CHAPTER 8

THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

GENERAL REVENUE ACCOUNT

GOVERNMENT SECRETARIAT

Environment and Food Bureau

GOVERNMENT DEPARTMENT

Environmental Protection Department

The provision of refuse transfer stations

Audit Commission
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THE PROVISION OF REFUSE TRANSFER STATIONS

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Summary and key findings

A. **Introduction.** Household, commercial and industrial activities in Hong Kong generate large quantities of municipal waste every day. According to the 1989 Waste Disposal Plan, the Government's long-term municipal waste disposal strategy is based on the provision of three strategic landfills and a network of refuse transfer stations (RTSs) for dealing with the waste collected by the Food and Environmental Hygiene Department (FEHD) and private-sector collectors. Waste delivered to the RTSs is compacted into purpose-built containers for transportation to the landfills. This method of handling waste is aimed to reduce the overall transportation cost and the environmental nuisance associated with the transportation of waste. Up to the end of 2000, the Environmental Protection Department (EPD) had put into operation seven RTSs at a total capital cost of $2,767 million. In 1999-2000, the recurrent operating cost of these RTSs amounted to $387 million (paras. 1.1 to 1.4).

B. **Audit review.** Audit has recently reviewed the provision of the RTSs (para. 1.5). The results indicate that there is room for improvement in the planning and development of RTSs as summarised in paragraphs C to E below.

C. **The need to conduct a costing review of the RTS operation.** The 1989 Waste Disposal Plan envisaged that there would be both cost and environmental benefits in the provision of the RTSs. The Government reviewed the progress made towards the objectives set in the Waste Disposal Plan between 1991 and 1996. Environmental problems may be caused by the direct hauling of waste by individual waste collection vehicles to the landfills. The EPD has also carried out performance reviews to ascertain the extent to which the bulk transfer of waste to landfills from the RTSs has reduced environmental problems. However, the EPD has not carried out a specific costing review to ascertain whether the financial objective of reducing the overall transportation cost by the bulk transfer of waste has in fact been achieved (paras. 2.2 to 2.5).

D. **Low utilisation of RTS service by private-sector waste collectors.** The capacities of the first three RTSs at Kowloon Bay, Island East and Sha Tin were designed to handle waste collected by the FEHD only. In accordance with the 1989 Waste Disposal Plan, the Island West and the West Kowloon RTSs were commissioned in mid-1997 to provide additional refuse transfer capacities for both the FEHD and private-sector collected waste. However, Audit found that:

(a) the RTS service was only extended to private-sector waste collectors in April 1998 instead of mid-1997 because there was a delay in the implementation of an RTS charging scheme (paras. 3.1, 3.2 and 3.18);

(b) since April 1998, the utilisation of the RTS service by the private sector has been below expectations. As a result, the objectives of providing the RTSs to reduce the environmental nuisance associated with the transportation of waste and to reduce the overall transportation cost were not fully met. Furthermore, the refuse transfer capacity provided for private-sector waste collectors was not fully utilised (para. 3.20);

(c) in 1998, the RTS charge rates were set to recover at least the Government's marginal operating cost and it was assumed that all private–sector waste collectors would be attracted to use the RTSs. However, it was not always cost-effective for private-sector waste collectors to use the RTS service mainly because they had to pay high RTS charges. In the circumstances, the RTS charge should have been set at lower rates so as to attract more private-sector waste collectors to use the RTSs (paras. 3.22 and 3.23); and

(d) in 1999, the EPD found that significant savings in landfill cost as a result of the provision of the RTSs had not been taken into account when the RTS charge rates were set in 1998. The EPD is currently revising the RTS charge, taking into account the savings in landfill cost, with a view to promoting the use of the RTSs by the private sector. Audit welcomes the EPD's efforts in this regard. However, based on the Government's current RTS charging strategy, it is difficult to achieve full utilisation of the RTSs as intended by the Waste Disposal Plan (paras. 3.24, 3.26 and 3.27).

E. **The need to review the provision of guaranteed minimum tonnage in RTS contract.** In the design, build and operate contracts of the RTSs, the Government guarantees the operators a minimum operating charge based on a guaranteed minimum tonnage of waste. Such a provision is to obviate the need for the RTS operators to take account of unforeseen reductions in waste intake in their tender prices. While the purpose of setting the guaranteed minimum payment was that it should only be invoked in extreme circumstances and not be used routinely, the Government had made guaranteed minimum payments for four RTS contracts for two years or more. The total guaranteed minimum payment would have been $7.7 million more than the estimated operating charge payable if the payment had been based on the actual tonnage of waste intake. The EPD could draw on the experience of these four RTS contracts for fine-tuning the mechanism for applying the provision of guaranteed minimum tonnage of waste in future RTS contracts (paras. 4.6 to 4.10).

F. **Audit recommendations.** Audit has made the following main recommendations:

(a) the EPD should carry out a specific costing review to ascertain the extent to which the provision of the RTSs has reduced the cost of transporting waste to the landfills (para. 2.6);

(b) the EPD should closely monitor the implementation of charging schemes in connection with the provision of new waste management services to ensure that potential problems which may arise are immediately addressed so as to enable the charging schemes to be implemented without undue delay (para. 3.19);

(c) the Administration should, in setting the service charges of waste management facilities such as those of the RTSs, critically consider all relevant cost factors and environmental benefits before deciding the charges (para. 3.25);

(d) the EPD should carry out a review of the long-term RTS charging strategy taking into account the Government's waste management objectives (para. 3.28(a));

(e) in carrying out the review, the EPD should fully assess the impact of any charging proposal on the utilisation of the RTS service by private-sector waste collectors so as to ensure that all RTSs are gainfully used in future (para. 3.28(b));

(f) in setting the guaranteed minimum tonnage of waste in future RTS contracts, the EPD should critically examine the likely extent of utilisation of the RTS service by both the FEHD and private-sector waste collectors (para. 4.19(a));

(g) where it is anticipated that there may be a large variation in the quantities of waste during the contract period, the EPD should consider specifying two or more levels of guaranteed minimum tonnage of waste in the RTS contract, so that the risk of unexpected waste fluctuations will be shared fairly between the Government and the operator throughout the contract period (para. 4.19(d)); and

(h) the EPD should consider incorporating greater flexibility into future RTS contracts so that the terms of the guaranteed minimum tonnage are subject to regular reviews and can be revised to take account of circumstances which have not been envisaged at the time of awarding the contract (para. 4.19(e)).

G. **Response from the Administration.** The Administration has generally agreed with the audit recommendations (paras. 2.7, 3.29 to 3.31 and 4.20).

PART 1: INTRODUCTION

1.1 Hong Kong disposes of large quantities of municipal waste and construction waste at landfills each day. This report only deals with municipal waste which arises from household, commercial and industrial activities (excluding construction waste — Note 1). In 1999, 9,300 tonnes per day (tpd) of municipal waste were disposed of at landfills. Of these, 6,100 tpd (66%) were collected by the Food and Environmental Hygiene Department (FEHD — Note 2) as the public-sector waste collector, and 3,200 tpd (34%) were collected by private-sector waste collectors.

1.2 The Government's overall policy objectives for the management of wastes, as stated in the 1989 White Paper entitled "Pollution in Hong Kong — A time to act", are:

(a) to ensure the provision of facilities for the cost-effective and environmentally satisfactory disposal of all wastes; and

(b) to ensure the availability and proper enforcement of legislation aimed at safeguarding the health and welfare of the community from any adverse environmental effects associated with the storage, collection, treatment and disposal of all wastes.

The infrastructural measures necessary to fulfil these policy objectives were described in a statutory Waste Disposal Plan of December 1989. At that time, it was expected that the Waste Disposal Plan would be implemented from 1989 to 2001.

1.3 According to the 1989 Waste Disposal Plan, the long-term plan for disposal of municipal waste was based on the provision of three strategically located landfills together with a network of refuse transfer stations (RTSs) constructed so as to provide the capacity for dealing with the **waste collected by both the FEHD and private-sector collectors**. Waste delivered to the RTSs would be compacted into purpose-built containers for transportation by road or sea to the three strategic landfills in the New Territories, i.e. the West New Territories (WENT) landfill, the South East New Territories (SENT) landfill, and the North East New Territories (NENT) landfill for final disposal. This method of handling waste is aimed:

(a) to reduce the overall transportation cost to a point of final disposal;

(b) to reduce the problems of odour and leachate during transportation; and

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Note 1: *In the Director of Audit's Report No. 28 of February 1997, Audit reported on the results of an audit review on the beneficial use of construction waste for reclamation.*

Note 2: *The FEHD was established on 1 January 2000 to take over the duties of the former Regional Services Department and the Urban Services Department in respect of food and environmental hygiene.*

(c) to facilitate an even distribution of waste to the three strategic landfills.

1.4 The Environmental Protection Department (EPD), as the Waste Disposal Authority, is responsible for the development of the RTSs. Up to the end of 2000, the EPD had put into operation seven RTSs at a total capital cost of $2,767 million. The recurrent operating cost of these RTSs was $387 million (see Table 1 below for details) in 1999-2000. A map showing the location of the RTSs and the routing of waste to the three strategic landfills is at Figure 1 below. The EPD has planned to construct three additional RTSs in future, as shown in Table 2 below.

Table 1

RTSs currently in operation

RTS	Date of commissioning	Design capacity (tpd)	Capital cost ($ million)	Operating cost (1999-2000) ($ million)
1. Kowloon Bay	April 1990	1,800	215	81
2. Island East	November 1992	1,200	413	85
3. Sha Tin	October 1994	1,000	201	37
4. Island West	May 1997	1,000	637	52
5. West Kowloon	June 1997	2,500	760	72
6. Outlying Islands Refuse Transfer Facilities (Note 1)	March 1998 (Note 1)	554 (Note 2)	303	38
7. North Lantau	June 1998	650 (Note 3)	238	22
	Total	**8,704**	**2,767**	**387**

