as TPFWPF) and the Sha Tin Sewage Treatment Works (STSTW) (hereinafter referred to as STFWPF) under the food waste/sewage sludge anaerobic co-digestion trial scheme, as follows:

(a) ***ORRCs.*** In October 2014 and June 2019, the Finance Committee of the Legislative Council approved the design and construction of O·PARK1 and O·PARK2 under two projects (Projects A and B) at an approved project estimate of $1,589.2 million and $2,453 million (which was further increased to $2,583.7 million in March 2024) respectively. In November 2014 and July 2019, EPD awarded 2 consultancies (Consultancies Q and S) to consultants (Consultants Q and S) for the design and construction supervision work of O·PARK1 and O·PARK2 respectively. In November 2014 and August 2019, EPD awarded 2 design-build-operate (DBO) contracts (Contracts A and B) to 2 contractors (Contractors A and B) for the design, construction and operation of O·PARK1 and O·PARK2 respectively. The design and

construction of O·PARK1 with the design treatment capacity of 200 tonnes per day (tpd) was substantially completed on 3 December 2018 and operation stage commenced on 4 December 2018, and the design and construction of O·PARK2 with the design treatment capacity of 300 tpd was substantially completed on 31 December 2024 and operation stage commenced on 1 January 2025. As at 31 March 2025, the total project costs for Projects A and B were $1,433.7 million and $2,454.3 million respectively; and

(b) ***FWPFs.*** Design and construction of TPFWPF and STFWPF were funded under the block allocation of the Capital Works Reserve Fund. The approved funding for design and construction of TPFWPF and STFWPF were $29.9 million and $28.7 million respectively. In October 2015 and June 2020, EPD awarded 2 consultancies (Consultancies T and U) to consultants (Consultants T and U) for the investigation, design and construction supervision work of TPFWPF and STFWPF respectively. In November 2017 and May 2022, EPD awarded 2 DBO contracts (Contracts C and D) to 2 contractors (Contractors C and D) for the design, construction and operation of TPFWPF and STFWPF respectively. The design and construction of TPFWPF with the design treatment capacity of 50 tpd was substantially completed on 14 August 2019 and operation stage commenced on 15 August 2019, and the design and construction of STFWPF with the design treatment capacity of 50 tpd was substantially completed on 14 November 2023 and operation stage commenced on 15 November 2023. As at 31 March 2025, the total costs for the design and construction of TPFWPF and STFWPF were $25.3 million and $20.8 million respectively.

EPD is responsible for monitoring the design, construction and operation of these food waste treatment facilities. The Audit Commission (Audit) has recently conducted a review of EPD's work in the management of food waste treatment facilities.

Design and construction of organic resources recovery centres

3. ***Omission of some necessary slope works in Contract A.*** While Contract A stipulated that Contractor A should carry out all necessary geotechnical investigations and natural terrain hazard mitigation works for the natural terrain, Contract A did not cover the relevant works for man-made slopes. After Contract A was awarded to Contractor A in November 2014, EPD found that there were 5 man-made slopes

within the site specified in Contract A that would be affected by the development of O·PARK1, and it was required to undertake the geotechnical investigations and studies, and necessary slope stabilisation works on these slopes in accordance with government guidelines. In the event, 3 Employer's Changes (ECs) (later valued at a total cost of $18.4 million) were issued under Contract A to instruct Contractor A to carry out the design of slope stabilisation works, site clearance and slope stabilisation works on the man-made slopes concerned (para. 2.4).

4. ***Construction works completed later than the scheduled completion date of Contract A.*** The design and construction works of O·PARK1 under Contract A was substantially completed on 3 December 2018, 627 days later than the original completion date of 16 March 2017. As at 31 March 2025, of the delay of 627 days: (a) extension of time (EOT) of 445 days was granted to Contractor A under Contract A such that the revised completion date of the construction works of O·PARK1 was 4 June 2018 and prolongation costs of $44 million were paid to Contractor A; and (b) the remaining 182 days were subject to liquidated damages of $49.7 million imposed on Contractor A. In implementing works projects, EPD needs to take measures to ensure the timely completion of construction works for the commissioning of facilities by contractors (paras. 2.6 and 2.8).

5. ***Need to expedite the assessment of claims under Contract B.*** As at 31 March 2025, the assessment of claims (involving both EOT and monetary claims) submitted by Contractor B under Contract B was still in progress. Audit examined the 42 claims submitted by Contractor B up to March 2025 and noted that the processing time of some claims was long. As at 31 March 2025, of the 42 claims, 22 (52%) were with assessment results pending from Consultant S, comprising: (a) 13 (59% of 22) quantified claims submitted by Contractor B between June 2020 and October 2023 (i.e. a lapse of 17 to 57 months); and (b) 9 (41% of 22) non-quantified claims submitted by Contractor B between April 2022 and October 2024 (i.e. a lapse of 5 to 35 months) (para. 2.12).

6. ***Delay in commissioning of visitor centre of O·PARK1.*** According to Contract A, Contractor A should be responsible for the design, construction and operation of the visitor centre at O·PARK1. Audit noted that: (a) while it was planned that the visitor centre would be commissioned at the same time as O·PARK1, it was commissioned 2.2 years (i.e. on 1 March 2021) after the commissioning of O·PARK1 on 4 December 2018. In this connection: (i) several ECs were issued under Contract A at different stages during the design and construction of the visitor centre to upgrade its design (including one issued after the visitor centre was substantially

completed); and (ii) there was a delay in substantial completion of the visitor centre from May 2019 to May 2020 (i.e. 12 months later than the target completion date); and (b) the revised design of the visitor centre was only finalised when most of the plant facilities, equipment and ventilation system of O·PARK1 were already in place at that time. The design of the visitor centre and the associated education activities (e.g. the guided tours) were therefore constrained by the existing set-up and layout, and the standard of ventilation and odour control was considered not be able to fully meet the expectations for public visits and educational uses. In the event, 2 ECs (estimated at a total cost of $1.7 million) were issued in 2024 for implementing odour mitigation enhancement works along the visitor path at O·PARK1 (paras. 2.23 to 2.26).

7. ***Low utilisation of visitor centre of O·PARK1.*** To cater for the anticipated increase in visitors from the original design of 80 visitors to 480 visitors per week (or 24,960 visitors per year), EPD approved an EC under Contract A in June 2017 to meet the additional operation and maintenance costs of $3.4 million per year. In September 2022, the EC was revised to $9.4 million per year, covering the period from March 2020 to December 2025. Audit noted that, excluding the first year of operation when it was disrupted by coronavirus disease (COVID-19) epidemic, from the second to fourth year of operation: (a) the number of visitors of the three years was on a decreasing trend from 9,721 in the second year to 5,913 in the fourth year; and (b) none of the years could meet the annual target number of 24,960 visitors. The shortfalls of the second, third and fourth year were 61%, 63% and 76% respectively (paras. 2.29 and 2.30).

Operation of organic resources recovery centres

8. ***Scope for enhancing the utilisation of ORRCs.*** The design treatment capacity of O·PARK1 and O·PARK2 are 200 tpd and 300 tpd respectively, representing an annual capacity of 73,000 tonnes and 109,500 tonnes respectively. Audit found that since the commissioning of ORRCs (O·PARK1 in December 2018 and O·PARK2 in January 2025) and up to March 2025: (a) the annual utilisation rate of O·PARK1 increased from 46% in 2019 to 82% in 2024, but decreased to 56% in 2025 (up to March); and (b) the overall utilisation rate of ORRCs in 2025 (up to March) was 61% (para. 3.4).

9. ***High proportion of inert materials found in food waste received at O·PARK1.*** According to Contract A, inert materials (e.g. plastic utensils, packaging

materials and cans that are not suitable for biological treatment) should not exceed 20% by weight in any individual load of food waste received. Audit noted that while the annual proportion of inert materials by weight found in the food waste received at O·PARK1 ranged from 11 % to 19% since its commissioning in December 2018 and up to December 2023 (i.e. 61 months), the situation deteriorated in 2024 and 2025 (up to March) (i.e. 15 months). The proportion of inert materials was 23% in 2024 and 29% in 2025 (up to March), and there were 12 (80%) months in which the proportion of inert materials exceeded 20% by weight (paras. 3.6 and 3.7).

10. ***Scope for improvement in processing incidents of failure to operate O·PARK1.*** According to Contract A, in the event that Contractor A fails to operate the facility, it should not be entitled to payment of such part of the operation fee for that month. Since the commissioning of O·PARK1 and up to March 2025, there were incidents considered as "failure to operate the facility" of a total of 16 days and deductions from the operation fees to Contractor A had been made. Audit noted that: (a) Contract A did not clearly specify the assessment criteria for determining the circumstances that would constitute "failure to operate the facility" and inconsistent treatments were adopted by EPD in processing two incidents of failure to operate O·PARK1 despite their similar nature; and (b) in March 2025, there was an incident at O·PARK1 and its food waste reception had been suspended for 10 days. According to EPD, it was concluded in October 2025 (i.e. a lapse of 7 months) that the incident would be considered as "failure to operate the facility" and deduction of the monthly payment to Contractor A would be made (paras. 3.12 and 3.13).

11. ***Scope for strengthening the monitoring of air emission from the ammonia stripping plant at O·PARK1.*** According to Contract A, environmental monitoring and auditing are required during the works and the operation of O·PARK1. Audit noted that: (a) from April 2019 to March 2025, of the 52,608 sets of air emission data for each parameter collected and monitored hourly at the ammonia stripping plant at O·PARK1, exceedance of emission limits specified in the environmental monitoring and audit manual was found in 19.1%, 14.3% and 6.3% of the monitoring data for nitrogen oxides, ammonia and sulphur dioxide respectively; and (b) from May 2020 to September 2024, EPD issued 5 ECs (estimated at a total cost of $8.2 million) under Contract A to instruct Contractor A to conduct feasibility studies and trial of new technology, aiming at reducing the emission of air pollutants from the ammonia stripping plant at O·PARK1. However, exceedance of emission limits of nitrogen oxides, ammonia and sulphur dioxide from the ammonia stripping plant at O·PARK1 persisted as at 30 June 2025 (paras. 3.15 and 3.16).

12. ***Need to ensure compliance with the performance requirements relating to air quality and quality of compost under Contract A.*** To monitor the performance of Contractor A, performance requirements are set out under Contract A. In the event of non-compliance with any of the performance requirements being detected, non-compliance points, subject to a cap of the maximum number of non-compliance points for each category of performance requirements, would be allocated to Contractor A and monthly payments to Contractor A would be deducted. According to EPD, since the commissioning of O·PARK1 in December 2018 and up to March 2025 (involving 76 reporting months), a total of 6,810 non-compliance points had been allocated to Contractor A and a total of $15.1 million had been deducted from the operation fees to Contractor A. Audit noted that, of the 6,810 points, 4,087 (60%) were related to the air quality and 1,740 (26%) were related to the quality of compost (paras. 3.29 and 3.30), as follows:

(a) ***Air quality.*** Non-compliance points related to non-compliance with the air quality requirements had been allocated to Contractor A in all the 76 (100% of 76) reporting months, of which the maximum number of points were allocated in 54 (71% of 76) reporting months. Notwithstanding that follow-up actions had been taken by Contractor A, air quality problem persisted as at 31 March 2025 (para.3.30(a)); and

(b) ***Quality of compost.*** Non-compliance points related to non-compliance with the quality requirement of compost had been allocated to Contractor A in 56 (74% of 76) reporting months, of which the maximum number of points were allocated in 19 (34% of 56) reporting months. Notwithstanding that feasibility studies, reviews and trials had been conducted by Contractor A to formulate modification to the existing composting process and replace the existing units in the composting system between January 2019 and June 2024, allocation of non-compliance points to Contractor A was still noted during the period from July 2024 to March 2025 due to poor quality of compost (para.3.30(b)).

13. ***Failure in meeting the performance requirement relating to export of surplus electricity under Contract A.*** According to Contract A, when the facility (i.e. O·PARK1) has been in operation for 12 months (i.e. since 4 December 2019) and the quantity of average monthly food waste treated at O·PARK1 over the past 12 months is 3,040 tonnes or above, Contractor A should produce and export the minimum monthly surplus electricity to the grid of the utility company after self-sustaining the internal use of the facility. Audit noted that: (a) of the 64 reporting months from December 2019 to March 2025, the quantities of average monthly food

waste treated at O·PARK1 over the past 12 months were 3,040 tonnes or above in 49 reporting months. Contractor A could not produce and export the minimum monthly surplus electricity for all the 49 reporting months; and (b) while there were non-compliances with the operational performance requirement, according to Contractor A, the characteristics of food waste received at O·PARK1 were different from that specified in the tender documents and requested for adjustment to the performance requirement relating to export of surplus electricity. As the mechanism for the non-compliance points allocation relating to export of surplus electricity was yet to be finalised, EPD did not allocate any non-compliance points to Contractor A and the deduction of monthly operation fees had been put on hold since March 2021 (paras. 3.33 to 3.35).

14. ***Non-compliance with quality standards of fertiliser under Contract B.*** A contractor's performance monitoring mechanism similar to that for Contractor A was in place for Contractor B (see para. 12). According to Contract B, Contractor B should ensure that the quality of the fertiliser produced from O·PARK2 complies with the relevant quality standards according to the functional uses. Audit noted that: (a) since the commissioning of O·PARK2 in January 2025 and up to March 2025, all fertilisers produced (i.e. 686 tonnes) did not meet the performance requirement on quality standards of fertiliser and had been disposed of at the landfills; (b) notwithstanding that rectification actions had been taken to address the quality issues of fertiliser, as at 30 September 2025, the fertiliser produced from O·PARK2 had not yet met the quality standards; and (c) Contractor B claimed that the non-compliance with the quality standards of fertiliser was due to the additional requirement of treating pig manure resulting in a change in the composition of the organic waste treated at the facility. It was agreed among EPD, Consultant S and Contractor B that a 12-month period starting from January 2025 would be allowed for the collection of operational data and evaluation of the overall impacts of O·PARK2's treatment of pig manure on its systems. Therefore, the allocation of non-compliance points and respective deduction of monthly operation fees related to non-compliance with the performance requirement on quality standards of fertiliser had been put on hold (paras. 3.29 and 3.37 to 3.39).

Design, construction and operation of food waste pre-treatment facilities at sewage treatment works

15. ***Scope for improvement in designing the food waste pre-treatment process.*** According to Contract C, to avoid the blockage or damage of the mechanical equipment downstream, the treated material with particle size less than or equal to

20 millimetres was set as the original contract requirement. Since the commissioning of TPFWPF in August 2019 and up to March 2025, there was a series of incidents of blockage of treated material transfer pipelines resulting in a total of 125 days of suspension in the operation of TPFWPF despite that the particle size of the treated material provided by Contractor C was less than or equal to 20 millimetres. Audit noted that: (a) from April 2020 to November 2022, 1 Variation Order to Consultant T and 6 ECs to Contractor C with a total cost of $7.1 million had been issued by EPD to tackle the blockage incidents, including enhancement works to further reduce the particle size of the treated material; and (b) while surveys and studies had been conducted to assess the quantity and quality of collectable food waste in Hong Kong and from the major factories in the Tai Po Industrial Estate between 2005 and 2015, certain types of food waste received at TPFWPF had not been identified in the surveys and studies (e.g. large amount of bones, fibres and herb residues). EPD needs to draw lessons from the blockage incidents of TPFWPF with a view to improving the design of the food waste pre-treatment process in future works projects (paras. 4.4 to 4.6).

16. ***Scope for enhancing the utilisation of STFWPF.*** The operation stage of TPFWPF and STFWPF commenced on 15 August 2019 and 15 November 2023 respectively and the design treatment capacity of both TPFWPF and STFWPF are 50 tpd. Audit analysed the utilisation of FWPFs since their commissioning and up to March 2025, and found that: (a) while the annual utilisation rate of TPFWPF increased from 11% in 2020 to 85% in 2025 (up to March), the rate of STFWPF remained 20% or less since its commissioning and decreased from 20% in 2024 to 16% in 2025 (up to March); and (b) the overall utilisation rate of FWPFs in 2024 and 2025 (up to March) was only about 50% (paras. 4.11 and 4.12).

17. ***High variable operation costs for FWPFs.*** According to Contracts C and D, the variable component of the monthly operation fees paid to Contractors C and D is calculated based on the guaranteed tonnage (daily for Contract C and monthly for Contract D) or the actual tonnage of food waste treated by the facilities, whichever is higher (para. 4.14). Audit noted that:

(a) ***TPFWPF.*** Of the 2,056 days of operation since its commissioning and up to March 2025, there were 927 (45%) days where the actual tonnage of daily food waste treated by TPFWPF was lower than the daily guaranteed tonnage (i.e. 15 tpd) specified in Contract C. As a result, the total variable operation fees to Contractor C (i.e. $231,245) was 21% higher than the

variable operation fees calculated based on the actual tonnage of food waste treated by the facility (i.e. $191,000) (para. 4.15(a)); and

(b) ***STFWPF.*** Since the post-commissioning of STFWPF in June 2024 (i.e. when monthly variable operation fee is applicable) and up to March 2025 (involving 10 months), the actual tonnage of food waste treated by STFWPF in 9.5 (95%) months was lower than the monthly guaranteed tonnage (i.e. 15 tpd × number of available days in a month) specified in Contract D. As a result, the total variable operation fees to Contractor D (i.e. about $1.3 million) was 211% higher than the variable operation fees calculated based on the actual tonnage of food waste treated by the facility (i.e. $412,160) (para. 4.15(b)).

