

Environmental Performance Report 2004



English

中文繁體

中文簡體

HONG KONG 香港



Foreword

Our Environment is an important and valuable asset. The Drainage Services Department is tasked to provide the community with a high standard of protection against flooding, and an effective system for the collection, treatment and disposal of sewage to protect the environment and safeguard public health.

Our services form part of the water cycle management contributing to environmental protection and sustainable development of Hong Kong. We deliver our services through planning, design, contracting, construction, operation and maintenance of the drainage and sewerage systems and sewage treatment plants. Besides seeking engineering excellence, we are mindful of the influence of our works on all aspects of the environment. We have set out very clear environmental policy and goals and provided relevant training, support and necessary resources to our staff helping them to identify and mitigate any potential environmental impacts arising from our works.

In 2004, we continued to improve the environmental performance of our services. On the land drainage side, wetlands were created in Yuen Long and San Tin as part of our drainage improvement works. In wastewater treatment, we adopted a tertiary treatment to facilitate effluent reuse in Ngong Ping. On energy saving, we won the Energy Efficiency & Conservation Best Practice Gold Award in the Hong Kong Awards for Energy Efficiency and Conservation in Government. On management side, we set up a Green Management Committee to capture our experience on green management and to keep up the momentum on green initiatives through experience sharing. This report describes our environmental performance in 2004. We hope you enjoy the reading and pass on any comments to us at enquiry@dsd.gov.hk to help us improve further



Recognition of staff's effort in green management

Environmental Policy and Goals

Environmental Policy

We commit to being environmentally conscious in all our activities and services and endeavor to serve the Hong Kong community with the best of our expertise in safeguarding human health, protecting and preserving natural ecosystems, thus contributing to the sustainable development of Hong Kong.

We aim to continually improve the quality of our services, and to alleviate as far as practicable the impact that our facilities and sewage and drainage systems impose on the environment of Hong Kong. To meet these objectives, we are committed to:

- Adopting state-of-the-art clean technologies and pollution prevention measures;
- Incorporating sustainability considerations into the design, construction and operation of our facilities;
- Minimizing and mitigating environmental impacts arising from the construction and operation of our facilities;
- Meeting all statutory and regulatory requirements on environmental performance that are applicable to the activities of the department; and
- Devising and conducting internal operations in an environmentally responsible manner.

We ensure that our Environmental Policy is communicated to all staff, our consultants and contractors, and is open to public scrutiny. Our staff are committed to upholding this departmental policy, obtaining the relevant training and deploying the necessary resources to enable its implementation.

Environmental Goals

1. To provide and operate world-class sewerage/drainage systems and sewage treatment/disposal facilities to fulfill the growing needs of the local community and contribute to the sustainable development of Hong Kong.
2. To implement sewerage and sewage treatment/disposal programmes in a professional manner, in partnership with other Government establishments including the Environmental Protection Department, and to meet the Water Quality Objectives for Hong Kong waters.
3. To implement drainage and flood protection programmes in a professional manner, to minimize flooding, and to provide protection to local inhabitants, property and the environment.
4. To apply the principles of Reduce, Reuse, Recycle and Recover in the consumption of materials and management of wastes and seek continuous improvement in the efficient use of natural resources and energy in all our operations.

Environmental Functions and Performance

Our key responsibility is to provide and operate the drainage, sewerage and sewage treatment infrastructure in Hong Kong. In 2004, we collected and treated 954 million cubic metres of sewage to achieve a high level of sanitation. In delivering the service, we operated 67 sewage treatment works, 172 sewage pumping stations and low flow interceptors, 43 submarine outfalls, 3 effluent disposal tunnels and maintained 1,506 km of sewers. In flood prevention, we maintained 2,514 km of drainage channels and drains and 26 flood pumping schemes. In the continuous improvement of the drainage and sewage treatment infrastructure, we are running 63 contracts to construct new works as well as to maintain and upgrade existing facilities.

Rising public health standard and increasing environmental effectiveness of sewage treatment are put in place. Towards improving the water quality of Victoria Harbour, the treatment of sewage from some 3 million people equivalent has been upgraded since 2001 from a simple screening process to a process beyond the conventional primary treatment, namely Chemically Enhanced Primary Treatment (CEPT) under the Harbour Area Treatment Scheme (HATS) Stage I.