Source: EPD's records

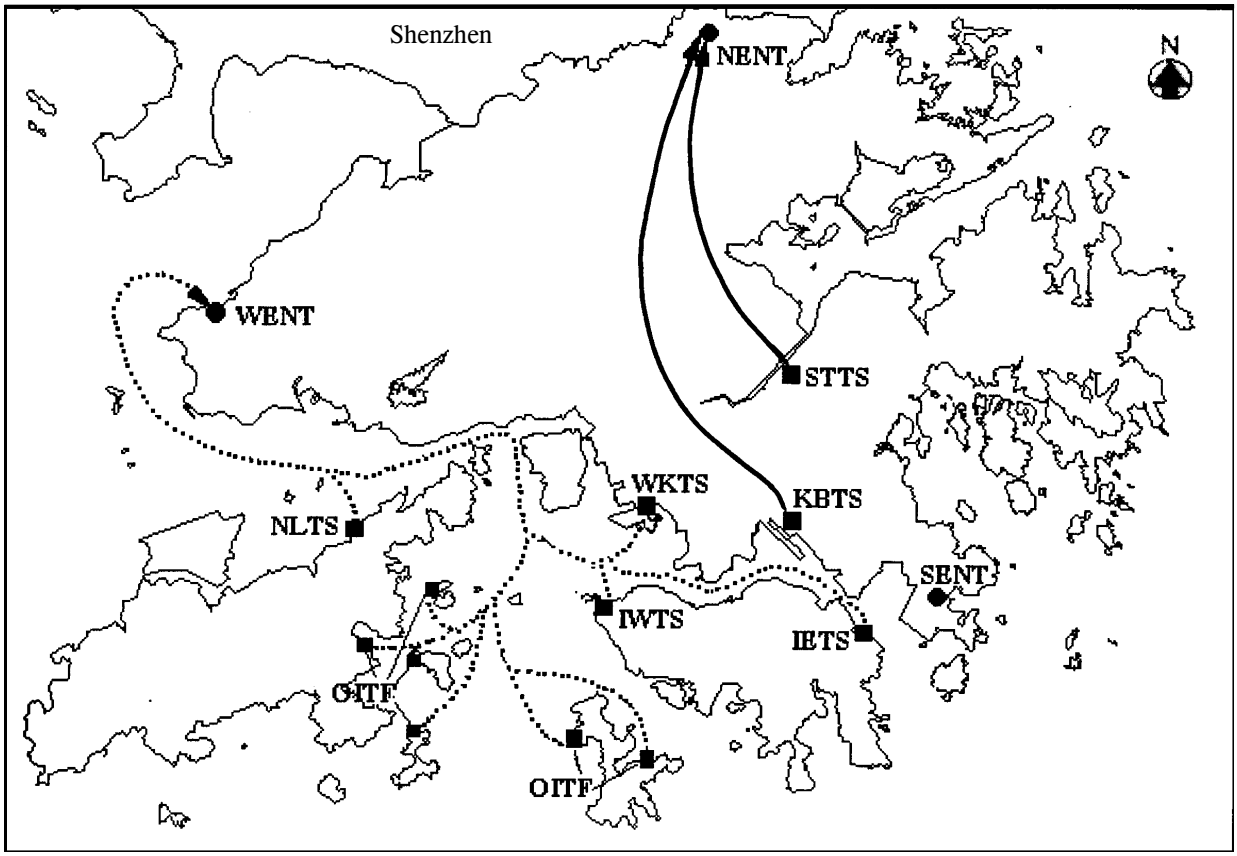
Note 1: The Outlying Islands Refuse Transfer Facilities comprise six small RTSs. The RTSs on Cheung Chau, Peng Chau and Mui Wo were commissioned in March 1998. The RTS on Hei Ling Chau was commissioned in July 1998. The RTSs at Sok Kwu Wan and Yung Shue Wan of Lamma Island were commissioned in May 2000.

Note 2: Unlike other RTSs, which only accept municipal waste, the Outlying Islands Refuse Transfer Facilities also accept construction waste and sludge. The total design capacity is made up of 306 tpd of municipal waste, 204 tpd of construction waste and 44 tpd of sludge.

Note 3: The North Lantau RTS was developed by stages. The design capacity for the initial stage was 650 tpd. When the RTS is fully developed, the design capacity will reach 1,200 tpd. The capital cost of $238 million stated above refers only to the cost of the initial stage of development.

Figure 1

Location of the existing RTSs and the routing of waste to landfills



■ RTS:	1.	IETS	=	Island East RTS
	2.	IWTS	=	Island West RTS
	3.	WKTS	=	West Kowloon RTS
	4.	KBTS	=	Kowloon Bay RTS
	5.	NLTS	=	North Lantau RTS
	6.	OITF	=	Outlying Islands Refuse Transfer Facilities
	7.	STTS	=	Sha Tin RTS
● Landfill:	1.	SENT	=	South East New Territories
	2.	NENT	=	North East New Territories
	3.	WENT	=	West New Territories
•••••••••	bulk transportation by sea on barges			
———	bulk transportation by land on transfer vehicles			

Source: EPD's records

Table 2

RTSs under planning and development

	RTS	Planned date of commissioning	Design capacity	Estimated capital cost	Estimated operating cost (Note 1)
			(tpd)	($ million)	($ million per annum)
1.	North West New Territories	late 2001	1,100	216 (Note 2)	27
2.	North New Territories	2005	1,100	496	67
3.	South East Kowloon	2007	3,000 (Note 3)	932	90
		Total	**5,200**	**1,644**	**184**

Source: EPD's records

Note 1: The estimated operating cost of the North West New Territories RTS is based on the anticipated waste intake level for the first year of operation. The estimated operating cost of the other two RTSs is based on the waste intake levels of the RTSs operating at the design capacity.

Note 2: The North West New Territories RTS is currently under construction. The capital cost stated is based on the contract sum of the awarded contract.

Note 3: This is a tentative figure based on the EPD's plan that the South East Kowloon RTS will eventually replace the Kowloon Bay RTS.

Audit review

1.5 Audit has recently conducted a review of the provision of the RTSs. The results indicate that there is room for improvement in the planning and the development of RTSs. Audit has made a number of recommendations to address the issues concerned.

PART 2: PERFORMANCE REVIEW OF THE RTS OPERATION

2.1 The provision of the RTSs involves significant capital and operating costs. This PART examines the reviews of the RTS operation against the Waste Disposal Plan objectives by the EPD.

Objectives set in the Waste Disposal Plan

2.2 As mentioned in paragraph 1.3 above, the Waste Disposal Plan envisaged that there would be both cost and environmental benefits in the provision of the RTSs in conjunction with the final disposal of waste at the landfills, as follows:

(a) the transfer of refuse in bulk from the RTSs to the landfills was aimed at reducing the overall costs of transporting waste;

(b) the problems of odour and leachate during transportation would be reduced considerably; and

(c) the RTSs would facilitate an even distribution of waste to be disposed of at the three strategic landfills (i.e. the SENT landfill, the WENT landfill and the NENT landfill).

Environmental performance of the RTS operation

2.3 The EPD has carried out performance reviews to ascertain the extent to which the bulk transfer of waste to landfills from the RTSs has reduced the environmental problems. In its Environmental Performance Report of 2000, the EPD said that the bulk transfer of waste to landfills from the RTSs had significantly reduced the traffic, noise and air emission problems that might otherwise be caused by the direct hauling of waste by many waste collection vehicles to the landfills. According to the EPD, in 1999 some 900 trips by small waste collection vehicles were dispensed with each day.

2.4 In addition, the EPD exercises strict environmental controls at the RTSs. There are stringent environmental standards in the design and operation of the RTSs. These standards govern noise, air emissions and wastewater. The RTSs are fully enclosed so that the noise of their operations is contained without the risk of affecting nearby residents. The air inside an RTS is extracted and passed through purification systems before it is emitted into the atmosphere. The wastewater generated from the operation is treated by wastewater treatment facilities of the RTS before it is discharged into the sewerage system. Before the waste collection vehicles or transfer vehicles leave an RTS, they are thoroughly cleaned. The EPD monitors the environmental

performance of the private-sector RTS operators through the inspection by its site staff. There are also provisions in the RTS contracts (see paragraph 4.5 below for details) for the deduction of the operating charge payable to the RTS operators if they fail to comply with the key environmental standards.

Audit observations on performance review of the RTS operation

2.5 The 1989 Waste Disposal Plan envisaged that there would be both cost and environmental benefits in the provision of the RTSs. The Government reviewed the progress made towards the objectives set in the Waste Disposal Plan, as part of its three reviews in 1991, 1993 and 1996 of the 1989 White Paper on Pollution. The EPD has made efforts to carry out performance reviews of the RTS operations against the environmental objectives as stated in the Waste Disposal Plan. **However, Audit notes that the EPD has not carried out a specific costing review to ascertain whether the financial objective of reducing the overall transportation cost by the bulk transfer of waste has in fact been achieved. As the reduction in the overall transportation cost is one of the main objectives (see paragraph 2.2 above) of providing the RTSs, Audit considers that the extent of achievement of this objective should be ascertained.** The implementation of the Waste Disposal Plan (construction of the three strategic landfills and a network of RTSs) is expected to be largely completed in 2001. The EPD has started work to develop a new waste management plan. It is an opportune time for the EPD to carry out a specific costing review to ascertain the extent of achievement of its financial objective in the provision of the RTSs.

Audit recommendation on performance review of the RTS operation

2.6 **Audit has *recommended* that the Director of Environmental Protection should carry out a specific costing review to ascertain the extent to which the provision of the RTSs has reduced the cost of transporting waste to the landfills.**

Response from the Administration

2.7 The **Director of Environmental Protection** has said that he accepts the audit recommendation. It is the right time to carry out a specific costing review. The review will also take into account the intangible environmental benefits, such as reduced air emission, to draw a balanced conclusion.

PART 3: PROVISION OF RTS SERVICE TO PRIVATE-SECTOR WASTE COLLECTORS

3.1 According to the 1989 Waste Disposal Plan, the Government is committed to providing adequate refuse transfer capacity to meet the need of processing the municipal waste collected by both the FEHD and private-sector collectors in the medium to long term. To implement the Waste Disposal Plan, the EPD has progressively expanded the refuse transfer capacity. In 1998, the EPD started to extend the RTS service to private-sector waste collectors. This PART examines the provision of the RTS service to private-sector waste collectors. The audit has revealed that there are lessons to be learnt in this regard.

Progressive development of new RTSs to handle the waste collected by both FEHD and private-sector collectors

3.2 The capacities of the first three RTSs at Kowloon Bay, Island East and Sha Tin (see Table 1 of paragraph 1.4 above) were designed to handle waste collected by the FEHD only. In 1994, the Government sought funding approvals from the Finance Committee to build three additional RTSs on Hong Kong Island, Kowloon and North Lantau (Note 3). These new RTSs were designed to cope with the waste collected by both the FEHD and private-sector collectors. Details are given in paragraphs 3.3 to 3.5 below.

Island West RTS

3.3 In March 1994, the EPD obtained funding approval from the Finance Committee for the construction of an RTS on Hong Kong Island West at an estimated capital cost of $1,311 million (Note 4) in money-of-the-day (MOD) prices (Note 5). The EPD informed the Finance Committee that waste collected by the FEHD and private-sector collectors on Hong Kong Island was estimated

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Note 3: *In July 1994, the Finance Committee also approved funding for the development of the Outlying Islands Refuse Transfer Facilities. These facilities were designed to handle waste collected by the FEHD and sludge from water and sewage treatment works. The private-sector waste collection service was insignificant on the outlying islands.*

Note 4: *The actual capital cost was $637 million because under the design, build and operate contract arrangement, the RTS operator was allowed to propose an innovative and cost-effective design. The RTS operator, with his previous experience in operating other RTSs, optimised the size and orientation of the cavern in which the Island West RTS was built and submitted a very competitive tender price.*

Note 5: *The MOD prices show the estimated cost of the project after allowing for forecast increases in construction prices during the period of construction.*

to reach about 2,450 tpd (Note 6) in 2001. Even allowing for a 10% reduction in the forecast amount of waste (Note 7), some 2,200 tpd of waste would still be generated. The Island East RTS, with a design capacity of 1,200 tpd, could just cope with the waste collected by the FEHD at that time. The proposed Island West RTS was therefore designed to handle 1,000 tpd of waste to ensure that there would be a combined refuse transfer capacity of 2,200 tpd on Hong Kong Island in 2001. **In May 1997, the EPD commissioned the Island West RTS** (see Table 1 of paragraph 1.4 above).