18. ***Need to review the effectiveness of the food waste/sewage sludge anaerobic co-digestion trial schemes at TPSTW and STSTW.*** According to EPD, to enhance the overall food waste recycling capacity in Hong Kong, EPD collaborated with the Drainage Services Department (DSD) in implementing the food waste/sewage sludge anaerobic co-digestion trial schemes at TPSTW and STSTW. Contract C for TPFWPF ended on 14 August 2025 after 6 years of operation. To provide a seamless continuation of the food waste pre-treatment services under the trial scheme, in July 2025, EPD had awarded a follow-on contract for the 12-month operation of TPFWPF. Besides, Contract D for STFWPF would end in November 2028. Audit noted that EPD had not conducted any evaluation on the effectiveness of the food waste/sewage sludge anaerobic co-digestion trial schemes at TPSTW and STSTW since their commissioning (paras. 4.22 and 4.23).

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 Director of Environmental Protection should:**

Design and construction of ORRCs

(a) **in implementing works projects:**

(i) **carry out ground investigation works as comprehensively as practicable at the project planning stage and to ensure that all**

necessary slope works are included in the tender documents in accordance with government guidelines (para. 2.21(a)(i));

(ii) **ensure the timely completion of construction works for the commissioning of facilities by contractors (para. 2.21(a)(ii)); and**

(iii) **draw lessons from the events leading to the delay in commissioning of the visitor centre at O·PARK1 (para. 2.32(a));**

(b) **expedite the assessment of claims submitted by Contractor B under Contract B as appropriate (para. 2.21(c));**

(c) **expedite the completion of the implementation of the odour mitigation enhancement works along the visitor path at O·PARK1 and closely monitor their effectiveness (para. 2.32(b));**

(d) **improve the utilisation rate of the visitor centre of O·PARK1, review its cost-effectiveness and take remedial measures where appropriate (para. 2.32(c) and (d));**

Operation of ORRCs

(e) **step up efforts in enhancing the utilisation of O·PARK1 and O·PARK2 and take necessary actions to rectify the situation of high proportion of inert materials found in the food waste received at O·PARK1 (para. 3.27(a) and (b));**

(f) **ensure that all incidents of failure to operate O·PARK1 are properly processed by EPD and operation fees to Contractor A are deducted in a timely manner (para. 3.27(e));**

(g) **keep under review the effectiveness of the follow-up actions taken by Contractor A in rectifying the emission of air pollutants from the ammonia stripping plant at O·PARK1 (para. 3.27(f));**

(h) **ascertain the reasons for the persistent non-compliances with performance requirements relating to air quality and quality of**

compost at O·PARK1 by Contractor A and take further measures to rectify the situation as appropriate (para. 3.44(a));

(i) **keep under review the effectiveness of the follow-up actions taken by Contractor A in mitigating the issues related to air quality and quality of compost at O·PARK1 (para. 3.44(b));**

(j) **ascertain the reasons for the persistent failure in producing and exporting the minimum monthly surplus electricity at O·PARK1 by Contractor A and take follow-up actions as appropriate (para. 3.44(c));**

(k) **resolve with Contractor A the dispute regarding the allocation of non-compliance points in respect of the performance requirement relating to export of surplus electricity and adjust the monthly operation fees to Contractor A as soon as practicable (para. 3.44(d));**

(l) **follow up with Contractor B for the rectification actions for the non-compliance with the quality standards of fertiliser and devise measures to address the quality issues of fertiliser produced from O·PARK2 as early as practicable (para. 3.44(e));**

(m) **resolve with Contractor B the allocation of non-compliance points relating to the performance requirement on quality standards of fertiliser and adjust the monthly operation fees to Contractor B as early as practicable (para. 3.44(f));**

Design, construction and operation of FWPFs at STWs

(n) **draw lessons from the blockage incidents of TPFWPF with a view to improving the design of the food waste pre-treatment process in future works projects (para. 4.9(a));**

(o) **step up efforts in enhancing the utilisation of STFWPF as far as practicable (e.g. discussing with DSD the acceptance criteria and allowable quantity of food waste slurry) (para. 4.24(a));**

(p) **closely monitor the variable operation costs for TPFWPF and STFWPF (para. 4.24(b)); and**

(q) **conduct a review on the food waste/sewage sludge anaerobic co-digestion trial schemes at TPSTW and STSTW to evaluate their effectiveness and determine the way forward, taking into account the audit observations and recommendations in this Audit Report (para. 4.24(f)).**

Response from the Government

20. The Director of Environmental Protection agrees with the audit recommendations.

PART 1: INTRODUCTION

1.1 This PART describes the background to the audit and outlines the audit objectives and scope.

Background

1.2 Lucid waters and lush mountains are invaluable assets. According to the Environmental Protection Department (EPD), about 10,900 tonnes of municipal solid waste were landfilled in Hong Kong per day in 2023, of which around 29% (i.e. about 3,200 tonnes) were food waste, constituting the largest municipal solid waste category. Food waste is any waste, whether raw, cooked, edible and associated with inedible parts generated during food production, distribution, storage, meal preparation or consumption of meals. At present, most of Hong Kong's food waste is disposed of at landfills together with other municipal solid waste.

1.3 According to EPD, the practice of disposing biodegradable food waste at landfills was not sustainable and was environmentally undesirable as it depleted valuable landfill capacity, created odour nuisance and squandered the useful organic resources. According to the Environment and Ecology Bureau (Note 1), there was a need to develop modern facilities to recycle and convert source-separated food waste into useful resources including energy. As at 31 March 2025, food waste treatment facilities included:

(a) ***Organic resources recovery centres (ORRCs).*** There were two ORRCs, namely ORRC Phase 1 (hereinafter referred to as O·PARK1) and ORRC Phase 2 (hereinafter referred to as O·PARK2); and

(b) ***Food waste pre-treatment facilities (FWPFs) at sewage treatment works (STWs).*** There were two pilot FWPFs at the Tai Po STW (TPSTW) (hereinafter referred to as TPFWPF) and the Sha Tin STW (STSTW)

Note 1: *In July 2022, the Environment and Ecology Bureau was formed to take over the policy responsibility for environmental matters from the then Environment Bureau, which is also referred to as the Environment and Ecology Bureau in this Audit Report for simplicity.*

(hereinafter referred to as STFWPF) under the food waste/sewage sludge anaerobic co-digestion trial scheme, which is collaboratively undertaken by EPD and the Drainage Services Department (DSD) (Note 2).

EPD is responsible for monitoring the design, construction and operation of these food waste treatment facilities and adopted a design-build-operate (DBO — Note 3) arrangement for implementing the design, construction and operation of these facilities.

Design and construction of ORRCs

1.4 According to EPD, ORRCs adopt anaerobic digestion (i.e. a series of processes in which microorganisms break down biodegradable material in the absence of oxygen) and composting/granulation technologies to convert source-separated organic waste into useful resources including biogas and compost/fertiliser. O·PARK1 was developed at Siu Ho Wan of the Lantau Island with design treatment capacity of 200 tonnes per day (tpd) (i.e. 73,000 tonnes per annum). O·PARK2 was developed at Sha Ling of the North District with design treatment capacity of 300 tpd (i.e. 109,500 tonnes per annum). Photographs 1 and 2 show O·PARK1 and O·PARK2 respectively.

Note 2: *Under the trial scheme, EPD is responsible for food waste pre-treatment and DSD is responsible for co-digesting food waste and sewage sludge in its anaerobic digestion tanks at STWs.*

Note 3: *DBO is a form of contract procurement whereby the contractor is required to design and construct a proposed facility in accordance with all requirements set forth in the contract by the Government. Upon completion, the contractor will be required under the contract to operate and maintain the completed facility for a specified period of time. The ownership of the facility will remain with the Government throughout the contract duration. Upon expiry of the operation phase specified in the contract, the facility will be handed back to the Government in a specified condition.*

Photograph 1

O·PARK1
(September 2020)

Source: *EPD records*

Photograph 2

O·PARK2
(April 2025)

Source: *EPD records*

1.5 Design and construction of O·PARK1 and O·PARK2 were implemented under two projects (hereinafter referred to as Projects A and B respectively). The scope of works under Projects A and B comprised:

(a) design and construction of ORRCs;

(b) design and construction of associated architectural, building, civil and landscape works;

(c) design and construction of heat recovery, power generation and surplus electricity export facilities; and

(d) provision of pollution control and environmental monitoring facilities.

1.6 The approved project estimate (APE) of Projects A and B totalled $4,172.9 million, comprising:

(a) ***Project A.*** $1,589.2 million (for design and construction of O·PARK1) approved by the Finance Committee of the Legislative Council (LegCo) in October 2014; and

(b) ***Project B.*** $2,453 million (for design and construction of O·PARK2) and an increase in APE by $130.7 million or 5.3% (from $2,453 million to $2,583.7 million) approved by the Finance Committee in June 2019 and March 2024 respectively.

1.7 Between July 2008 and July 2019, EPD awarded 4 consultancies relating to the design and construction of O·PARK1 and O·PARK2 (see Table 1), as follows:

(a) 2 consultancies for the feasibility study of O·PARK1 and O·PARK2 respectively; and

(b) 2 consultancies for the design and construction supervision work of O·PARK1 and O·PARK2 which involved two DBO contracts (Contracts A and B — see para. 1.8) respectively.

Table 1

Consultancies awarded for Projects A and B
(31 March 2025)

Consultancy	Consultant	Particulars	Consultancy fee ($ million)
Project A (for design and construction of O·PARK1)			
P (Awarded in July 2008)	P (Note 1)	Feasibility study	9.4 (Note 2)
Q (Awarded in November 2014)	Q (Note 1)	Design and construction supervision work	11.2 (Note 3)
		Sub-total (a)	20.6
Project B (for design and construction of O·PARK2)			
R (Awarded in December 2011)	R	Feasibility study	8.2 (Note 2)
S (Awarded in July 2019)	S (Note 1)	Design and construction supervision work	5.0 (Note 3)
		Sub-total (b)	13.2
		Total (c) = (a) + (b)	33.8

Source: *EPD records*

Note 1: *Consultants P, Q and S referred to the same consultancy firm.*

Note 2: *The consultancy fees were funded under the block allocation Subhead 5101DX of the Capital Works Reserve Fund Head 705 under the control of EPD.*

Note 3: *The consultancy fees were funded under the respective project vote.*

1.8 In November 2014 and August 2019, EPD awarded 2 DBO contracts (Contracts A and B) to 2 contractors (Contractors A and B) for the design, construction and operation of O·PARK1 and O·PARK2 respectively (see Table 2). The design and construction of O·PARK1 (under Contract A) and O·PARK2 (under Contract B) commenced on 18 December 2014 and 5 September 2019 respectively,

and were substantially completed on 3 December 2018 and 31 December 2024 respectively.

Table 2

DBO contracts awarded for Projects A and B
(31 March 2025)

Contract	Contractor	Contract sum		
		Design and construction	Operation	Total
		($ million)		
Project A (for design and construction of O·PARK1)				
A (Awarded in November 2014)	A	1,285.6 (54%)	1,095.0 (46%) (Note 1)	2,380.6 (100%) (Note 2)
Project B (for design and construction of O·PARK2)				
B (Awarded in August 2019)	B	2,118.8 (58%)	1,545.7 (42%) (Note 1)	3,664.5 (100%) (Note 2)
			Overall	6,045.1

Source: *EPD records*

Note 1: *Contracts A and B cover the contractual operation period of 15 years.*

Note 2: *While the expenditure incurred for the design and construction portions of O·PARK1 and O·PARK2 would be covered by APE of $1,589.2 million and $2,583.7 million respectively (see para. 1.6(a) and (b)), the operating costs of O·PARK1 and O·PARK2 would be funded under the General Revenue Account.*

Project costs of ORRCs

1.9 As at 31 March 2025, the total project costs for Projects A and B were $1,433.7 million (i.e. 90% of APE of $1,589.2 million) and $2,454.3 million (i.e. 95% of APE of $2,583.7 million) respectively. Of the total project costs:

(a) $1,369.3 million (96% of $1,433.7 million) and $2,358.3 million (96% of $2,454.3 million) were related to expenditure for the design and

construction of O·PARK1 (under Contract A) and O·PARK2 (under Contract B) respectively (see Table 3); and

(b) the remaining \$64.4 million (4% of \$1,433.7 million) and \$96 million (4% of \$2,454.3 million) for Projects A and B respectively mainly included resident site staff costs (Note 4), consultancy fees (see Note 3 to Table 1 in para. 1.7) and other costs.

Table 3

Contract expenditure of Contracts A and B relating to design and construction portions (31 March 2025)

Contract	Original contract sum (a)	Contract expenditure (b)	Increase (c) = (b) – (a)	Increase in provision for price fluctuation adjustment (Note) (d)	Increase/ (Decrease) after price fluctuation adjustment (e) = (c) – (d)
	(\$ million)				
A	1,285.6	1,369.3	83.7 (6.5%)	23.7 (1.8%)	60.0 (4.7%)
B	2,118.8	2,358.3	239.5 (11.3%)	279.3 (13.2%)	(39.8) (-1.9%)
Overall	3,404.4	3,727.6	323.2 (9.5%)	303.0 (8.9%)	20.2 (0.6%)

Source: *EPD records*

Note: *The original contract sums have already included provision for price fluctuation adjustment.*

Note 4: *Consultants are required to employ resident site staff of different grades (e.g. professional grade and technical grade) for supervising contractors' works. The Government reimburses consultants for the personal emoluments of the staff and pays an on-cost to consultants to cover their costs in managing the staff.*

Operation of ORRCs

1.10 The operation stage of O·PARK1 and O·PARK2 commenced on 4 December 2018 and 1 January 2025 respectively. During the initial operation of O·PARK1 (i.e. from 4 December 2018 to 30 September 2020) and O·PARK2 (i.e. from 1 January to 31 December 2025), Consultants Q and S was/is the Employer's Representative for Contracts A and B respectively and responsible for supervising Contractors A and B's operation of ORRCs and reporting contractors' performance to EPD. Effective from 1 October 2020 and 1 January 2026, EPD has fully taken up/will take up the work of monitoring (including supervising) Contractors A and B's operation of O·PARK1 and O·PARK2 respectively.

1.11 The design treatment capacity of O·PARK1 and O·PARK2 are 200 tpd and 300 tpd respectively. Monthly variable operation fee is paid to Contractors A and B based on the tonnes of food waste treated at O·PARK1 and O·PARK2 during the month. Since the commissioning of O·PARK1 and O·PARK2 and up to March 2025, the average quantity of food waste received at O·PARK1 and O·PARK2 were 123 tpd and 192 tpd respectively, and the average quantity of treatable food waste (i.e. food waste received at ORRCs and after removal of inert materials) treated at O·PARK1 and O·PARK2 were 102 tpd and 186 tpd respectively. The amount of payment to Contractors A and B for the operation of O·PARK1 in 2024-25 and O·PARK2 from January to March 2025 were $68 million and $24.8 million respectively.

Design and construction of FWPFs at STWs

1.12 According to EPD, FWPFs use mechanical treatment to convert food waste into food waste slurry, and the slurry would be injected into the anaerobic digestion facilities at STWs managed by DSD for co-digestion treatment with sewage sludge generated during the sewage treatment process. Food waste and sewage sludge would then be converted into biogas (i.e. for generating electricity and heat for use in STWs). FWPFs were developed at TPSTW and STSTW with design treatment capacity of 50 tpd each. Photographs 3 and 4 show TPFWPF and STFWPF respectively.

Photograph 3

TPFWPF
(January 2021)

Source: *EPD records*

Photograph 4

STFWPF
(November 2023)

Source: *EPD records*

1.13 Design and construction of TPFWPF and STFWPF were funded under the block allocation of the Capital Works Reserve Fund. The approved funding totalled $58.6 million, comprising:

(a) ***TPFWPF.*** A total of $29.9 million for design and construction of TPFWPF approved in May 2015 and April 2017; and

(b) ***STFWPF.*** A total of $28.7 million for design and construction of STFWPF approved in December 2019 and May 2022.

1.14 In October 2015 and June 2020, EPD awarded 2 consultancies for the investigation, design and construction supervision work of TPFWPF and STFWPF (see Table 4), which involved two DBO contracts (Contracts C and D — see para. 1.15) respectively.

Table 4

Consultancies awarded for design and construction of TPFWPF and STFWPF (31 March 2025)

Consultancy	Consultant	Particulars	Consultancy fee ($ million)
TPFWPF			
T (Awarded in October 2015)	T	Investigation, design and construction supervision work	9.8 (Note 1)
STFWPF			
U (Awarded in June 2020)	U (Note 2)	Investigation, design and construction supervision work	5.2 (Note 1)
		Total	15.0

Source: EPD records

Note 1: The consultancy fees were funded under the block allocation Subhead 5101DX of the Capital Works Reserve Fund Head 705 under the control of EPD.

Note 2: Consultant U referred to the same consultancy firm as Consultants P, Q and S in Table 1 in paragraph 1.7.

1.15 In November 2017 and May 2022, EPD awarded 2 DBO contracts (Contracts C and D) to 2 contractors (Contractors C and D) for the design, construction and operation of TPFWPF and STFWPF respectively (see Table 5). The design and construction of TPFWPF (under Contract C) and STFWPF (under

Contract D) commenced on 8 December 2017 and 24 June 2022 respectively, and were substantially completed on 14 August 2019 and 14 November 2023 respectively.

Table 5

DBO contracts awarded for design, construction and operation of TPFWPF and STFWPF (31 March 2025)

Contract	Contractor	Contract sum		
		Design and construction	Operation	Total
		($ million)		
TPFWPF				
C (Awarded in November 2017)	C (Note 1)	15.0 (18%)	67.8 (82%) (Note 2)	82.8 (100%) (Note 4)
STFWPF				
D (Awarded in May 2022)	D (Note 1)	18.0 (15%)	100.9 (85%) (Note 3)	118.9 (100%) (Note 4)
			Overall	201.7

Source: *EPD records*

Note 1: *Contractors C and D referred to the same contractor.*

Note 2: *Contract C covers a contractual operation period of 6 years.*

Note 3: *Contract D covers a contractual operation period of 5 years.*

Note 4: *While the expenditure incurred for the design and construction portions would be funded under the block allocation Subhead 5101DX of the Capital Works Reserve Fund Head 705 under the control of EPD, the operating costs would be funded under the General Revenue Account.*

Costs for design and construction of FWPFs at STWs

1.16 As at 31 March 2025, the total costs for the design and construction of TPFWPF and STFWPF were $25.3 million (i.e. 85% of the approved funding of

$29.9 million) and $20.8 million (i.e. 72% of the approved funding of $28.7 million) respectively. Of the total costs for the design and construction of FWPFs:

(a) $14.9 million (59% of $25.3 million) and $14.1 million (68% of $20.8 million) were related to expenditure for the design and construction of TPFWPF (under Contract C) and STFWPF (under Contract D) respectively (see Table 6); and

(b) the remaining $10.4 million (41% of $25.3 million) for TPFWPF and $6.7 million (32% of $20.8 million) for STFWPF were consultancy fees (see Table 4 in para. 1.14) and other costs.