Sewage treatment in Hong Kong

Treatment level provided	2002	2003	2004	
	(Million m ³)	(Million m ³)	(Million m ³)	Percentage Share
Screening and degritting	274	275	284	29.8%
Primary treatment	4	4	4	0.4%
Chemically Enhanced Primary Treatment	485	508	507	53.1%
Secondary biological treatment	148	156	159	16.7%
Total	911	943	954	100.0%

Performance Measures

We constantly introduce sound management practices and the best available technology to make our operations more energy efficient, more sustainable and more effective in pollution reduction. Considerable achievements were made in 2004. We removed 87,910 tonnes of BOD, 121,003 tonnes of Suspended Solids and 4,889 tonnes of Nitrogen from entering our receiving waters. We collected 8.2 million m³ of methane generated from anaerobic digestion of sewage sludge in our works to generate heat and electricity for plant use and hence help reduce demand on electricity or fossil fuel. The surplus gas is flared to reduce the impact on global warming, as methane is a strong greenhouse agent which is 21 times more powerful in trapping heat in the atmosphere than Carbon Dioxide does.

The removal of pollutants, resource consumption and environmental emissions are summarized in the following table.



Sewage treatment facilities in Hong Kong

Achievements, Resource Consumption and Environmental Emissions in 2004

Sewage treatment		2003	2004
Quantity			
Total Flow	(Million m ³)	943	954
BOD (tonnes)	In	124,157	116,409
	Removed	93,654	87,910
	Out	30,503	28,499

SS (tonnes)	In	155,693	142,567
	Removed	129,563	121,003
	Out	26,130	21,562

Total N (tonnes)	In	5,906	6,464
	Removed	3,770	4,889
	Out	2,136	1,575

Waste Produced			
Screenings	m ³	20,705	19,220
Grit	m ³	7,078	6,738
Dewatered sludge	tonnes	305,660	288,757

Gas emission			
Greenhouse gas recovered	Million m ³	9.3	8.2

Resource Consumption			
Power	KWh	231,002,217	210,714,011
Chemicals			
a. sewage treatment			
ferric chloride	tonnes	13,235	13,154
alum	tonnes	86	209

	polymer	tonnes	72	87
b.	sludge dewatering			
	ferric chloride	tonnes	2,912	2,799
	polymer	tonnes	682	562
c.	odour control			
	ferric Chloride	tonnes	-	2,168
	calcium nitrate	tonnes	-	3,503

Effectiveness				
	BOD removed		75.4%	75.5%
	SS removed		83.2%	84.8%
	Total N removed		63.8%	75.6%
	Power consumed (KWh per m ³ sewage treated)		0.245	0.221
	Power consumed (KWh per tonne BOD removed)		2,344	2,397

Office			2003	2004
	Paper consumed	Reams	17,300	18,810
	Paper consumed per staff	Reams	8.9	9.7
	Envelopes consumed	number	148,089	97,700

Waste paper recycled (1)	kg	9,290	12,360
Power (2)	KWh	159,505	158,379

(1) (1) Estimates based on data for the whole Revenue Tower

(2) (2) Only for the Sewage Services Branch office at Guardian House where individual meter was provided

Sewer and Drainage Maintenance

Quantity			
Drains, channels and water courses cleansed	km	513	629
Silt removed	m ³	59,946	279,909

Sewers cleansed	km	614	627
Silt removed	m ³	6,351	4,956

Abbreviations	
BOD	Biochemical Oxygen Demand
SS	Suspended Solids

Total N

Total Nitrogen

KWh

Kilowatt hour

Energy Efficiency

We operated and maintained some 240 sewage treatment and pumping facilities that consumed 210 million kWh of energy in 2004. We recognize that we are one of the largest energy consumption departments in the government and therefore strongly committed to conservation of energy. In 2004, our hard work and commitment brought home the Energy Efficiency & Conservation Best Practice Gold Award from the Hong Kong Awards for Energy Efficiency and Conservation in Government. We achieved this through the cooperation and communication of all staff in the department, including the firm commitment from the top management to drive the green management and the active participation and support of all staff. We will continue our effort on energy saving and share our experience with other departments and the public sector.



