Environmental Report

2013

Highways Department

同心展關懷 2011/12
caringorganisation
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Contents

Director's Message

It is my pleasure to present to you our Environmental Report 2013 which summarised our efforts and achievement in environmental management as well as our environmental targets and initiatives for 2014.

In this report, you will see our efforts in pursuing environmentally friendly and sustainable measures at all stages of our road projects. We continue to carefully plan every stage of our projects to fulfil our commitment to environmental management. For example, we have made extensive efforts in tree preservation and thematic planting in the Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling project, and adopted comprehensive noise and dust mitigation measures in the Shatin to Central Link project, in order to minimize environmental impacts arising from the construction works.

We uphold the Government's policy of developing the environmentally friendly railway system as the backbone for the mass public transportation. It aims to reduce the overall tailpipe emission from vehicles and lessen the impact on the environment. The West Island Line, the South Island Line (East), the Kwun Tong Line Extension, the Shatin to Central Link and the Hong Kong section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link are under construction. We target to complete the consultancy study for the Review and Update of the Railway Development Strategy 2000 in 2014 and the Government will subsequently announce the way forward for a series of new railway projects.

To enhance cost-effectiveness and environmental-friendliness in road maintenance, we adopt long-life pavement strategy and extend the use of Polymer Modified Stone Mastic Asphalt for road surfacing. Also, we have adopted the use of Mobile Mapping System technology for updating road surface inventories of the streets, roads and tunnels maintained by the Highways Department in a more efficient and environmentally friendly manner.

Stone wall trees are attractive and valuable natural heritage features in Hong Kong's streetscape. We are committed to preserving the 214 stone wall trees managed by the Highways Department while ensuring safety to the public. The major pruning operation to a stone wall tree overhanging Bonham Road to reduce the risk of its falling fully demonstrated our commitment to striving for a suitable balance between tree preservation and public safety. To enhance the aesthetics and biodiversity of slopes under our maintenance, we proactively implement a Landscape Enhancement Management Plan. One prominent and exemplary case is the landscape enhancement work for a 14-hectare hill slope under Castle Peak in Tuen Mun New Town.

We promote environmental consciousness and exchange of ideas amongst our colleagues and external stakeholders. Internally, we organised training courses and green activities for our staff with a view to heightening the knowledge of and awareness in environmental management. Externally, we co-organise the Joint Safety, Health and Environmental Seminar with various corporations around the city to enhance the knowledge of environmental management measures for professional and technical staff. We continue to encourage our contractors to organise and participate in various environmental promotional activities. We have also engaged the community's support to enhance our services by organising community planting, roving exhibition and publishing details of our projects to the public and soliciting their views through various channels.

We are pleased to conclude that most of our environmental targets for 2013 were achieved and our efforts were recognised. We are honoured to receive four Outstanding Environmental Management and Performance Awards and six Considerate Contractors Site Awards in our construction sites as well as the Grand Award for Outstanding Exhibit in Hong Kong Flower Show 2013. These awards were presented in recognition of our good site safety, environmental performance and considerate attitude towards the neighbourhood and the public.

Looking into the future, we will endeavour to carry out our business in an environmentally responsible manner. With the concerted efforts of my colleagues, we strive to continue to make our community a better and lovely place to live in.

K.K. LAU
Director of Highways
30 December 2014

Department Profile

The Highways Department is responsible for:

- implementation of highway projects in the Public Works Programme;
- maintenance of public roads, including road furniture, road drainage and roadside slopes, and co-ordination and control of utility openings on public roads;
- planning, monitoring and coordinating various activities associated with implementation of new railway projects;
- providing design input for road lighting, highway structures, roadside slope upgrading and landscape features associated with capital works projects and maintenance works;
- inspecting the safety provision on highway construction sites;
- researching into new materials, techniques and standards; and
- providing engineering, quantity surveying and landscaping technical services.

The Headquarters of the Highways Department are located in Ho Man Tin Government Offices (HMTGO), with sub-offices in North Point Government Offices, Cheung Sha Wan Government Offices, Cheung Sha Wan Plaza, Skyline Tower, Nan Fung Commercial Centre and MG Tower. We have an establishment of about 490 professional staff and about 1,630 technical / common and general grades staff. We maintain about 2,090 km of roads and some 13,110 roadside slopes within the territory. The total operating expenditure for the financial year 2013/14 is HK$2,470 million.

Vision and Mission

Our Vision

To develop and upkeep the road network as well as to plan and implement railway development to world-class standards.

Our Mission

In order to enhance the long term prosperity and improve the living standards of the community, we are committed to:

- expanding and improving the road network to meet the growth and change in transport needs, and development requirements;
- maintaining the integrity of the road network;
- providing high quality technical support for the planning, design, construction and maintenance of the road network; and
- implementing and updating the Railway Development Strategy.

Environmental Goal

Our environmental goal is to accomplish public works efficiently and with due regard to the environment.

Management Policy

We maintain a Quality Management System to meet the requirements of the International Standards ISO 9001 and ISO 14001. We incorporate quality and environmental considerations at all stages of our work in developing and up-keeping the road network as well as planning and implementing the railway system. In so doing, we are committed to:

- delivering high quality services to our community;
- identifying and controlling the environmental aspects at all stages of our work, using resources efficiently, minimising waste and preventing pollution as far as practicable;
- monitoring the performance of our contractors to ensure good quality of works and to prevent or mitigate potential environmental impacts arising from our projects;
- complying with relevant legal and other requirements; and
- sustainable construction with due consideration to balancing environmental, social and economic needs.

We improve our services through regular review of our Quality Management System, its Management Objectives and Targets, and through identification of opportunities for continual improvement.

About this Report

This report covers the period from 1 January 2013 to 31 December 2013. It shows the environmental awareness of our work and efforts in supporting the Clean Air Charter, environmental management, research and technology and stakeholder's engagement. Our environmental awards received in 2013, our achievement of environmental objectives and targets for 2013 and our environmental targets for 2014 are also included in this report.

To reduce paper consumption, this report is published in CD-Rom format and uploaded to our website.

We are proactive and committed to energy saving. Various energy saving measures have been adopted to support the clean-air initiatives and help reduce emissions.

Clean Air Charter

Energy Saving in Public Lighting

In 2013, we installed dimmable electronic ballasts for the lighting systems of 15 nos. of footbridges and about 1,000 nos. of road lights to reduce the illumination level. We also replaced the aged fluorescent tubes with lower wattage ones in 10 nos. of footbridges and aged lanterns in 3 nos. of Public Transport Interchanges. Moreover, we installed about 520 nos. of Ceramic Discharge Metal Halide Lamps (CDM) and 47 nos. of LED road lights for trial. Under these measures, annual energy saving of about 432,000 kWh was achieved. The performance, reliability, public acceptance and cost effectiveness of these new products (i.e. LED lights & CDM lamps) are being monitored and evaluated with a view to continuing with finding more energy saving opportunities in public lighting.

With continuous efforts to achieve higher energy efficiency, we were able to contain the increase in the territory-wide public lighting electricity consumption to 0.01% only despite the 1.39% increase in lighting points in 2013. The total consumption in the year was 133,035,493 kWh, being merely 9,171 kWh more than the consumption in 2012. In other words, about 1,840,000 kWh of electricity had been saved and the corresponding indirect emission of 3,517 kg of sulphur dioxide (SO_2), 2,136 kg of nitrogen oxides (NO_x), and 110 kg of respirable suspended particulates (RSP) had been avoided.

Energy Saving in Office

Electricity consumption in 2013 with corresponding indirect gas emission figures :

Offices[1]	Electricity (kWh)	Indirect gas emissions (kg)		
		SO_2	NO_x	RSP
Ho Man Tin Government Offices	1,089,811	2,081.54	1,264.18	65.39
Nan Fung Commercial Centre	595,917	1,138.20	691.26	35.76
Cheung Sha Wan Plaza	277,660	530.33	322.09	16.66
Skyline Tower	301,554	575.97	349.80	18.09

[1] *Only offices of the Highways Department with individual electricity metres installed are included.*

The result of our continuous efforts in saving energy in office is demonstrated in the following comparison on electricity consumption for 2012 and 2013 :

Offices	Electricity (kWh)	
	2012	2013
Ho Man Tin Government Offices	1,089,903	1,089,811
Nan Fung Commercial Centre	615,275	595,917
Cheung Sha Wan Plaza	277,264	277,660
Skyline Tower	290,401	301,554
Total	**2,271,843**	**2,264,942**

Energy Saving Measures

The following measures have been promulgated to enhance energy saving in offices:

- appoint Energy Wardens in every office/ division to monitor the usage of light and to keep the illumination level to the acceptable minimum level;
- review the illumination level arising from the change of room use;
- maintain air-conditioning not lower than 25.5°C in hot seasons;
- switch off lights during lunch and when staff are away for long hours;
- switch off computer equipment and electric appliances when not in use;
- encourage the use of staircase for inter-floor traffic;
- use automatic low flow water taps in toilets; and
- monitor the electricity consumption of different floors by individual meters installed on each floor of HMTGO.

