



2021/22
Environmental Report





01 Director's Message

02 Introduction

04 Clean Air Charter

08 Environmental
Management

26 Research and
Technology

30 Stakeholder
Engagement

38 Environmental
Performance

DIRECTOR'S MESSAGE

I am pleased to present our Environmental Report 2021/22. Similar to previous years, this report highlights our efforts in the past year in environmental management and introduces our environmental targets and initiatives for 2022/23.

In 2021/22, we continued to implement a diverse range of environmentally friendly initiatives in major infrastructure projects as well as our daily operation. The Central Kowloon Route project upon completion will provide an alternative route bypassing the existing congested road network in central Kowloon area. With reduced traffic on surface road, enhanced travelling experience and substantial environmental improvements will be brought to the public. We seized every opportunity to enrich the landscape setting of the community. Through adopting a sustainable design methodology and the provision of extensive landscaping works in our projects, we made contribution to build Hong Kong a more liveable and greener city. We also spared no effort in the reduction of waste in our works such as by recycling and upcycling of yardwaste generated from our vegetation maintenance works. We continued the public lighting replacement programme aiming to reduce energy consumption by using LED in road lights. In pursuit of innovation and excellence in our daily work, we kept on conducting researches and trials on environmentally friendly technologies, including studies on the use of rubberized bituminous pavement materials and development of multi-functional smart lampposts.

I am glad to report that we have fully achieved our environmental targets for 2021. In recognition of our efforts and achievement, we received various awards for green management in the past year. We also continued to attain the Construction Industry Caring Organisation logo for our longstanding support to corporate social responsibility initiatives.

During the year, we have actively participated in various anti-epidemic work to fight the virus. Our colleagues volunteered to participate in inter-departmental anti-epidemic joint "restriction – testing declaration" operations. We also provided support for the operation of Tai Po Community Vaccination Centre as well as the packaging work of the anti-epidemic service bags.

I would like to express my most sincere gratitude to our colleagues who have exhibited professionalism and dedication in maintaining high quality services and delivering volunteer services to our community through concerted efforts in the face of unprecedented challenges. Looking ahead, we will continue to provide the public with services in an environmentally responsible manner, and strive to build a greener environment for our society.



Jimmy P M CHAN
Director of Highways

INTRODUCTION

This report shows the work and initiatives of the Highways Department in fulfilling our environmental responsibilities through supporting the Clean Air Charter, environmental management, research and development and stakeholder engagement in the year 2021/22. Our environmental performance was well recognized with the winning of several environmental awards in 2021/22. The report also records our achievement of environmental objectives and targets for 2021, and environmental targets set for 2022/23. To reduce paper consumption, this report is published in English and Chinese on our website.

DEPARTMENT PROFILE

Who we are

- We have about 630 professional staff spanning across various disciplines including engineering, surveying, landscaping and architecture. In addition, we also have about 1,730 staff in other grades.

What we do

- To expand and improve the road network of Hong Kong in order to meet the growth in traffic demand, serve new development areas and facilitate the movement of people and goods both within the territory and across the boundary and at the same time contribute towards sustainable development.
- To maintain the integrity of the road network with particular emphasis on safety and serviceability, and implement local road infrastructure works to facilitate and cope with the public and private sector developments.
- To provide infrastructure for pedestrians such as footbridges, lifts, covered walkways and escalators to enhance accessibility and connectivity of local destinations with a view to fostering a pedestrian friendly environment.
- To formulate plans for further development of the railway network in Hong Kong.
- To provide technical support and set standards for the construction and maintenance of the road network.
- To research into new materials, techniques and standards including environmentally friendly technology, and evaluate their applicability in Hong Kong.

Where we are



We have



630

professional staff



1,730

staff in other grades

We maintain



2,223 km
of roads



1,444
road bridges



19
road tunnels



1,036
footbridges



536
subways



13,257
roadside slopes



585,000
trees

Total operating expenditure
in the financial year 2021/22

\$4,106 million

VISION AND MISSION



Environmental Goal

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

Management Policy

We maintain an Integrated 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 service providers 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;
- sustainable construction with due consideration to balancing environmental, social and economic needs; and
- wider adoption of innovative technologies and practices.