Energy saving award



Experience sharing workshop on energy saving

Examples of Energy Saving include:

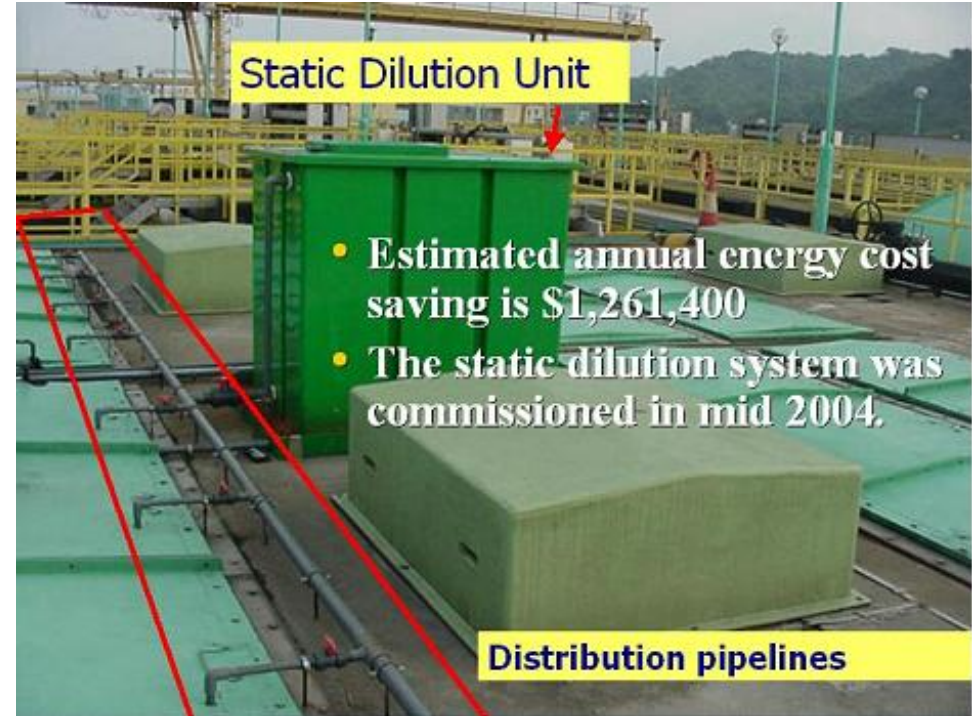
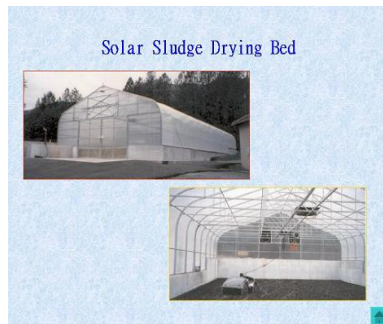
1. Energy Audit

Energy audits help identify Energy Management Opportunities where saving of energy

and money can be made. We have an in-house energy saving working committee to provide technical support and expert advice to help individual division to achieve the energy saving target.

2. Use of Advanced Technology

One of our approaches for continuous improvement is by exploration of the latest technologies suitable for sewage pumping and treatment applications. The successful applications include a multi-point chemical dosing system, low pressure UV lamps for effluent disinfection, water cooled air-conditioners, and solar energy.



Multi-point chemical dosing system

Replace air-chilled cooling system (4 x 430kW) by WACS (water-cooled air conditioning system) in SCISTW



Solar Energy



Ecological Enhancement

It is our policy to incorporate environmentally friendly features into new or upgrading projects wherever possible. The features would provide greenery in the countryside, restore or compensate for disturbed habitats and preserve valuable freshwater ecosystems. As a result of our commitment and actions, works in the past decade have cumulated into large tracts of vegetated river banks, preserved meanders, wetland features and mangrove habitats.

To give further emphasis in conservation, we launched a new internal technical circular in October 2004 on the protection of water courses from adverse impacts arising from construction works. Following on the achievement, a multidisciplinary team from six departments has now produced a reference guide to ecological and landscape improvement considerations in channel design. The work is elaborated in our Annual Report 2004.