Indoor Air Quality Certification

The indoor air measurement was conducted by EMSD in August 2013. HMTGO was awarded the “Good Class” Indoor Air Quality Certificate for 2013. The indoor air quality of HMTGO has been fully complying with the Good Class of the Indoor Air Quality Objectives since 2003.

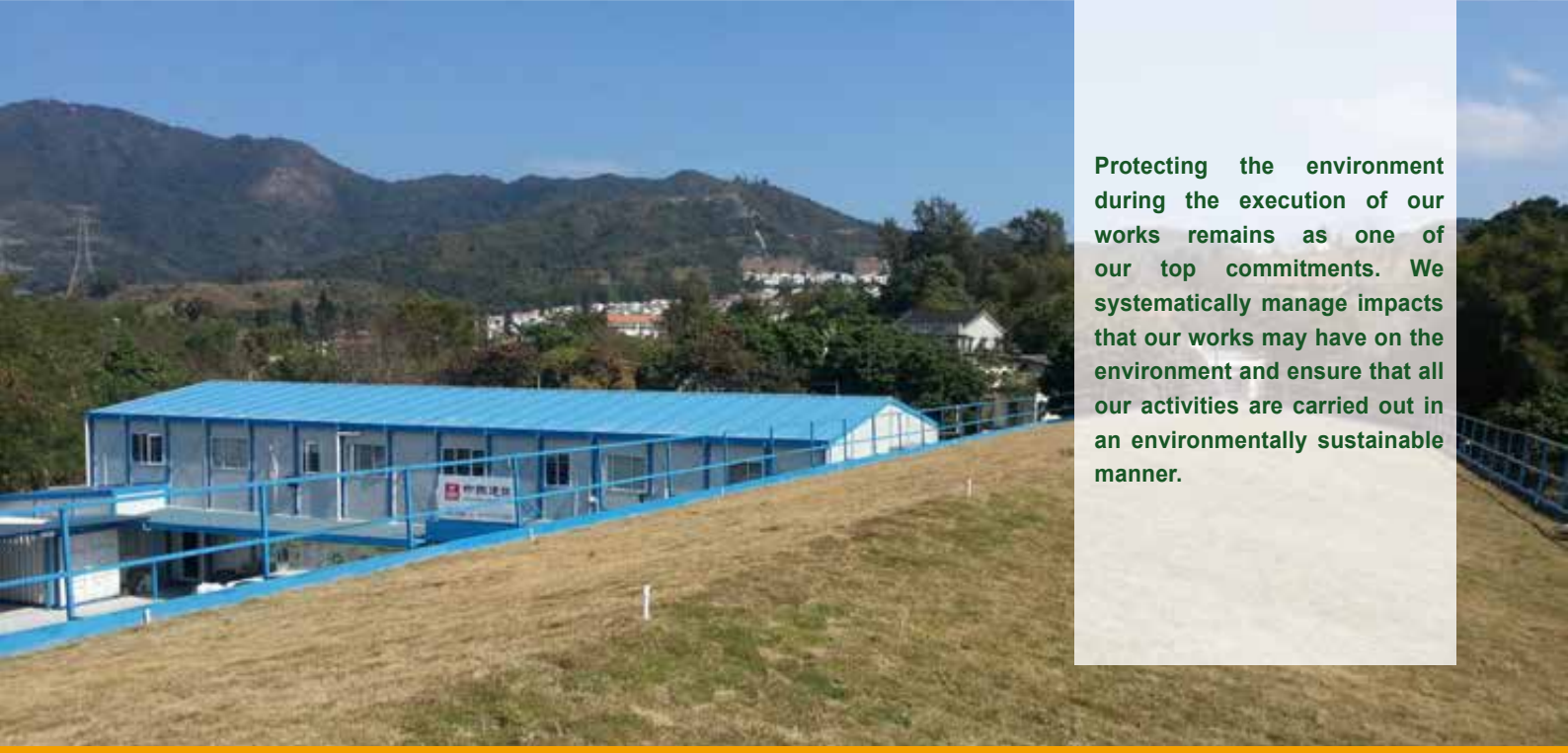
Environmentally Friendly Vehicles

We have been striving to reduce greenhouse gas emission of vehicles through the use of environmentally friendly vehicles and promulgation of internal guidelines to remind motor drivers of the green driving habits. In 2013, we adopted an electrical car which greatly reduced greenhouse gas emission to zero. Together with the earlier introduction of two hybrid vehicles in 2011, the travel distance covered per litre of petrol consumed had increased from 9 km in April 2010 to 17 km in December 2013. Furthermore, following the procurement of the environmentally friendly vehicles approved by the Environmental Protection Department (EPD) for all saloon type contract vehicles for all new major works contracts, we have also started adopting these types of contract cars extensively in our road maintenance term contracts.

Electric Car

Special Measures to Cope With the Air Quality

A set of precautionary measures for outdoor front-line staff and their supervisors in relation to the air quality was issued 2013. In particular, email reminders would be sent regularly to all staff whenever the Air Quality Health Index (AQHI) reaches or is forecasted to reach the “very high” or “serious” health risk categories. The guidelines cover assessment of risk of outdoor work for workers performing heavy manual works and measures to be taken to reduce outdoor physical exertion and outdoor-staying time, especially in areas with heavy traffic.



Protecting the environment during the execution of our works remains as one of our top commitments. We systematically manage impacts that our works may have on the environment and ensure that all our activities are carried out in an environmentally sustainable manner.

Environmental Management

Tree Preservation and Thematic Planting in the Widening of Tolo Highway /Fanling Highway between Island House Interchange and Fanling Project

Tolo Highway and Fanling Highway are expressways forming a vital section of Route 9. To alleviate the existing congestion problem and cater for future traffic demand, it has been proposed to widen the two existing highways from dual 3-lane to dual 4-lane carriageway. The road widening project is implemented in two stages. Stage 1 comprising the widening of the section of Tolo Highway/Fanling Highway between Island House Interchange and Tai Hang commenced in 2009 for completion in 2014. Stage 2 of the project includes widening the section of Fanling Highway between Tai Hang and Wo Hop Shek Interchange. It commenced in July 2013 and is expected to complete by 2018.

Tolo Highway/Fanling Highway widening Stage 1 and Stage 2 — Project Layout Plan

Tree Preservation and Reuse

During the planning of the Stage 1 road widening works, a number of measures have been adopted to mitigate the environmental impact of the project. They include preservation of existing trees as far as possible by such means like modification of the road alignment to minimize cutting of existing slopes with vegetation and forming of new slopes.

Preserved trees at the slope near King Nga Court

Of the 16,500 trees within the Stage 1 project boundary, about 4,500 trees have been preserved. The other affected trees are common species planted on the existing man-made slopes when Tolo Highway was constructed in the 1980s. Trees to be felled are either of invasive weedy species or assessed to have low post-transplantation survival rate, poor health or located on steep slopes, or impractical to prepare proper root balls. Felled species include *Acacia confusa*, *Leucaena leucocephala*, *Casuarina equisetifolia* and *Acacia auriculiformis*.

Five important trees have been identified. The species involved *Melaleuca quinquenervia*, *Celtis sinensis*, *Ficus microcarpa* and *Bombax ceiba*. Three of them have been retained and two removed due to poor health despite our extra efforts to preserve them.

Another measure adopted is to provide compensatory planting under the project. 4,000 heavy standard trees, 95,500 seedlings and 427,000 shrubs consisting of native species such as *Gordonia axillaris*, *Rhododendron simsii* and *Gardenia jasminoides* totaling about 6.1 ha of woodland planting area are being planted. The total number of trees to be planted exceeds the total number of trees affected.