West Kowloon RTS

3.4 In June 1994, the EPD obtained funding approval from the Finance Committee for the construction of an RTS in West Kowloon at an estimated capital cost of $808 million in MOD prices. The EPD informed the Finance Committee that waste collected by the FEHD and private-sector collectors in Kowloon, Kwai Tsing and Tsuen Wan was estimated to reach about 5,300 tpd (Note 8) in 2001. The EPD estimated that some 4,410 tpd of waste collected by the FEHD and private-sector collectors would need to be delivered to landfills through the existing Kowloon Bay RTS and the proposed West Kowloon RTS, after taking into account the following factors:

(a) a 10% reduction in the forecast amount of waste (see Note 7 of paragraph 3.3 above); and

(b) some of the waste generated in the eastern part of Kowloon would be directly transferred to the SENT landfill (see Figure 1 of paragraph 1.4 above).

The Kowloon Bay RTS has a design capacity of 1,800 tpd but was expected to be capable of handling 2,000 tpd of waste. The West Kowloon RTS was therefore designed to handle 2,500 tpd of waste to ensure that there would be a combined capacity of 4,500 tpd in Kowloon in 2001. **In June 1997, the EPD commissioned the West Kowloon RTS** (see Table 1 of paragraph 1.4 above).

Note 6: *The waste forecast was made by the EPD in 1993. Based on the EPD's forecast, of the estimated 2,450 tpd of waste that would be generated in 2001, 1,570 tpd (or 64%) and 880 tpd (or 36%) were expected to be collected by the FEHD and private-sector waste collectors respectively.*

Note 7: *In 1994, the Government commissioned a waste reduction study to develop a range of new initiatives that would bring about a major reduction in the volume of waste requiring disposal.*

Note 8: *According to the final report of the consultancy study for the West Kowloon RTS of March 1994, of the estimated 5,300 tpd of waste that would be generated in 2001, about 2,800 tpd (or 53%) and 2,500 tpd (or 47%) were expected to be collected by the FEHD and private-sector collectors respectively.*

North Lantau RTS

3.5 In February 1994, the Territory Development Department (Note 9) obtained funding approval from the Finance Committee for the construction of an RTS in North Lantau at an estimated capital cost of $387 million in MOD prices as part of the North Lantau development. The Finance Committee was informed that the North Lantau RTS, designed to handle 1,200 tpd (Note 10) of waste collected by the FEHD and private-sector collectors, would be sufficient to meet the demand from the development of North Lantau and the new Hong Kong International Airport at Chek Lap Kok up to year 2011. **In June 1998, the EPD commissioned the North Lantau RTS** (see Table 1 of paragraph 1.4 above).

Charging for the RTS service provided to private-sector waste collectors

Charging arrangement

3.6 The 1989 Waste Disposal Plan stated that RTSs had a key role to play in the waste disposal strategy. If full costs were to be charged for providing the proposed RTS service to private-sector waste collectors, they would have less incentive to utilise the service of the RTSs. They would rather prefer to deliver the waste directly to the landfills, which were provided free of charge (see Note 12 of paragraph 3.8 below). This would lead to an uneven distribution of the waste among the three landfills, resulting in an early exhaustion of the capacity of the most popular landfill (i.e. the SENT landfill). There would also be operational difficulties in coping with a large number of small collection vehicles at the popular landfill.

Implementation of an RTS charging scheme

3.7 In October 1994, the Secretary for the Treasury, on the recommendation of the Central Tender Board (CTB — Note 11), gave approval to the EPD to shortlist tenderers for the Island West RTS contract, and imposed the condition that the contract should only be awarded upon the

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Note 9: *The EPD was responsible for the planning and management of the North Lantau RTS contract.*

Note 10: *The North Lantau RTS was developed by stages. The design capacity for the initial stage was 650 tpd. When the RTS is fully developed, the design capacity will reach 1,200 tpd. For the initial years of the North Lantau RTS's operation, waste delivered to it from the new airport was expected to account for about 68% of the waste handled by this RTS (see paragraph 4.14 below). The waste forecast of the new airport was based on the Provisional Airport Authority's assessment in 1993.*

Note 11: *The CTB is chaired by the Secretary for the Treasury. Its members include the Director of Government Supplies, the Secretary for Works or his representative, a member of the Department of Justice and a Deputy Secretary for the Treasury. The CTB is responsible for making recommendations to the Secretary for the Treasury on the acceptance of tenders.*

development of an RTS charging scheme. In March 1995, the then Planning, Environment and Lands Bureau (PELB) assured the CTB that an RTS charging scheme would be introduced to tie in with the commissioning of the new RTSs in mid-1997.

3.8 In May 1995, the EPD initiated action on the development of an RTS charging scheme. Meanwhile, the EPD was implementing the landfill charging scheme (Note 12). In mid-1995, the private-sector waste collectors objected to the implementation of the landfill charging scheme. The EPD then deployed its staff resources to revise the landfill charging scheme to address the waste collectors' concerns. This led to a delay in the development of the RTS charging scheme. In March 1996, the then PELB informed the Chief Secretary for Administration's Committee of its proposal that the RTS charging scheme should recover the operating costs of transferring waste collected by private-sector collectors to landfills in phases. In June 1996, the EPD estimated that it would take a further 21 months to introduce the RTS charging scheme by subsidiary regulation under the Waste Disposal Ordinance (Cap. 354). On this basis, the RTS charging scheme would only be implemented in 1998 and could not tie in with the commissioning of the Island West RTS and the West Kowloon RTS in mid-1997.

3.9 In September 1996, the EPD proposed to the then PELB that the RTS charging scheme should be implemented by administrative measures (Note 13) rather than by enacting legislation which would involve a long lead time. The proposed implementation of the charging scheme by administrative measures would be simple to administer, and would tie in with the commissioning of the operation of the Island West RTS and the West Kowloon RTS in mid-1997. In late 1996, the then PELB sought advice of the Department of Justice (D of J — formerly the Attorney General's Chambers) about the proposed implementation of the RTS charging scheme by administrative measures. In reply, the D of J advised that it would not be acceptable, from the legal point of view, to implement the RTS charging scheme by administrative measures. In early 1997, the EPD started to prepare draft drafting instructions with a view to introducing the RTS charges by enacting subsidiary regulation.

Note 12: *The landfill charging scheme was approved by the Executive Council in May 1995. After the implementation of the landfill charging scheme, the RTS users would have to pay both the landfill charge and the RTS service charge, while non-RTS users would have to pay the landfill charge only. In June 1995, because of objections from private-sector waste collectors, the Government undertook not to implement the landfill charging scheme until there was agreement between the Government and the waste collectors on the charging arrangement. Up to February 2001, the landfill charging scheme had not yet been implemented.*

Note 13: *There were provisions in the RTS contracts for the handling of private-sector collected waste by the RTS operators. The proposed administrative measures were to allow the RTS operators to provide the RTS service to private-sector waste collectors and to collect a service fee from them. The service fee was to be administered by the RTS operators while the Government only played regulatory and coordinating roles.*

3.10 In late 1997, the then PELB consulted the then Provisional Legislative Council Panel on Environmental Affairs, the Advisory Council on the Environment, the then Provisional Urban Council Public Health Select Committee and the then Provisional Regional Council Environmental Hygiene Select Committee and the relevant trade associations about the proposed RTS charging scheme. In the consultation with the then Provisional Legislative Council Panel on Environmental Affairs in November 1997, some Members raised concerns about the proposed RTS charges. They suggested that the Government should consider the cost structures of private-sector waste collectors in devising the charging scheme and should provide sufficient financial incentive to them. The Government explained that the RTS service would be a voluntary alternative disposal means for private-sector waste collectors. The Government had taken a conscious decision not to charge the full cost of providing the service, after taking into account the potential savings to private-sector waste collectors in using the RTS service. As a trial scheme, the RTS charging scheme would be reviewed six months after implementation.

3.11 In January 1998, the Administration submitted to the Executive Council (ExCo) an ExCo Memorandum setting out the salient features of the charging scheme, as follows:

(a) ***A voluntary scheme.*** In the first phase, private-sector waste collectors would only be allowed to use the RTS service of the Island East RTS (Note 14) and the West Kowloon RTS (Note 15) on a voluntary basis. Those waste collectors who would not choose to use the service could continue to deliver their waste to the landfills. Those waste collectors who chose to use the RTS service had to pay a service charge. A higher charge rate would be set for the peak hour period (between 8 a.m. and 9 a.m.). The provision of peak and non-peak hour charge rates was designed to regulate the utilisation of the RTSs so that the service currently provided to the FEHD would not be disrupted. A lower charge rate for non-peak hours was set to encourage utilisation of the RTSs in less busy periods;

(b) ***Charging basis.*** While it is the Government's policy to recover the full cost of service provision, it would be impractical in the case of the RTSs. The full-cost charge, estimated at $233 per tonne, would be economically unattractive to private-sector waste collectors. As the scheme was voluntary, these collectors would not use the RTSs and the available spare capacity in non-peak hours would not be fully utilised. The Government therefore **intended to recover at least the marginal operating cost**

Note 14: *The Island West RTS was not open to private-sector waste collectors in 1998 because the adjacent road network had not yet been completed and was not able to cope with a higher traffic load. Therefore, only the Island East RTS was open to private-sector waste collectors on Hong Kong Island.*

Note 15: *The EPD made available only the West Kowloon RTS to private-sector waste collectors in Kowloon because it has a high design capacity and it is far away from the SENT landfill.*

(i.e. the additional cost to the Government) in providing the new RTS service, and at the same time to make the RTS service commercially viable to private-sector waste collectors. The marginal operating costs for handling waste delivered by private-sector collectors were $28.9 per tonne and $50 per tonne for the Island East RTS and the West Kowloon RTS respectively. Having regard to the potential savings (Note 16) available to private-sector waste collectors using the RTS service, the Government proposed that the charge rates should be:

(i) $65 per tonne for the Island East RTS. The peak hour rate should be $85 per tonne; and

(ii) $50 per tonne for the West Kowloon RTS (Note 17). The peak hour rate should be $65 per tonne; and

(c) ***Financial implications.*** In providing the RTS service to private-sector waste collectors on Hong Kong Island and in Kowloon, the Government would incur an estimated marginal operating cost of $16 million per annum, mainly for the payment of additional fees to the RTS operators and the administrative charges of account billing for RTS charges. The payment of these costs and the additional workload arising from the implementation of the charging scheme would be absorbed within the existing provision of the EPD. On the revenue side, the Government estimated that the RTS charges would generate $22.7 million per annum, on the assumption that 510 tpd and 580 tpd of waste would be delivered to the Island East RTS and the West Kowloon RTS respectively.