River Indus



Nam San Wai

In brief, our efforts included the creation of wetland, the preservation and enrichment of habitat, and the harmonization of new works with the surroundings in our two major river training projects, namely Yuen Long Bypass Floodway and Construction of San Tin Eastern Main Drainage Channel. Works on the projects were satisfactory and these projects will ultimately create 7.9 and 3.7 hectares of wetland habitats respectively upon their anticipated completion in 2006.

Another area of ecological enhancement is the greening of our sewage treatment plants and pumping facilities. Planting are provided as a landscape buffer along the boundary of our facilities, between the concrete structures and in areas accessible by the public. To maintain our effort on planting, we target to plant a total of 11,300 trees and 214,000 shrubs in 2004 and 2005.



Yuen Long Sewage Treatment Works



Stonecutters Island Sewage Treatment Works

Greener Office and Staff Commitment

We focus on conservation of resources in our offices. This is achieved through the leadership of the Green Management Committee set up at the end of 2004. The main fronts include Lighting, Air Conditioning, Office Equipment, Elevator Service, and Paper. Each division has a Green Action Team Leader to spearhead the green initiatives and some energy wardens to remind colleagues on energy saving in the office.

To empower our staff to do our job with environmental awareness and understanding, we supported 126 staff to attend training events in 2004 on environmental knowledge and practices. We also launched a green management portal in our intranet for dissemination of information and experience sharing.

Furthermore, we made use of the Staff Suggestion Scheme to motivate staff in resources conservation, waste minimization and waste recovery. In 2004, we launched internal competitions for the best suggestion in saving resources and the best green slogan. These attracted many eager participants and a full display of wit. Winning entrants had included useful ideas to save power in computer operation, reduce use of fax and promote paper conservation. Some excellent slogans are shown below.

多行一步身體好 調高一度助環保 廢紙一再循環用 大家一起省源好	電燈冷氣莫長開 資源耗盡不再來	救地球 莫遲猶 善用紙張 樹木免遭殃 省原油 記心頭 出門緊記 熄燈關冷氣
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Despite our effort in energy saving, the power consumption in the office that has a separate electricity meter for monitoring purpose showed that the target was not met. In 2004, we only reduced the power consumption by 1% over the 2003 level, but it was 3.8% more than the 2002 level. We investigated the situation and noted that there were two major activities contributing to a higher than expected power consumption. One was a major renovation work to install sprinklers for the whole office and the work needed to be carried out after office hours and during weekends, and the other one was a large amount of overtime work for the implementation of a customer care and billing system for sewage revenue during the last quarter of 2004. The situation has much been improved in the first 6 months of 2005 with a power consumption at only 92% of the corresponding 2002 level.

Details of our green office initiatives are described below:

Lighting

1. The more efficient fluorescent [T-5 tubes](#) and [luminaries](#) with parabolic reflectors now make up the dominant lighting fixtures in our offices. Lighting areas are arranged with suitable individual switch to allow flexibility.
2. Operational measures are emphasized, including : Switching off lighting when rooms are not occupied and during lunch time. Reducing [lights](#) near windows. Designated staff to check and switch off lights of unoccupied areas after office hours.

Air Conditioning

The thermal setting is adjusted to 25.5°C. Heat ingress is reduced by lowering blinds or keeping windows shut. Air conditioning of unoccupied rooms is switched off.

Office Equipment

Set photocopiers, personal computers and fax machines to go into hibernation mode while inactive. Advocate paper saving and paperless office to reduce energy and paper consumption for document copying and printing. Assign officers to switch off all shared use office equipment after office hours.

Elevator Service

Promote using stairs rather than the elevator.

Paper

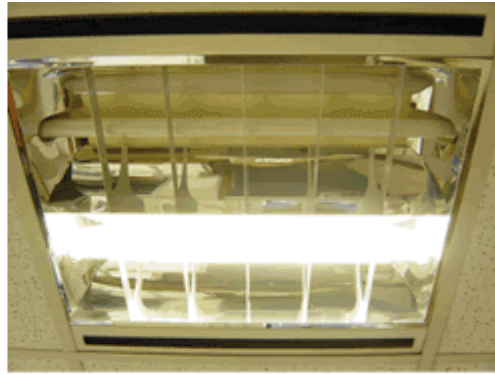
Economy in use of paper, including re-use and recycling are promulgated in the department. Unfortunately, due to an unexpected printing demand in producing technical manuals, survey reports, works orders and tender-related documents in 2004, [Paper consumption](#) was up 8% when compared to the previous year. To address the situation, we have now put in place a quota system on paper purchase and encourage the use of recycled paper. Publicity materials and publications will be put on internet wherever practicable, if printing is required, they would only be printed on both sides of recycled paper and produced in restricted number of copies.