Table 6

Contract expenditure of Contracts C and D relating to design and construction portions (31 March 2025)

Contract	Original contract sum (a)	Contract expenditure (b)	Decrease (c) = (b) – (a)	Increase in provision for price fluctuation adjustment (Note) (d)	Decrease after price fluctuation adjustment (e) = (c) – (d)
	($ million)				
C	15.0	14.9	(0.1) (-0.7%)	0.5 (3.3%)	(0.6) (-4.0%)
D	18.0	14.1	(3.9) (-21.7%)	0.1 (0.5%)	(4.0) (-22.2%)
Overall	33.0	29.0	(4.0) (-12.1%)	0.6 (1.8%)	(4.6) (-13.9%)

Source: *EPD records*

Note: *The original contract sums have already included provision for price fluctuation adjustment.*

Operation of FWPFs at STWs

1.17 The operation stage of TPFWPF and STFWPF commenced on 15 August 2019 and 15 November 2023 respectively. During the initial operation of TPFWPF (i.e. from 15 August 2019 to 13 August 2020) and STFWPF (i.e. from 15 November 2023 to 14 May 2024), Consultants T and U were the Employer's Representative for Contracts C and D respectively and responsible for supervising Contractors C and D's operation of FWPFs and reporting contractors' performance to EPD. Since 14 August 2020 and 15 May 2024, EPD has fully taken up the work of monitoring (including supervising) Contractors C and D's operation of TPFWPF and STFWPF respectively.

1.18 The design treatment capacity of TPFWPF and STFWPF are 50 tpd each. Monthly variable operation fee is paid to Contractors C and D based on the tonnes of food waste treated at TPFWPF and STFWPF during the month. Since the commissioning of TPFWPF and STFWPF and up to March 2025, the average quantity of food waste treated at TPFWPF and STFWPF were 18.6 tpd and 8.9 tpd respectively. In 2024-25, the amount of payment to Contractors C and D for the operation of TPFWPF and STFWPF were $10.2 million and $15.5 million respectively.

Responsible division of EPD

1.19 The Organic Waste Infrastructure Group under EPD's Waste Infrastructure Division is responsible for the management of food waste treatment facilities. As at 31 March 2025:

(a) 12 staff in this Division were involved in, among other things, monitoring the design, construction and operation of O·PARK1. In 2024-25, the related staff expenditure incurred solely for carrying out the relevant duties was $8.5 million;

(b) 13 staff in this Division were involved in, among other things, monitoring the design, construction and operation of O·PARK2. In 2024-25, the related staff expenditure incurred solely for carrying out the relevant duties was $7.6 million; and

(c) 7 staff in this Division were involved in, among other things, monitoring the design, construction and operation of TPFWPF and STFWPF. In 2024-25, the related staff expenditure incurred solely for carrying out the relevant duties was $5.9 million.

An extract of EPD's organisation chart as at 31 March 2025 is at Appendix A.

Audit review

1.20 In May 2025, the Audit Commission (Audit) commenced a review of EPD's work in the management of food waste treatment facilities. The audit review has focused on the following areas:

(a) design and construction of ORRCs (PART 2);

(b) operation of ORRCs (PART 3); and

(c) design, construction and operation of FWPFs at STWs (PART 4).

Audit has found room for improvement in the above areas and has made a number of recommendations to address the issues.

General response from the Government

1.21 The Director of Environmental Protection thanks Audit for conducting the audit review of management of food waste treatment facilities and agrees with the audit recommendations. He has said that EPD will take follow-up actions and improvement measures as appropriate.

Acknowledgement

1.22 Audit would like to acknowledge with gratitude the full cooperation of the staff of EPD during the course of the audit review.

PART 2: DESIGN AND CONSTRUCTION OF ORGANIC RESOURCES RECOVERY CENTRES

2.1 This PART examines EPD's work in monitoring the design and construction of ORRCs, focusing on:

(a) design and construction of ORRCs (paras. 2.2 to 2.22); and

(b) visitor centre of O·PARK1 (paras. 2.23 to 2.33).

Design and construction of organic resources recovery centres

2.2 In November 2014 and August 2019, EPD awarded Contracts A and B to Contractors A and B respectively for the design, construction and operation of O·PARK1 and O·PARK2 respectively. The design and construction of O·PARK1 (under Contract A) commenced on 18 December 2014 and was substantially completed on 3 December 2018, whereas the design and construction of O·PARK2 (under Contract B) commenced on 5 September 2019 and was substantially completed on 31 December 2024.

Omission of some necessary slope works in Contract A

2.3 According to Environment, Transport and Works Bureau Technical Circular (Works) No. 29/2002 "Geotechnical Control for Slopes and Retaining Walls", the project department should:

(a) ensure that the details of all permanent geotechnical works for man-made slopes and retaining walls within or in the vicinity of the site are submitted to the Civil Engineering and Development Department for checking;

(b) make the necessary arrangements to ensure that the finished project will not be subject to or pose an unacceptable landslide risk to the public throughout its design life; and

(c) in detailed design stage of the project, submit the findings of geotechnical investigations and studies on existing man-made slopes and retaining walls which may affect or be affected by the proposed project to the Civil Engineering and Development Department.

2.4 Audit noted that some necessary slope works were omitted in Contract A, as follows:

(a) while Contract A stipulated that Contractor A should carry out all necessary geotechnical investigations and natural terrain hazard mitigation works for the natural terrain (i.e. the natural ground that had not been modified significantly by human activities), and the maintenance of such works on the facility and on the geological section at Contractor A's own cost, Contract A did not cover the relevant works for man-made slopes; and

(b) in May 2016 (i.e. after Contract A was awarded to Contractor A in November 2014), EPD found that there were 5 man-made slopes within the site specified in Contract A that would be affected by the development of O·PARK1, and it was required to undertake the geotechnical investigations and studies, and necessary slope stabilisation works on these slopes in accordance with Environment, Transport and Works Bureau Technical Circular (Works) No. 29/2002. In the event:

(i) as the works for the 5 man-made slopes were not within the scope of Contract A, in November 2016, Consultant Q issued an Employer's Change (EC) (EC A, later valued at a cost of $0.4 million) under Contract A to instruct Contractor A to carry out the design of slope stabilisation works; and

(ii) in November 2017, EPD was required to carry out the slope stabilisation works for 4 of the 5 man-made slopes for upgrading to the one with higher slope safety factor in order to meet the new and additional requirements. In December 2017 and February 2018, Consultant Q issued ECs B and C (later valued at a total cost of $18 million) under Contract A respectively to instruct Contractor A to carry out site clearance and slope stabilisation works (e.g. installation of soil nails, construction of surface channels and removal of existing loose fill) on the man-made slopes concerned.

2.5 In January 2018, the Development Bureau (DEVB) (Note 5) commented that a more detailed investigation could be conducted during the early planning stage, so as to define and incorporate the scope of works more accurately into the contract documents as appropriate. In Audit's view, in implementing works projects, EPD needs to take measures to carry out ground investigation works as comprehensively as practicable at the project planning stage and to ensure that all necessary slope works are included in the tender documents in accordance with government guidelines.

Construction works completed later than the scheduled completion date of Contract A

2.6 The design and construction works of O·PARK1 under Contract A commenced on 18 December 2014 and was substantially completed on 3 December 2018, 627 days (or 20.6 months) later than the original completion date of 16 March 2017 (Note 6). As at 31 March 2025, of the delay of 627 days:

(a) extension of time (EOT — Note 7) of 445 days was granted to Contractor A under Contract A such that the revised completion date of the construction works of O·PARK1 was 4 June 2018 and prolongation costs of $44 million were paid to Contractor A; and

---

Note 5: *According to EPD, EC C was submitted to the Project Strategy and Governance Office (formerly known as the Project Cost Management Office) of DEVB for review as the estimated value of variation of works under EC C had exceeded $1.4 million.*

Note 6: *The design and construction works of O·PARK2 under Contract B commenced on 5 September 2019 and was substantially completed on 31 December 2024, 941 days (or 30.9 months) later than the original completion date of 4 June 2022. As at 31 March 2025, notwithstanding that extension of time of 276 days was granted to Contractor B under Contract B such that the revised completion date of the construction works of O·PARK2 was 7 March 2023, the assessment results of the remaining claims submitted by Contractor B under Contract B were pending from Consultant S (see para. 2.12(c)).*

Note 7: *If a contractor fails to substantially complete the works within the time for completion, the Employer should be entitled to recover liquidated damages for the delay of works from the contractor, unless an EOT for the completion of the works is granted.*

(b) the remaining 182 days were subject to liquidated damages of $49.7 million imposed on Contractor A.

Audit noted that, of the 8 Contractor A's performance reports for the design and construction stage, 3 (38%) were with "poor" ratings under the performance aspect of "progress".

2.7 According to EPD, O·PARK1 is the first-of-its-kind food waste treatment facility in Hong Kong. Despite the fact that the detailed designs for all systems of the facility were included during the design stage, additional requirements on power export and fire service installations imposed by relevant parties during the project implementation stage had necessitated redesign of the facility as well as procurement and installation of new provisions, and hence resulting in substantial delays in project completion. These additional requirements were unexpected and unforeseeable during the tendering stage. As such, the time taken for Contractor A to design, supply and install the relevant systems was lengthened substantially. In the event, EOT of 445 days was granted due to the following:

(a) additional requirements imposed by the relevant authority for obtaining the statutory approval for fire service installations and equipment of 204 days;

(b) additional requirements imposed by an utility company on the power connection arrangement of 196 days; and

(c) inclement weather and other reasons of 45 days.

2.8 In Audit's view, in implementing works projects, EPD needs to take measures to ensure the timely completion of construction works for the commissioning of facilities by contractors.

Additional costs for design review and enhancement works under Contract B

2.9 On 12 August 2019, EPD awarded Contract B to Contractor B and the related design and construction works of O·PARK2 commenced on 5 September 2019. Shortly after the commencement of Contract B, EPD invited Contractor B to conduct a design review of O·PARK2, subsequently leading to the

issuance of EC D (later valued at a cost of $149.2 million) under Contract B to instruct Contractor B to carry out the design enhancement works of O·PARK2. The salient points are as follows:

(a) in December 2016, EPD invited open tender for Contract B. The design specifications included in the tender documents (for tenderers' reference during the tendering stage and for Contractor B's reference during the detailed design stage after contract award) were based on Consultant R's final engineering feasibility study report endorsed by EPD in March 2015;

(b) the tender for Contract B was closed in July 2017 and the tender assessment was completed in November 2017. In January 2018, EPD submitted the tender recommendation to the Central Tender Board and approval-in-principle was obtained in the same month (Note 8);

(c) with the funding approval given by the Finance Committee in June 2019, formal approval of the award of Contract B was obtained in July 2019 and Contract B was awarded to Contractor B on 12 August 2019;

(d) between July and August 2019, duty visits of the Environment and Ecology Bureau and EPD revealed that new designs and technologies in respect of food waste reception, pre-treatment and wastewater treatment had been adopted in food waste treatment facilities in the Chinese Mainland and overseas;

(e) on 27 September 2019 (i.e. 46 and 22 days after the date of contract award and the date of commencement of Contract B respectively), EPD invited Contractor B to conduct a design review of O·PARK2 to identify possible design enhancements before finalising the overall design of O·PARK2 with a view to:

    (i) ensuring that the DBO of O·PARK2 would be on par with the latest food waste treatment facilities worldwide given the specifications of O·PARK2 were developed in March 2015 (i.e. 4.5 years ago); and

---

Note 8: *According to EPD, due to delays in the funding approval procedures of LegCo in 2018-19, the original expiry date of validity of tenders for Contract B on 20 July 2018 had been extended to 21 October 2019.*

(ii) improving the operational efficiency, odour control and flexibility of O·PARK2; and

(f) between October and November 2019, Contractor B submitted the proposal on design enhancement works of O·PARK2 (including enhancement of wastewater treatment system, waste reception and pre-treatment process and administration building). On 12 August 2020, after obtaining the consent from EPD, Consultant S issued EC D (Note 9).

2.10 Audit noted that:

(a) to provide more accurate project estimates and expedite the progress of project delivery, EPD adopted parallel tendering for Contract B (i.e. invite tenders before funding is secured). Contract B was tendered out in December 2016 and the tendering exercise was completed in January 2018. After that, it took EPD 17 months to secure funding from the Finance Committee in June 2019. In the event, Contract B was awarded in August 2019 (i.e. 19 months after the completion of the tendering exercise) and commenced in September 2019; and

(b) as the design specifications included in Contract B were developed in March 2015 (i.e. 4.5 years ago), EPD invited Contractor B to conduct a design review of O·PARK2 shortly after contract commencement in September 2019 with a view to ensuring the design parameters in Contract B to be on par with the latest food waste treatment facilities worldwide. In the event, EC D was issued in August 2020 for carrying out the related design enhancement works, resulting in a total additional costs of $149.2 million (i.e. 7% of the original contract sum of $2,118.8 million for the design and construction portions of Contract B).

Note 9: *According to EPD, the design enhancement works of O·PARK2 could not be executed by another contractor under a new procurement because the proposed variations could not be segregated as a separate works contract. Between May and August 2020, EPD obtained advice from the Legal Advisory Division (Works) of DEVB and the Department of Justice regarding the implementation of the design enhancement works by way of EC under Contract B.*

2.11 In Audit's view, EPD needs to draw lessons from the events leading to the design review of O·PARK2 shortly after contract commencement and the subsequent design enhancement works with a view to improving the procurement of DBO contracts for implementing future works projects, particularly those projects involving development of facilities adopting fast-changing technologies in the market.

Need to expedite the assessment of claims under Contract B

2.12 According to EPD, as at 31 March 2025, the assessment of claims (involving both EOT and monetary claims) submitted by Contractor B under Contract B was still in progress. Audit examined the 42 claims submitted by Contractor B up to March 2025 and noted that the processing time of some claims was long. As at 31 March 2025, of the 42 claims:

(a) 10 (24%) and 7 (17%) claims were withdrawn by Contractor B and rejected by Consultant S respectively;

(b) 3 (7%) were assessed by Consultant S before April 2022 with EOT of 276 days (Note 10) granted to Contractor B; and

(c) 22 (52%) were with assessment results pending from Consultant S, comprising:

(i) 13 (59% of 22) quantified claims (comprising 9 EOT claims and 4 monetary claims) submitted by Contractor B between June 2020 and October 2023 (i.e. a lapse of 17 to 57 months) (Note 11); and

---

Note 10: *According to EPD, EOT of 276 days was granted due to: (a) impact of coronavirus disease (COVID-19) epidemic of 182 days; (b) additional time for design work for preparation and acceptance of design enhancement papers of 89 days; and (c) inclement weather of 5 days.*

Note 11: *According to EPD, as at 30 September 2025, the 13 quantified claims remained unsettled because the particulars submitted by Contractor B were insufficient for supporting the claims. Hence, EPD and Consultant S could not properly assess the claims.*

(ii) 9 (41% of 22) non-quantified claims submitted by Contractor B between April 2022 and October 2024 (i.e. a lapse of 5 to 35 months).

Despite the long processing time taken by Consultant S, the performance item of "handling of contractor's claims" was rated as "poor" in Consultant S's performance report only for the period from October to December 2022.

2.13 In response to Audit's enquiry, EPD informed Audit in October 2025 that:

(a) it had been assessing EOT and monetary claims submitted by Contractor B in a timely manner. However, most of the quantified claims remaining unsettled were not supported by sufficient particulars, making proper assessment difficult. Contractor B had also not provided further information to substantiate these claims or to clarify their basis; and

(b) as at 30 September 2025, the 9 non-quantified claims were yet to be quantified by Contractor B. These included claims relating to treatment of animal (chicken and pig) manure which might have possible impacts to the performance of downstream anaerobic digestion, wastewater treatment, granulation and odour control process. For the claims relating to treatment of animal manure:

(i) the possible impacts to the performance of downstream treatment processes were yet to be ascertained due to the absence of precedent operations locally or outside Hong Kong that could be made reference to; and

(ii) to allow for an impartial assessment, it was agreed among EPD, Consultant S and Contractor B that a 12-month period starting from January 2025 would be allowed for the collection of operational data and evaluation of the overall impacts, if any, on the treatment systems.

EPD aimed to complete all assessments for EOT and monetary claims within three months after the expiration of the one-year evaluation and assessment period.

2.14 In Audit's view, EPD needs to take measures to expedite the assessment of claims, including both EOT and monetary claims, submitted by Contractor B under Contract B as appropriate and to ensure that the performance of Consultant S in handling of contractor's claims is duly reflected in the performance reports.

Need to ensure timely completion of outstanding works

2.15 According to Contracts A and B, Contractors A and B should carry out any outstanding works as soon as practicable after the issue of certificate of substantial completion for the works, but in any event within 56 days after the date of substantial completion of works (i.e. the specified timeframe). When all the outstanding works have been completed to the satisfaction of EPD and certified by the independent consultants, EPD or Consultants Q or S would issue the certificate of completion for the works.