In January 1998, ExCo advised and the Chief Executive ordered that subsidiary regulation should be enacted to implement a charging scheme for the provision of the RTS service to private-sector waste collectors at the Island East RTS and the West Kowloon RTS.

North Lantau RTS charging scheme

3.12 In June 1998, the Administration submitted to ExCo an ExCo Memorandum setting out the salient features of the charging scheme at the North Lantau RTS, as follows:

Note 16: *Based on an EPD's market survey, the potential savings to private-sector waste collectors in using the RTS service included a reduction in travelling time to a landfill and savings in fuel cost and tunnel tolls.*

Note 17: *In October 1996, the EPD proposed to the then PELB to set the RTS charge for the West Kowloon RTS at a level below the marginal operating cost of $50 per tonne. Otherwise, the RTS charge would be too high to be commercially attractive to the majority of private-sector waste collectors in the Kowloon region. However, upon further consideration by the Finance Bureau, the then PELB and the EPD in February 1997, it was decided that the RTS charge level for a region should not be lower than the corresponding marginal operating cost for that region.*

(a) ***Intended users.*** The North Lantau RTS was closest to the new Hong Kong International Airport at Chek Lap Kok which was scheduled to open in July 1998. Waste generated by the Airport Authority (AA) and its tenants in the passenger terminal building would be collected and transported by the AA's waste operator. The AA's franchisees and lessees would have to employ their own contractors to handle the waste generated. While the AA had agreed to deliver all the airport waste to the North Lantau RTS, the AA's franchisees, lessees and other private-sector waste collectors would unlikely use the RTS service if the RTS service charge was commercially unattractive;

(b) ***Charging basis.*** The marginal operating cost to the Government for handling waste delivered by private-sector collectors at the North Lantau RTS was $64 per tonne. Having regard to the potential savings (e.g. distance from the West Kowloon RTS, bridge tolls, etc.) to private-sector waste collectors (Note 18), the Government proposed to charge $110 per tonne for using the North Lantau RTS during both peak and non-peak hours. There was no need to provide for different peak and non-peak hour charges as the Government expected the utilisation of the North Lantau RTS to be low for some time; and

(c) ***Financial implications.*** The provision of the RTS service to private-sector waste collectors in North Lantau would incur an estimated marginal operating cost of $4.67 million per annum, mainly for the payment of additional fees to the North Lantau RTS operator and for the administration of the account billing system. The payment of these costs and the additional workload arising from the implementation of the charging scheme would be absorbed within the existing provision of the EPD. On the revenue side, the Government estimated that the proposed RTS charge would generate $8 million per annum, on the assumption that 200 tpd of waste would be delivered to the North Lantau RTS.

In June 1998, ExCo advised and the Chief Executive ordered that subsidiary regulation should be enacted to charge for the provision of the RTS service to private-sector waste collectors in North Lantau.

Low utilisation of the RTS service by private-sector waste collectors

3.13 In April 1998, the Island East RTS and the West Kowloon RTS began to provide RTS service to private-sector waste collectors. While it was stated in the January 1998 ExCo Memorandum that 510 tpd and 580 tpd of waste collected by private-sector collectors would be delivered to the Island East RTS and the West Kowloon RTS respectively, the EPD's statistics showed that the actual utilisation of the two RTSs by private-sector waste collectors was consistently below the expected levels. Details are given in Table 3 below.

Note 18: *According to the EPD's records, the estimated savings to private-sector waste collectors using the North Lantau RTS ranged from $110 to $120 per tonne.*

Table 3

Waste collected by private-sector collectors and delivered to Island East RTS and West Kowloon RTS 1998 to 2000

RTS	Year	Expected quantity (according to January 1998 ExCo Memorandum)	Actual quantity	Percentage
		(a)	(b)	$\frac{(b)}{(a)} \times 100\%$
		(tpd)	(tpd)	
Island East	1998 (April to December)	510	3	0.6%
	1999	510	7	1.4%
	2000 (January to October)	510	11	2.2%
West Kowloon	1998 (April to December)	580	14	2.4%
	1999	580	26	4.5%
	2000 (January to October)	580	37	6.4%

Source: EPD's records

3.14 Based on the EPD's statistics, the actual quantities of waste handled by private-sector waste collectors on Hong Kong Island and in western Kowloon were 592 tpd and 819 tpd respectively in 1998, and increased to 604 tpd and 892 tpd respectively in 1999 (Note 19). If more private-sector waste collectors had made use of the RTSs, the overall utilisation of the Island East RTS and the West Kowloon RTS in 1998 and 1999 would have been significantly increased as illustrated in Table 4 below. The financial implications of not optimising the usage of the two RTSs in 1998 and 1999 were estimated to be $11.4 million in terms of depreciation cost of fixed assets not gainfully employed (see Appendix A for details).

Note 19: *The actual quantities of waste handled by private-sector waste collectors on Hong Kong Island and in western Kowloon in 1998 and 1999 were lower than the estimated waste levels used for planning the Island West RTS and the West Kowloon RTS in 1993 and 1994 respectively (see Note 6 of paragraph 3.3 and Note 8 of paragraph 3.4 above). This was because there was a decrease in municipal waste for Hong Kong Island and western Kowloon in 1994 and 1995.*

Table 4

Overall utilisation of the RTSs

RTS	Year (Note 1)	Design capacity of the RTS	Quantity expected to be delivered by private-sector waste collectors	Actual quantity delivered by		Overall utilisation	
				FEHD	Private-sector waste collectors	Expected	Actual
		(a)	(b)	(c)	(d)	(e) = $\frac{(c)+(b)}{(a)}$ × 100%	(f) = $\frac{(c)+(d)}{(a)}$ × 100%
		(tpd)	(tpd)	(tpd)	(tpd)	(%)	(%)
Island East	1998 (April to December)	1,200	368 (Note 2)	832	3	100.0	69.6
	1999	1,200	345 (Note 2)	855	7	100.0	71.8
West Kowloon	1998 (April to December)	2,500	580 (Note 3)	1,434	14	80.6	57.9
	1999	2,500	580 (Note 3)	1,519	26	84.0	61.8

Source: *"Monitoring of Solid Waste in Hong Kong" 1998 and 1999, the EPD*

Note 1: *Full year data for 2000 were not yet available.*

Note 2: *According to the January 1998 ExCo Memorandum, 510 tpd of waste collected by private-sector collectors would be delivered to the Island East RTS. However, in 1998 and 1999, the actual quantities of FEHD collected waste at the Island East RTS were 832 tpd and 855 tpd respectively (i.e. more than the estimated quantities for FEHD). Therefore, the Island East RTS only had the capacity to handle the private-sector collected waste of 368 tpd in 1998 and 345 tpd in 1999 (i.e. column (a) minus column (c)).*

Note 3: *According to the January 1998 ExCo Memorandum.*

Reviews of provision of RTS service to private-sector waste collectors

3.15 ***The 1998 review.*** In November 1998, the EPD submitted a review report to the then PELB on the provision of RTS service to private-sector waste collectors at the Island East RTS and the West Kowloon RTS. The salient points of the review report are as follows:

(a) ***Low private sector usage.*** The private sector usage rate remained at an unexpectedly low level for some six months, from late April to October 1998;

(b) ***Financial loss.*** The intake of waste was much lower than the EPD's original estimate. From April to September 1998, the Government incurred a net loss of $658,950 in providing the RTS service to private-sector waste collectors at the Island East RTS. Taking into account the profit of $192,780 for the West Kowloon RTS for the same period, the net loss was reduced to $466,170 (Note 20);

(c) ***User survey.*** According to a mini-survey carried out at the SENT landfill in June 1998, 58% of the respondents said that they did not use the RTS service because the RTS charge rates were too high;

(d) ***Possible cause of low utilisation.*** The EPD's assessment of the possible cause of the low usage rate was that the charge rates were set at levels very close to the average cost savings of the users. It was expected that the time saved in using the RTS service would provide private-sector waste collectors with another incentive, i.e. an opportunity to expand their waste collection services. However, the EPD stated that with the decline in Hong Kong's economy in late 1997, the time savings no longer represented an opportunity for private-sector waste collectors to expand their business; and

(e) ***EPD's recommendation.*** The EPD recommended continuation of the scheme for another six months to allow time for more detailed investigation into the possible causes of the low usage of the scheme.

3.16 ***The 1999 review.*** In late 1999, the EPD submitted a second review report to the then PELB on the provision of the RTS service to private-sector waste collectors. The salient points of this review report are as follows:

Note 20: *In the EPD's subsequent review as mentioned in the paragraph 3.16(a) below, there would in fact be no loss incurred if the savings in landfill costs had been taken into account.*

(a) ***Savings in landfill costs not previously taken into account.*** The EPD's record showed that private-sector waste collectors on Hong Kong Island and in Kowloon had delivered their waste to the SENT landfill, instead of using the RTSs. The provision of the RTS service at the Island East RTS and the West Kowloon RTS, with the designated disposal site at the WENT landfill, would result in a redistribution of the waste from the SENT landfill to the WENT landfill. As the landfill disposal cost of the WENT landfill was lower than that of the SENT landfill, there would be savings in landfill disposal cost which had not been taken into account when the RTS charges were set in 1998. The savings were so significant that it would in most cases offset the Government's marginal operating cost of providing the RTS service to private-sector waste collectors (Note 21). Therefore, it was possible to consider establishing more commercially attractive charge rates to improve the utilisation of the RTS service;

(b) ***Analysis of savings to private-sector waste collectors.*** Because of the lack of an appropriate computer model, an analysis of the estimated savings to private-sector waste collectors on using the RTS service was not possible at the time when the RTS charging scheme was first designed. With the aid of the newly commissioned computer-based waste management model, the estimated savings to private-sector waste collectors and their demands of the RTS service under different levels of charges could be worked out. Based on this analysis, the EPD found that reducing the charge level to $40 per tonne for the Island East RTS and $30 per tonne for the West Kowloon RTS would increase the utilisation of the RTSs and optimise the cost recovery to the Government;

(c) ***Peak-hour rates.*** Past records showed that the peak hour rate might not deter some users from using the RTS service. The average turn-around time of the FEHD's waste collection vehicles was not affected even when private-sector waste collectors were using the service during the peak hour. In view of the usage rate, it was considered possible to set the peak and non-peak hour rates at the same level; and

(d) ***North Lantau RTS.*** The EPD anticipated that the waste intake would increase with the completion of the Tung Chung New Town development (Note 22). As the utilisation of the North Lantau RTS was fairly constant throughout the period, the EPD recommended that the charge rate for the North Lantau RTS should remain unchanged.