Green Survey

Our green initiatives would not be completed without a feedback on how we did. Therefore, at the end of 2004 we started to launch quarterly green surveys to measure the energy saving, paper reuse and recycling habits of our staff. The findings are enumerated and put in our intranet as an appreciation of the good work and an indication of the areas for improvement. The aim is to cultivate a culture of conservation in the department.



Fluorescent T-5 tube



Parabolic reflector

Environmental Challenges and Continuous Improvement

In 2004, we continued to face with the challenges of increasing volume of sewage to our sewage treatment works in which some have already been overloaded, and we have committed to improve our service delivery to meet the ever higher demand of the public on environmental quality. We took a two-pronged approach of maintaining a lively dialogue with the stakeholders to understand their concerns and explain our work, and exploring the latest proven technology to address the specific local environmental issues. A few examples of how we addressed the issues are given below.

Overloading of Sewage Treatment Works

We tackled the problem of sewage overloading by a long term solution of extending the capacity of our sewage treatment works. In the interim, we modified the treatment processes and made extra effort to monitor the processes to achieve the effluent quality standards. In 2004, the Stage 3 Phase 1 of the Shatin Sewage Treatment Works was commissioned successfully and the treatment capacity was increased from 148,000 to 216,000 m³/day. The treatment capacity will further be increased to 318,000 m³/day upon the successful commissioning of the Phase 2 of the project in 2005. The extension of the Tai Po Sewage Treatment Works and Shek Wu Hui Sewage Treatment Works were in satisfactory progress.

On process modification, we have been upgrading the Siu Ho Wan Treatment Works to Chemically Enhanced Primary Treatment with UV disinfection to remove BOD and disinfect the effluent, modifying two primary sedimentation tanks at Shek Wu Hui Sewage Treatment Works to Sequencing Batch Reactors to reduce the nitrogen loading to the aeration tanks, and converting some aeration tanks of the activated sludge treatment process at the Yuen Long Sewage Treatment Works to be operated as extended aeration process to reduce sludge production.



Siu Ho Wan Sewage Treatment Works



Shatin STW aeration tank



Shatin STW sedimentation tank

Odour Control

Odour is a common problem of sewage and sewerage. The extension of the sewage treatment works and the process modification and upgrading mentioned above help alleviate the problem. In addition, we added ferric chloride to precipitate the odour causing agent, sulfide; and added calcium nitrate to prevent its production in the sewerage handling septic sewage.

Sewerage Works in Urban Area

Construction and replacement of sewers in busy urban areas pose a unique challenge to us. We have to strike a balance between the disruption to traffic and the impact on the environment. We need to restrict the work site area and shorten the work duration on one hand, and put in more pollution control equipment on site and limit our working hours on the other hand. In addition to reduce road openings to a minimum, we have to implement stringent environmental control on site to properly manage dust, odour, noise and muddy discharge. Furthermore, we also set up communication channels to neighbours so that their grievances can be attended to and resolved immediately.