Tree planting at the slope near Grand Dynasty View

Schefflera arboricola planted at the planter on Bridge 15A near Tai Po Tai Wo Road

To promote reuse, some of the felled tree trunks have been collected and used by the Agriculture, Fisheries and Conservation Department (AFCD) to produce country park facilities such as park furniture, fences, benches and steps. Also, some of the felled tree trunks have been chopped to small pieces to produce mulch and compost for beneficial uses.

Delivery of the felled tree trunks for reuse by AFCD as country park facilities

Production of mulch and compost

Thematic Planting

When planning compensatory tree planting for the project, designer has adopted a seasonal planting theme alongside the widened highways. The theme can create a unique experience for the drivers and provide a beautiful scenery for local residents. This includes planting various species of trees, which would blossom with different flower colours or change leave colours during different seasons of the year.

The thematic trees planted include :

1. *Crateva unilocularis* with white yellow flowers in spring
2. *Jacaranda mimosifolia* with purple blue flowers in summer
3. *Koelreuteria bipinnata* with yellow flowers in late summer, red leaves in autumn
4. *Sapium sebiferum* with yellow and red leaves in winter

Crateva unilocularis

Jacaranda mimosifolia

Koelreuteria bipinnata

Sapium sebiferum

Typical Environmental Measures Taken in Construction Sites

Sustainable Energy and Energy Saving

Solar panel for carpark lighting

Provision of solar water heater

Tree Preservation and Greening

Proper protection of retained trees

Seminar from tree specialist

Dust Control

Erecting dust screen alongside works area

Covering the dusty materials with tarpaulin sheet

Noise Mitigation

Temporary noise barrier

Wrapping up the breaker tip with sound absorbing material

Waste Management

On site sorting of timber

Collecting and returning waste wooden pallets for reuse

Wastewater Management

Wastewater treatment facility

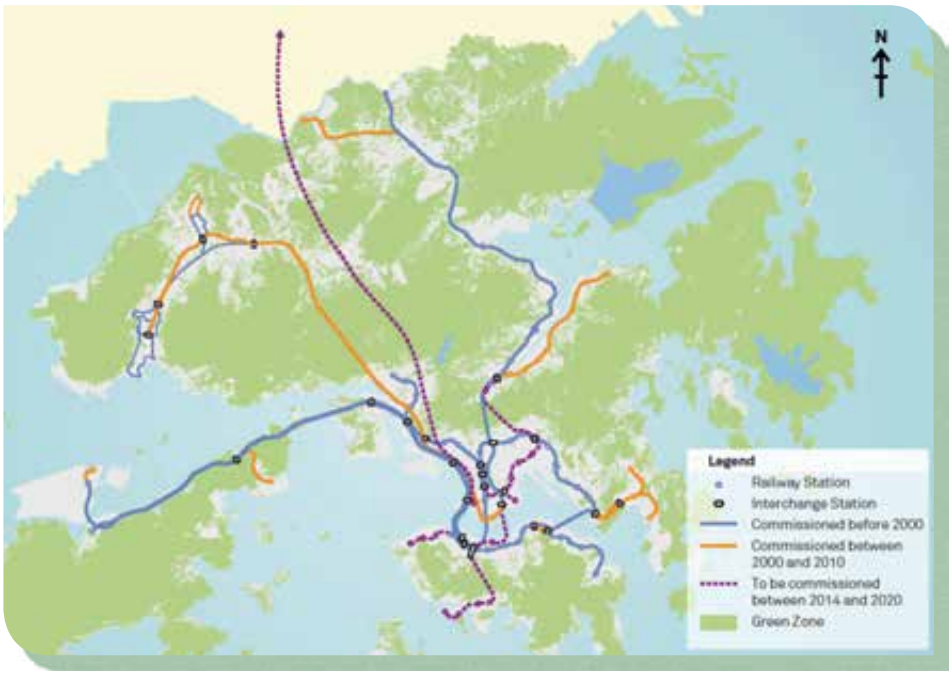
Deployment of wastewater treatment facility

Development of Environmentally Friendly Railway System

Railway is a safe, efficient and environmentally friendly mass public transportation carrier. The Government policy places emphasis on railways as the backbone of public transport. The Highways Department adheres to this policy and aim at planning and implementing the railway system to world-class standards.

Overview of Railway Development

The "Railway Development Strategy 2000" published in 2000 provided a blueprint for a new phase of railway development which included a number of new railway schemes to meet Hong Kong's increasing transport needs in a sustainable manner. Less reliance on road-based transport will alleviate the pressure on transport systems, reduce overall tailpipe emission from vehicles and, in turn, lessen the impact on the environment.



Alignments of railway lines

Eight new railway lines, or extensions of existing lines, were commissioned between 2002 and 2009. Besides, five new railway lines are under construction, including the West Island Line, the South Island Line (East), the Kwun Tong Line Extension, the Hong Kong section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link and the Shatin to Central Link.

We commenced the consultancy study for the Review and Update of the Railway Development Strategy 2000 in March 2011 to further our policy of using railways as the backbone of the passenger transport system in Hong Kong. Upon its completion in 2014, the Government will announce the way forward for further development of the railway system.

Environmentally friendly Measures for Shatin to Central Link

The Shatin to Central Link (SCL) is a 17 km strategic rail line connecting several existing ones to form two railway corridors, namely the "East West Corridor" and the "North South Corridor". It will improve connectivity and provide efficient and reliable access to more areas of Hong Kong. Not only will this bring substantial social and economic benefits, it will also bring environmental benefits.

Before the public can enjoy these benefits, some environmental disturbance is inevitable during the construction of the project. To mitigate the disturbance, since the start of construction in 2012, the project team has been endeavoring to minimize the impacts by its commitment to sound environmental management,

Alignment of SCL

environmental initiatives and continuous improvement. Independent consultants have also been appointed to carefully assess the possible environmental impacts and to check against the requirements of the Environmental Permits (EP). The project team will continue to work with stakeholders to implement good site practices and ensure that the design, construction and operation of SCL comply with the relevant statutory environmental protection requirements and that all necessary measures are implemented to reduce the project's impact on the public and the environment.

Highlights on Environmental Management

Cultural Heritage

As per Environmental Impact Assessment recommendations and with archaeological findings during the course of works in the To Kwa Wan Station area, archaeological survey works were conducted to cover the whole station and part of the associated adit areas. Some artifacts and features dated to late Qing Dynasty and Song-Yuan Dynasties were identified (e.g. pottery, ceramic shards, wells and damaged building foundations). The project team will continue to be in close discussions with Antiquities and Monuments Office on the findings and preservation proposals for their consideration with the Antiquities Advisory Board.

The conservation works for the historic structures (namely the Former Royal Air Force Hangar and the Old Pillbox) and archaeological sites (namely Lung Tsun Stone Bridge and Former Kowloon City Pier) were also implemented according to EP requirements. Extensive communication and collaborative efforts between engineers, building heritage experts, archaeologists, Antiquities and Monuments Office and the public are being put in to preserve the heritage values while serving the transport needs of the community.

Noise and Dust Mitigation Measures

Construction noise impact associated with the use of Powered Mechanical Equipment (PME) has been carefully controlled throughout construction. With the implementation of practical mitigation measure, construction noise impacts at sensitive receivers arising from works activities are controlled to acceptable levels. Apart from the use of movable noise barriers and quiet PME, mitigation measures in the form of noise enclousures have been adopted to mitigte construction noise coming from the shaft structures. At the works sites of Hin Keng Station for tunnelling works by drill and blast and the extension of Diamond Hill Station by tunnel boring machine, a specifically designed sound insulating enclosure equipped with proprietary acoustic panels and silencers at the ventilation exhaust, was built over the large shaft structure and designed with a noise reduction of around 51 dB(A) and 31dB(A) respectively.

Noise enclosure at Hin Keng

In order to minimize the potential dust impact from the Kai Tak barging point, 3 sided screen with top tipping halls have been provided. Moreover, hard paved haul road, regular watering and wheel washing facilities have been provided in order to reduce the dust impact owing to the truck movement within the barging point.