Note 21: *The Government has to pay the landfill operators a service charge for the disposal of waste at landfills on a tonnage basis. The service charge at the SENT landfill is higher than that of the WENT landfill. Based on the EPD's estimate, the savings in landfill disposal cost to the Government as a result of the redistribution of waste collected by private-sector collectors from the SENT landfill to the WENT landfill were about $46 per tonne.*

Note 22: *The waste intake at the North Lantau RTS increased from 44 tpd in 1998 to 91 tpd in 1999, and to 124 tpd in October 2000. According to the EPD's records, the private-sector waste collectors of the new airport frequently used the North Lantau RTS.*

Revision of the RTS charging scheme

3.17 Having regard to the findings of the 1999 review, in December 1999, the EPD recommended:

(a) a reduction of the charge rates at the Island East RTS, from $65 per tonne to $40 per tonne, and at the West Kowloon RTS, from $50 per tonne to $30 per tonne;

(b) opening of the Island West RTS to private-sector waste collectors; and

(c) abolishing the peak hour rate of charge.

The Environment and Food Bureau (formerly the PELB) and the Finance Bureau endorsed the proposed revision of the RTS charging scheme in February 2000 and May 2000 respectively. Public consultation on the proposed revision of the RTS charging scheme was in progress.

Audit observations and recommendations on the provision of the RTS service to private-sector waste collectors

Delay in extending the RTS service to private-sector waste collectors

3.18 The Island West RTS and the West Kowloon RTS were completed in mid-1997 to provide the RTS service to both the FEHD and private-sector collectors. **In March 1995, the then PELB assured the CTB that an RTS charging scheme would be introduced to tie in with the commissioning of the Island West RTS and the West Kowloon RTS in mid-1997 (see paragraph 3.7 above).** However, in mid-1995, because of the problems encountered in implementing the landfill charging scheme, the EPD deployed its staff to revise the landfill charging scheme (see paragraph 3.8 above). This led to a delay in developing the RTS charging scheme. In September 1996, the EPD suggested the implementation of the RTS charging scheme by administrative measures in order to speed up the process, but without success. **As a result, the EPD was only able to implement the RTS charging scheme and to provide the RTS service in April 1998 (i.e. almost one year after the commissioning of the Island West RTS and West Kowloon RTS).** Audit understands that in 1995, the EPD was unable to implement both the landfill charging scheme and the RTS charging scheme because of limited staff resources. However, bearing in mind that the target date of implementation of the RTS charging scheme was in mid-1997, urgent action should have been taken to implement the RTS charging scheme in late 1995 because the EPD had estimated that the process would take about 21 months to complete.

3.19 **Audit has *recommended* that the Director of Environmental Protection should closely monitor the implementation of charging schemes in connection with the provision of new waste management services to ensure that potential problems which may arise are immediately addressed so as to enable the charging schemes to be implemented without undue delay.**

Low utilisation of the RTS service by private-sector waste collectors

3.20 Since the extension of the RTS service to private-sector waste collectors in April 1998, the utilisation of the two RTSs by private-sector waste collectors has been much lower than expectations. **As can be seen from Table 3 of paragraph 3.13 above, for the 31 months from April 1998 to October 2000, the quantity of waste delivered to the Island East RTS by private-sector collectors was only in the range of 0.6 per cent to 2.2 per cent of the expected quantity of 510 tpd stated in the January 1998 ExCo Memorandum. For the same period, the quantity of waste delivered to the West Kowloon RTS by private-sector collectors was in the range of 2.4 per cent to 6.4 per cent of the expected quantity of 580 tpd stated in the January 1998 ExCo Memorandum.** This is unsatisfactory because:

(a) the objectives of providing the RTSs were to reduce the environmental nuisance associated with the transportation of waste and to reduce the overall transportation cost. These objectives were not fully met;

(b) the capacity made available to private-sector collectors by the provision of the Island East RTS and the West Kowloon RTS was not fully utilised; and

(c) as a result of the low utilisation, the total waste (i.e. waste collected by the FEHD and private-sector collectors) handled by the Island East RTS was below the guaranteed minimum tonnage specified in the RTS contract. The Government had to pay the RTS operator the operating charge based on the guaranteed minimum tonnage of waste handled instead of the actual tonnage (see paragraph 4.9 below for details).

Problem in setting the RTS charge rates

3.21 According to the survey carried out by the EPD in 1998, 58% of the respondents said that they did not use the RTS service because the RTS charges were too high (see paragraph 3.15(c) above). The problem of setting the RTS charge rates is given in paragraphs 3.22 to 3.24 below.

3.22 ***Questionable assumptions.*** **As mentioned in paragraph 3.11 above, in the January 1998 ExCo Memorandum, ExCo was informed that the Government intended to recover at least the marginal operating cost of providing the RTS service and at the same time**

to make the RTS service commercially viable to private-sector waste collectors. ExCo was also informed that the proposed RTS charge rates would generate an additional revenue of $22.7 million a year, based on the assumption that 510 tpd and 580 tpd of waste collected by private-sector collectors would be delivered to the Island East RTS and the West Kowloon RTS respectively. However, based on the information provided by the EPD to the then PELB in July and October 1997, it was questionable whether the assumed waste intake levels would be achievable under the then proposed RTS charge rates. The reasons are as follows:

(a) ***Island East RTS.*** In July 1997, when seeking policy support for the proposed RTS charging scheme, the EPD informed the then PELB that, on the assumption that **all** the private-sector waste collectors on Hong Kong Island would use the RTS service, the waste intake at the Island East RTS would be 510 tpd. **However, as indicated by the EPD's costing information of October 1997 (summarised in Appendix B), it would not always be cost-effective for waste collectors using large and medium-sized waste collection vehicles to use the RTS. This was because the savings in their transportation cost, estimated to range from $52 per tonne to $65 per tonne, were about equal to the RTS charge of $65 per tonne. The expected savings would be fully offset by the proposed RTS charge of $65 per tonne. These waste collectors together handled some 76% of the total private-sector collected waste. It was therefore questionable whether the assumed waste intake at the Island East RTS would be achievable by levying an RTS charge at the rate of $65 per tonne**; and

(b) ***West Kowloon RTS.*** In July 1997, the EPD informed the then PELB that, on the assumption that **all** the private-sector waste collectors in western Kowloon, Kwai Tsing and Tsuen Wan areas would use the RTS service, the waste intake at the West Kowloon RTS would be 580 tpd. **However, as indicated by the EPD's costing information of October 1997 (summarised in Appendix B), it would not be cost-effective for waste collectors using large and medium-sized waste collection vehicles to use the RTS. This was because the savings in their transportation cost, estimated to be from $24 per tonne to $37 per tonne, were much lower than the RTS charge of $50 per tonne. These waste collectors handled some 77% of the total private-sector collected waste. It was therefore questionable whether the assumed waste intake at the West Kowloon RTS would be achievable under the RTS charge rate of $50 per tonne.**

3.23 In the 1998 review, the EPD said that the RTS charge rates were set very close to the cost savings to private-sector waste collectors because it was expected that the time saved in using the RTS would provide them with another incentive, i.e. an opportunity to expand their business (see paragraph 3.15(d) above). However, there were no supporting data to show whether the time savings would provide sufficient incentive to attract all the private-sector waste collectors to use the RTSs, as had been assumed in making the revenue estimates in the January 1998 ExCo Memorandum. **In the circumstances, the RTS charge should have been set at lower rates so as to attract more private-sector waste collectors to use the RTSs.**

3.24 ***Savings in landfill cost not taken into account.*** As stated in the 1989 Waste Disposal Plan, one of the objectives of the RTS operation was to facilitate an even distribution of waste finally disposed of at the three strategic landfills. In setting the RTS charge in 1998, the EPD had to follow the decision made in February 1997 that the RTS charge level for a region should not be lower than the corresponding marginal operating cost of that region (see Note 17 of paragraph 3.11(b) above). **However, as mentioned in paragraph 3.16(a) above, in 1999, the EPD realised that, as a result of the redistribution of waste collected by private-sector collectors from the SENT landfill to the WENT landfill through the RTS operation, there were significant savings in landfill cost. Such savings in cost would, in most cases, offset the Government's marginal operating cost of providing the RTS service to private-sector waste collectors. If these savings had been taken into account when the RTS charges were set in 1998, it would have been possible to set lower RTS charges which would have been more acceptable to private-sector waste collectors.** Audit notes that the EPD is currently taking action to revise the RTS charge, taking into account the savings in landfill cost.

3.25 **Audit has *recommended* that the Administration should, in setting the service charges of waste management facilities such as those of the RTSs, critically consider all relevant cost factors and environmental benefits before deciding the charges.**

RTS charging strategy and capacity of future RTSs

3.26 After the review in 1999, the EPD is currently in the process of implementing a revised charging scheme with a view to attracting private-sector waste collectors to use the RTSs. The new charge rates were proposed after analysing the potential effects of different charge rates on the estimated savings to private-sector waste collectors and their demand for the RTS service, as well as the Government's recovery of cost (Note 23). **The EPD's analysis showed that the proposed new charge rates were expected to optimise the cost recovery to the Government, and would increase private-sector waste collectors' utilisation of the RTSs to 307 tpd and 167 tpd for the two Hong Kong Island RTSs and the West Kowloon RTS respectively. However, the projected RTS utilisation still represented only 51% and 19% of the waste collected in 1999 by private-sector collectors of 604 tpd and 892 tpd for Hong Kong Island and western Kowloon respectively. Based on the EPD's analysis, the utilisation of the RTSs could be further increased if there were further reduction in the RTS charges.** Audit notes that the EPD has planned to also utilise the Island East RTS to handle construction waste, and the West Kowloon RTS to also handle both construction waste and sewage sludge (Note 24). While these measures

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Note 23: *As mentioned in paragraph 3.24 above, the savings in landfill disposal cost would in most cases offset the marginal operating cost to the Government in providing the RTS service to private-sector waste collectors. The term cost recovery refers to the partial recovery of the Government's full cost in providing the RTS service.*

Note 24: *RTSs do not normally accept construction waste and sewage sludge, which must, at present, be transported to the landfills for disposal.*

are expected to use some of the spare capacity of the RTSs in the interim, and reduce the environmental problems associated with the transportation of these wastes to landfills, the EPD still needs to further promote the use of the RTSs by private-sector waste collectors because they are the intended users of the RTSs.