Works in Java Road near North Point Pier

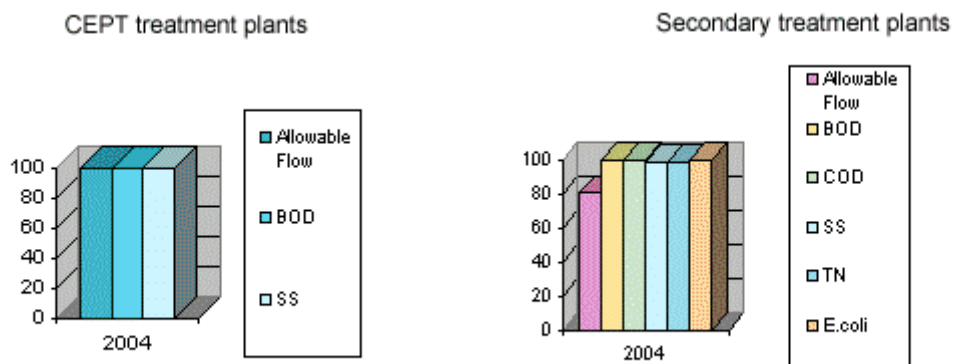


Works in shopping district Causeway Bay

Law Compliance and Environmental Risks Management

Law Compliance

All sewage treatment works and relevant new works (Designated Projects) are regulated by Environmental Protection Department (EPD) under the Water Pollution Control Ordinance (WPCO) and the Environmental Impact Assessment Ordinance (EIAO) respectively, in addition to other relevant environmental legislations. We directly held 29 discharge licences under the WPCO and 19 various Environmental Permits under the EIA Ordinance.



Percentage Compliance in 2004 for CEPT and Secondary Treatment Plants

To measure performance and to guard against pollution, we have an intensive programme to monitor the quality of discharge at all of the sewage treatment works. Effluent is sampled and tested. Anomalies are immediately identified, reported to EPD and corrective action made. Data are compiled and sent to EPD for reference every month. Some major sewage works such as Shatin, Tai Po, Shek Wu Hui and Sai Kung also have online sensors to monitor TSS, NH₃-N, NO_x-N of the final effluent.

We thoroughly complied with the EIA Ordinance in 2004. Apart from conducting EIAs, we also adhered to Environmental Monitoring and Audit requirements of EIAO Environmental

Permits. Our contractors had eight convicted environmental offences in 2004, a reduction of 40% from the 14 convicted cases in 2003. Among the eight cases, two related to irregularities in dust control at construction sites, one on construction site drainage and five on noise offence.

We have step up our efforts in site supervision and contractor management with a view to further improving our environmental performance. Since 2004, we have launched a "Construction Site Housekeeping Award Scheme" to promote cleanliness, tidiness and good hygiene of our construction sites and to give recognition to contractors for their achievement in performing outstandingly in these respects. Our project and site staff holds regular site safety and environmental meetings with the contractors to promote and reinforce the contractors' awareness in environmental protection. We are committed to environmental protection and we will take regulating action against contractors with poor environmental protection records.

Management of Environmental Risks

Due to the polluting nature of sewage, we recognise the potential threat of sewage overflows upon bathing beaches, the sea or even in the street. We keep ourselves ready to respond immediately to overflow of sewage from anywhere in the sewerage system or the sewage treatment works. Contingency Plans are drawn up for individual sewage treatment works and major pumping stations. Guidelines for classification, response and reporting of sewage bypass are agreed with the environmental authority and communicated to all relevant offices. The line of communication with the environmental authority is also well defined and the telephone list regularly updated.

Risks can be minimised by planned inspection, desilting, proactive repairs and upgrading in order to ensure our systems are in proper working conditions . In 2004, 627 km of sewer were cleansed, 4956 m³ of silt were removed from sewers.

Communication with Stakeholders

We always endeavour to make our activities as transparent as possible to environmental stakeholders.

On 13 & 14 March 2004, we held an Open Day at the Stonecutters Island Sewage Treatment Works to invite the public to visit Hong Kong's world class sewage treatment facility and one of the world's most efficient CEPT plants. This was the second public open day event for this plant. It aimed to reveal to the stakeholders - the community at large, the enormity of the task and the sophistication behind treating sewage to protect Victoria Harbour from pollution. The Open Day included video shows on our duties, a technical tour of the plant, exhibitions and games. The activity attracted 9,500 visitors over two days and was a great success.

The Chairmen and Vice-chairmen of all District Councils in Hong Kong visited Stonecutters Island Sewage Treatment Works on 2 November 2004. The site walk provided the visitors with the first hand information on the operation of the plant and the achievements brought about by the Harbour Area Treatment Scheme (HATS) Stage 1. The Secretary for Environment, Transport and Works, Dr Sarah Liao, and a number of senior government officials accompanied the Councillors. During the tour, our colleagues explained to the visiting party the computer control system, the operation of the flocculation and sedimentation tanks, the sludge dewatering house and the chemical dosing facilities.