2.16 Audit noted that there were delays in the completion of outstanding works of both Contracts A and B, as follows:

(a) ***O·PARK1 under Contract A.*** In respect of the design and construction works of O·PARK1 under Contract A:

(i) in February 2019, Consultant Q certified Contractor A's substantial completion of works on 3 December 2018 and required Contractor A to complete a list of outstanding works involving 15 items within the specified timeframe (i.e. 28 January 2019);

(ii) all the outstanding works were completed to the satisfaction of EPD and certified by the independent consultants on or before 30 April 2021 (i.e. 823 days after the specified timeframe) and Consultant Q then certified Contractor A's completion of works; and

(iii) the delay in completing the outstanding works was reflected in Contractor A's performance report only for the period from January to June 2021 (i.e. the performance items of "adequacy of and adherence to programme" and "action taken to mitigate delay/catch up with programme" under the performance aspect of

"progress" were rated as "poor"). The delay was not reflected in Contractor A's performance reports for the period from February 2019 to December 2020; and

(b) ***O·PARK2 under Contract B.*** In respect of the design and construction works of O·PARK2 under Contract B:

(i) in January 2025, Consultant S certified Contractor B's substantial completion of works on 31 December 2024 and required Contractor B to complete a list of outstanding works involving 401 items within the specified timeframe (i.e. 25 February 2025);

(ii) as at 31 May 2025 (i.e. 95 days after the specified timeframe), of the 401 items of outstanding works, only 27% were certified as completed; and

(iii) the delay in completing the outstanding works was reflected in Contractor B's performance reports for the period from December 2024 to May 2025 (e.g. the performance item of "achievement in period" under the performance aspect of "progress" was rated as "poor").

2.17 In response to Audit's enquiry, EPD informed Audit in October 2025 that it had taken measures to expedite the completion of the outstanding works by holding weekly outstanding works meetings with Contractor B. In addition, EPD issued warning letters to Contractor B to indicate dissatisfaction with the delays and requested Contractor B to expedite the completion of the outstanding works. As at 30 September 2025, of the 401 items of outstanding works, 211 (53%) items had been completed. In Audit's view, EPD needs to:

(a) require Contractor B to expedite the completion of outstanding works as early as practicable; and

(b) in implementing works projects, strengthen measures to ensure the timely completion of outstanding works by contractors in accordance with the contract requirements.

Need to timely conduct post-completion review for Contracts A and B

2.18 According to the Project Administration Handbook for Civil Engineering Works issued by the Civil Engineering and Development Department:

(a) a post-completion review is a useful project management tool and should be conducted upon the substantial completion of a major works contract on projects under the Public Works Programme. The emphasis and objective of the review are to gain maximum benefit from the experience accrued, rather than to apportion blame;

(b) a post-completion review is generally not warranted for works contracts of a project which has a total cost less than $500 million or of a project which does not involve complicated technical and management issues (e.g. a claim of a substantial sum, say over $1 million);

(c) a post-completion review should be carried out within a reasonable period, say six months, after the substantial completion of a works contract. However, in case there are on-going disputes with the contractors, it may be more appropriate to defer the review until the disputes are settled or the review may have to be carried out without the participation of the contractor concerned; and

(d) upon the completion of a post-completion review, the government department should prepare a report documenting all concerned issues, findings, conclusions and recommendations for future reference by the government department.

2.19 The design and construction portions of Contracts A and B were already substantially completed in December 2018 and December 2024 respectively. As at 31 March 2025, the respective total contract expenditures of Contracts A and B (i.e. $1,369.3 million for Contract A and $2,358.3 million for Contract B) were much higher than $500 million. However, Audit noted that, as at 31 August 2025 (i.e. 6.7 years and 8 months after the date of substantial completion of works for Contracts A and B respectively), EPD did not conduct a post-completion review for the design and construction portions of Contracts A and B. According to EPD, the assessment of claims submitted by Contractor B under Contract B was still in progress.

2.20 As a post-completion review is a useful project management tool to facilitate drawing on the experience gained in future DBO contracts, in Audit's view, EPD needs to conduct a post-completion review for the design and construction portions of Contracts A and B as soon as practicable.

Audit recommendations

2.21 **Audit has *recommended* that the Director of Environmental Protection should:**

(a) **in implementing works projects:**

(i) **take measures to carry out ground investigation works as comprehensively as practicable at the project planning stage and to ensure that all necessary slope works are included in the tender documents in accordance with government guidelines;**

(ii) **take measures to ensure the timely completion of construction works for the commissioning of facilities by contractors; and**

(iii) **strengthen measures to ensure the timely completion of outstanding works by contractors in accordance with the contract requirements;**

(b) **draw lessons from the events leading to the design review of O·PARK2 shortly after contract commencement and the subsequent design enhancement works with a view to improving the procurement of DBO contracts for implementing future works projects, particularly those projects involving development of facilities adopting fast-changing technologies in the market;**

(c) **take measures to expedite the assessment of claims, including both EOT and monetary claims, submitted by Contractor B under Contract B as appropriate and to ensure that the performance of Consultant S in handling of contractor's claims is duly reflected in the performance reports;**

(d) **require Contractor B to expedite the completion of outstanding works as early as practicable; and**

(e) **conduct a post-completion review for the design and construction portions of Contracts A and B as soon as practicable.**

Response from the Government

2.22 The Director of Environmental Protection agrees with the audit recommendations. He has said that EPD will:

(a) in future DBO projects, carry out comprehensive ground investigation works at the planning stage in accordance with prevailing government guidelines and incorporate all relevant requirements in the tender documents;

(b) in future DBO projects, adopt a more proactive, transparent and collaborative project management approach through the implementation of New Engineering Contract for effective programme monitoring and handling of changes and unforeseeable events;

(c) work closely with Contractor B and Consultant S to complete the assessment of claims and all outstanding works within the first quarter of 2026; and

(d) conduct a post-completion review for the design and construction portions of Contracts A and B within the first quarter of 2026.

Visitor centre of the Organic Resources Recovery Centre Phase 1

2.23 According to Contract A, to facilitate the public learning the principle of food waste treatment and other environmental protection information, and to demonstrate the useful products (e.g. energy and compost) that can be generated and utilised, an environmental education centre (hereinafter referred to as the visitor centre) should be provided at O·PARK1 and Contractor A should be responsible for the design, construction and operation of the visitor centre.

Delay in commissioning of visitor centre of O·PARK1

2.24 While it was planned that the visitor centre would be commissioned at the same time as O·PARK1, it was commissioned 2.2 years (i.e. on 1 March 2021) after the commissioning of O·PARK1 on 4 December 2018. The salient points are as follows:

(a) the design and construction works of O·PARK1 (including the visitor centre) under Contract A commenced on 18 December 2014. In October 2016 and June 2017, Consultant Q issued 2 ECs under Contract A to instruct Contractor A to carry out additional works related to the visitor centre that were outside the scope of Contract A, namely:

(i) EC E (later valued at a cost of $3.7 million) to develop a public relations plan for O·PARK1, including the provision of conceptual design and supervision for the development of visitor centre and exhibits, with the possible adoption of new media activities; and

(ii) EC F (later valued at a cost of $42.3 million) to provide design and construction of the visitor centre.

With the proposed special features (e.g. the adoption of visual reality technology and infographic panels, interactive games and computer graphics displays), EPD envisaged that the visitor centre could host six times more visitors (i.e. 480 visitors per week) as compared to the original design of 80 visitors per week;

(b) in August 2017, the design of the visitor centre, which located at the waste receiving and administration building, was rejected by an approving authority from the fire safety point of view. As the building had seven dangerous goods stores, it was classified as an industrial building and the visitor centre should be physically separated from it;

(c) EPD revised the design of the visitor centre as a standalone building. Subsequent to the approval of the revised design, in May 2018, Consultant Q issued EC G (later valued at a cost of $20.6 million) under Contract A to instruct Contractor A to provide additional works for the construction of the visitor centre. In May 2020, 12 months later than the target completion date of the construction works of the visitor centre in

May 2019, the construction and interior fitting out of the visitor centre was substantially completed; and

(d) in October 2020, Consultant Q issued EC H (later valued at a cost of $1.4 million) under Contract A to instruct Contractor A to carry out the upgrading works of the visitor centre. In the event, the visitor centre was commissioned in March 2021.

2.25 Audit noted that:

(a) several ECs were issued at different stages during the design and construction of the visitor centre to upgrade its design (e.g. ECs E and F were issued 1.8 and 2.5 years after the commencement of the design and construction works of O·PARK1 respectively and EC H was issued after the visitor centre was substantially completed);

(b) the visitor centre was accessible by the public, which included vulnerable persons such as children, elderly and persons with disabilities. It is important that the centre is situated in a safe location; and

(c) there was a delay in substantial completion of the visitor centre from May 2019 to May 2020 (i.e. 12 months later than the target completion date).

2.26 The design and construction works of O·PARK1 were substantially completed in December 2018. According to EPD:

(a) as the revised design of the visitor centre as a standalone building was only finalised in May 2018, most of the plant facilities, equipment and ventilation system of O·PARK1 were already in place at that time. The design of the visitor centre and the associated education activities (e.g. the guided tours) were therefore constrained by the existing set-up and layout; and

(b) due to limited site area, it was inevitable that part of the visitor path overlapped with hallways where facility operators needed access to. The

standard of ventilation and odour control was considered not be able to fully meet the expectations for public visits and educational uses.

In the event, ECs I and J (estimated at a total cost of $1.7 million) were issued in January and November 2024 for implementing odour mitigation enhancement works along the visitor path at O·PARK1. According to EPD, the implementation of enhancement works under EC I was expected to be completed by the end of 2025.

2.27 In Audit's view, EPD needs to:

(a) in implementing works projects, draw lessons from the events leading to the delay in commissioning of the visitor centre at O·PARK1 with a view to ensuring timely completion of the works; and

(b) expedite the completion of the implementation of the odour mitigation enhancement works along the visitor path at O·PARK1 and closely monitor their effectiveness.

Low utilisation of visitor centre of O·PARK1

2.28 According to Contract A, Contractor A should be responsible for the operation of the visitor centre of O·PARK1 and monthly fixed operation fees should be paid to Contractor A to cover its monthly fixed costs for the operation, including the labour resources for organising guided tours and maintenance of facilities.

2.29 According to EPD, with the proposed special features (e.g. the adoption of visual reality technology and infographic panels, interactive games and computer graphics displays) provided under ECs E and F, EPD envisaged that the visitor centre could host six times more visitors (i.e. 480 visitors per week or 24,960 visitors per year) as compared to the original design of 80 visitors per week. To cater for the anticipated increase in visitors, EPD approved an EC (EC K) (estimated at a cost of $64.5 million) under Contract A in June 2017 to meet the additional operation and maintenance costs (including additional shuttle bus leasing cost and staff cost for 15 years) of $3.4 million per year. EPD further revised EC K to increase the additional operation and maintenance costs (e.g. purchase, operation and maintenance cost of an electric visitor bus and staff cost), as follows:

(a) in February 2020, EC K was revised from $64.5 million for 15 years to $43.6 million for 5 years (i.e. from $3.4 million to $8.7 million per year); and

(b) in September 2022, EC K was further revised to $46.8 million for 5 years, covering the period from March 2020 to February 2025 (i.e. $9.4 million per year). The period had been further extended to December 2025 at no further cost (Note 12).

2.30 Up to March 2025, the actual expenditure incurred in operating the visitor centre was $40.8 million and there were a total of 28,891 visitors. Audit noted that, excluding the first year of operation (i.e. 13 months from March 2021 to March 2022), when it was disrupted by coronavirus disease (COVID-19) epidemic, from the second to fourth year of operation (i.e. from April 2022 to March 2025):

(a) the number of visitors of the three years was on a decreasing trend, dropping from 9,721 in the second year to 9,127 in the third year, and further decreased to 5,913 in the fourth year; and

(b) none of the years could meet the annual target number of 24,960 visitors. The shortfalls of the second, third and fourth year were 61%, 63% and 76% respectively.

2.31 According to the Accommodation Regulations (Note 13), government bureaux/departments are accountable for education/resource centres under their charge and must ensure that they are well-utilised and cost-effective. If the utilisation and cost-effectiveness of an education/resource centre fail to achieve a reasonable level, the government bureaux/departments concerned should promptly implement remedial measures, including putting the education/resource centre to multiple uses,

---

Note 12: *According to EPD, due to operational disruptions caused by COVID-19 epidemic, periods of closure and reduced visitor numbers resulted in lower than anticipated maintenance costs, the EC budget timeline had been extended to December 2025.*

Note 13: *The Accommodation Regulations set out the policy and guiding principles on government accommodation and related matters for government bureaux/departments.*

downsizing or closing it and putting the space released to gainful alternative use. In Audit's view, EPD needs to:

(a) take measures to improve the utilisation rate of the visitor centre of O·PARK1 (e.g. reaching out to more potential visitor groups such as schools); and

(b) review the cost-effectiveness of the visitor centre of O·PARK1 and take remedial measures where appropriate (e.g. by considering the need to further extend EC K when it ends in December 2025).

Audit recommendations

2.32 **Audit has *recommended* that the Director of Environmental Protection should:**

(a) **in implementing works projects, draw lessons from the events leading to the delay in commissioning of the visitor centre at O·PARK1 with a view to ensuring timely completion of the works;**

(b) **expedite the completion of the implementation of the odour mitigation enhancement works along the visitor path at O·PARK1 and closely monitor their effectiveness;**

(c) **take measures to improve the utilisation rate of the visitor centre of O·PARK1 (e.g. reaching out to more potential visitor groups such as schools); and**

(d) **review the cost-effectiveness of the visitor centre of O·PARK1 and take remedial measures where appropriate (e.g. by considering the need to further extend EC K when it ends in December 2025).**

Response from the Government

2.33 The Director of Environmental Protection agrees with the audit recommendations. He has said that EPD will:

(a) complete the ongoing odour mitigation enhancement works at O·PARK1 by the end of 2025; and

(b) undertake measures to improve the utilisation rate and cost-effectiveness of the visitor centre of O·PARK1, such as stepping up promotion to different aspects of the community including schools and community organisations.

PART 3: OPERATION OF ORGANIC RESOURCES RECOVERY CENTRES

3.1 This PART examines the operation of ORRCs, focusing on:

(a) monitoring of operation of ORRCs (paras. 3.2 to 3.28);

(b) monitoring of contractors' performance (paras. 3.29 to 3.45); and

(c) site and occupational safety (paras. 3.46 to 3.50).

Monitoring of operation of organic resources recovery centres

3.2 According to EPD, ORRCs were constructed to recycle food waste into renewable energy, including biogas and electricity. Source-separated organic waste (hereinafter referred to as food waste received) are collected from districts and delivered to ORRCs for treatment and treatable food waste (i.e. food waste received at ORRCs and after removal of inert materials) would be turned into quality compost/fertiliser as by-product, which could be used for landscaping and agricultural applications.

3.3 The operation stage of O·PARK1 and O·PARK2 commenced on 4 December 2018 and 1 January 2025 respectively. According to Contracts A and B, the monthly operation fees paid to Contractors A and B comprise a fixed component (i.e. a fixed amount regardless of the quantity of food waste treated) and a variable component (i.e. monthly variable operation fee based on the quantity of food waste treated at O·PARK1 and O·PARK2 during the month and payment for ECs, if any). Since the commissioning of O·PARK1 and O·PARK2 and up to March 2025:

(a) the total amount of payment to Contractors A and B for the operation of O·PARK1 and O·PARK2 were $409.6 million and $24.8 million respectively;

(b) the total quantity of food waste received for treatment at O·PARK1 and O·PARK2 were 283,853 tonnes and 17,272 tonnes respectively; and

(c) the total quantity of food waste treated (i.e. organic food waste excluding inert materials) at O·PARK1 and O·PARK2 were 234,816 tonnes and 16,739 tonnes respectively.

Scope for enhancing the utilisation of ORRCs

3.4 The design treatment capacity of O·PARK1 and O·PARK2 are 200 tpd and 300 tpd respectively, representing an annual capacity of 73,000 tonnes and 109,500 tonnes respectively. According to EPD, although theoretically the treatment capacity specified in the contract was based on the organic portion of food waste being treated (i.e. those undergone the full anaerobic digestion and power generation process), in fact, the inorganic portion was also required to be processed (i.e. inert materials undergone pre-treatment by segregating the valuable metals and removing the impurities including plastic utensils, packaging materials, cans, shells and bones). As a result, EPD considered that both the organic and inorganic portion of food waste collected should be included when calculating the utilisation rates of ORRCs. Audit analysed the utilisation of ORRCs since their commissioning and up to March 2025, and found that (see Table 7):

(a) except for 2018 (O·PARK1 was commissioned in December 2018), there was an increasing trend in the annual utilisation rate of O·PARK1 from 46% in 2019 to 82% in 2024. However, the rate decreased to 56% in 2025 (up to March); and

(b) with the commissioning of O·PARK2 in January 2025 (in which the utilisation rate in 2025 (up to March) was 64%), the overall utilisation rate of ORRCs in 2025 (up to March) was 61%.