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

CLEAN AIR CHARTER

LED LIGHTS REPLACEMENT PROGRAMME

From 1 Jan 2021 to 31 Mar 2022

LED luminaries provide

40,000
lighting points replaced

~30%
energy saving

ENERGY SAVING IN OFFICE

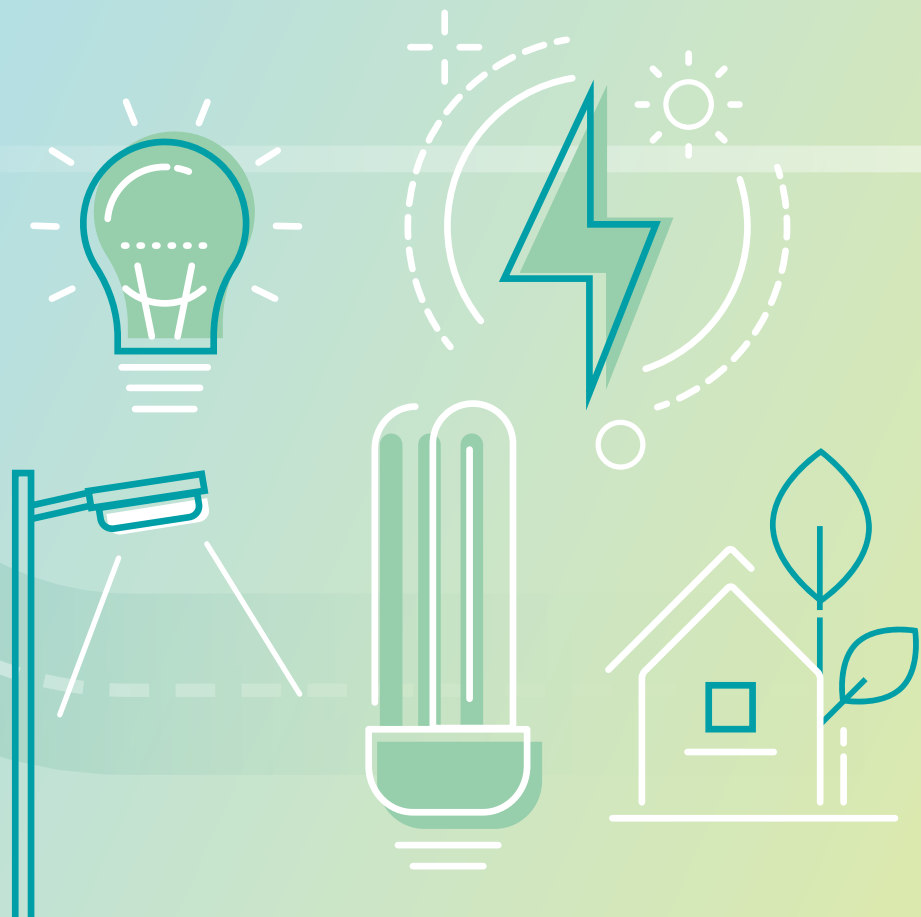
9 offices

have been installed with individual electricity meters to monitor energy consumption

CONTRIBUTION TO REDUCE EMISSION

50%
of saloon cars in HyD's fleet
are electric cars

5
HyD offices attained Excellent Class
or Good Class IAQ Certificates



The Hong Kong Special Administrative Region Government has endorsed and signed the Clean Air Charter, a project launched by the Hong Kong General Chamber of Commerce and the Hong Kong Business Coalition on the Environment aiming to engage the whole community in tackling air pollution. The Highways Department continued to support the Charter by taking various measures to reduce emission and energy consumption.

ENERGY SAVING IN PUBLIC LIGHTING

Background

The "Hong Kong's Climate Action Plan 2030+" outlined the medium and long term work against climate change and carbon reduction objectives, with an aim to reducing Hong Kong's carbon emission by 65% to 70% by 2030 using 2005 as the base. To align with the objectives of reducing carbon intensity with the vision to further enhance the energy efficiency of public lighting in Hong Kong, we launched the Light Emitting Diode (LED) public lighting replacement programme in 2017 to replace the conventional road lights, floodlights of directional and gantry signs and fluorescent tubes of subways and footbridges with LED luminaires.