We also communicate the content of our work and Environmental Performance of our activities through our homepage, which is freely accessible to the public, the engineering profession and the green groups. We believe that successful projects are founded on good communication and therefore consult the relevant stakeholders on our proposed new projects on sewerage, sewage treatment and flood control, listen to and consider their views.



Open day of Stonecutters Island sewage treatment works



The Secretary Dr. Liao (centre) explained the HATS to Councillors

Achievement of Environmental Targets

Progress of environmental targets (Details reported in previous chapters)

	Targets for 2004	Progress in 2004
A.	Minimising Impacts of Our Operation	
	To achieve full compliance with legal environmental requirements at our sewage treatment works, sewerage system and land drainage system.	Despite of volume overloading of the Shatin sewage treatment works, the effluent met the required quality standards. No major non-compliance at other plants.
	To closely supervise our work sites aiming at full compliance with both legal and contractual requirements	Contractors had 8 convicted environmental offences related to dust control, site drainage and noise, a drop from 14 in 2003.
B.	Green Office	
	To encourage paper conservation and implement paper saving measures, aiming to reduce consumption to 17,461 reams i.e. 95 % of 2002 level.	Target not met. 2004 consumption reached 18,810 reams. Upon a quota system on purchasing of paper, we met the 2005 target in the first 6 months.
	To continue to introduce energy saving measures in lighting, air conditioning, and use of office equipment and computers. Reduce power consumption of building services to 97% of 2002 level.	Appointed 47 Energy Wardens, adopted air-conditioner setting at 25.5°C, launched quarterly Green Surveys, stepped up Cat 1 energy saving measures. Power consumption in office has been reduced from 2003 level. Target was not met in 2004 but was achieved in the first 6 months of 2005.
C.	Energy Efficiency in Plants	
	To introduce best available and cost effective energy efficient equipment and operations in plants to achieve maximum savings in power consumption.	Implemented efficiency measures at HATS(I), Pillar Point PTW, Shek Wu Hui STW, Tai Po STW, Yuen Long STW, Wanchai East PTW. Achieved a saving of \$4,582,900 in 03/04.

	Energy Saving Working Committee actively pursuing more measures.
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Environmental Targets for 2005

In the coming year, we will press on with meeting government-wide targets on paper and energy conservation. Additionally, to show our commitments, we will diversify our targets to address all our major activities that have impact on the environment.

A. Resource Conservation

A1.1 To save 2.85 Million kWh from the 2004 level. Achieve a sewage treatment efficiency of 0.217 kWh/m³

A1.2 Carry out 8 Energy Audits for sewage treatment facilities

A2 To achieve energy saving in lighting, air conditioning, and use of office equipment and computers. Reduce power consumption to 95.5% of 2002 level.

A3 Reduce annual paper consumption to 17,000 reams i.e. 92.5 % of 2002 level. Launch a quota system on paper procurement. Promote paperless office operation.

A4 While elevating sewage treatment level and expanding sewerage and sewage treatment to new development areas, keep the net increase of consumption of flocculants, oxidizing agent and alkali to not more than 6,370 tonnes over 2004 levels.

A5 Reduce consumption of whole ball pens by 30% of 2004

B. Waste Reduction

B1 Reduce waste by strengthening existing waste paper recycling and used toner cartridge recycling. Launch quarterly checks in offices.

C. Waste Recovery

C1 Seek outlet for productive use of green waste generated from landscape maintenance and projects.

D. Minimising Impact on the Environment

D1.1 To achieve full compliance with legal environmental requirements at our sewage treatment works and sewer and land drainage systems.

D1.2 To closely supervise our work sites aiming at full compliance with both legal and contractual requirements

D2 Recycle paper to comprise 50% of our total printing paper consumption. Print newsletters and annual report on recycled paper.

E. Staff Development

E1 To coordinate 6 training events in Energy Saving, environmental compliance knowledge and environmental special topics within 2005.

F. Environmental Improvement

F1.1 Beginning from 2004, plant a cumulative total of 11,300 trees and 214,000 shrubs.

F1.2 Beginning from 2004, create/restore a total of 15.4 ha of wetland/fish ponds.