Table 7

Utilisation of O·PARK1 and O·PARK2
(December 2018 to March 2025)

Year	O·PARK1		O·PARK2		Overall	
	Food waste received (Note 1) (a) (tonnes)	Utilisation rate (Note 2)	Food waste received (Note 1) (b) (tonnes)	Utilisation rate (Note 2)	Food waste received (Note 1) (c) = (a)+(b) (tonnes)	Utilisation rate (Note 2)
2018 (since December)	3,145	56%	N.A. (Note 3)		3,145	56%
2019	33,704	46%			33,704	46%
2020	34,165	47%			34,165	47%
2021	45,023	62%			45,023	62%
2022	45,654	63%			45,654	63%
2023	52,340	72%			52,340	72%
2024	59,684	82%			59,684	82%
2025 (up to March)	10,138	56%	17,272	64%	27,410	61%

Source: *EPD records*

Note 1: *According to EPD, the quantity of food waste received represents the quantity of organic waste and inorganic portion (i.e. inert materials including plastic utensils, packaging materials, cans, shells and bones) received.*

Note 2: *The utilisation rate is calculated by dividing the quantity of food waste received by the design treatment capacity of the corresponding period.*

Note 3: *O·PARK2 commenced operation in January 2025.*

3.5 According to EPD:

(a) the decrease in utilisation rate of O·PARK1 was due to the gradual distribution of food waste received to the newly opened O·PARK2 and an incident at O·PARK1 in March 2025 involving system malfunctioning,

resulting in a sudden drop in the treatment tonnage in that particular month. The utilisation of O·PARK1 had substantially improved after the March 2025 incident;

(b) more fundamentally, the quantity of food waste received at O·PARK1 and O·PARK2, which directly affected the two facilities' utilisation rates, was highly dependent on the extent of source separation of food waste in the community as well as the business sector. With the latest policies in encouraging behavioural change in the disposal of food waste, it was expected that the community's environmental awareness and therefore the extent of food waste separation would grow with time, resulting in an increase in food waste received and hence the utilisation rates of the facilities. As a matter of fact, the food waste recycling rate had been on an increasing trend in recent years, denoting the community was gradually adopting a recycling habit for food waste; and

(c) as in other infrastructure and utility projects in the territory, EPD considered that it was the Government's responsibility to plan ahead and provide sufficient spare capacity in order to cater for future increase in the demand for food waste treatment resulting from population growth and behavioural changes. As such, the relatively low utilisation rates during the initial years upon the commissioning of the two facilities were considered not unusual.

In Audit's view, EPD needs to step up efforts in enhancing the utilisation of O·PARK1 and O·PARK2 (e.g. liaising with suitable food waste generators to help securing an adequate quantity of food waste).

High proportion of inert materials found in food waste received at O·PARK1

3.6 Food waste received at ORRCs would first undergo pre-treatment (i.e. food waste is smashed and turned into suspension) and the inert materials (e.g. plastic utensils, packaging materials and cans) that are not suitable for biological treatment should be sorted out from the pre-treatment system. According to Contracts A and B, inert materials should not exceed 20% by weight in any individual load of food waste received.

3.7 Audit analysed the proportion of inert materials found in the food waste received at O·PARK1 and O·PARK2 and noted that, while the proportion of inert materials by weight found in the food waste received at O·PARK2 was low (i.e. 3% since its commissioning in January 2025 and up to March 2025), the proportion for O·PARK1 was much higher (see Table 8), as follows:

(a) since the commissioning of O·PARK1 in December 2018 and up to December 2023 (i.e. 61 months), the annual proportion of inert materials by weight found in the food waste received at O·PARK1 ranged from 11% to 19%. Of the 61 months, there were 6 (10%) months in which the proportion of inert materials exceeded 20% by weight; and

(b) the situation deteriorated in 2024 and 2025 (up to March) (i.e. 15 months). The proportion of inert materials was 23% in 2024 and 29% in 2025 (up to March). Of the 15 months, there were 12 (80%) months in which the proportion of inert materials exceeded 20% by weight.

Table 8

Inert materials received at O·PARK1
(December 2018 to March 2025)

Year	Food waste received (a) (tonnes)	Inert materials (b) (tonnes)	Proportion of inert materials in food waste received (c) = (b) ÷ (a) ×100%	Number of months exceeded 20% by weight	
2018 (since December)	3,145	406	13%	0	
2019	33,704	5,693	17%	1	
2020	34,165	6,462	19%	3	6
2021	45,023	5,722	13%	1	
2022	45,654	5,076	11%	0	
2023	52,340	8,859	17%	1	
2024	59,684	13,860	23%	9	12
2025 (up to March)	10,138	2,959	29%	3	
Overall	283,853	49,037	17%	18	

Source: EPD records

3.8 According to EPD, O·PARK1 was originally designed to treat homogenous food waste source separated from the commercial sector (e.g. food factories, hotels and wet markets) with minimal amount of packaging materials. However, as a positive response to strong calls from the society and as part of the facilitation measures for domestic households in building up a habit of separating food waste, in 2022, the Government decided to relax the collection requirements of food waste to include packaging materials (e.g. plastic bags) and other impurities (e.g. large bones). Due to the Government's decision to encourage the community to practise food waste separation at source by accepting food waste with impurities including large bones and plastic bags, an increasing trend in the proportion of inert materials found in the food waste received at O·PARK1 was thus noted. EPD would monitor changes in community behaviour and step up promotion of good practices in food waste separation in due course. In Audit's view, EPD needs to take necessary actions to

rectify the situation of high proportion of inert materials found in the food waste received at O·PARK1.

Scope for improvement in reporting of food waste treated at ORRCs

3.9 According to Contracts A and B, the quantity of food waste treated for payment purpose should exclude inert materials. However, Audit examined the reported tonnage of food waste treated at ORRCs in the Controlling Officer's Reports of EPD from 2019 to 2024 and noted that the quantity of inert materials received at O·PARK1 was included in the reported tonnage of food waste treated (Note 14).

3.10 According to EPD:

(a) as all food waste received at ORRCs had undergone the pre-treatment process before the inert materials could be screened out, the total quantity of food waste received was reported in the Controlling Officer's Reports of EPD from 2019 to 2024 as food waste treated at O·PARK1; and

(b) the reported quantity was consistent with the quantity of food waste collected from the food waste collection network.

3.11 In Audit's view, EPD needs to:

(a) specify in the Controlling Officer's Report of EPD that the reported quantity of food waste treated refers to the actual quantity of food waste received at ORRCs; and

(b) consider reporting the quantity of food waste treated, excluding the inert materials, at ORRCs separately in the Controlling Officer's Report of EPD.

Note 14: *O·PARK2 commenced operation in January 2025.*

Scope for improvement in processing incidents of failure to operate O·PARK1

3.12 According to Contract A, the facility should run 24 hours every day and 365 days each year continuously under normal operation. In the event that Contractor A fails to operate the facility (i.e. to maintain the operational hours of the facility for waste reception and achieve the overall plant availability for the facility as set out in Contract A), it should not be entitled to payment of such part of the operation fee for that month (maximum deduction is capped at 20%).

3.13 According to EPD, since the commissioning of O·PARK1 and up to March 2025, there were incidents considered as "failure to operate the facility" of a total of 16 days and deductions from the operation fees to Contractor A had been made. Audit noted that there was scope for improvement in processing incidents of failure to operate O·PARK1, as follows:

(a) ***Inconsistent treatments in processing incidents of failure to operate O·PARK1.*** According to EPD, as Contract A did not clearly specify the assessment criteria for determining the circumstances that would constitute "failure to operate the facility", each incident is considered by EPD on a case-by-case basis. Audit found that inconsistent treatments were adopted by EPD in processing the following incidents of failure to operate O·PARK1 despite their similar nature:

(i) in February 2023, Contractor A reported to EPD that due to the poor performance of the wastewater treatment plant and malfunction of the grab crane, O·PARK1 could not handle the high tonnage of food waste received. In the event, food waste had been diverted to landfill for 10 days. However, the incident was not considered by EPD as "failure to operate the facility". As far as could be ascertained, there was no documentation to justify EPD's consideration; and

(ii) in May 2023, Contractor A reported to EPD that due to the poor performance of the pre-treatment system, O·PARK1 could not handle the high tonnage of food waste received. In the event, food waste had been diverted to landfill for 5 days. The incident was considered by EPD as "failure to operate the facility" and 5-day

operation fee had been deducted from the monthly payment to Contractor A.

In response to Audit's enquiry, EPD informed Audit in October 2025 that the incident happened in February 2023 (see (i) above) was outside Contractor A's control. During the period from November 2022 to January 2023, a trial of co-treatment of pig manure with food waste was conducted by Contractor A at O·PARK1 as instructed by EPD. As a result, the change in the composition of infeed (pig manure and food waste) affected the performance of the wastewater treatment plant of O·PARK1. As the incident was due to the trial instructed by EPD, payment was not deducted at that time; and

(b) ***Long time taken by EPD to handle incidents of failure to operate O·PARK1.*** In March 2025, there was an incident at O·PARK1 that due to the leakage of the suspension buffer tank, flooding of the pump room and collection chamber was resulted. Food waste reception of O·PARK1 had been suspended for 10 days. In the event, food waste slurry and wastewater had been diverted to other facilities (such as O·PARK2) and landfill. According to EPD, it was concluded in October 2025 (i.e. a lapse of 7 months) that the incident would be considered as "failure to operate the facility" and deduction of the monthly payment to Contractor A would be made.

3.14 Audit also noted that EPD did not require Contractor A to regularly compile management information about incidents of failure to operate O·PARK1, such as instances of food waste diversion, quantity and destination of food waste diverted, and the number of days involved, and report such information for EPD's monitoring. In response to Audit's enquiry, EPD informed Audit in October 2025 that, after re-examining the records, there was no previous omitted incidents of "failure to operate the facility". In Audit's view, EPD needs to take measures to ensure that all incidents of failure to operate O·PARK1 are properly processed by EPD and operation fees to Contractor A are deducted in a timely manner, including:

(a) establishing internal guidelines for EPD staff to set out the timeframe and assessment criteria for determining whether an incident should be classified as "failure to operate the facility", and the need to document the justifications when the incidents are considered not so;

(b) requiring Contractor A to regularly report management information on incidents of failure to operate O·PARK1 for EPD's monitoring; and

(c) completing the payment deduction process of the "failure to operate the facility" incident happened in March 2025 as soon as practicable.

Scope for strengthening the monitoring of air emission from the ammonia stripping plant at O·PARK1

3.15 According to Contract A, environmental monitoring and auditing are required during the works and the operation of O·PARK1. Contractor A should engage a monitoring team to carry out the monitoring work, including monitoring of air quality parameters (e.g. nitrogen oxides, ammonia and sulphur dioxide).

3.16 Audit noted that:

(a) air emission data are collected and monitored hourly. From April 2019 to March 2025, of the 52,608 sets of air emission data for each parameter (including nitrogen oxides, ammonia and sulphur dioxide) collected and monitored hourly at the ammonia stripping plant at O·PARK1, exceedance of emission limits specified in the environmental monitoring and audit manual was found in 19.1%, 14.3% and 6.3% of the monitoring data for nitrogen oxides, ammonia and sulphur dioxide respectively;

(b) the emission limits of air pollutants from the ammonia stripping plant at O·PARK1 were not part of the environmental performance requirements of Contract A, and hence, no deduction of monthly operation fees to Contractor A was noted for the exceedance of emission limits mentioned in (a) above; and

(c) from May 2020 to September 2024, EPD issued 5 ECs (estimated at a total cost of $8.2 million) under Contract A to instruct Contractor A to conduct feasibility studies and trial of new technology, aiming at reducing the emission of air pollutants from the ammonia stripping plant at O·PARK1 and exploring other treatment technologies with lower emission of air pollutants. As at 31 March 2025, 4 of these 5 ECs had been completed and the work of 1 EC was ongoing. However, according to EPD, exceedance

of emission limits of nitrogen oxides, ammonia and sulphur dioxide from the ammonia stripping plant at O·PARK1 persisted as at 30 June 2025.

3.17 In response to Audit's enquiry, EPD informed Audit in October 2025 that:

(a) the provision of ammonia stripping plant at O·PARK1 was not originally specified under the tender documents for Contract A and it was Contractor A's own initiative to propose the installation of ammonia stripping plant in its bid. Subsequent to the implementation of O·PARK1, for innovative and additional systems and equipment proposed by tenderers which were not covered in the original tender documents, their performance parameters had been incorporated into the respective contracts such that any non-compliance would be followed up accordingly;

(b) persistent exceedance of limits in air emissions, particularly nitrogen oxides, from the ammonia stripping plant at O·PARK1 had been noted. Contractor A attempted to resolve the issue by optimising the operation of the ammonia stripping plant system and performing various maintenance works, but the issue was not yet fully resolved; and

(c) in late 2024, EPD proactively engaged an overseas expert and a review was conducted in January 2025 with a view to understanding the root cause of the exceedance of limits in air emissions from the ammonia stripping plant at O·PARK1. Based on the findings of the review, EPD was implementing various corrective actions.

3.18 In Audit's view, EPD needs to:

(a) keep under review the effectiveness of the follow-up actions taken by Contractor A in rectifying the emission of air pollutants (including nitrogen oxides, ammonia and sulphur dioxide) from the ammonia stripping plant at O·PARK1; and

(b) in preparing documents for DBO contracts in future, consider incorporating environmental performance requirements for all facilities with emission of air pollutants (e.g. ammonia stripping plant) as far as practicable.

Some equipment and systems at O·PARK1 required frequent maintenance and long repairing time

3.19 According to Contract A, throughout the operation period, Contractor A should be responsible for the maintenance of the facility (including all repairs, replacements and renewals of the plant and materials) which at all times should be maintained to perform in accordance with the specification.

3.20 Audit noted that since the commissioning of O·PARK1 and up to March 2025, there were instances of failure of equipment and systems at O·PARK1 that required frequent maintenance and long repairing time, as follows:

(a) ***Ammonia stripping plant.*** From November 2021 to March 2025, there were 15 instances of failure of the ammonia stripping plant. In particular, the failure happened in January 2022 lasted for about 16 days and wastewater had been diverted to the Siu Ho Wan STW. The incident was considered as a major plant failure incident by EPD. Besides, another failure happened in June 2022 also resulted in shut down of the plant for 5 days, during which wastewater had been diverted to the Siu Ho Wan STW;

(b) ***Weighbridge system.*** From December 2021 to December 2024, there were 6 instances of failure of the weighbridge system. In particular, the failure happened in April 2023 lasted for 2 weeks. The breakdown of the weighbridge system rendered all transaction records such as incoming food waste, outgoing inert materials and composts had to be entered to the system manually. As a result, EPD needed to make extra efforts in verifying and correcting the food waste data for certification of operation fees;

(c) ***Sensors at the centralised air pollution control system.*** From March 2022 to February 2023, the volatile organic compounds sensors at the centralised air pollution control system had been found malfunctioning, resulted in no instantaneous real time monitoring of the volatile organic compounds level at the centralised air pollution control system; and

(d) ***Closed circuit television system.*** From July 2022 to August 2023, due to the partial failure of the closed circuit television system, EPD had been unable to monitor the complete site situation through the closed circuit television system at EPD's office.

In the event, of the 19 Contractor A's performance reports for the operation stage, 4 (21%) and 2 (11%) were with "poor" ratings under the performance aspects of "operation" and "environmental monitoring and pollution control" respectively for the instances of equipment and system failure mentioned above.

3.21 In Audit's view, EPD needs to keep under review the conditions of the equipment and systems at O·PARK1, particularly those equipment and systems with frequent maintenance and long repairing time that affect the normal operation of O·PARK1, with a view to ensuring the smooth operation of the food waste treatment process.

Need to conduct system performance tests and facility condition surveys in accordance with Contract A

3.22 In order to ascertain that all facilities of O·PARK1 are operating satisfactorily and in good condition, according to Contract A:

(a) ***System performance tests.*** At least once a year or as ordered by EPD, system performance tests should be conducted by Contractor A, as follows:

  (i) to cover various key systems of O·PARK1 (e.g. the anaerobic digestion treatment system, the wastewater treatment system, and the heat recovery and power generation system); and

  (ii) prior to the system performance test, Contractor A should submit a performance test plan specifying the systems to be tested to EPD for approval. After the completion of the system performance tests, Contractor A should submit a report of the performance tests to the Employer and the Employer's Representative within 28 days after the end of the testing period; and

(b) ***Facility condition surveys.*** Of the contractual operation period of 15 years, 5 facility condition surveys should be conducted by an independent surveyor in accordance with the timeframe stipulated in Contract A, as follows:

(i) Contractor A should engage an independent surveyor at his own cost to conduct the facility condition surveys; and

(ii) prior to the facility condition survey, Contractor A should submit a condition survey plan to EPD for consent at least 45 days prior to commencement of the condition survey. The independent surveyor should complete the facility condition survey within 1 calendar month after consent was obtained and submit a report to Contractor A and EPD within 28 days after the completion of the survey.

3.23 Audit examined the system performance tests conducted by Contractor A and facility condition surveys conducted by the independent surveyor since the commissioning of O·PARK1 in December 2018 and up to March 2025 and noted the following scope for improvement:

(a) ***Scope for improvement in conducting system performance tests.*** During the period, 6 system performance tests (from 2019 to 2024) were due to be conducted by Contractor A. Of the 6 system performance tests:

(i) 1 test (i.e. 2019) was not conducted; and

(ii) for the remaining 5 tests (i.e. 2020 to 2024) with test reports submitted by Contractor A:

- the tests for 2022 and 2023 were not conducted in accordance with the performance test plans approved by EPD. In particular, the performance tests on one of the heat recovery and power generation units were conducted 1 year and 5 months later than the scheduled time of the 2022 and 2023 tests respectively; and

- the performance test reports for 2022, 2023 and 2024 were submitted by Contractor A to EPD 7, 8 and 9 months after the end of the respective testing periods respectively, contrary to the 28-day submission timeframe as stipulated in

Contract A (Note 15). According to EPD, the delay in Contractor A's submission of the 2024 performance test report was due to malfunctioning of individual systems of O·PARK1 in September 2024, November 2024 and March 2025 which had prevented the conduct of performance tests for the respective systems until their recovery. As such, the 2024 performance test was completed in July 2025; and

(b) ***Facility condition surveys not timely conducted.*** During the period, 2 facility condition surveys had been conducted by the independent surveyor engaged by Contractor A. For the second condition survey, EPD only received the condition survey report in August 2025 (i.e. about 13 months later than the due date), as follows:

(i) the independent surveyor only submitted the condition survey plan to EPD in January 2025, a lapse of 10 months after the due date stipulated in Contract A (i.e. March 2024) (during which 7 reminders had been issued by EPD to Contractor A); and

(ii) the condition survey plan was approved by EPD in February 2025. However, the condition survey was completed in May 2025 and EPD received the condition survey report in August 2025 (Note 16), contrary to the 1-calendar month completion timeframe and 28-day submission timeframe respectively as stipulated in Contract A. According to EPD, due to the suspension buffer tank leakage incident happened in March 2025, the on-site survey activities were delayed due to safety concerns and in turn delaying the progress of the condition survey.