A public road with LED lights



Conventional High Pressure Sodium lights at Tai Au Mun Road in Sai Kung

Same location after replacement with LED lights

Advantages of LED Luminaries

As compared with conventional High Pressure Sodium lights, LED lights are of more energy-saving, durable, environmentally friendly and higher colour rendering. In addition to savings in operating and maintenance costs, LED lights could improve the performance and reliability of public lighting, and provide road users with a safe and high quality lighting environment.

Target and Achievement

Under the current programme, we target to replace 6,500 road lights and 1,500 fluorescent tubes at footbridges and subways with LED lights each year, and replace 4,500 directional sign and gantry sign lights in 5 years.

From 1 January 2021 to 31 March 2022, we have replaced about 40,000 lighting points which are well above our annual target. Since the commencement of the programme, we have replaced about 93,000 various lighting points, covering about 50% of total road lights in Hong Kong. We have also achieved our 5-year target to replace 4,500 directional sign and gantry sign lights with LED lights.



Directional sign illuminated with LED lights



Gantry sign illuminated with LED lights

We will continue to monitor the latest development of LED luminaries and other new lighting technologies, and to optimize the design standards as well as operational and maintenance works of public lighting systems. We aim to provide safe, high quality, reliable and sustainable public lighting services to the public.

ENERGY SAVING IN OFFICE

Energy Saving Measures

We endeavour to reduce energy consumption in office as far as possible. The following measures have been promulgated to enhance energy saving in our offices.



Appoint Energy Wardens to monitor the usage of lighting equipment and to keep the illumination level to the minimum but acceptable level



Switch off computer equipment and electric appliances when not in use



Maintain air-conditioning temperature not lower than 25.5°C in hot seasons



Encourage the use of staircase for inter-floor traffic



Switch off lights during lunch or when staff are away for long hours



Monitor the electricity consumption of offices of the Highways Department with individual electricity meters installed

Electricity consumption in 2021 with corresponding indirect gas emission figures

OFFICES	Electricity Consumption (kWh)	Comparison with 2020	Indirect Gas Emissions (kg)		
			SO ₂	NO _x	RSP
Ho Man Tin Government Offices	922,609	+10.39%	1,762.18	1,070.23	55.36
North Point Government Offices	184,307	+10.01%	352.03	213.80	11.60
Trade and Industry Tower	627,303	+3.29%	1,198.15	727.67	37.64
Nan Fung Commercial Centre	432,661	+16.25%	826.38	501.89	25.96
Grand City Plaza	24,134	-4.59%	46.10	28.00	1.45
Cheung Sha Wan Plaza ¹	9,818	+35.50%	18.75	11.39	0.59
The Harbourfront Tower 1	64,255	-7.59%	122.73	74.54	3.86
The Harbourfront Tower 2	14,620	-0.16%	27.92	16.96	0.88
Spectrum Tower ²	241,694	N/A	461.64	280.37	N/A

Since 2021, we have been exploring the feasibility of replacing lighting fittings with LED tubes for open-plan areas at Ho Man Tin Government Offices (HMTGO) to achieve a further reduction of energy consumption of our offices. The replacement of existing compact fluorescent lamps with LED lights would reduce the annual energy consumption by 285,061 kWh, equivalent to 38% of the whole building's energy consumption annually. We will conduct a trial of replacement of lighting fittings with LED lights for the open-plan area on 5/F HMTGO. Depending on the results of the trial, we will consider extending the proposed lighting replacement works to other floors in HMTGO by phases.

Notes

¹ Office in Cheung Sha Wan Plaza was under renovation in Q4 2020. The electricity consumption in that period was very low and the total electricity consumption in 2020 represented office operation for approximately 9 months only. Therefore, electricity consumption was increased significantly in 2021 when compared with that in 2020.

² Offices were progressively moving in to Spectrum Tower from 2020 to 2022. It is not meaningful to compare electricity consumption during that period.

CONTRIBUTION TO REDUCING EMISSION



Electric saloon cars

Environmentally Friendly Vehicles

To support Government’s policy on using environmentally friendly vehicles for better air quality, we have replaced the hybrid saloon car in our fleet with an electric saloon car with a driving range of over 300km in December 2021. Along with the new electric saloon car, a new 32A medium charger was installed in the carpark of Trade and Industry Tower in addition to the charger in HMTGO for charging electric vehicles. In view of the latest government-wide policy of setting electric vehicles as standard for small and medium private cars in the government fleet, we will replace progressively other saloon cars in our fleet with electric vehicles.