Tipping hall at Kai Tak Barging Point

Trees Preservation and Greening Measures

Trees retained in construction sites were properly protected with close monitoring by the appointed certified arborist under the EP. The transplanted trees were maintained with care in both receptor locations and nursery. In the former Tai Hom Village, 2 large banyan trees weighted between 140 – 200 tonnes with 10m diameter rootballs have been transplanted within the site successfully. Transplanting such large trees have rarely been done in Hong Kong and required careful engineering design and tree expert input.

Transplantation of a banyan tree

In addition, new landscape resources such as green roof, shrub planting and climbers, etc, are proposed as alternative compensatory planting to optimise greening opportunities.

Being the largest site office of SCL, Hung Hom Site Office has adopted numerous green design initiatives. For example, the seafront is flanked by rows of bamboo and green wall with climbers to shield the office from the western sun to reduce heat absorption. At the main entrance foyer, the glazed wall and skylight provides ample natural daylight saving a lot of energy on artificial light. Artificial turf was also laid on the roof to minimize visual impact to adjacent residents and provide additional thermal insulation to the roof. Inside the office, false ceilings were omitted to reduce future construction wastes. Other green initiatives include external solar light poles, solar tubes, sunshades above windows, use of water fitments with Grade 1 water efficiency labels etc.

Rows of bamboo and glazed wall at Hung Hom site office

Stone Wall Tree Pruning Operation in Bonham Road

Stone wall trees are attractive and valuable natural features in Hong Kong's streetscape. The Highways Department (HyD) is currently responsible for the management and maintenance of 214 stone wall trees, including the 6 Chinese banyan (*Ficus microcarpa*) alongside Bonham Road parallel to St Stephen's Lane (Slope No. 11SW-A/R577). Bonham Road is a busy street with heavy traffic for most of the day. Pedestrian footpaths are relatively narrow and congested at peak times, particularly around the bus stop immediately below the stone wall trees. During a routine inspection of these banyans in 2010, it was observed that a portion of the roots of one tree (T4) had become detached from the wall. As the tree overhangs Bonham Road, it was considered necessary to take remedial action to prevent the tree from falling and injuring passers-by or damaging adjacent property. However, the challenging site constraints had to be overcome.

Location of the concerned tree

Photo of the concerned tree (Indicated by Red Arrow)

A tree specialist was invited to assess the condition of the stone wall trees and propose remedial measures. It was determined that there was an alarming risk of Tree T4 becoming totally detached from the wall and falling into the road. The tree specialist suggested for further investgation a number of different methods to stabilise the branch, including installation of cable ties anchored to adjacent buildings in St Stephen's Lane or steel frame props set into the Bonham Road pavement below to support the tree. However, upon review of these

proposals by HyD, and after consultation with the Tree Management Office and Expert Panel on Tree Management (EPTM) of DEVB, none of the proposals was considered to be feasible due to the site constraints and close proximity of pedestrians and road users. To mitigate the safety risk on one hand and to address public aspiration to preserve the tree on the other, it was decided that, instead of a complete felling, a substantial pruning operation to remove a large branch of T4 overhanging Bonham Road was the best course of action and should be carried out urgently.

The local District Council (DC) members and the Central and Western District Council were informed of the proposed tree surgery work to promote the public's understanding of the need to prune this prominent stone wall tree for safety reasons and the comprehensive investigation carried out before coming up with the proposed operation.

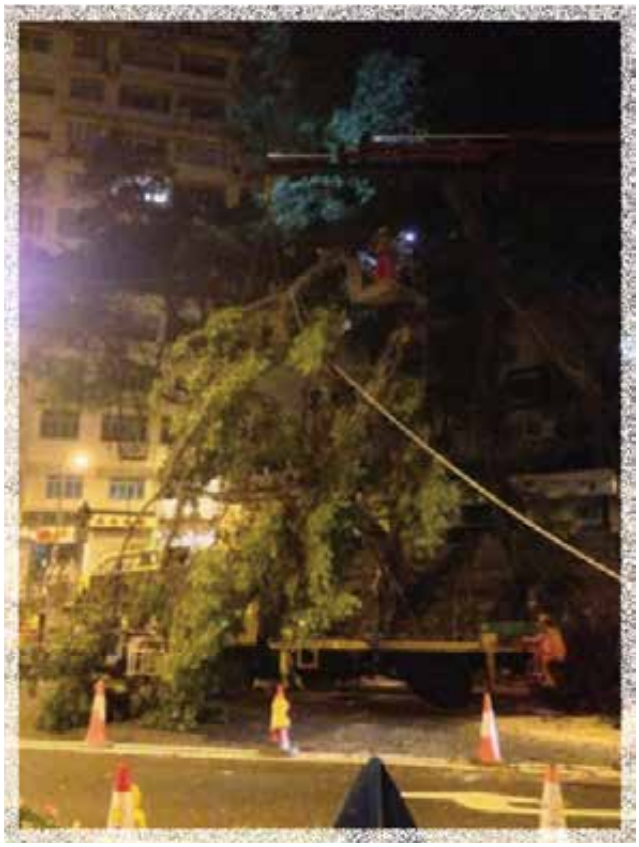
On site meeting with EPTM

On site meeting with local DC member

Careful planning and detailed coordination were required to implement the pruning work. The pruning operation was carried out in two consecutive nights of 16 and 17 May 2013 as planned under the dedicated efforts of approximately 30 staff from the Contractor to operate machinery and control traffic as well as 10 staff from HyD including Engineers, Landscape Architect and site staff to supervise the work and communicate with public members as necessary.

Traffic congestion at the beginning of the operation

HyD professionals provided on-site supervision during the operation



The crane lorry transferred the pruned branches to the ground for clearance

After two nights of hard work, the major branch of T4 posing significant risk to public was removed and the road was re-opened to traffic at 6 am of 17 May, 2013.

With the threat to public's safey successfully mitigated and the valuable stone wall tree properly preserved, HyD's professional efforts striking the appropriate balance between protection of public safety and preservation of stone wall trees were well demonstrated. Yet, continuous efforts would still be needed to monitor the health and stability of the stone wall trees at the busy urban road junction.

Before the operation *After the operation*

Landscape Enhancement Management Plan

The Highways Department also proactively implements a Landscape Enhancement Management Plan (LEMP) to enhance the aesthetics and biodiversity of slopes managed and maintained by it. One prominent and exemplary case is the landscape enhancement work for slope 5SE-D/F68 completed in 2013.

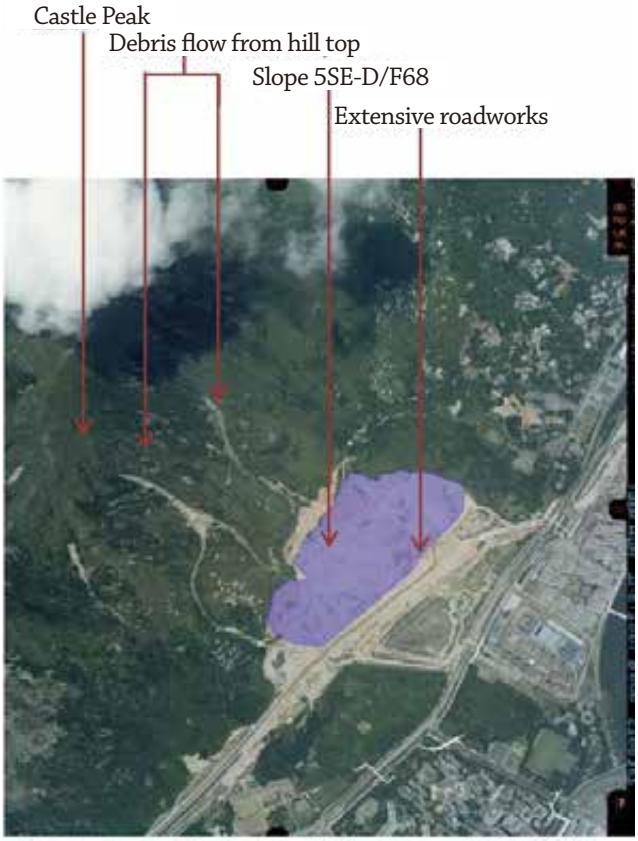
Project Description and Site History

- Location: Hill slope under Castle Peak in Tuen Mun New Town
- Area: 14 hectares
- Site History: A disturbed land from extensive landslides and road works

Vegetation History Before LEMP

After both natural (sizeable landslides) and human (extensive road works) disturbance, the site was planted with various woodland mix seedling species for quick initial green cover and short-term erosion control on sloping ground before handover to the Highways Department for long-term vegetation maintenance.