3.27 Two new RTSs, namely the North New Territories and South East Kowloon RTSs, are currently under planning (see Table 2 of paragraph 1.4 above). The North New Territories RTS is quite close to the NENT landfill, and the South East Kowloon RTS is quite close to the SENT landfill. If the charging rates are not attractive, private-sector waste collectors may prefer to deliver the waste directly to the landfills rather than to these two RTSs. Based on the Government's current RTS charging strategy, it is difficult to achieve full utilisation of the RTS service as intended by the Waste Disposal Plan (see paragraph 3.26 above). There is a need to review the long-term RTS charging strategy against the waste management objectives. If the long-term RTS charging strategy is that the Government should continue to recover the cost incurred, the implications to private-sector waste collectors' usage of the RTSs should be fully assessed. Otherwise, the RTSs will remain underutilised.

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

(a) **carry out a review of the long-term RTS charging strategy taking into account the Government's waste management objectives; and**

(b) **in carrying out the review, fully assess the impact of any charging proposal on the utilisation of the RTS service by private-sector waste collectors so as to ensure that all RTSs are gainfully used in future.**

Response from the Administration

3.29 The **Director of Environmental Protection** in general accepts the audit recommendations. He has said that:

Delay in extending the RTS service to private-sector waste collectors

(a) the EPD has been monitoring closely the implementation of the charging schemes. In view of the audit recommendation mentioned in paragraph 3.19 above, the EPD, in conjunction with the relevant bureaux and departments, will focus more on addressing any potential problems which may arise and take necessary actions to ensure the timely implementation of the charging schemes;

Problem in setting RTS charge rates

(b) the audit recommendation on setting the service charges of waste management facilities mentioned in paragraph 3.25 above is reasonable and reaffirms that the direction of the EPD's review is correct. However, it should be noted that the EPD has no sole control over the basis of charging and has to take into account the views of the relevant policy bureaux;

RTS charging strategy and capacity of future RTSs

(c) he agrees with the audit recommendations on reviewing the RTS charging strategy mentioned in paragraph 3.28 above. He considers that the review of the RTS charging strategy should also take into account the environmental benefits, such as reduced air emission, to draw a balanced conclusion; and

General

(d) all the problems identified in the audit review were mainly caused by the continued failure to implement the landfill charge. The RTS charge was a new fee to private-sector waste collectors. They might be rather reluctant to pay a charge for the service. However, the original programme was to implement the RTS charging scheme after the implementation of the landfill charging scheme. If private-sector waste collectors were used to paying the landfill charge, they would unlikely be reluctant to use the RTS service which would only cost them a bit more. In addition, the landfill charging scheme is an effective economic measure to promote waste reduction. After the implementation of the landfill charging scheme, the waste collected by the waste collection vehicles in each trip can well be reduced significantly. As the EPD's analysis indicates that it is more cost-effective for vehicles with small and medium loads to use the RTS service, the EPD expects that more private-sector waste collectors will be attracted to deliver waste to the RTSs.

3.30 The **Secretary for the Environment and Food** has said that:

Problem in setting RTS charge rates

(a) she agrees with the audit recommendation mentioned in paragraph 3.25 above that all relevant factors, including costing and environmental ones, should be considered in setting the service charges of waste management facilities. In 1999, the Administration

initiated a review of the current RTS charges, taking into account the revenue and cost in servicing the private-sector waste collectors at the RTSs and the savings in landfill cost as a result of the redistribution of waste collected by them from the SENT landfill to the WENT landfill. Subject to the endorsement of the Legislative Council, the Administration will reduce the RTS charges starting from late-April 2001. The Administration will closely monitor the utilisation rate of the RTSs by private-sector waste collectors after the rate reduction and further review the rate as and when necessary; and

RTS charging strategy and capacity of future RTSs

(b) it is the existing charging policy that RTS charges should be set at levels which will be commercially viable to private-sector waste collectors and enable the Government to cover at least the marginal operating cost for handling the waste delivered by private-sector waste collectors. She agrees with the audit recommendations mentioned in paragraph 3.28 above to carry out a review of the long-term RTS charging strategy with the Finance Bureau and the EPD and to fully assess the implications of the charging strategy to the utilisation of the RTS service by private-sector waste collectors. The Administration will first need to ascertain the elasticity of demand of private-sector waste collectors for RTS service some time after the implementation of the new RTS charges.

3.31 The **Secretary for the Treasury** agrees with the audit recommendations mentioned in paragraphs 3.19, 3.25 and 3.28 above. She has said that she will support the Environment and Food Bureau and the EPD in reviewing the long-term RTS charging strategy, taking all relevant factors into consideration.

PART 4: DESIGN, BUILD AND OPERATE CONTRACT ARRANGEMENT

4.1 The EPD has adopted a design, build and operate contract arrangement for the development and operation of all the RTSs. This PART examines the design, build and operate contract arrangement for the development and operation of the RTSs. The audit has revealed that there are issues which warrant the EPD's attention in respect of the provision of guaranteed minimum tonnage of waste in the contracts.

Need for a design, build and operate contract arrangement

4.2 In January 1988, ExCo decided that, subject to an operational and financial appraisal, the option of operating the RTSs by the private sector should be considered. To implement ExCo's decision, in late 1988, after an appraisal had been carried out which concluded that it would be generally cheaper to use a private-sector operator, a contract for the development and operation of the first RTS in Kowloon Bay was awarded to a private-sector consortium. In a report of August 1996, the EPD advised the then PELB of the need for adopting a design, build and operate contract arrangement for the development and operation of the RTSs by private-sector operators. The salient features of that report are given in paragraphs 4.3 to 4.5 below.

4.3 RTSs are large-scale infrastructural projects with stringent environmental requirements. After the construction phase, they will be operated by the same contractor for an operational period of 15 years. Their development not only requires significant financial commitment on the part of the Government, but also an appropriate contractual framework to apportion the responsibilities and risks between the Government and the RTS operators.

4.4 In developing an appropriate contractual framework for the RTS, the EPD drew on the experience from the provision of the then existing landfills (Note 25). These landfills were provided through conventional civil engineering contracts. While these conventional civil engineering contracts had adequate control over the capital works element of the project, there were inadequacies from the operational angle.

4.5 After due consideration, in 1988, the EPD decided to adopt a design, build and operate contract arrangement for the development of the RTSs. Under this contract arrangement, the operator is responsible for designing the RTS, building it to his own design, and operating the

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Note 25: *The then existing landfills refer to those landfills in operation before the Government designated the three strategic landfills, i.e. the SENT landfill, the NENT landfill and the WENT landfill.*

RTS for a period of 15 years from the date of commissioning. Provided that the operator's proposal satisfies the performance requirements and the environmental standards set by the EPD, he is given maximum flexibility to propose his own innovative technology for the contract. The advantages of the design, build and operate contract arrangement are summarised below:

(a) ***Clearly defined responsibilities.*** Responsibilities and liabilities are clearly defined because one party (i.e. the RTS operator) carries out the design, construction and operation work. In the event of non-compliance, deductions from contract payments can be made;

(b) ***Access to international expertise.*** International waste management companies can be attracted. This provides an assurance that the most modern technology will be used to meet the high environmental standards; and

(c) ***Speed in project commissioning.*** A project can be commissioned faster as all civil works, electrical and mechanical services of an RTS are controlled by the operator as a single entity.

Contract payments

4.6 Under the design, build and operate contract arrangement, upon the commissioning of the RTS, the Government pays the operator the lump sum capital cost of the RTS. Thereafter, for the 15-year operational period, the Government makes monthly payments to the operator for the operation of the RTS according to the levels of waste intake. In relation to the monthly operating charge, the design, build and operate contract has the following contractual provisions:

(a) ***Banded charge rates.*** The operator is allowed to tender different charge rates for different levels of waste intake, i.e. higher charge rates for low levels of waste intake and progressively lower charge rates for higher levels of waste intake;

(b) ***Price adjustment.*** To allow for price fluctuations over the long operational period, the monthly operating charges payable to the operator will be adjusted according to the movements in the Consumer Price Index since the tendering stage. The price fluctuation formula and index will be subject to reviews at five-yearly intervals by the Government; and

(c) ***Guaranteed minimum payment.*** To protect the operators against unforeseen reductions in waste intake over the long contract period, the Government guarantees the operator a minimum operating charge based on a guaranteed minimum tonnage of waste. Such a provision would obviate the need for the operator to take account of unforeseen reductions in waste intake in his tender price.

Guaranteed minimum tonnage of waste

4.7 For the first two RTSs in Kowloon Bay and Island East, for which the EPD entered into contracts with the operators before 1992, the EPD allowed the operators to bid for the guaranteed minimum tonnage of waste as part of their tenders. Since 1992, this arrangement has been changed and the EPD has set the guaranteed minimum tonnage of waste in the RTS contracts. This change was made after the completion of a consultancy study (Note 26). The consultant advised the EPD that the guaranteed minimum tonnage of waste would need to be chosen with care. **The purpose of setting the guaranteed minimum payment should be that this contractual provision would only be invoked in extreme circumstances and should not be used routinely.** Otherwise, the form of payment would not be different from a fixed fee, and the benefits of the chosen method of payment of banded charge rates (see paragraph 4.6(a) above) would be missed. Therefore, the guaranteed minimum tonnage of waste should be set lower than that of the expected waste intake. A low guaranteed minimum tonnage of waste may attract some additional price loading but the competitive tendering position should help to overcome this problem.

Actual waste intake below the guaranteed minimum tonnage provided for in RTS contracts

4.8 Audit found that, of the seven RTSs currently in operation, four RTSs (i.e. the Island West RTS, the Island East RTS, the Outlying Islands Refuse Transfer Facilities and the North Lantau RTS) had not received waste up to the guaranteed minimum tonnages specified in their respective contracts for periods of two years or more. Table 5 below summarises the position up to October 2000.

Note 26: *The consultancy study was completed in January 1992 and its purpose was for the development of a new form of contract for the three strategic landfills. However, the EPD also took on board the consultant's recommendations in its RTS contracts.*

Table 5

Actual waste intake less than the guaranteed minimum tonnages specified in four RTS contracts

RTS contract	Period during which actual waste intake was below the guaranteed minimum tonnage	Minimum tonnage guaranteed by the contract (a) (tpd)	Actual waste intake (b) (tpd)	Percentage below the guaranteed minimum tonnage [(a) - (b)] ´ 100% / (a)
1. Island East	**41 months** i.e. from May 1997 to October 2000 (Note 1)	933	853	9%
2. Island West	**42 months** i.e. from May 1997 to October 2000	500	468	6%
3. Outlying Islands (Note 2):				
(a) Cheung Chau, Peng Chau and Mui Wo	**31 months** i.e. from April 1998 to October 2000	110	74	33%
(b) Hei Ling Chau	**27 months** i.e. from July 1998 to October 2000 (Note 3)	5	4	20%
4. North Lantau	**24 months** i.e. from June 1998 to June 2000 (Note 4)	100	87	13%

Source: EPD's waste intake records

Note 1: The actual waste intake exceeded the guaranteed minimum tonnage for the month of August 1999.