New 32A medium charger at Trade and Industry Tower

Special Measures to Cope With the Air Quality

To increase staff awareness on air quality, we reminded our staff when the Air Quality Health Index has reached or is forecasted to reach the “very high” or “serious” health risk categories. A set of precautionary measures for reference by front-line staff and their supervisors were provided with the reminders. The measures included conducting risk assessment of outdoor work for workers performing heavy manual work and actions to reduce outdoor physical exertion and time of staying outdoor, especially in areas with heavy traffic.

Indoor Air Quality Certification

In 2003, EPD launched the Indoor Air Quality (IAQ) Certification Scheme to promote and commend good IAQ management practice. Up to 2021, HMTGO has been awarded the Good Class IAQ Certificate consecutively for 18 years. In 2021, North Point Government Offices and Trade and Industry Tower attained Excellent Class IAQ, while Cheung Sha Wan Government Offices and our offices in Nan Fung Commercial Centre attained Good Class IAQ. We would continue our efforts in maintaining good IAQ in offices and open spaces in order to safeguard the health of building users and increase productivity of our staff.



IAQ certificates of our offices

ENVIRONMENTAL MANAGEMENT

GREENING AND LANDSCAPING

Central Kowloon Route

20,000 m²
landscaped deck to be created

Tuen Mun-Chek Lap Kok Link

6,300 trees
planted

33 hectares
landscape areas formed

3,390,000 shrubs
planted



BENEFICIAL REUSE

Central Kowloon Route

1,500 m³
of marine sediment reused

Enhancement Programme of
Vegetated Slopes

230 tonnes
of wood upcycled

AIR QUALITY

Central Kowloon Route

The Air Purification System
removes

80%
of NO₂ and RSPs

Tuen Mun-Chek Lap Kok Link

The planted trees
absorb

41 tonnes
of CO₂ per year



CENTRAL KOWLOON ROUTE

STRIVING TOWARDS GREEN CONSTRUCTION



Introduction

The Central Kowloon Route (CKR) is a 4.7km-long dual 3-lane trunk road connecting east and west Kowloon, 3.9km of which is a tunnel underneath central Kowloon. It provides an alternative route bypassing the existing congested at-grade road network in central Kowloon area. Upon the anticipated commissioning in 2025, the journey time between Yau Ma Tei and Kowloon Bay during peak hour is expected to shorten from 30 minutes to about 5 minutes. With reduced traffic on the existing at-grade road network, the emission of traffic noise and air pollutants such as carbon dioxide, nitrogen oxides and respirable suspended particulates from vehicles will be greatly reduced, leading to improvement of noise level and air quality in the nearby neighbourhood including Yau Ma Tei, Ho Man Tin, Wong Tai Sin and Kowloon City. With an aim to promote sustainable development, the CKR project adopts a wide range of environmentally friendly design and construction methods throughout different stages of project implementation.



Alignment of the Central Kowloon Route

- Viaduct/at-grade road
- Tunnel/depressed road

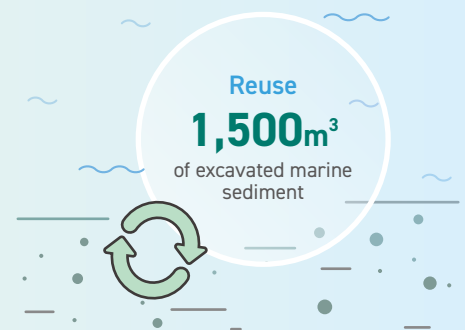
Extensive Greening and Landscaping

To improve the environment in the vicinity of the CKR, a landscaped deck will be constructed at the western tunnel portal of the CKR at Yau Ma Tei. The 20,000m² landscaped deck, spanning 250m-long from east to west and 270m-long from south to north, covers the CKR depressed road and the section of elevated Hoi Wang Road between Yan Cheung Road and Lai Cheung Road. The deck provides additional greenery and leisure facilities for public enjoyment. It will also be connected to the landscaped deck of the West Kowloon Station of Guangzhou-Shenzhen-Hong Kong Express Rail Link to form an elevated pedestrian route between Yau Ma Tei and the rail station and further south to the West Kowloon Cultural District, creating a large public space and amenity area for public recreation.