Our challenge was to make good a landscape with such history for better aesthetics and wildlife through landscape management.



Source : Aerial photo from Lands Department, HKSAR, 2001

LEMP for both Aesthetics & Biodiversity

From 2011 to 2013, we have launched a LEMP on the vegetation of Slope 5SE-D/F68 which includes the following:

Landscape Enhancement Management Plan – Step 1

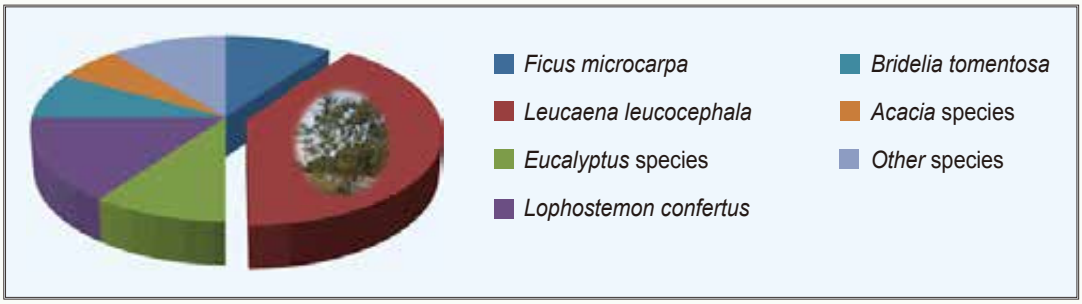
Monitor the landscape change

- To monitor the performance of each individual vegetation species and its contribution to the whole landscape as a base to transform it into a sustainable landscape
- To design a sustainable landscape which is aesthetically appealing and in balance with the local climate and environment

Landscape Enhancement Management Plan – Step 2

Vegetation survey on the performance of initial planting species

- A comprehensive vegetation survey was conducted in 2011, the findings are shown below:



Landscape Enhancement Management Plan – Step 3

Identify undesirable species

From the vegetation survey, it was clear that *Leucaena leucocephala* was the most successful pioneer species on the disturbed land.

However, *Leucaena leucocephala* is a vigorous exotic species from tropical America. Its dominance would prevent natural succession of native species and disturb the biodiversity. As its historical role of establishing initial green cover had accomplished, it was therefore identified as an undesirable species to be removed to give way for desirable species and biodiversity.

Leucaena leucocephala dominated the slope before the enhancement works

Poor quality of greening from Leucaena leucocephala

Landscape Enhancement Management Plan – Step 4

Selective removal of undesirable species based on ground conditions

- Since the site was on sloping ground, gradual removal of the undesirable species - *Leucaena leucocephala* had to be carried out in phases
- A total of 3,000 *Leucaena leucocephala* with diameter at breast height over 250mm and numerous seedlings of *Leucaena leucocephala* were removed from slope surface area of over 147,609m^2

Stump of *Leucaena leucocephala* not removed for slope stability but black plastic bags were used to prevent its regrowth

Gradual clearance of Leucaena leucocephala

Landscape Enhancement Management Plan – Step 5

Plant desirable species for aesthetics and biodiversity enhancement

- Native tree species were selected for replanting in the cleared land of *Leucaena leucocephala*
- Some were selected for seasonal effect such as *Castanopsis fissa* for beige yellow flower in Spring and *Liquidambar formosana* for red leaves in Fall
- Some were selected for the enhancement of biodiversity such as *Morus alba* and *Citrus maxima* to attract butterflies, insects and birds
- More than 11,000 number of plants were planted in the cleared land from *Leucaena leucocephala*
- The actual enhancement planting works were carried out in Hong Kong's planting season between February to May to save frequent watering on the extensive land
- Mostly whip size of trees (with some light standard size if the area is not steep) were planted for its easy adaptation and growth

Species for biodiversity enhancement:

Morus alba

Citrus maxima

Poluspora axillaris

Rhus succedanea

Species for aesthetic enhancement:

Castanopsis fissa

Liquidambar formosana

Rhododendron simsii

Rhus succedanea

Landscape Enhancement Management Plan – Step 6

a) Check the results on biodiversity – butterflies

- Before the enhancement works: Only a few *Catopsilia pomona* were found
- After the enhancement works: As many as 13 Hong Kong's common butterfly species were found during the field counts as follows:
  - *Blues* species
  - *Catopsilia pomona*
  - *Celastrina lavendularis*
  - *Faunis eumeus*
  - *Hypolimnas bolina*
  - *Mycalesis mineus*
  - *Neptis clinia*
  - *Papilio polytes*
  - *Parnara ganga*
  - *Potanthus confucius*
  - *Tirumala limniace*

Mycalesis mineus

Neptis clinia

Parnara ganga

Hypolimnas bolina

b) Check the results on biodiversity – insects

- Before the enhancement works: The presence of insects was scarcely observed
- After the enhancement works: Insects like *Pantala flavescens*, *Hydrobasileus croceus*, *Orthetrum glaucum*, *Erthesina fullo*, *Xenocatantops brachycerus* and *Lymantriidae* family were found during the field counts in August 2013

Orthetrum glaucum

Xenocatantops brachycerus

Xenocatantops brachycerus

Pantala flavescens

Erthesina fullo

Hydrobasileus croceus

Family Lymantriidae

c) Check the results on biodiversity - birds

- Before the enhancement works: Only a few *Zosterops japonica* were found
- After the enhancement works: The following birds were also observed:

Zosterops japonica

Groups of Zosterops japonica were found on trees

Egretta garzetta

One Egretta garzetta seen in wet season in the downslope water catchment area

Sturnus nigricollis

Two Sturnus nigricollis in open area

d) Check the results on biodiversity – amphibian

One common native spotted narrow-mouthed frog *Kalophrynus interlineatus* which fed on mosquitos and red worms was found on site during rainy season. It indicated that our site had red worm that attracted insects as the food chain of the ecosystem.

Kalophrynus interlineatus

e) Check the results on biodiversity – understory growth

It was found that almost all butterflies and insects observed were resting on native undergrowth like *Bidens alba*, *Lantana camara* and *Miscanthus sinensis*. It proved that native tree attracts native understory growth.

Catopsilia pomona* on *Lantana camara

Elymnias hypermnestra* on *Miscanthus sinensis

Mycalesis mineus* on *Bidens alba

Flowering of *Bauhinia* species

Before enhancement work - A disturbed land in 2001

After enhancement work - A high ecological value woodland has been established in 2013

Conclusion

In conclusion, the LEMP has not only enhanced the aesthetics, but also enriched the wildlife and biodiversity, making a better world through landscape management. HyD will continue to seek sustainable enhancements to landscape when suitable opportunities arise during the course of its vegetation management.

Green Office Management

In support of the Government's drive to save natural resources, we are committed to making every endeavour to make our green office management a greater success. In addition to energy saving as mentioned under the chapter on "Clean Air Charter", we have been making our best effort to save other resources.

Paper Saving

To align with the green office initiative, we have promulgated and would continue with the following measures to minimise paper consumption:

- minimise photocopying paper consumption;
- use both sides of paper for printing and photocopying;
- use the blank side of used paper for drafting/ photocopying for internal document/ correspondence/ fax document;
- use electronic means extensively for communication (for instance, use electronic files and keep the use of hard copies to the minimum);
- reuse envelopes and file covers; and
- encourage the use of recycled paper.

In 2013, we consumed 18,322 reams of paper (representing a saving of 3.72% of that of 2012) of which all were recycled paper.

Waste Recycling

We encourage collection of waste with recycle value by taking the following measures over the years:

- put up green boxes to collect reusable envelopes and papers;
- collect computer printer toners and ink cartridges for refilling and recycling; and
- put up recycling boxes to collect used paper, CDs, plastic bottles, aluminium cans and rechargeable batteries for recycling.

Water Saving

The renovation works of 6/F toilets in HMTGO were carried out in November 2013. To maximize water conservation, we have adopted the use of dual-flush toilets, automatic low flow water taps and sensor type urinals. These new components could effectively control the duration of water flow and also keep the water flow at low level. We target to complete the renovation project by 2014.