Note 2: The Sok Kwu Wan RTS and the Yung Shue Wan RTS on Lamma Island were commissioned in May 2000. The waste intake at Sok Kwu Wan RTS exceeded the guaranteed minimum tonnage from July 2000 onwards but the waste intake at the Yung Shue Wan RTS was below the guaranteed minimum tonnage for the six months ended October 2000. However, for illustration purposes, this audit review only focussed on those RTSs for which the guaranteed minimum tonnage was not met for a longer period of time.

Note 3: The actual waste intake exceeded the guaranteed minimum tonnage for the month of September 1999.

Note 4: The actual waste intake exceeded the guaranteed minimum tonnage for the month of August 1999 and from July 2000 onwards.

Financial implications

4.9 According to a provision of the RTS contract, if the actual waste intake is below the guaranteed minimum tonnage in any month, the Government has to make a guaranteed minimum payment for that month, as if the RTS operator has processed all the guaranteed minimum tonnage of waste. **As summarised in Appendix C, the total guaranteed minimum payments made by the Government to the RTS operators (from May 1997 to October 2000) would have been about $7.7 million more than the estimated charge payable if the payment had been based on the actual tonnage of waste intake.**

Audit observations on the provision of guaranteed minimum tonnage of waste in RTS contracts

4.10 Audit noted that the purpose of the provision of guaranteed minimum tonnage of waste in RTS contracts is to protect the RTS operators against any unforeseen reductions in waste intake. However, as pointed out by the EPD's consultancy study in 1992, the provision of the guaranteed minimum payment should only be invoked in extreme circumstances and should not be used routinely (see paragraph 4.7 above). **Audit considers that, based upon the experience from the four RTS contracts (see Table 5 of paragraph 4.8 above), in which the Government had made guaranteed minimum payments for two years or more, it is an opportune time for the EPD to fine-tune the mechanism for applying the provision of guaranteed minimum tonnage of waste in future RTS contracts.** (Details are given in paragraphs 4.11 to 4.18 below).

Contracts of two RTSs on Hong Kong Island

4.11 The Island East RTS was the first RTS in operation on Hong Kong Island and its contract provided for a guaranteed minimum tonnage of waste of 933 tpd (Note 27). Before the commissioning of the Island West RTS in May 1997, the Island East RTS could achieve the guaranteed minimum tonnage because it was the only RTS receiving the waste delivered by the FEHD on Hong Kong Island. The Island West RTS contract has provided for a guaranteed minimum tonnage of 500 tpd (Note 28). Upon the commissioning of the Island West RTS in May 1997, a portion of the waste delivered by the FEHD would be delivered to the Island West

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Note 27: *This guaranteed minimum tonnage was included as part of the tender of the Island East RTS operator. In accordance with the EPD's consultancy study of 1992, the EPD has changed this arrangement for subsequent RTS contracts. The EPD now sets the guaranteed minimum tonnage itself (see paragraph 4.7 above).*

Note 28: *Audit noted that in setting the guaranteed minimum tonnage for the Island West RTS, the EPD had taken into account the anticipated quantities of waste collected by the FEHD and private-sector collectors on Hong Kong Island. The guaranteed minimum tonnage for the Island West RTS had made an allowance for the possibility that not all the waste collected by private-sector collectors would be routed through the RTSs.*

RTS instead of to the Island East RTS (Note 29). However, utilisation of the Island East RTS by private-sector waste collectors was low because of the high RTS charge rates (see paragraph 3.21 above). As a result, the actual waste intake at both the Island East RTS and the Island West RTS has been lower than the guaranteed minimum tonnage.

4.12 As mentioned in paragraph 3.16 above, in 1999, the EPD reviewed the RTS charge rates with a view to promoting the use of the RTS. The EPD has made use of a new computer-based waste management model to make a more reliable estimate of the savings to private-sector waste collectors under different charging levels, and to assess the likely demand of the RTS service. This in turn has helped the EPD in revising the RTS charge rates. According to the EPD's estimate, the revised RTS charge rates thus arrived at could increase the overall waste intake of the two RTSs to more than the guaranteed minimum tonnage. This new computer-based waste management model was, however, not available in 1994 when the guaranteed minimum tonnage of waste was set in the Island West RTS contract.

4.13 **Audit considers that the new computer-based waste management model is useful for assessing the likely demand of the RTS service by private-sector waste collectors. The EPD should make use of suitable computer modelling techniques when it sets the guaranteed minimum tonnage of waste in future RTS contracts.**

North Lantau RTS

4.14 The North Lantau RTS serves the new North Lantau development, including the new Hong Kong International Airport at Chek Lap Kok. At the time of setting the guaranteed minimum tonnage of waste for the North Lantau RTS contract in 1995, the new North Lantau development was still under construction. According to the 1994 North Lantau RTS consultancy study (Note 30), the predominant source of waste would be waste from the new airport and the port facilities. This was especially so for the initial years of operation, in which it was expected that the waste from the new airport would account for some 68% of all the waste delivered to the North Lantau RTS. It was also expected that there would be a large variation in the quantities of waste during the 15-year operational period. The increase in waste generation would depend on the actual timing and scale of the development of the new airport and the port.

Note 29: *In 1997, the quantity of waste delivered by the FEHD to the Island East RTS and the Island West RTS was consistent with the EPD's estimate used for setting the guaranteed minimum tonnage in the Island West RTS contract. Only the quantity of waste delivered by private-sector collectors was below the EPD's estimate.*

Note 30: *The consultancy study confirmed, among other things, the feasibility and outline design of the North Lantau RTS before the contract for the North Lantau RTS was put to tender.*

4.15 In the circumstances, the EPD made a provision for two levels of the guaranteed minimum tonnage of waste in the North Lantau RTS contract. A lower guaranteed minimum tonnage level of 100 tpd will apply when the EPD's anticipated waste intake level is 300 tpd or below. A higher guaranteed minimum tonnage level of 300 tpd will apply when the EPD's anticipated waste intake exceeds 300 tpd.

4.16 As shown in Table 5 of paragraph 4.8 above, during the first two years of operation of the North Lantau RTS, the actual waste intake was lower than that anticipated. **However, due to higher usage, since July 2000 the initial guaranteed minimum tonnage of waste of 100 tpd has been exceeded. This shows that the provision of a two-tier guaranteed minimum tonnage of waste is useful for reducing the chances of the Government having to make guaranteed minimum payments during the initial years of the operation of the RTS, if the actual waste intake is below the amount stated in the contract.** In Audit's view, the EPD should consider using a similar arrangement for setting the guaranteed minimum tonnage of waste for future RTS contracts where it is anticipated that there would be a large variation in the quantities of waste during the contract period.

Outlying Islands Refuse Transfer Facilities

4.17 ***Waste forecast.*** As can be seen from Table 5 of paragraph 4.8 above, the actual waste quantities handled by the RTSs at Cheung Chau, Peng Chau and Mui Wo for the period April 1998 to October 2000 was 74 tpd, i.e. 36 tpd below the guaranteed minimum tonnage of 110 tpd provided for in the contract. In January 1996, when the EPD set the guaranteed minimum tonnage for these three Outlying Islands RTSs, the EPD had taken into account the estimated quantities of water and sewage treatment sludge (see Note 2 in Table 1 of paragraph 1.4 above) and municipal waste delivered by the FEHD, as follows:

(a) the EPD made reference to an estimate of 20 tpd of water treatment sludge expected to be produced from the Silvermine Bay Water Treatment Works in 1998, and 3 tpd of sewage sludge. However, the water treatment sludge was only delivered to the Mui Wo RTS starting from January 2001. This was because the construction of the sludge treatment and disposal facilities of the Silvermine Bay Water Treatment Works was completed in late 2000; and

(b) for the municipal waste, the EPD had made reference to two forecasts: one forecast by the consultant of the Outlying Islands Refuse Transfer Facilities project in 1993, and the other forecast made by the EPD in late 1995 (see the graph at Appendix D). In view of the difference in the waste estimates of the two forecasts, the EPD finally used the consultant's 1993 waste forecast which the EPD considered to be more conservative. However, the waste statistics available in January 1996 indicated that the consultant's 1993 forecast was still on the high side. This was because, while the consultant's forecast was that the waste quantity in 1994 would be 107 tpd, the actual waste quantity

in 1994 (Note 31) was only 81 tpd. Audit considers that there was merit for the EPD to review the waste forecast with reference to the latest available figures of waste collected in setting the guaranteed minimum tonnage.

4.18 ***Flexibility in RTS contracts.*** As mentioned in paragraph 4.17 above, due to circumstances which were unforeseen at the time of setting the guaranteed minimum tonnage for the Outlying Islands RTS contract, water treatment sludge was only delivered to the Mui Wo RTS starting from January 2001. The EPD's records showed that the quantities of water treatment sludge delivered to the Mui Wo RTS from two trial runs of the new sludge treatment and disposal facilities of the Silvermine Bay Water Treatment Works so far were 13 tonnes and 17 tonnes respectively. Based on the available data from January to October 2000, the average quantity of municipal waste and sewage treatment sludge handled by Cheung Chau, Peng Chau and Mui Wo RTSs was 74 tpd. The current indication is that the aggregate amount of municipal waste, water treatment sludge and sewage sludge expected to be handled by the three Outlying Island RTSs is likely to remain at levels below the guaranteed minimum tonnage of 110 tpd specified in the contract. The guaranteed minimum payment may still have to be made for some time in future. **At present, there is no provision in the RTS contract for a review of the terms of the guaranteed minimum tonnage.** However, Audit notes that there is a provision in the RTS contract for the regular review of the terms of price fluctuations by the Government and the operator. **Audit considers that it is necessary for the EPD to consider providing more flexibility in future RTS contracts so that the terms of the guaranteed minimum tonnage can be reviewed on a regular basis to cater for unforeseen circumstances.**

Audit recommendations on the provision of guaranteed minimum tonnage of waste in RTS contracts

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

(a) **in setting the guaranteed minimum tonnage of waste in future RTS contracts, critically examine the likely extent of utilisation of the RTS service by both the FEHD and private-sector waste collectors;**

(b) **review waste forecast used for setting the guaranteed minimum tonnage against the latest available figures of waste collected prior to tendering any design, build and operate contract;**

Note 31: *Based on the EPD's report on "Monitoring of Municipal Solid Waste 1993 and 1994" published in December 1995, the actual waste figure for Cheung Chau, Peng Chau and Mui Wo was 81 tpd.*

(c) **make full use of information technology (e.g. the computer-based waste management model that examines the sensitivity of demand to RTS charge level) in assessing the demand for a new RTS by private-sector waste collectors;**

(d) **where it is anticipated that there may be a large variation in the quantities of waste during the contract period, consider specifying two or more levels of guaranteed minimum tonnage of waste in the RTS contract, so that the risk of unexpected waste fluctuations will be shared fairly between the Government and the operator throughout the contract period; and**

(e) **consider incorporating greater flexibility into future RTS contracts so that the terms of the guaranteed minimum tonnage are subject to regular reviews and can be revised to take account of circumstances which have not been envisaged at the time of awarding the contract.**

Response from the Administration

4.20 The **Director of Environmental Protection** agrees that the audit recommendations mentioned in paragraph 4.19 above will enhance the guaranteed minimum tonnage provision in future RTS contracts as well as its management during the contract period. The EPD is ready to take these recommendations into account in planning future RTSs and preparing their contracts. He has said that:

(a) while there would be benefit to conduct a review on waste projection with reference to latest available information as mentioned in paragraph 4.17 above, it should be noted that the review will also need to take into account the long-term trend of waste growth which plays a more important role in waste forecast than the short-term waste fluctuation; and

(b) the availability of water works sludge from the Silvermine Bay Water Treatment Works will help resolve the problem of making guaranteed minimum payments for the three Outlying Islands RTSs mentioned in paragraph 4.18 above.