Note 15: *According to EPD: (a) the performance tests for 2022 to 2024 showed that 3, 1 and 1 of the 5 systems failed the test in 2022, 2023 and 2024 respectively. In particular, 1 of the 5 systems failed the test continuously for all the 3 years; and (b) follow-up actions had been taken by EPD (including re-performance of the tests).*

Note 16: *According to the facility condition survey completed in May 2025, the overall condition of O·PARK1 is considered to be fair. The operations and management of the overall process were found to be in good order. The statutory and regulatory requirements were being adhered to, whilst there were numerous defects identified, with consideration of the nature of the operations, they were not unexpected. According to EPD, the condition survey report was received in August 2025 and was under review as at 9 October 2025.*

3.24 In Audit's view, EPD needs to take measures to ensure that the system performance tests and facility condition surveys are conducted in accordance with the requirements stipulated in Contract A.

Need to draw lessons from the operation of O·PARK1

3.25 O·PARK1 commenced operation in December 2018 and it is the first-of-its-kind food waste treatment facility in Hong Kong. According to EPD, since the commissioning of O·PARK1 and up to March 2025, with an aim to improve the operation efficiency, it had been exploring the feasibility of adopting new technologies at O·PARK1 for improving the food waste treatment processes. Audit noted that, according to Contract A, the operation period of O·PARK1 was 15 years and it was in its seventh year of operation as at 31 August 2025, about halfway of the operation period. In Audit's view, it is an opportune time for EPD to conduct a review on the operation of O·PARK1, taking into account the audit observations and recommendations in this Audit Report, with a view to further improving the operation efficiency of O·PARK1.

3.26 Besides, O·PARK2 commenced operation in January 2025 and is in its initial stage of operation. Audit noted that the operation of O·PARK2 shared some of the shortcomings of O·PARK1. For example, same as Contract A, Contract B did not clearly specify the assessment criteria for determining whether an incident should be classified as "failure to operate the facility" (which would result in deduction of monthly operation fee) (see para. 3.12). In Audit's view, EPD needs to draw lessons from the operation difficulties encountered in O·PARK1 with a view to preventing similar difficulties from occurring at O·PARK2 as far as practicable.

Audit recommendations

3.27 **Audit has *recommended* that the Director of Environmental Protection should:**

(a) **step up efforts in enhancing the utilisation of O·PARK1 and O·PARK2 (e.g. liaising with suitable food waste generators to help securing an adequate quantity of food waste);**

(b) **take necessary actions to rectify the situation of high proportion of inert materials found in the food waste received at O·PARK1;**

(c) **specify in the Controlling Officer's Report of EPD that the reported quantity of food waste treated refers to the actual quantity of food waste received at ORRCs;**

(d) **consider reporting the quantity of food waste treated, excluding the inert materials, at ORRCs separately in the Controlling Officer's Report of EPD;**

(e) **take measures to ensure that all incidents of failure to operate O·PARK1 are properly processed by EPD and operation fees to Contractor A are deducted in a timely manner, including:**

(i) **establishing internal guidelines for EPD staff to set out the timeframe and assessment criteria for determining whether an incident should be classified as "failure to operate the facility", and the need to document the justifications when the incidents are considered not so;**

(ii) **requiring Contractor A to regularly report management information on incidents of failure to operate O·PARK1 for EPD's monitoring; and**

(iii) **completing the payment deduction process of the "failure to operate the facility" incident happened in March 2025 as soon as practicable;**

(f) **keep under review the effectiveness of the follow-up actions taken by Contractor A in rectifying the emission of air pollutants (including nitrogen oxides, ammonia and sulphur dioxide) from the ammonia stripping plant at O·PARK1;**

(g) **in preparing documents for DBO contracts in future, consider incorporating environmental performance requirements for all facilities with emission of air pollutants (e.g. ammonia stripping plant) as far as practicable;**

(h) **keep under review the conditions of the equipment and systems at O·PARK1, particularly those equipment and systems with frequent maintenance and long repairing time that affect the normal operation of O·PARK1, with a view to ensuring the smooth operation of the food waste treatment process;**

(i) **take measures to ensure that the system performance tests and facility condition surveys are conducted in accordance with the requirements stipulated in Contract A;**

(j) **conduct a review on the operation of O·PARK1, taking into account the audit observations and recommendations in this Audit Report, with a view to further improving the operation efficiency of O·PARK1; and**

(k) **draw lessons from the operation difficulties encountered in O·PARK1 with a view to preventing similar difficulties from occurring at O·PARK2 as far as practicable.**

Response from the Government

3.28 The Director of Environmental Protection agrees with the audit recommendations. He has said that EPD will:

(a) continue to actively expanding the food waste recycling network across the territory to facilitate participation from both domestic and business sectors;

(b) strengthen public education and publicity efforts to enhance environmental awareness and foster proper food waste recycling habits in the community, thereby increasing utilisation rates of food waste treatment facilities and improving the proportion of treatable food waste in incoming source;

(c) update the reporting format of the Controlling Officer's Report of EPD by presenting separate figures on:

(i) the actual quantity of food waste received at ORRCs; and

(ii) the quantity of treatable food waste with impurities and the inert materials removed;

(d) establish and implement clear assessment criteria and procedures with definite timeline and in standardised documentation format for the evaluation of incidents that may be subject to payment deduction under the classification of "failure to operate the facility" for both Contracts A and B;

(e) devise a comprehensive improvement plan jointly with Contractor A aiming for completion of the rectification by the second quarter of 2026 to further improve the effectiveness of ammonia removal in wastewater;

(f) make provisions in future DBO contracts to ensure emission levels from all systems are incorporated in the environmental performance requirements in contracts;

(g) step up the review of corrective and preventive maintenance by Contractor A;

(h) take measures to strengthen the monitoring of the schedule and progress of system performance tests and facility condition surveys; and

(i) conduct a thorough review on the operation of O·PARK1 and formulate a comprehensive improvement plan to further enhance the operation efficiency of O·PARK1 and continue to optimise the operations of both ORRCs to maintain a robust and efficient food waste treatment service in the territory.

Monitoring of contractors' performance

3.29 To monitor the performance of Contractors A and B, performance requirements are set out for the design and construction stage and the operation stage under Contracts A and B. In the event of non-compliance with any of the performance requirements being detected, non-compliance points, subject to a cap of the maximum number of non-compliance points for each category of performance requirements, would be allocated to Contractors A and B and monthly payments to them would be deducted based on the total non-compliance points allocated in that period. According to Contracts A and B:

(a) ***Contract A.*** There are a total of 59 performance requirements under Contract A, as follows:

(i) ***Design and construction stage.*** There is a set of 21 environmental performance requirements (e.g. air quality and water quality) for measuring the performance of Contractor A during the design and construction stage; and

(ii) ***Operation stage.*** There is a set of 38 performance requirements for measuring the performance of Contractor A during the operation stage, comprising 19 environmental performance requirements (e.g. air quality, odour and water quality) and 19 operational performance requirements (e.g. safety, site cleanliness and maintenance management); and

(b) ***Contract B.*** There are a total of 63 performance requirements under Contract B, as follows:

(i) ***Design and construction stage.*** There is a set of 25 environmental and safety performance requirements for measuring the performance of Contractor B during the design and construction stage; and

(ii) ***Operation stage.*** There is a set of 38 performance requirements for measuring the performance of Contractor B during the operation stage, comprising 22 environmental and safety performance requirements and 16 operational performance requirements.

Need to ensure compliance with the performance requirements relating to air quality and quality of compost under Contract A

3.30 According to EPD, during the design and construction stage of O·PARK1, no non-compliance points had been allocated to Contractor A and a total of 6,810 non-compliance points had been allocated since the commissioning of O·PARK1 in December 2018 and up to March 2025 (involving 76 reporting months). In the event, a total of $15.1 million had been deducted from the operation fees to Contractor A. Of the 6,810 points, 4,087 (60%) were related to the air quality and 1,740 (26%) were related to the quality of compost. Details are as follows:

(a) ***Air quality.*** According to Contract A, failure to achieve any of the emission limits of the centralised air pollution control system, the combined heat and power generation units, and the standby flaring gas unit should be counted as non-compliance with the environmental performance requirements. Audit noted that:

(i) non-compliance points related to non-compliance with the air quality requirements had been allocated to Contractor A in all the 76 (100% of 76) reporting months, of which the maximum number of points were allocated in 54 (71% of 76) reporting months; and

(ii) notwithstanding that follow-up actions had been taken by Contractor A (e.g. review the performance of the combined heat and power generation units and carry out modifications of the relevant units in 2024), air quality problem persisted and non-compliance points related to non-compliance with the air quality requirements continued to be allocated to Contractor A as at 31 March 2025; and

(b) ***Quality of compost.*** According to Contract A, Contractor A is required to produce compost from O·PARK1 and the quality of the mature compost produced should comply with the relevant quality standards according to the functional uses, including organic farming, general agricultural uses and non-agricultural uses. Failure to comply with the relevant compost quality standards at any time should be counted as non-compliance with the operational performance requirement. Audit noted that:

(i) non-compliance points related to non-compliance with the quality requirement of compost had been allocated to Contractor A in 56 (74% of 76) reporting months, of which the maximum number of points were allocated in 19 (34% of 56) reporting months; and

(ii) with a view to improving the composting process and enhancing the quality of compost:

- between January 2019 and December 2022, EPD approved 3 ECs (later valued at a total cost of $5.5 million) under Contract A to instruct Contractor A to conduct several feasibility studies, reviews and trials to formulate modification

to the existing composting process and replace the existing units in the composting system; and

- between January 2022 and June 2024, Contractor A conducted trials to explore alternative compost products.

However, the quality of the compost remained unstable and allocation of non-compliance points to Contractor A was still noted during the period from July 2024 to March 2025 due to poor quality of compost.

3.31 In response to Audit's enquiry, EPD informed Audit in October 2025 that, a primary factor affecting compost quality was the high concentration of ammonia resulting from the treatment of protein-rich food waste. As Contractor A has no control over the composition of food waste received, there had been inherent challenges in precisely controlling the quality of compost as the end product of food waste treatment. Notwithstanding this, with the implementation of trials and reviews under the 3 ECs, Contractor A had since taken measures to deal with the issue of quality of compost, including aligning Contract A's requirements with the latest standards of compost, and introducing a new product standard for soil conditioner to better utilise compost products.

3.32 In Audit's view, EPD needs to:

(a) ascertain the reasons for the persistent non-compliances with performance requirements relating to air quality and quality of compost at O·PARK1 by Contractor A and take further measures to rectify the situation as appropriate; and

(b) keep under review the effectiveness of the follow-up actions taken by Contractor A in mitigating the issues related to air quality and quality of compost at O·PARK1 with a view to ensuring compliance with the relevant performance requirements under Contract A.

Failure in meeting the performance requirement relating to export of surplus electricity under Contract A

3.33 According to EPD, biogas is combusted to generate electricity to self-sustain the operation of ORRCs and surplus electricity would be exported to the power grid of the utility company. According to Contract A:

(a) during the operation, Contractor A should produce and export the minimum monthly surplus electricity to the grid of the utility company after self-sustaining the internal use of the facility; and

(b) the minimum monthly surplus electricity is determined by the quantity of average monthly food waste treated at O·PARK1 over the past 12 months (e.g. a minimum monthly surplus electricity of 660 megawatt-hour (MWh) should be produced by an average quantity of monthly food waste treated ranging from 3,040 tonnes to less than 3,800 tonnes):

(i) failure to produce and export the minimum monthly surplus electricity to the grid of the utility company after self-sustaining the internal use of the facility in any reporting month should be counted as a non-compliance with the operational performance requirement and result in deduction of the monthly operation fee; and

(ii) if the quantity of average monthly food waste treated at O·PARK1 over the past 12 months is below 3,040 tonnes, Contractor A should not be subject to the requirement of exporting the minimum monthly surplus electricity.

3.34 According to Contract A, the operational performance requirement relating to electricity production should only be applicable when the facility has been in operation for 12 months (i.e. since 4 December 2019). Of the 64 reporting months from December 2019 to March 2025, the quantities of average monthly food waste treated at O·PARK1 over the past 12 months were below 3,040 tonnes in 15 reporting months (i.e. from December 2019 to February 2021). Audit noted that Contractor A could not produce and export the minimum monthly surplus electricity for all the remaining 49 (i.e. 64 less 15) reporting months since March 2021, as follows:

(a) there were net import of electricity from the utility company of 154 MWh and 156 MWh in 2 (4%) reporting months (Note 17);

(b) there were net export of electricity to the utility company in 47 (96%) reporting months. However, the amount of monthly surplus electricity produced by O·PARK1 was less than the respective minimum monthly surplus electricity in all the 47 reporting months, with the shortfall ranging from 13% to 93% (averaging 58%); and

(c) while there were non-compliances with the operational performance requirement relating to electricity production, EPD did not allocate any non-compliance points to Contractor A and the deduction of monthly operation fees had been put on hold since March 2021.

3.35 According to EPD:

(a) O·PARK1 presented a unique challenge as Hong Kong's first plant of its kind with no local precedents and its design was made reference to similar overseas facilities. However, as O·PARK1 entered operation stage, it had become clear that the mixed waste composition in Hong Kong differed drastically from the single-stream food waste typically processed in these overseas facilities; and

(b) according to the contract provisions, non-compliance points should be allocated to Contractor A and deduction of monthly operation fees should be resulted. They had been put on hold because the mechanism for the non-compliance points allocation relating to export of surplus electricity was yet to be finalised. In this connection:

(i) in June 2021, Contractor A submitted a proposal to request for adjustment to the performance requirement relating to export of surplus electricity. According to Contractor A, the characteristics of food waste received at O·PARK1 (e.g. moisture content and total

---

Note 17: *It represented some days that the electricity produced by O·PARK1 was insufficient to meet the facility's internal use (e.g. on the days when the facility was undergoing maintenance, import of electricity from the utility company was required instead).*

organic matter) were different from that specified in the tender documents. As a result, the amount of biogas and electricity generated in the food waste treatment process was lower than expected;

(ii) in January 2022 and September 2023, Contractor A submitted reports to EPD to reiterate that the requirement on the minimum monthly surplus electricity for export should be adjusted, taking into consideration the implication of food waste quality on electricity generation; and

(iii) in August 2025, EPD requested Contractor A to provide additional details to support its proposal, and further requested Contractor A for clarification.

3.36 In Audit's view, EPD needs to:

(a) ascertain the reasons for the persistent failure in producing and exporting the minimum monthly surplus electricity at O·PARK1 by Contractor A and take follow-up actions as appropriate with a view to ensuring compliance with the performance requirement relating to export of surplus electricity under Contract A; and

(b) resolve with Contractor A the dispute regarding the allocation of non-compliance points in respect of the performance requirement relating to export of surplus electricity and adjust the monthly operation fees to Contractor A as soon as practicable.

Non-compliance with quality standards of fertiliser under Contract B

3.37 According to EPD, as at 31 March 2025, no non-compliance points had been allocated to Contractor B during the design and construction stage and the operation stage of O·PARK2. However, Audit noted that, since the commissioning of O·PARK2 in January 2025 and up to March 2025 (involving 3 reporting months), the quality standards of fertiliser produced from O·PARK2, which is one of the operational performance requirements of Contract B, were not complied with. Details are as follows:

(a) Contractor B is responsible for producing fertiliser under Contract B. According to Contract B:

(i) Contractor B should ensure that the quality of the fertiliser produced from O·PARK2 complies with the relevant quality standards according to the functional uses. If any of the parameters of the fertiliser produced from O·PARK2 fails to meet the specified quality standards, such fertiliser should be regarded as non-compliant and should be sold or disposed of by Contractor B; and

(ii) the non-compliant fertiliser may be disposed of at appropriate waste disposal sites (e.g. landfills) subject to the prior permission obtained from the Employer's Representative (i.e. EPD or Consultant S). Contractor B should maintain all records of disposal of fertiliser for inspection by the Employer's Representative;

(b) in April 2021, Contractor B proposed to enhance the digestate treatment process by replacing the composting process by granulation process (i.e. a process to heat up digestate to become fertiliser as a by-product) with the benefits of reduction of treatment time from 21 days to 1 day, better control on the quality and consistency of the products, and odour control and safeguard of the operators' occupational health. In the event, Consultant S issued a Contractor's Change (later valued at a cost saving of $2.2 million) under Contract B; and

(c) since the commissioning of O·PARK2 in January 2025 and up to March 2025, all fertilisers produced (i.e. 686 tonnes) did not meet the performance requirement on quality standards of fertiliser and had been disposed of at the landfills. According to Contract B, non-compliance points should be allocated to Contractor B and deduction of monthly operation fees should be resulted. However, contrary to the contract provisions, EPD did not allocate any non-compliance points to Contractor B in relation to non-compliant fertilisers produced from O·PARK2.

3.38 According to EPD, prior to the commissioning of O·PARK2, pig manure was disposed of at the North East New Territories Landfill, which caused nuisance to the neighbourhood. To phase out the practice, EPD instructed Contractor B under

Contract B to receive pig manure at O·PARK2, resulting in a change in the composition of the organic waste treated at the facility. In this connection:

(a) Contractor B claimed that the non-compliance with the quality standards of fertiliser was due to the additional requirement of treating pig manure. It was agreed among EPD, Consultant S and Contractor B that a 12-month period starting from January 2025 would be allowed for the collection of operational data and evaluation of the overall impacts, if any, of O·PARK2's treatment of pig manure on its systems as well as the design parameters of fertiliser as the end product of the treatment process. Therefore, the allocation of non-compliance points and respective deduction of monthly operation fees related to non-compliance with the performance requirement on quality standards of fertiliser had been put on hold; and

(b) the following rectification actions had been taken to address the issues:

    (i) in April 2025, EPD requested Contractor B to investigate the reasons for non-compliance with the quality standards of fertiliser and submit a rectification plan. In May and July 2025, Contractor B submitted the rectification plans to EPD to address the non-compliance issues; and

    (ii) in September 2025, EPD further requested Contractor B to submit a detailed report to address the non-compliance issues, including rectification measures implemented to date, planned actions to further address the non-compliance, target date of achieving full compliance with the performance requirement and other reasons contributed to the failure to meet the quality standards of fertiliser.