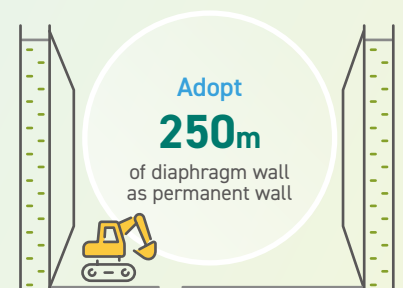
Maximum Reuse of Excavated Marine Sediment

Marine sediment is a layer of fine particles deposit on the seafloor and is often contaminated with heavy metals and organic matter. Particular care is required for disposal of marine sediment at designated open sea or confined marine disposal sites. In this project, special compartments were designed under the depressed road at Yau Ma Tei to accommodate the excavated marine sediment as permanent backfilling material. The marine sediment also serves as the counterweight to avoid floatation of the depressed road structure. This innovative use of excavated marine sediment not only reduces the volume of concrete used for the road structure, but also minimises the long distance transportation and disposal of the sediment, thereby reduces the carbon generation from the construction activities.



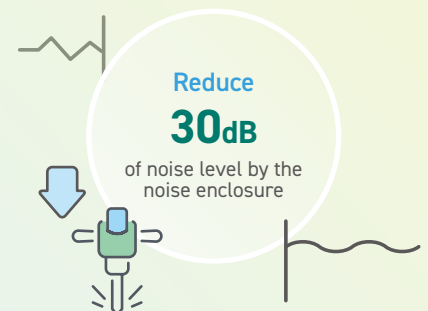
Sustainable Diaphragm Wall Construction

For the depressed road construction of the tunnel entrance at Yau Ma Tei, diaphragm wall is adopted in lieu of conventional pipe pile wall with socketed H-piles to retain the ground. The diaphragm wall also serves as permanent wall which eliminates the need of temporary retaining structures. In comparison to the conventional method, adoption of diaphragm wall construction greatly reduces the use of heavy plants and volume of excavation and backfilling materials as well as shortens the construction time. With such significant advantages, the construction carbon footprint of the CKR is greatly reduced.



Reduced Impacts from Blasting Operations

Drill-and-blast method is adopted for constructing the CKR tunnel at deep rock stratum in urban area. The blasting works are carried out underground in an enclosed environment. A series of mitigation measures are implemented, including installation of filter in the ventilation system and construction of temporary noise enclosure to fully cover the access shaft, in order to further reduce the environmental impacts to the nearby residents. The noise enclosure is a composite structure comprising reinforced concrete side walls and steel roof panels covered by acoustic material to achieve maximum noise mitigation effect. The enclosure structure also confines the dust generated from the blasting operations within the access shaft in which the air will be filtered before emission.



Better Air Quality

The CKR introduces an advanced Air Purification System (APS) to treat the vehicular exhaust conveyed by the tunnel ventilation system during the operation stage of the CKR. The APS is installed in three ventilation buildings at Yau Ma Tei, Ho Man Tin and Kai Tak Development Area. The operation of APS consists of two main processes. First, it involves the use of electro-static precipitators to remove portion of suspended particulates, including particles with diameter of 2.5 micrometers or less (PM2.5), from the air extracted from the tunnel. After that, the air is fed into a Nitrogen Dioxide (NO₂) removal system under the second main process to reduce the concentration of NO₂. The purified air is then discharged from the ventilation shafts to the atmosphere. The APS is capable of filtering 80% of the NO₂ and respirable suspended particulates (RSPs) from the vehicular exhaust, hence improving the overall air quality in the neighbourhood.