Auditing

Annual Environmental Audit

We conduct annual environmental audits in all 16 offices located in different premises with a view to maintaining the impetus of green measures in housekeeping. The objectives of conducting annual environmental audits are:

- to assess compliance with the green housekeeping guidelines;
- to identify non-compliance and recommend remedial actions;
- to promote good environmental management; and
- to increase staff awareness of green management and occupational safety and health initiatives.

Our offices have been making continuous efforts to comply with the green housekeeping guidelines. We have also taken the opportunity to share among the offices the green management best practices.

Carbon Audit

Two carbon audits were conducted for HMTGO by the Building Management Office (BMO) in 2013 to monitor the effectiveness of Green House Gas reduction efforts. The relevant data are being studied by the BMO.

Energy Audit

To upkeep our effort in energy saving, an Energy Audit for HMTGO had been conducted by the Government Property Agency (GPA) which identified three energy management opportunities. In 2013, we worked together with GPA and the Architectural Services Department (ArchSD) to take forward the remaining two identified energy management opportunities, being:

- the installation of motion sensors in carparking areas so that lighting would be switched off when no one moves around there; and
- the replacement of the existing fluorescent lighting fixtures by dual lights fixtures completed with motion sensors in staircases.

Installation work of motion sensors light in carparking areas of HMTGO will be carried out by ArchSD's Contractor from February 2014 to June 2014. The work schedule for the replacement of fluorescent lighting fixtures is being processed by the ArchSD.

We continue to focus our research on environmentally friendly technology, such as improving the design of pavement material, reviewing the pavement maintenance practice and applying Mobile Mapping System technology for highly efficient road inventories survey.

Research & Technology

Long-Life Pavement Strategy

General Description of the Strategy and Long Life Roadbase

Road reconstruction unavoidably causes nuisance to nearby residents and disturbance to road users. To effectively eliminate the large scale full depth reconstruction of bituminous carriageway, the development of a long-life bituminous pavement strategy for Hong Kong thus comes into place. The strategy makes reference to the latest international understanding that a pavement designed to an adequate roadbase thickness would not manifest structural failure. With timely maintenance and appropriate rehabilitation works, the service life of a well-designed and properly constructed pavement structure can be prolonged sustainably and the need for major reconstruction is remote.

Bituminous roadbase under construction

The strategy comprises an integrated approach covering proper design and construction, regular monitoring of road defects, timely implementation of stop-gap repairs and rehabilitation works to restore the pavement serviceability and integrity and to avoid distress proliferation to such a manner that full depth construction is required. The relevant design guidelines have been promulgated in 2013 for implementation. In the long run, the overall life cycle cost for our road asset and environmental impacts induced by their reconstruction can considerably be reduced.

Robust Surfacing - Polymer Modified Stone Mastic Asphalt

As part of the long-life pavement strategy, Stone Mastic Asphalt (SMA) had been promoted to be used as the surfacing layer on heavily utilized and stressed bituminous carriageways since 2001. Due to the instability under high local temperature, the occurrence of rutting and shoving on SMA was noted and sometimes these defects emerged shortly after construction. In view of the cause of the failure, the Highways Department (HyD)

launched a laboratory study to evaluate the performance of the conventional SMA and the SMA with polymer modified bitumen (PMSMA). The laboratory tests showed that PMSMA could positively address the stability problem of the conventional SMA. With the promising outcome, the PMSMA was put forth for further site trials to evaluate its performance under live traffic. The trials also showed that PMSMA has much higher stability against heavy traffic loading, even under high temperature in the summer. Use of PMSMA has then been started to be included in HyD's maintenance contract commenced in 2012 and extended to be included in HyD's maintenance contracts commenced in 2013. With the use of this robust surfacing, the frequency of resurfacing and its associated environmental impact can be reduced.

PMSMA surfacing at Pok Oi Interchange, Yuen Long

Resurfacing of Polymer Modified Friction Course Without Relaying Wearing Course

Polymer modified friction course (PMFC) is a standard bituminous surfacing material for high speed roads (HSR) in Hong Kong to provide better surface drainage and higher skid resistance, particularly on rainy days. Under the current practice, defective HSR surface is made good by milling off and re-laying both the PMFC and its underlying wearing course (WC).

Some overseas experience and local pilot study indicate that deteriorated PMFC can be milled off and resurfaced while maintaining its underlying WC untouched without affecting its intended performance. A progressive trial program in tandem with theoretical verification is being conducted to thoroughly assess the performance of PMFC layer without WC re-laid under various HSR traffic and road geometry conditions. In the foreseeable future, the single-layer PMFC resurfacing practice will likely be adopted in many circumstances, bringing a more cost-effective and environmentally friendly maintenance method to society.

Re-laying PMFC over existing WC

Road Inventory Survey by Mobile Mapping System

Comprehensive collecion of road inventory data requires input of significant resources and thus carries environmental implications. Nowadays, Mobile Mapping System (MMS) technology is increasingly significant in a wide range of applications from automation of the survey data collection, digital mapping to autonomous navigation. A service contract was awarded in 2013 for the acquisition of a complete set of 3D geo-referenced images by using the MMS technology for updating road surface inventories of the streets, roads and tunnels maintained by the Highways Department.

MMS Computer System on board

Through the use of this advanced and cost-effective technology, 3D geo-referenced photographic images of streets and roads can be obtained by a set of cameras with GPS and inertia sensor devices mounted on a vehicle traveling at normal speed. With the use of the MMS associated tools for visualization, mapping and measurement functions, a large number of road surface drains, roadside trees and footpaths can be extracted for asset management and other application purposes, e.g. establishment of road inventory data, planning and design of road maintenance works, etc. It can be seen that the use of the MMS technology can facilitate the updating of our road asset in a more efficient and environmentally friendly manner, as well as can enhance the efficiency and cost-effectiveness at work.

Mitigation of Vehicle Usage

MMS changes the mode of traditional field survey operation. MMS primarily employs only one vehicle for the acquisition of road inventory data, whilst the traditional survey methods always involve more field survey teams and field trips to complete the task. In comparison with the traditional survey methods, MMS is an effective means to reduce the number of vehicles deployed for large scale inventory survey. This in turn helps reduce fuel consumption, vehicle emissions and air pollutants, inclusive of Carbon Monoxide, Oxides of Nitrogen, particles and hydrocarbons, etc., and mitigate roadside air pollution accordingly.

Only one MMS vehicle deployed for the road inventory survey

Reduction of Paper Wastage

MMS also changes the mode of data capture and data dissemination. In traditional surveys, small portable field books are used for recording both survey data and relevant notes taken at sites. Record plans of the surveys showing the captured road inventory features are also produced. To complete the road inventory survey covering all roads maintained by the department would involve a bulk consumption of paper field books and ink/toner cartridges for the plans production. On the contrary, the MMS survey deliverables involve only a complete and reliable set of 3D Geo-referenced Images associated with the attribute data of road inventories. The digital images and inventory data can facilitate respective users for other applications with less printing and plotting, e.g. digitization and taking measurement of any viewable features and visualization of proposed works in the MMS virtual reality environment. It thus helps saving the consumption of field books, drawing papers, drawing films, ink/toner and print cartridges, etc.

A stack of record plans

Field books

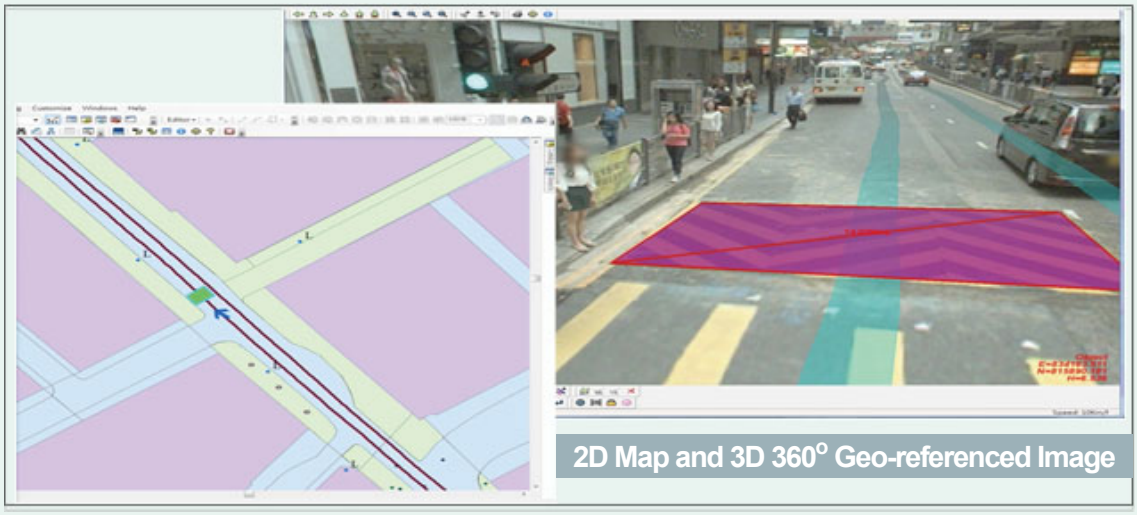
Detailed Configuration of MMS

The system consists of a vehicle mounted

with two sets of 360-degree digital cameras for image acquisition, Global Navigation Satellite System (GNSS), an Inertial Measurement Unit (IMU), a distance measurement indicator (DMI) devices for position fixing and an inclinometer for image rectification (see Diagram 1). In addition, a MMS computer system is installed inside the vehicle for capturing of time synchronized image and positional data that shot by cameras as well. Through the formation of 3D Geo-referenced Images and extraction of road inventory GIS data, the data can be readily identified and visualized from the images. Besides, initial planning and design of road work could be performed using the images.