Financial implications of not fully utilising the Island East RTS and the West Kowloon RTS for 1998 and 1999

RTS	Year	Utilisation of the RTS (see Table 4 of paragraph 3.14 above)		Tangible fixed assets not gainfully employed	Annual depreciation of tangible fixed assets (see Table A1 below)	Financial implication
		Expected	Actual			
	(a)	(b)	(c)	(d) = (b) - (c)	(e)	(f) = (e) ´ (d) ´ (a)
					($ million)	($ million)
Island East	1998 (8 months, i.e. 2/3 year) (Note)	100%	69.6%	30.4%	13.2	2.7
	1999 (one year)	100%	71.8%	28.2%	13.2	3.7
West Kowloon	1998 (8 months, i.e. 2/3 year) (Note)	80.6%	57.9%	22.7%	13.4	2.0
	1999 (one year)	84.0%	61.8%	22.2%	13.4	3.0
					Total	**11.4**

Note: The two RTSs were open to private-sector waste collectors from 21 April 1998. The relevant period for calculating the depreciation cost is therefore reckoned to commence from May 1998.

Table A1

Annual depreciation of tangible fixed assets

	Building	**Marine vessels**	**Mechanical plant and equipment**	
Depreciation rate per annum (a) (Note 1)	2.5%	5%	10%	
Cost of tangible fixed assets (Note 2)	**($ million)**	**($ million)**	**($ million)**	**Total ($ million)**
Island East RTS (b)	56	126	55	**237**
West Kowloon RTS (c)	55	73	83	**211**
Annual depreciation:				
Island East RTS, i.e. (a) × (b)	1.4	6.3	5.5	**13.2**
West Kowloon RTS, i.e. (a) × (c)	1.4	3.7	8.3	**13.4**

Source: EPD's records

Note 1: Depreciation rates are based on the expected useful life of fixed assets laid down in the Treasury's Costing Manual.

Note 2: The cost of tangible fixed assets used in this calculation excluded those items of capital expenditure (e.g. seawall, access ramp, etc.) which did not vary directly with the scale of operation of the RTSs.

Appendix B
(paragraph 3.22 refers)

Percentage of total waste handled by waste collection vehicles of different size and EPD's estimated savings if RTS service used

Vehicle type	Hong Kong Island		Kowloon	
	% of waste handled (Note 1)	Savings per tonne (Note 2)	% of waste handled (Note 1)	Savings per tonne (Note 3)
		($)		($)
Small (5.5 tonnes or below)	24%	117	23%	67
Medium (above 5.5 tonnes but below or equal to 16 tonnes)	40%	65	41%	37
Medium (above 16 tonnes but below or equal to 24 tonnes)	34%	63	34%	31
Large (above 24 tonnes)	2%	52	2%	24
Total	**100%**		**100%**	

Source: EPD's records

Note 1: The percentages were the EPD's estimate based on summarised data collected at the SENT landfill from April to June 1996.

Note 2: The proposed RTS charge was $65 per tonne.

Note 3: The proposed RTS charge was $50 per tonne.

Appendix C
(paragraph 4.9 refers)

Guaranteed minimum payments made to RTS operators from May 1997 to October 2000

	RTS contract	Period for which guaranteed minimum payment applied	Actual guaranteed minimum payment made based on guaranteed minimum tonnage	Estimated operating charge based on actual waste intake level (Note 1)	Excess amount
			(a)	(b)	(a) - (b)
			($ million)	($ million)	($ million)
1.	Island East	May 1997 to October 2000 (Note 2)	292.1	289.5	**2.6**
2.	Island West	May 1997 to October 2000	183.7	182.3	**1.4**
3.	Outlying Islands: Cheung Chau, Peng Chau and Mui Wo (Note 3)	April 1998 to October 2000	92.2	91.1	**1.1**
4.	North Lantau	June 1998 to June 2000 (Note 4)	44.8	42.2	**2.6**
		Total	**612.8**	**605.1**	**7.7**

Source: *EPD's records*

Note 1: *The estimated operating charges were based on the EPD's extrapolation using trends of operating charges for waste intake levels above the guaranteed minimum tonnages.*

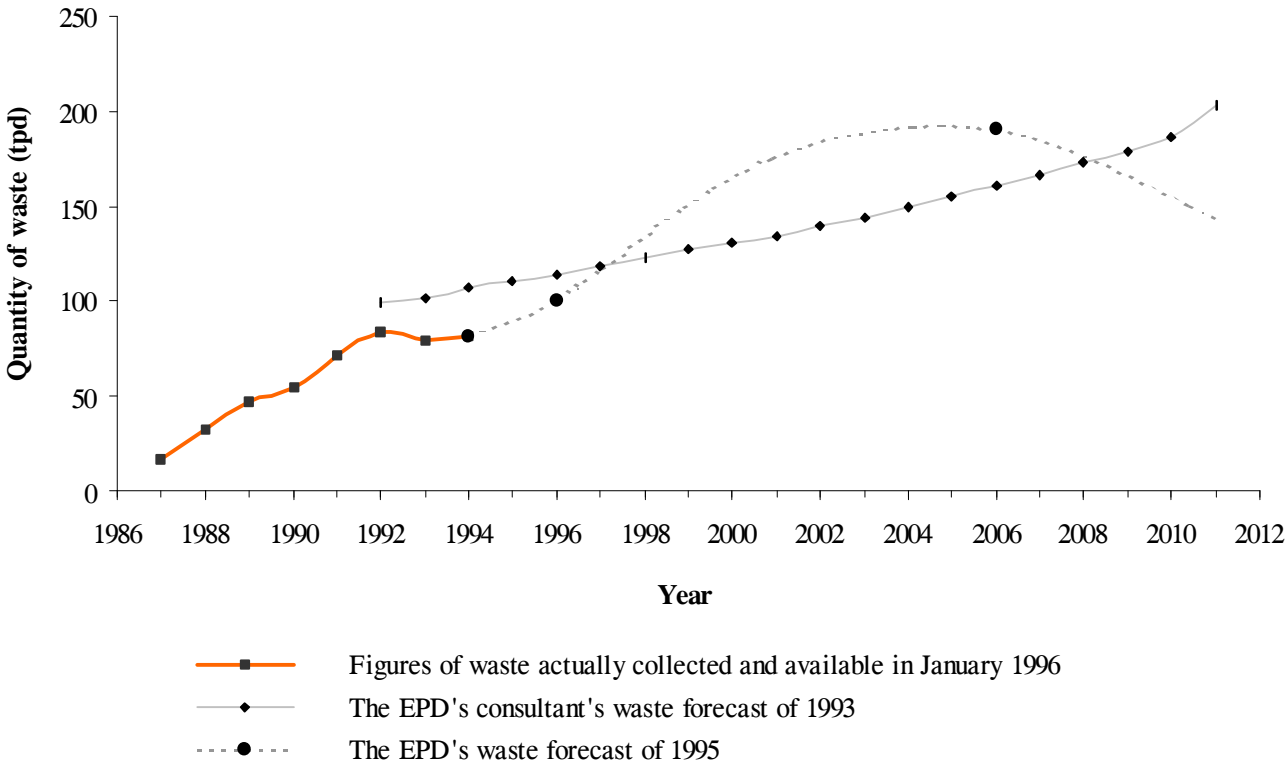
Note 2: *The calculation excluded the month of August 1999 in which the actual waste intake exceeded the guaranteed minimum tonnage.*

Note 3: *The guaranteed minimum payments for the Hei Ling Chau RTS were insignificant.*

Note 4: *The calculation excluded the months of August 1999 and from July 2000 onwards in which the actual monthly waste intake exceeded the guaranteed minimum tonnage.*

Appendix D
(paragraph 4.17(b) refers)

Waste forecast used for setting the guaranteed minimum tonnage of Cheung Chau, Peng Chau and Mui Wo RTSs in January 1996



Source: *EPD's records*

Note: *The EPD used the consultant's waste forecast of 1993 to set the guaranteed minimum tonnage of the Outlying Islands RTS contract.*

Appendix E

Chronology of key events

June 1989	The Government issued the White Paper "Pollution in Hong Kong — A time to act".
December 1989	The Waste Disposal Plan set out the long-term plan for disposal of municipal waste which was based on the provision of three strategically located landfills together with a network of RTSs.
1992	The EPD's consultancy study for the development of a new form of contract for the three strategic landfills was completed. The EPD also took on board the consultant's recommendation in its RTS contracts.
February 1994	The Finance Committee approved funding for the construction of an RTS in North Lantau.
March 1994	The Finance Committee approved funding for the construction of an RTS on Hong Kong Island West.
June 1994	The Finance Committee approved funding for the construction of an RTS in West Kowloon.
May 1997	The Island West RTS commenced operation.
June 1997	The West Kowloon RTS commenced operation.
January 1998	ExCo advised and the Chief Executive ordered the enactment of subsidiary regulation to implement a charging scheme for the provision of the RTS service to private-sector waste collectors at the Island East RTS and the West Kowloon RTS.
April 1998	The RTS service was extended to private-sector waste collectors of Hong Kong Island and Kowloon.
June 1998	ExCo advised and the Chief Executive ordered the enactment of subsidiary regulation for the provision of the RTS service to private-sector waste collectors at the North Lantau RTS.
June 1998	The North Lantau RTS commenced operation.
November 1998	The EPD submitted to the then PELB a review report on the provision of the RTS service to private-sector waste collectors.
Late 1999	The EPD submitted to the then PELB a second review report on the provision of the RTS service to private-sector waste collectors.
February and May 2000	The Environment and Food Bureau and the Finance Bureau endorsed the EPD's proposed revision of the RTS charging scheme.

Appendix F

Acronyms and abbreviations

AA	Airport Authority
CTB	Central Tender Board
D of J	Department of Justice
EPD	Environmental Protection Department
ExCo	Executive Council
FEHD	Food and Environmental Hygiene Department
MOD	Money-of-the-day
NENT	North East New Territories
PELB	Planning, Environment and Lands Bureau
RTS	Refuse transfer station
SENT	South East New Territories
tpd	tonnes per day
WENT	West New Territories