Environmental Excellence

The CKR project always aims at higher standards in green construction. The project's contractors actively participated in various environmental promotion campaigns and activities, and attained excellent achievements:



GOLD AWARD
Hong Kong Green Awards 2021
 by the Green Council



BRONZE AWARD
Hong Kong Awards for Environmental Excellence 2020
 by the Environmental Campaign Committee alongside the Environmental Protection Department



BRONZE AWARD
Outstanding Environmental Management and Performance Awards 2021
 by the Development Bureau and Construction Industry Council

TUEN MUN - CHEK LAP KOK LINK

CREATION OF ATTRACTIVE GREEN SPACES



Introduction

The entire Tuen Mun-Chek Lap Kok Link (TM-CLKL) was opened to traffic in end 2020. The TM-CLKL provides a strategic link connecting the Northwest New Territories with the Hong Kong Port of the Hong Kong-Zhuhai-Macao Bridge, North Lantau and the Hong Kong International Airport. The TM-CLKL is not only a transport infrastructure but also a piece of landscape artwork. The project brings extensive green spaces to the community which help build a more liveable and greener city. According to the Environmental Impact Assessment of the project, around 6,300 trees and 33 hectares of landscape areas (i.e. equivalent to about 46 soccer fields) will be provided by this project. The extensive green spaces are provided at the northern and southern landfalls (i.e. the reclaimed land for construction of the sub-sea tunnel of TM-CLKL), roadside areas in Tuen Mun, green roofs of ventilation buildings, etc.



Alignment of the Tuen Mun-Chek Lap Kok Link

- Original Route between Tuen Mun & Hong Kong International Airport
- Tuen Mun-Chek Lap Kok Link

VIVID WAYS TO CREATE GREEN SPACE

Landmark Scenery

The green space created at the northern landfall becomes a recognizable landmark. Besides beautiful scenery of palm trees along the waterfront, flowering plants such as *Lantana montivendensis* (小葉馬纓丹) and *Catharanthus roseus* (長春花) are also planted. Their pink and purple flowers add striking colours to the palette of greens in the landscape.



Landmark scenery at the northern landfall



Colourful landscape at the northern landfall

Landmark scenery with palm trees at the northern landfall

Seaside Green Space Scenery

The northern and southern landfalls provide a very good platform for accomplishing a comprehensive planting objective. The newly reclaimed lands create opportunities for having beautiful seaside landscape with a wide range of attractive plant species, including *Livistona chinensis* (蒲葵), *Plumeria spp.* (雞蛋花), *Pongamia pinnata* (水黃皮), *Scaevola taccada* (草海桐) and *Wodyetia bifurcata* (狐尾椰子).



Seaside landscape scenery at the southern landfall



Seaside green space scenery at the northern landfall

Striking colours at the southern landfall



Roadside Green Space Scenery

The project team seized every opportunity to enrich the TM-CLKL landscape areas. Apart from the northern and southern lanfalls, extensive green spaces are also created at rooftop of buildings, roadside areas and the newly created or modified slopes. The roadside green spaces help to balance the mobility and liveability of the city.

Roadside landscape area at the northern landfall



Green space scenery along a footway/cycle track near Butterfly Beach



Green space scenery near Lung Fu Road roundabout

Green Roofs

Planting on the roofs is another effective way to create quality green space in the TM-CLKL project.



Rooftop greening at the Tuen Mun Customs Marine Base



Rooftop greening at North Ventilation Building

Floral Attraction and Sustainable Habitat

The plants adopted in the TM-CLKL project comprise both native and exotic species. The mix of evergreen and deciduous plant species offers aesthetics and diversity in all seasons. Butterflies feed on nectar of flowers were observed. Different kinds of birds were also witnessed perching in the landscape areas.

Plant species adopted



Rhodomyrtus tomentosa
桃金娘



Raphiolepis indica
車輪梅



Lantana montivendensis
小葉馬纓丹



Catharanthus roseus
長春花



Terminalia mantaly
小葉欖仁



Scaevola taccada
草海桐



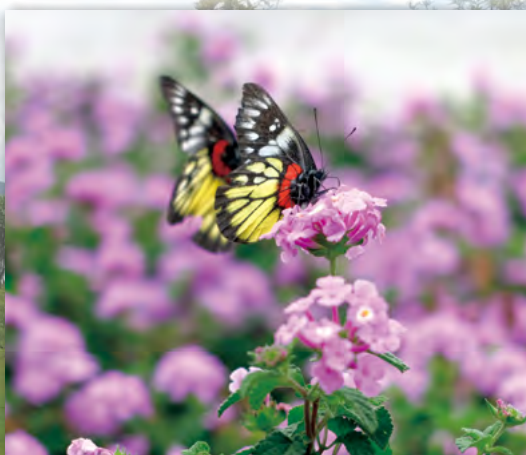
Pongamia pinnata
水黃皮



Plumeria spp.
雞蛋花



"Visitors" at the northern landfall



Challenges were encountered in considering plant species to be adopted under different conditions. Due to the requirements on bird control because of the vicinity to the airport, plant species at the southern landfall were carefully selected to modify the ecological character to ensure that large birds or birds staying in flocks, which would cause hazards to the flight path at the airport island, were not attracted to the area. Plant species that produce fleshy fruits were also avoided so the planting area would be less attractive to birds and other wildlife which feed on these fruits.