Diagram 1 - Mobile Platform of MMS

Equipment Setup :	
Image capturing Device System	1) LadyBug 360° camera (2 sets) with an Inclinometer
Position Fixing Device System	2) GNSS Antenna with calibrated GNSS receiver (2 sets)
	3) IMU
	4) DMI



2D Map and 3D 360° Geo-referenced Image

Planning and Design of road works using the 3D Geo-referenced Image

We are committed to organising different activities to promote interaction both internally and externally, as well as to foster the public's understanding of our services.

Stakeholders Engagement

Our Staff

Green Training

In 2013, we continued to provide various training courses to acquaint our staff with necessary environmental knowledge for carrying out their duties.

Course Name	Date	No. of Participant
ISO14001:2004 EMS Internal Auditor Training	29 & 30 July 2013	20
Environmental Monitoring / Measurement Procedures & Environmental Requirements for Professional Staff	27 - 29 November 2013	41
Environmental Monitoring / Measurement Procedures and Environmental Requirements for Technical Staff	2, 3, 5, & 6 December 2013	50
Joint Safety, Health & Environmental Seminar 2013	30 September 2013	59

Green Activitiy

The Recreation and Sports Committee of Highways Department has kept on organizing green activities, such as outing and hiking, for staff and their family to enjoy the environment and to promote a better work-life balance.

Green Advice

We have adopted various measures to enhance environmental awareness of staff through the provision of green advice :

- re-circulate environmentally related departmental guidelines regularly through e-mail and the intranet;
- display posters to promote economical use of resources and green housekeeping measures;
- invite staff to put forward suggestions on green management such as through the Staff Suggestions Scheme; and
- extend the green office concepts to daily life through activities such as recycling of used red packets, empty moon cakes / candy cans organised by the BMO of HMTGO.

The Industry

Environmental Training in Collaboration with Others

To enhance our staff's knowledge on environmental management measures, we continued to co-organize the Joint Safety, Health and Environmental Seminar 2013 with CLP Power Hong Kong Limited, Mass Transit Railway Corporation Limited, Civil Engineering & Development Department and Environmental Protection Department. One of the core objectives of the Seminar was to enhance the knowledge of environmental management measures for the professional and technical staff.

Co-organizing Joint Safety, Health and Environmental Seminar 2013

Presenting a keynote speech in the seminar

Joint Safety, Health and Environmental Seminar 2013

Besides, we gave a presentation on "Construction Dust Management in Hong Kong Construction Sites" to Guangdong government delegates to share and promote good practices of dust control measures in local construction sites.

Environmental Promotion Campaign in Construction Site

Contractors of the Highways Department were encouraged to organize and participate in various environmental promotional activities, which include displaying environmental messages on sites, organizing talks and campaigns, distributing newsletters, awarding staff of their good performance on environmental management, and joining environmental campaigns and competitions organized by other organizations, etc.. In response, a significant number of contractors had actively participated in the Hong Kong Awards for Environmental Excellence (HKAEE) which was presented by the Environmental Campaign Committee in conjunction with the Environmental Protection Department and other organizations. They had practiced good green management and green innovations in their construction sites. HKAEE had benchmarked their commitment towards environmental excellence.

Contractors were also encouraged to apply for Environmental Labels and Sectoral Awards under HKAEE. The Environmental Labels consisted of Wastewise and Energywise Labels. The Labels demonstrated that the contractors had effectively adopted measures to reduce the amount of waste generated and save energy within their establishments respectively, and recognized the waste reduction and energy saving effort of the contractors. The Sectoral Awards encouraged the contractors to adopt green management; benchmarked their commitments towards best practices within construction industry; and acknowledged their efforts of leading the construction industry. In 2013, eight projects were awarded Wastewise Environmental Labels, two projects were awarded Energywise Environmental Labels and three projects were received Sectoral Awards.

The Community

We continued to organise a wide range of activities in 2013 to maintain close ties with the community. Through these activies, we aimed to enhance neighbourliness, publicize project details, share technical knowledge and collect opinions for continuous improvement.

Community Planting

Widening of Tolo Highway - Community Planting Day

Public Forum

Our Future Railway - Stage 2 Public Engagement

Roving Exhibition

Widening of Tolo Highway

Central Kowloon Route

Our Future Railway

Engagement with Outside Parties

Representatives of Local Community

Local Institution - The Chartered Institution of Highways & Transportation (HK Branch)

Local Institution - The Institute of Clerks of Works & Construction Inspectorate (Hong Kong)

Local University - Department of Land Surveying and Geo-Informatics, Hong Kong Polytechnic University

Mainland University - School of Civil Engineering and Transportation, Guangzhou, China

Overseas University - Lübeck University of Applied Sciences

Mainland Counterparts

Taiwan Journalists

Project Newsletter

Traffic Improvements to Tuen Mun Road Town Centre Section

Widening of Tolo Highway

Project Website

Hiram's Highway Improvement

Hong Kong-Zhuhai-Macao Bridge Related Hong Kong Projects

Central Kowloon Route

Reconstruction and Improvement of Tuen Mun Road

Central-Wan Chai Bypass and Island Eastern Corridor Link

Widening of Tolo Highway

For the purpose of sustainable development, we have been striving for continual improvement in the protection of environment by attaining objectives, reaching targets and achieving merits.

Environmental Performance

Awards

2013 Hong Kong Flower Show – The Highways Department's Display Booth

The Highways Department was honoured to receive the 'Grand Award for Outstanding Exhibit (Landscape Display)'.

The theme of the Hong Kong Flower Show 2013 was the "Kaleidoscope of Spring" and the theme flower was "*Dendrobium*". The design concept aimed to combine the Highways Department's mega infrastructure project namely, the Hong Kong-Zhuhai-Macao Bridge and the geographical location of the Pearl River Delta, in order to create an amazing and colorful "Kaleidoscopes of Spring".

The entire design consisted of three "Kaleidoscopes", representing Hong Kong, Zhuhai and Macao. Vertical planes of each "Kaleidoscope" constituted of plant materials and PVC mirrors, which defined three different cellular spaces. Changing ripples spreading from the center of the "Kaleidoscopes" not only represented the "time lines" required for traveling between cities, but also created an interesting paving pattern in the display booth. The optical principle of the "Kaleidoscopes" was used to link up the three "cities" by using one of their vertical planes with PVC mirrors placed at three equilateral sides of the central courtyard. The "Kaleidoscopes'" ever-changing patterns and the vivid color of the "*Dendrobium*", would give us the lively atmosphere and happiness during the visit of the "Kaleidoscope of Spring" and our display booth.

Outstanding Environmental Management and Performance Award (OEMPA) and Considerate Contractors Site Award (CCSA)

The Development Bureau and Construction Industry Council jointly organized the Considerate Contractors Site Award Scheme to recognize construction sites with good site safety and environmental performance and considerate attitude towards the neighbourhood and the public. In 2013, our construction sites received six CCSA and four OEMPA awards, including two Gold, one Silver, one Bronze and two Merit Prizes from CCSA, and one Silver and three Merit Prizes from OEMPA.