3.39 Audit noted that, as at 30 September 2025, the fertiliser produced from O·PARK2 had not yet met the quality standards. In Audit's view, EPD needs to:

(a) step up efforts to follow up with Contractor B for the rectification actions for the non-compliance with the quality standards of fertiliser and devise measures to address the quality issues of fertiliser produced from O·PARK2 as early as practicable; and

(b) take prompt actions to resolve with Contractor B the allocation of non-compliance points relating to the performance requirement on quality standards of fertiliser and adjust the monthly operation fees to Contractor B as early as practicable.

Persistent poor performance of Contractors A and B

3.40 With a view to ensuring that the performance of the contractors is up to standard, performance reports for Contractors A and B are prepared regularly and issued by EPD. In each performance report, Contractors A and B are evaluated under 12 and 10 performance aspects (e.g. progress, site safety, and environmental monitoring and pollution control) for their performance under Contracts A and B respectively. According to EPD:

(a) the performance reports for Contractor A were prepared on a half-yearly basis from December 2014 to May 2022 and a quarterly basis since June 2022; and

(b) the performance reports for Contractor B were prepared on a quarterly basis.

3.41 Up to May 2025, EPD issued 27 and 23 performance reports for Contractors A and B respectively. Of the 50 performance reports for Contractors A and B, the overall performance of the contractors was satisfactory for 49 (98%) reports and a "poor" rating was given to the overall performance of Contractor A for the period from March to May 2025 (Note 18). Audit examined the performance reports and noted that while the overall performance of the contractors in most reports was satisfactory, there was persistent poor performance in certain aspects of Contractors A and B, as follows:

Note 18: *According to EPD, if a "very poor" rating was given to the overall performance of a contractor in the contractor's performance report, an adverse report would be issued to the contractor. In the event, EPD would step up monitoring on the contractor and decide the actions to be taken requesting the contractor to make improvement.*

(a) ***Contractor A (for O·PARK1).*** Of the 27 performance reports (covering 12 performance aspects):

(i) a "poor" rating was given under the performance aspect of "operation" in 6 (22%) reports and they were given within 7 consecutive assessment periods from 1 September 2023 to 31 May 2025;

(ii) a "poor" rating was given under the performance aspect of "environmental monitoring and pollution control" in 6 (22%) reports and 4 of them were given within 5 consecutive assessment periods from 1 September 2023 to 30 November 2024; and

(iii) a "poor" rating was given under the performance aspect of "progress" in 3 (11%) reports and they were given in 3 consecutive assessment periods from 1 January 2017 to 30 June 2018; and

(b) ***Contractor B (for O·PARK2).*** Of the 23 performance reports (covering 10 performance aspects):

(i) a "poor" rating was given under the performance aspect of "progress" in 8 (35%) reports and 6 of them were given within 8 consecutive assessment periods from 1 June 2023 to 31 May 2025; and

(ii) a "poor" rating was given under the performance aspect of "design" in 3 (13%) reports and they were given within 4 consecutive assessment periods from 1 December 2020 to 30 November 2021.

3.42 According to EPD, unlike typical capital works projects which would have run its course after completion of construction works and fitting-out, DBO contracts administered by EPD have the feature of spanning across a long contract duration often exceeding ten years, covering not only the design and construction phase, but also the operational phase after completion of construction and commissioning works. During the operational phase which would last for years, the performance of contractors tend to fluctuate as a result of different factors such as operational incidents, changes in the volume and content of food waste received, etc. EPD has been consistently applying a strict and objective assessment standard of the

performance of contractors, and closely monitors contractors' investigation of any cause of performance drops and follow-up actions. As at 30 September 2025, EPD had issued 4 warning letters to Contractors A and B respectively in relation to their poor performance.

3.43 According to the Stores and Procurement Regulations, if the performance of a contractor is not satisfactory or deteriorating and the contractor fails to make any improvement in performance, the responsible department should warn the contractor in writing that further unsatisfactory performance of the contractor may result in the termination of the contract and/or suspension of the contractor from bidding Government's new contracts. In Audit's view, EPD needs to strengthen measures to monitor the performance of Contractors A and B and take follow-up actions as appropriate with a view to improving the performance of Contractors A and B.

Audit recommendations

3.44 **Audit has *recommended* that the Director of Environmental Protection should:**

(a) **ascertain the reasons for the persistent non-compliances with performance requirements relating to air quality and quality of compost at O·PARK1 by Contractor A and take further measures to rectify the situation as appropriate;**

(b) **keep under review the effectiveness of the follow-up actions taken by Contractor A in mitigating the issues related to air quality and quality of compost at O·PARK1 with a view to ensuring compliance with the relevant performance requirements under Contract A;**

(c) **ascertain the reasons for the persistent failure in producing and exporting the minimum monthly surplus electricity at O·PARK1 by Contractor A and take follow-up actions as appropriate with a view to ensuring compliance with the performance requirement relating to export of surplus electricity under Contract A;**

(d) **resolve with Contractor A the dispute regarding the allocation of non-compliance points in respect of the performance requirement**

relating to export of surplus electricity and adjust the monthly operation fees to Contractor A as soon as practicable;

(e) **step up efforts to follow up with Contractor B for the rectification actions for the non-compliance with the quality standards of fertiliser and devise measures to address the quality issues of fertiliser produced from O·PARK2 as early as practicable;**

(f) **take prompt actions to resolve with Contractor B the allocation of non-compliance points relating to the performance requirement on quality standards of fertiliser and adjust the monthly operation fees to Contractor B as early as practicable; and**

(g) **strengthen measures to monitor the performance of Contractors A and B and take follow-up actions as appropriate with a view to improving the performance of Contractors A and B.**

Response from the Government

3.45 The Director of Environmental Protection agrees with the audit recommendations. He has said that EPD:

(a) has instructed Contractor A to design and implement improvement measures including optimising operation efficiency of the combined heat and power generation units by enhancing maintenance and installing additional nitrogen oxides removal equipment at exhaust;

(b) has updated the standards of compost by:

(i) aligning them with the latest Hong Kong Organic Resource Centre Standard to ensure that the current best practices are adopted; and

(ii) introducing a new product standard for soil conditioner to better utilise compost products and meet market demand;

(c) will collect the plant's actual performance data on electricity generation and consumption for analysis and review with a view to formulating an

objective basis for handling the disagreement between EPD and Contractor A in respect of power export, as well as deliberating an updated and more realistic rate of power export. EPD targets to conclude the review by the first quarter of 2026;

(d) will complete a review on the non-compliance incidents regarding quality of fertilisers within three months after expiration of the one-year evaluation and assessment period; and

(e) will strengthen monitoring measures on various operation issues with a view to pushing Contractors A and B to improve on areas ranked "unsatisfactory" in previous performance reports.

Site and occupational safety

3.46 According to Contracts A and B and the related safety and health plans, Contractors A and B should:

(a) take full responsibility for the adequate stability and safety of all works and operations connected with the execution of the works or the operation on the site, and the safety and health of all persons throughout the progress of the works and operation;

(b) keep the site, works and facility in an orderly state appropriate to the avoidance of danger to all persons; and

(c) report accidents and submit the related accident reports to EPD or Consultants Q or S immediately and within 7 days after the date of accidents respectively. The contractors should also report accidents resulting in an injury with incapacity of the employees for more than 3 days to the Labour Department within 14 days after the date of the accidents in accordance with the Employees' Compensation Ordinance (Cap. 282).

Scope for enhancing site and occupational safety

3.47 Audit examination revealed that there was scope for enhancing site and occupational safety. According to EPD, since the commencement of Contracts A

and B and up to March 2025, there were 29 and 6 non-fatal reportable accidents (i.e. accidents resulting in an injury with incapacity of the employees for more than 3 days) reported under Contracts A and B respectively, comprising:

(a) 14 and 6 non-fatal reportable accidents reported during the design and construction stage of Contracts A and B respectively; and

(b) 15 non-fatal reportable accidents reported during the operation stage of Contract A.

3.48 Audit noted that:

(a) ***Inconsistent contract provisions related to performance requirements on safety during the design and construction stage under Contract B.*** While a contract provision in Contract B specified that there were performance requirements on safety for Contractor B during both the design and construction stage and operation stage, another contract provision specified that the 3 performance requirements on safety should be effective for the operation stage only. In the event, the latter contract provision prevailed and despite that there were 6 non-fatal reportable accidents happened during the design and construction stage, no non-compliance points had been allocated to nor payments had been deducted from Contractor B;

(b) ***No performance requirements on safety during the design and construction stage under Contract A.*** While there were more non-fatal reportable accidents happened during the design and construction stage of Contract A (i.e. 14 accidents) than that of Contract B (i.e. 6 accidents), unlike Contract B, there were no specific performance requirements on safety for Contractor A during the design and construction stage under Contract A. As a result, no non-compliance points had been allocated to nor payments had been deducted from Contractor A; and

(c) ***Reportable accidents not timely reported by Contractors A and B.*** EPD did not compile management information summarising the reporting of accidents by Contractors A and B under Contracts A and B respectively. Upon Audit's enquiry, EPD provided the relating information for Audit examination. Audit found that some reportable accidents were not timely

reported by Contractors A and B under Contracts A and B respectively, as follows:

(i) ***Contractor A.*** Of the 29 non-fatal reportable accidents happened during the period, 15 (52%) were reported to EPD or Consultant Q by Contractor A 1 to 25 days (averaging 7 days) after the accidents. While 22 (76%) accidents were reported to the Labour Department on time, EPD could not provide the date of reporting to the Labour Department for the remaining 7 (24%) accidents; and

(ii) ***Contractor B.*** Of the 6 non-fatal reportable accidents happened during the period, 4 (67%) were reported to EPD or Consultant S by Contractor B 3 to 102 days (averaging 44 days) after the accidents. While 2 (33%) accidents had been timely reported to the Labour Department by Contractor B, late reporting of 4 (67%) accidents to the Labour Department by 3 to 80 days (averaging 44 days) was noted.

Audit recommendations

3.49 **Audit has *recommended* that the Director of Environmental Protection should:**

(a) **make continued efforts to enhance site and occupational safety of O·PARK1 and O·PARK2 with a view to safeguarding safety of all works and operations and all persons on sites;**

(b) **in preparing documents for DBO contracts:**

(i) **take measures to critically vet tender documents to ensure consistency of the contract provisions related to performance requirements on safety before tenders are invited with a view to avoiding ambiguity; and**

(ii) **consider incorporating performance requirements on safety during the design and construction stage for all contracts as far as practicable; and**

(c) **take measures to ensure that accidents are reported by Contractors A and B in a timely manner in accordance with the contract and statutory requirements, such as compiling regular management information summarising the reporting of accidents for monitoring purpose.**

Response from the Government

3.50 The Director of Environmental Protection agrees with the audit recommendations. He has said that:

(a) in respect of the six reportable accidents happened during the design and construction stage of Contract B, EPD had followed up by withholding payment under the Pay for Safety Performance Merit Scheme amounting to $2,473,800. In subsequent DBO contracts, EPD has rectified the corresponding clauses in the specifications to ensure consistency;

(b) EPD is making continued efforts to enhance site and occupational safety of its facilities, particularly that of O·PARK1 and O·PARK2;

(c) EPD is exploring the application of artificial intelligence technology to assist in the verification of and checking for unintended inconsistencies and ambiguity in tender and contractual documents for future DBO projects;

(d) EPD will critically review the need for incorporating performance requirements on safety under the non-compliance system during tender preparation stage of future DBO contracts; and

(e) EPD will strengthen its incident reporting mechanism with a view to ensuring timely reporting of all incidents.

PART 4: DESIGN, CONSTRUCTION AND OPERATION OF FOOD WASTE PRE-TREATMENT FACILITIES AT SEWAGE TREATMENT WORKS

4.1 This PART examines EPD's work in the design, construction and operation of FWPFs at STWs, focusing on:

(a) design and construction of FWPFs (paras. 4.2 to 4.10); and

(b) monitoring of operation of FWPFs (paras. 4.11 to 4.25).

Design and construction of food waste pre-treatment facilities

4.2 According to EPD:

(a) food waste accounts for 30% of municipal solid waste currently landfilled daily. Apart from the development of ORRCs, there is a need to develop more food waste treatment facilities so that food waste collected through the network could be properly handled by sustainable waste-to-energy/resources treatment facilities, and the burden on landfills could be relieved;

(b) by utilising the anaerobic digesters provided at STWs, development of FWPFs to treat food waste is more cost-effective and requires less land space. It could also expedite the enhancement of overall food waste recycling capacity in Hong Kong as the additional electrical and mechanical installations of pre-treatment system only involve few kinds of equipment (e.g. weighbridge, reception hopper, hammermill, macerators);

(c) TPFWPF and STFWPF are facilities developed by EPD for testing co-digestion technology under a trial scheme with the prime objective to identify critical design, construction and operational considerations through experimental on-site operation and modification. The design requirements

would in turn be incorporated in the specification for full-scale food waste co-digestion facilities for Hong Kong in the future; and

(d) taking into account the unique characteristics of mixed food waste generated in Hong Kong, which includes domestic food waste with high impurity level (plastic bags and utensils), high water content soup ingredients, as well as a wide range of commercial food waste (such as herbal materials, fruit seeds and fat content), to avoid upsetting the downstream anaerobic digestion system of STWs which is serving over a million of population in Hong Kong, EPD and DSD decided that a small scale food waste/sewage sludge anaerobic co-digestion trial scheme is required, aiming to:

(i) determine more specific and workable technical requirements and electrical and mechanical installations suitable for pre-treating food waste before feeding into the anaerobic digestion tanks for further co-digestion; and

(ii) identify teething problems (including pipe blockage, foaming occurred at the anaerobic digestion tanks, mixing ratio requirements and volume feed rate limit) so that modifications could be made before scaling up the pre-treatment facilities.

4.3 The design and construction works of FWPFs at TPSTW under Contract C and STSTW under Contract D were as follows:

(a) the design and construction works of TPFWPF commenced on 8 December 2017 and was substantially completed on 14 August 2019 (i.e. 7.3 months (or 220 days) later than the original completion date of 6 January 2019). As at 31 March 2025, EOT of 209 days (Note 19) was granted to Contractor C; and

---

Note 19: *According to EPD, EOT of 209 days was granted due to: (a) modification works to the automatic fire alarm system of the upgraded switchroom of 164 days; (b) cable diversion arrangement of 33 days; and (c) incident of blockage of main access happened in September 2018 of 12 days. The remaining 11 (i.e. 220 less 209) days were subject to liquidated damages of $60,000 imposed on Contractor C.*

(b) the design and construction works of STFWPF commenced on 24 June 2022 and was substantially completed on 14 November 2023 (i.e. 3 months (or 89 days) later than the original completion date of 17 August 2023). As at 31 March 2025, EOT of 89 days (Note 20) was granted to Contractor D.

Scope for improvement in designing the food waste pre-treatment process

4.4 According to EPD, food waste/sewage sludge anaerobic co-digestion facilities at TPSTW and STSTW are formed by two parts, comprising FWPFs and the existing anaerobic co-digestion tanks. After pre-treatment of food waste at FWPFs, food waste slurry would be transferred via the treated material transfer system to the anaerobic digestion system managed by DSD. According to Contract C, to avoid the blockage or damage of the mechanical equipment downstream and to be compatible with other pre-treatment equipment, and performing and functioning integrally, the treated material with particle size less than or equal to 20 millimetres was set as the original contract requirement. According to EPD, in view of the pilot nature of the facility, Contract C also included the downstream blockage as one of the scenarios of emergency event.

4.5 Since the commissioning of TPFWPF in August 2019 and up to March 2025, there was a series of incidents of blockage of treated material transfer pipelines resulting in a total of 125 days of suspension in the operation of TPFWPF despite that the particle size of the treated material provided by Contractor C was less than or equal to 20 millimetres. Audit noted that:

(a) to tackle the blockage incidents, from April 2020 to November 2022, 1 Variation Order to Consultant T and 6 ECs to Contractor C with a total cost of $7.1 million had been issued by EPD, including the enhancement works of installing a macerator to further reduce the particle size of the treated material to less than or equal to 10 millimetres;

Note 20: *According to EPD, EOT of 89 days was granted due to: (a) inclement weather of 47.5 days; (b) variation works due to uncharted underground utilities discovered on-site of 23 days; (c) modification works of the existing facility at STSTW of 13 days; and (d) the ingress of suspected sewage from the existing facilities of DSD of 5.5 days.*

(b) no further incidents of blockage of treated material transfer pipelines at TPFWPF was noted after the installation of macerator in August 2023; and

(c) factories in the Tai Po Industrial Estate are the major source of food waste of TPFWPF. While surveys and studies had been conducted to assess the quantity and quality of collectable food waste in Hong Kong and from the major factories in the Tai Po Industrial Estate between 2005 and 2015, certain types of food waste received at TPFWPF had not been identified in the surveys and studies (e.g. large amount of bones, fibres and herb residues).

4.6 In Audit's view, EPD needs to draw lessons from the blockage incidents of TPFWPF with a view to improving the design of the food waste pre-treatment process in future works projects.

Outstanding works of Contracts C and D not timely completed

4.7 According to Contracts C and D, Contractors C and D should carry out any outstanding works as soon as practicable after the issue of certificate of substantial completion for the works, but in any event within 56 days after the date of substantial completion of works (i.e. the specified timeframe). When all the outstanding works have been completed to the satisfaction of EPD and certified by the independent consultants, EPD or Consultants T or U would issue the certificate of completion for the works. Audit noted that there were delays in completion of the outstanding works of both Contracts C and D, as follows:

(a) ***TPFWPF under Contract C.*** In respect of the design and construction works of TPFWPF under Contract C:

(i) in November 2019, Consultant T certified Contractor C's substantial completion of works on 14 August 2019 and required Contractor C to complete a list of outstanding works involving 89 items (Note 21) within the specified timeframe (i.e. 9 October 2019); and

---

Note 21: *According to Consultant T, examples of outstanding works items included detailed design submission of site formation and surface drainage, material submission of concrete, method statement for temporary power supply and modification of the crusher.*

(ii) all the outstanding works were completed to the satisfaction of EPD and certified by the independent consultants on or before 28 June 2021 (i.e. 628 days after the specified timeframe) (Note 22); and

(b) ***STFWPF under Contract D.*** In respect of the design and construction works of STFWPF under Contract D:

(i) in December 2023, EPD certified Contractor D's substantial completion of works on 14 November 2023 and required Contractor D to complete a list of outstanding works involving 69 items (Note 23) within the specified timeframe (i.e. 9 January 2024); and

(ii) all the outstanding works were completed to the satisfaction of EPD and certified by the independent consultants on or before 31 May 2024 (i.e. 143 days after the specified timeframe).

4.8 According to EPD, it had taken measures to monitor the completion of the outstanding works by holding monthly progress meetings with Contractors C and D. In Audit's view, in implementing works projects, EPD needs to strengthen measures to ensure the timely completion of outstanding works by contractors in accordance with the contract requirements.

Note 22: *According to EPD, the progress of the outstanding works was affected during the COVID-19 epidemic from January 2020 to June 2021.*

Note 23: *According to Consultant U, examples of outstanding works items included spillage of food waste unloading to bunker, water leakage on the tray under the separation mill and seal up the pipe and cable openings.*

Audit recommendations

4.9 **Audit has *recommended* that the Director of Environmental Protection should:**

(a) **draw lessons from the blockage incidents of TPFWPF with a view to improving the design of the food waste pre-treatment process in future works projects; and**

(b) **in implementing works projects, strengthen measures to ensure the timely completion of outstanding works by contractors in accordance with the contract requirements.**

Response from the Government

4.10 The Director of Environmental Protection agrees with the audit recommendations. He has said that EPD:

(a) had reviewed the design of the food waste pre-treatment process in STFWPF, drawing lessons from the blockage incidents at TPFWPF. No blockage incident at STFWPF took place upon implementation of the improved design; and

(b) will undertake measures to ensure timely completion of outstanding works by contractors in future contracts.

Monitoring of operation of food waste pre-treatment facilities

4.11 According to EPD, FWPFs use mechanical treatment to convert food waste into food waste slurry, and the slurry would be injected into the anaerobic digestion facilities in STWs for further treatment. The operation stage of TPFWPF and STFWPF commenced on 15 August 2019 and 15 November 2023 respectively. Monthly variable operation fee is paid to Contractors C and D based on the quantity of food waste treated at TPFWPF and STFWPF respectively during the month. Since the commissioning of TPFWPF and STFWPF and up to March 2025, the total amount of payment to Contractors C and D for the operation of TPFWPF and STFWPF were

$57.8 million and $19.8 million respectively, and the total quantity of food waste treated at TPFWPF and STFWPF were 38,220 tonnes and 4,458 tonnes respectively.

Scope for enhancing the utilisation of STFWPF

4.12 The design treatment capacity of both TPFWPF and STFWPF are 50 tpd. Audit analysed the utilisation of FWPFs since their commissioning and up to March 2025, and found that (see Table 9):

(a) while the annual utilisation rate of TPFWPF increased from 11% in 2020 to 85% in 2025 (up to March), the rate of STFWPF remained 20% or less since its commissioning and decreased from 20% in 2024 to 16% in 2025 (up to March); and

(b) except for 2023 (STFWPF was commissioned in November 2023), the overall utilisation rate of FWPFs in 2024 and 2025 (up to March) was only about 50%.

Table 9

Utilisation of TPFWPF and STFWPF
(August 2019 to March 2025)

Year	TPFWPF		STFWPF		Overall	
	Food waste treated (a) (tonnes)	Utilisation rate (Note 1)	Food waste treated (b) (tonnes)	Utilisation rate (Note 1)	Food waste treated (c) = (a) + (b) (tonnes)	Utilisation rate (Note 1)
2019 (since August)	874	13%	N.A. (Note 2)		874	13%
2020	1,968	11%			1,968	11%
2021	4,009	22%			4,009	22%
2022	3,595	20%			3,595	20%
2023	8,575	47%	116	5%	8,691	42%
2024	15,395	84%	3,604 (Note 3)	20%	18,999	52%
2025 (up to March)	3,804	85%	738 (Note 3)	16%	4,542	50%

Source: *EPD records*

Note 1: *The utilisation rate is calculated by dividing the quantity of food waste treated by the design treatment capacity of the corresponding period.*

Note 2: *STFWPF commenced operation in November 2023.*

Note 3: *According to EPD, due to the incident of overflow of an anaerobic digestion tank at STSTW on 26 May 2024, DSD had suspended the reception of food waste slurry generated from STFWPF from 26 May 2024 to 28 May 2025.*

4.13 According to EPD, the utilisation rate of STFWPF was constrained by the capacity and stability of the downstream co-digestion facilities at STSTW as well as a prolonged incident at STSTW (see Note 3 to Table 9 in para. 4.12) which substantially limited the volume and nature of food waste received at STFWPF. In May 2025, DSD informed EPD that it would only accept food waste of 10 tpd for co-digestion at STSTW. In Audit's view, EPD needs to step up efforts in enhancing

the utilisation of STFWPF as far as practicable (e.g. discussing with DSD the acceptance criteria and allowable quantity of food waste slurry).

High variable operation costs for FWPFs

4.14 According to Contracts C and D, the monthly operation fees paid to Contractors C and D comprise a fixed component (i.e. a fixed amount regardless of the quantity of food waste treated) and a variable component. The variable operation fee is calculated as follows:

(a) ***Contract C.*** Variable operation fee for a day should be calculated based on the daily guaranteed tonnage (i.e. 15 tpd) or the actual tonnage of daily food waste treated by the facility, whichever is higher; and

(b) ***Contract D.*** Variable operation fee for a month should be calculated based on the monthly guaranteed tonnage (i.e. 15 tpd × number of available days in a month) or the actual tonnage of monthly food waste treated by the facility, whichever is higher.

4.15 Audit noted that, since the commissioning of TPFWPF and STFWPF and up to March 2025, there were instances where the actual tonnage of food waste treated by the facilities were lower than the guaranteed tonnage, resulting in a higher variable operation cost, as follows:

(a) ***TPFWPF.*** Of the 2,056 days of operation since its commissioning and up to March 2025:

(i) there were 927 (45%) days where the actual tonnage of daily food waste treated by TPFWPF was lower than the daily guaranteed tonnage (i.e. 15 tpd) specified in Contract C; and

(ii) as a result, the total variable operation fees to Contractor C (i.e. $231,245) was 21% higher than the variable operation fees calculated based on the actual tonnage of food waste treated by the facility (i.e. $191,000) and the average variable cost per tonnage of food waste treated was $6; and

(b) ***STFWPF.*** According to Contract D, monthly variable operation fee would be paid to Contractor D since the post-commissioning stage (i.e. since 1 June 2024). Since its post-commissioning in June 2024 and up to March 2025 (involving 10 months):

(i) the actual tonnage of food waste treated by STFWPF in 9.5 (95%) months was lower than the monthly guaranteed tonnage (i.e. 15 tpd × number of available days in a month) specified in Contract D. According to EPD, the intake tonnage was substantially restricted in view of the constraint at the downstream co-digestion facilities at STSTW; and

(ii) as a result, the total variable operation fees to Contractor D (i.e. about $1.3 million) was 211% higher than the variable operation fees calculated based on the actual tonnage of food waste treated by the facility (i.e. $412,160) and the average variable cost per tonnage of food waste treated was $840.

4.16 With the utilisation rate of TPFWPF improved in 2024 and 2025, the quantities of actual tonnage of food waste treated were well above the daily guaranteed tonnage. In Audit's view, EPD needs to take measures to closely monitor the variable operation costs for TPFWPF and STFWPF.

Availability of TPFWPF persistently lower than the guaranteed availability

4.17 According to Contracts C and D, Contractors C and D should maintain TPFWPF and STFWPF at the guaranteed annual availability of 98.5% and 97.3% respectively. The operation fees for the past 12 months should be adjusted downward based on the number of actual available days that fell short of the number of guaranteed available days in the relevant 12-month period.

4.18 Audit noted that, since the commissioning of TPFWPF and STFWPF and up to March 2025:

(a) there were 274 days of breakdown for TPFWPF and no breakdown was noted for STFWPF. In the event, some $1 million had been deducted from the annual operation fees to Contractor C during the period; and

(b) for TPFWPF, the annual availability of all the 5 full operation years from 15 August 2019 to 14 August 2024 did not meet the guaranteed annual availability, ranging from 67% to 98% (representing 7 to 120 days of breakdown per annum).

4.19 While there were no incidents of breakdown from 15 August 2024 to 31 March 2025 for TPFWPF, in Audit's view, EPD needs to closely monitor the availability of TPFWPF and take measures to ensure that the contractor maintains the availability in accordance with the requirements stipulated in the contract.

Scope for enhancing the maintenance of facilities at TPFWPF and STFWPF

4.20 According to Contracts C and D, during the normal operation, Contractors C and D should carry out maintenance, repair, rehabilitation and replacement work to ensure safe and effective operation of FWPFs. Audit noted that, since the commissioning of TPFWPF and STFWPF and up to March 2025:

(a) there were instances of prolonged failure in equipment and systems at both FWPFs, for example:

(i) the hydraulic system of the bunker cover for food waste reception at TPFWPF was found broken for nearly 9 months during 2022 to 2023;

(ii) the landfill gas sensors at TPFWPF failed the carbon dioxide and methane calibration tests for nearly 3 months in 2024;

(iii) the impurity separator at TPFWPF for removing impurity was found broken for nearly 1 year in 2021; and

(iv) the inlet sensor at STFWPF for testing ammonia was found broken for nearly 3 months during 2024 to 2025; and

(b) Contractor C did not maintain sufficient spare parts for some equipment (e.g. main shaft of shredders, crusher blades and screw conveyors) for maintaining the normal operation of TPFWPF, for example:

(i) spare part items such as shredder blades and crusher blades had been out of stock for 10 months from May 2023 to March 2024 and for 5 months from August to December 2023 respectively; and

(ii) in August 2022, there was delay in procurement of spare parts (e.g. shredder main shaft) by Contractor C, resulting in the suspension of the plant operation for 17 days as no spare parts for replacement could be found.

According to EPD, shredder was a special equipment. The spare part supply from the original supplier was found to be unstable which required long procurement time. To address this issue, Contractor C had sourced a workshop near Hong Kong for replication of the spare parts and spare part supply had been improved since September 2023.

4.21 In Audit's view, in order to ensure the smooth operation of the food waste pre-treatment process, EPD needs to:

(a) keep under review the conditions of the equipment and systems at TPFWPF and STFWPF, particularly those equipment and systems with prolonged failure; and

(b) take measures to ensure that sufficient spare parts for equipment, particularly those equipment more prone to damages and frequent replacements, are maintained by the contractor for the operation of TPFWPF.

Need to review the effectiveness of the food waste/sewage sludge anaerobic co-digestion trial schemes at TPSTW and STSTW

4.22 According to EPD, to enhance the overall food waste recycling capacity in Hong Kong, EPD collaborated with DSD in implementing the food waste/sewage sludge anaerobic co-digestion trial schemes at TPSTW and STSTW since the

commissioning of TPFWPF and STFWPF on 15 August 2019 and 15 November 2023 respectively, as follows:

(a) ***TPFWPF.*** Contract C ended on 14 August 2025 after 6 years of operation. According to EPD:

(i) to provide a seamless continuation of the food waste pre-treatment services under the trial scheme, in July 2025, EPD had awarded a follow-on contract for the 12-month operation of TPFWPF;

(ii) with the upgrading of TPSTW by DSD for completion in 2033, subject to funding availability, EPD planned to upgrade TPFWPF into the Organic Waste Pre-treatment Centre (New Territories East) (i.e. with an increase in the treatment capacity from 50 tpd to 500 tpd) in future; and

(iii) it had commenced the relevant feasibility study in August 2021 with a target completion date by the end of the first quarter of 2026; and

(b) ***STFWPF.*** Contract D would end in November 2028. According to EPD, STSTW would be relocated to caverns in A Kung Kok of Sha Tin in 2029 and FWPF at the existing STSTW would not be relocated to caverns as the sewage treatment technology of the relocated STSTW would not have anaerobic digestion system. According to Contract D, equipment and machinery on the site were provided by Contractor D. Rental fee to Contractor D is included in the fixed operation fee.

4.23 Audit noted that EPD had not conducted any evaluation on the effectiveness of the food waste/sewage sludge anaerobic co-digestion trial schemes at TPSTW and STSTW since their commissioning. With EPD's feasibility study in relation to the Organic Waste Pre-treatment Centre (New Territories East) in progress, in Audit's view, it is an opportune time for EPD to conduct a review on the trial schemes at TPSTW and STSTW to evaluate their effectiveness and determine the way forward, taking into account the audit observations and recommendations in this Audit Report.

Audit recommendations

4.24 **Audit has *recommended* that the Director of Environmental Protection should:**

(a) **step up efforts in enhancing the utilisation of STFWPF as far as practicable (e.g. discussing with DSD the acceptance criteria and allowable quantity of food waste slurry);**

(b) **take measures to closely monitor the variable operation costs for TPFWPF and STFWPF;**

(c) **closely monitor the availability of TPFWPF and take measures to ensure that the contractor maintains the availability in accordance with the requirements stipulated in the contract;**

(d) **keep under review the conditions of the equipment and systems at TPFWPF and STFWPF, particularly those equipment and systems with prolonged failure;**

(e) **take measures to ensure that sufficient spare parts for equipment, particularly those equipment more prone to damages and frequent replacements, are maintained by the contractor for the operation of TPFWPF; and**

(f) **conduct a review on the food waste/sewage sludge anaerobic co-digestion trial schemes at TPSTW and STSTW to evaluate their effectiveness and determine the way forward, taking into account the audit observations and recommendations in this Audit Report.**

Response from the Government

4.25 The Director of Environmental Protection agrees with the audit recommendations. He has said that EPD will:

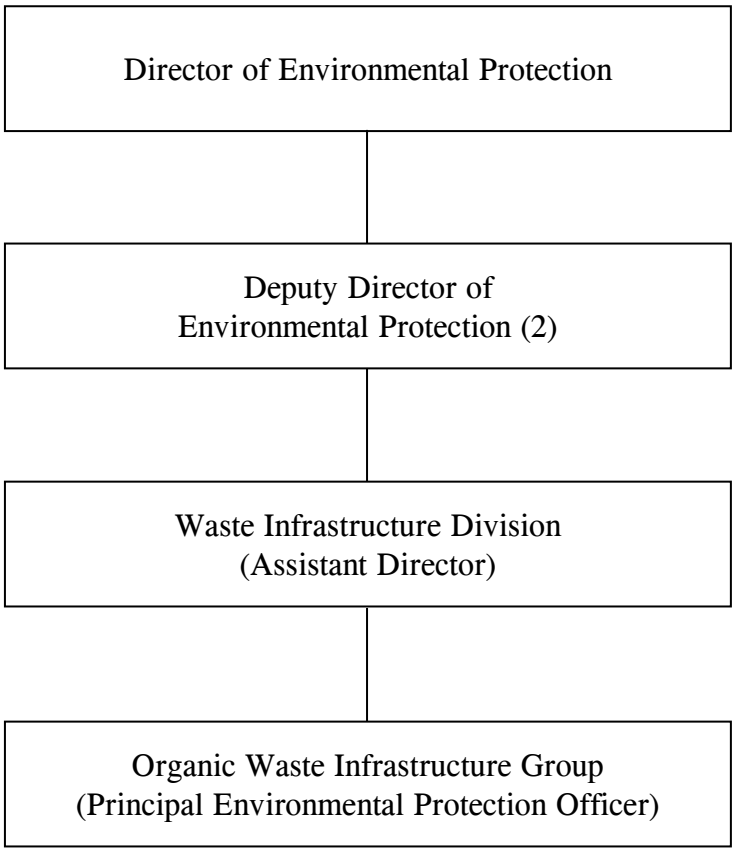
(a) continue the discussion with DSD with a view to enhancing the utilisation of STFWPF as far as practicable. It is noted that the utilisation rate for TPFWPF has improved since 2024;

(b) continue to monitor the operation of TPFWPF and STFWPF, and urge the contractors of the two facilities to ensure stable operation and minimise down time for the two facilities; and

(c) conduct a review of the anaerobic co-digestion trial schemes, taking into account technical feasibility, interfacing issues, etc. with a view to recommending a way forward by the second quarter of 2026.

Appendix A
(para. 1.19 refers)

Environmental Protection Department: Organisation chart (extract) (31 March 2025)



Source: *EPD records*

Appendix B

Acronyms and abbreviations

APE	Approved project estimate
Audit	Audit Commission
DBO	Design-build-operate
DEVB	Development Bureau
DSD	Drainage Services Department
EC	Employer's Change
EOT	Extension of time
EPD	Environmental Protection Department
FWPF	Food waste pre-treatment facility
LegCo	Legislative Council
MWh	megawatt-hour
O·PARK1	Organic Resources Recovery Centre Phase 1
O·PARK2	Organic Resources Recovery Centre Phase 2
ORRC	Organic resources recovery centre
STFWPF	Food waste pre-treatment facility at the Sha Tin Sewage Treatment Works
STSTW	Sha Tin Sewage Treatment Works
STW	Sewage treatment works
tpd	tonnes per day
TPFWPF	Food waste pre-treatment facility at the Tai Po Sewage Treatment Works
TPSTW	Tai Po Sewage Treatment Works