Contract number HY/2009/18 "Central-Wanchai Bypass – Central Interchange"

winner of CCSA (New Works) Gold Price and OEMPA Silver Prize

Contract number HY/2009/15 "Central-Wanchai Bypass – Tunnel (Causeway Bay Typhoon Shelter Section"

winner of CCSA (New Works) and OEMPA Merit Prizes

Contract number 01/HY/2009 "Management, Operation, Installation and Maintenance of the Public Lighting System in Hong Kong Island and Lamma Island 2009-2013)"

winner of CCSA(RMAA Works) Merit Prize

Contract number 01/HY/2011 "Management, Operation, Installation and Maintenance of the Public Lighting System in New Territories West 2011-2015)"

winner of OEMPA(RMAA Works) Merit Prize

Environmental Objectives and Targets

Achievement in 2013

Objectives	Target	Achievement
Reducing the energy consumption in public lighting	To install dimmers for the lighting system at footbridges	Target achieved; Dimmers were successfully installed for the lighting system of 15 nos. of footbridges
Saving 5% electricity consumption in HMTGO by 2014 (Comparing with the baseline electricity consumption in 2009)	As the target for 2012 has not been achieved, we shall continue to work with Government Property Agency and Architectural Services Department for: (a) Installing 10 sets of motion sensors in carparking area; and (b) Replacing 60 nos. of fluorescent lighting by dual lighting fittings with motion sensors in staircases.	(a) Installation work of motion sensors light in carparking space of HMTGO will be carried out by Arch SD's contractor from Feb to Jun 2014. (b) The work schedule for the replacement work is being processed by Arch SD.
Adopting measures in water conservation	To continue installing dual-flush toilets, automatic low flow water taps and sensor type urinals in the toilets of HMTGO when they are refurbished.	Toilet refurbishment works were carried out at 6/F toilet in December 2013. It would be completed in late January 2014.
Improving indoor air quality	To continue upkeeping the indoor air quality at or above the level of "Good Class" in HMTGO.	Target achieved. Air measurement was conducted by the Electrical and Mechanical Services Department in 2013. HMTGO was awarded the Indoor Air Quality Certificate (Good Class).
Carrying out carbon audit for tracking the effectiveness of Green House Gas (GHG) reduction	To continue carrying out carbon audit twice per year for tracking the effectiveness of GHG reduction.	Target achieved. Two carbon audits were arranged by the Building Management Office of HMTGO.
Encouraging the use of recycled paper in the Department	To raise the percentage usage of recycled paper not less than 96.5% of the total consumption.	Target achieved. 18,322 reams of paper were consumed in the year of which all (100%) were recycled paper.
Setting target in reducing photocopying paper consumption	To maintain the consumption of photocopying paper at a level not exceeding the consumption level of 2012.	Target achieved. 18,322 reams of paper were consumed in the year. Comparing with 19,029 reams of paper consumed in 2012, a saving of 3.72% in paper consumption was achieved.
Promoting the wider use of recycled materials	To introduce the use of the following construction materials/ methods in more maintenance contracts progressively; (a) Reclaimed Asphalt Pavement (RAP) in bituminous pavement construction; and (b) Thermal Patcher for appropriate scale resurfacing.	(a) Target Achieved: Use of RAP has been specified in two new road maintenance contracts scheduled to commence in April 2014. (b) Target Achieved: Use of Thermal Patcher for appropriate scale resurfacing has been specified in two new road maintenance contracts scheduled to commence in April 2014.
Planting trees and shrubs	To plant 156,000 trees/shrubs in capital works contracts of MWPMO and HZMB-HKPMO	Target achieved; 424,318 trees/shrubs have been planted.
Adopting site office equipment with energy saving label	To use site office equipment with energy saving labels in all new capital works contracts of MWPMO and HZMB-HKPMO	Target achieved; All 6 new works contracts tendered in 2013 have adopted site office equipment with energy saving label.
Procuring environmentally friendly contract vehicle	To procure environmentally friendly private car model approved by EPD for saloon type contract vehicle in all new capital works contracts of MWPMO and HZMB-HKPMO	Target achieved; All 6 new works contracts tendered in 2013 have procured environmentally friendly contract vehicles.
Reducing dust emission	To include a particular specification clause for dust suppression in all new capital works contracts of MWPMO and HZMB-HKPMO	Target achieved; All 6 new works contracts tendered in 2013 have included the dust suppression particular specification clause.
Adopting energy efficient features and renewable energy technologies	(a) To adopt energy efficient features and renewable energy technologies in all capital works projects of MWPMO and HZMB-HKPMO with consultancy agreement tendered during the calendar year of 2013; and (b) to conduct carbon audit to assess the carbon footprint of the road projects of MWPMO and HZMB-HKPMO during feasibility and design stages with a view to providing recommendations for appropriate compensatory / mitigation measures.	Target achieved; All 5 new consultancy agreements tendered in 2013 have included relevant requirements for the consultants to produce a separate study report on both items.
Green Roof and Green Wall at the Engineer's Site Office	To include a particular specification clause for construction of Green Roof and Green Wall at the Engineer's Site Office which is exposed in sunlight in selected capital works contracts of MWPMO and HZMB-HKPMO tendered during the calendar year of 2013.	Target achieved; All 6 new works contracts of MWPMO and HZMB-HKPMO tendered in 2013 have included relevant particular specification clause for construction of green wall and green roof.

Looking Ahead for 2014

Objectives	Target
Reducing the energy consumption in public lighting	To continue installation of dimmers for the lighting system at footbridges
Saving 5% electricity consumption in HMTGO by 2014 (Comparing with the baseline electricity consumption in 2009)	As the target for 2013 has only been partially achieved, we shall continue to work with Government Property Agency and Architectural Services Department for : Replacing 60 nos. of fluorescent lighting by dual lighting fittings with motion sensors in staircases of HMTGO
Adopting measures in water conservation	To continue installing dual-flush toilets, automatic low flow water taps and sensor type urinals in the toilets of HMTGO when they are refurbished.
Improving indoor air quality	To continue upkeeping the indoor air quality at or above the level of "Good Class" in HMTGO.
Carrying out carbon audit for tracking the effectiveness of Green House Gas (GHG) reduction	To continue carrying out carbon audit twice per year for tracking the effectiveness of GHG reduction.
Encouraging the use of recycled paper in the Department	To maintain the percentage usage of recycled paper not less than 96.5% of the total consumption.
Setting target in reducing photocopying paper consumption	To maintain the consumption of photocopying paper at a level not exceeding the consumption level of 2013.
Promoting the wider use of recycled materials	To introduce the use of the following construction materials/methods in more maintenance contracts progressively: (a) RAP in bituminous pavement construction; and (b) Thermal Patcher for appropriate scale resurfacing.
Planting trees and shrubs	To plant 625,000 trees/shrubs in capital works contracts of MWPMO and HZMB-HKPMO.
Adopting site office equipment with energy saving label	To include particular specification clauses for using site office equipment with energy saving labels and water consuming appliances with WSD water efficiency labels in all Engineer's Site Office of capital works contracts of MWPMO and HZMB-HKPMO to be tendered during the calendar year of 2014.
Procuring environmentally friendly contract vehicle	To procure environmentally friendly private car model approved by EPD for saloon type contract vehicle in all capital works contracts of MWPMO and HZMB-HKPMO to be tendered during the calendar year of 2014.
Reducing dust emission	To include a particular specification clause for dust emission reduction in all capital works contracts of MWPMO and HZMB-HKPMO to be tendered during the calendar year of 2014.
Adopting energy efficient features and renewable energy technologies	In all capital works consultancy agreements of MWPMO and HZMB-HKPMO tendered dring the calendar year of 2014 to include requirements for the consultants : (i) to identify opportunities to utilize energy efficient features and renewable energy technologies; and (ii) to assess carbon footprint of the road work project during design stage and to provide recommendations on measures to reducing carbon footprint.
Green Roof and Green Wall at the Engineer's Site Office	To include a particular specification clause for construction of green roof and green wall in all capital works contracts of MWPMO and HZMB-HKPMO to be tendered during the calendar year of 2014 with Engineer's Site Office exposed in sunlight.

Hoping that this report could provide you with a glimpse of our dedication and efforts in environmental protection. Should you have any comment to our work, please share with us your views through our homepage on the Internet (address: http://www.hyd.gov.hk). Thank you for reading this publication.

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