Greenery roadside aesthetics at Lung Mun Road, Tuen Mun

Innovative Greening

Another challenge falls on the integration of greening into infrastructure components that are considered unfavourable habitats for plants. For example, the highly visible retaining wall along Lung Mun Road below the road deck, which is shaded from sunshine, is not suitable for planting. To reduce the adverse visual impacts of this huge structure, instead of planting, vitreous enamel cladding panels with aesthetic design were installed on the wall surface, fostering a more interesting and attractive streetscape.

Sustaining Conservation Spirit

To sustain and pass on the spirit of conservation, environmental education is crucial. In this regard, community planting activities were organized upon completion of the project to promote community involvement of our next generation and to raise their awareness on greening and environment conservation.

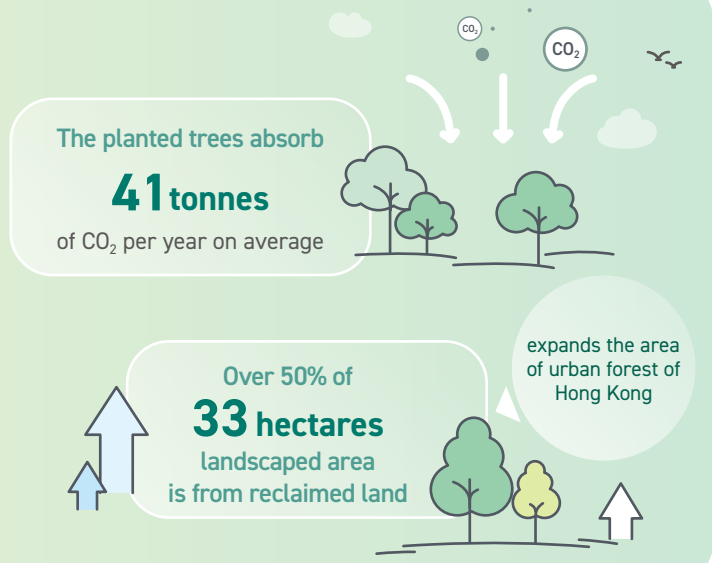


Community planting at the southern landfill

TM-CLKL – The Remarkable Landscape Artwork

The greening works of the TM-CLKL project have brought remarkable environmental benefits to the public. Greening not only beautifies the townscape, but also improves the environment by lowering atmospheric temperature and absorbing pollutants.

Despite numerous challenges encountered, the project team endeavoured to maximise the greening feature through continuous efforts of collaboration and adopting innovative ideas. Upon completion of the project, more than 6,300 trees and 3,390,000 shrubs were planted, 3,000m² of green space was created on building rooftops and 33 hectares of land were landscaped. We will continue to make contributions towards shaping a greener Hong Kong with greater mobility.



SUSTAINABLE DESIGN FOR TUNG CHUNG EAST STATION



Railway is a safe, efficient and environmentally friendly mode of transportation. The Government policy has positioned railway as the backbone of public transport system. We adhere to this policy and aim at planning and developing our railway system to world-class standard.

Proposed Tung Chung East Station under the Tung Chung Line Extension Project

The proposed Tung Chung Line Extension is one of the projects recommended in the Railway Development Strategy 2014. It comprises the extension of the existing Tung Chung Line (TCL) westward by 1.3km from its existing terminus (i.e. Tung Chung Station) to a new station in Tung Chung West (TCW), and an intermediate station, Tung Chung East (TCE) Station, which involves modification of about 1.2km long existing TCL railway tracks near the Tung Chung New Town Extension (TCNTE) (East) reclamation area. It is targeted for commissioning in 2029 to provide enhanced railway services to the population in Tung Chung area.



Alignment of the proposed Tung Chung Line Extension

Existing Tung Chung Line Proposed Tung Chung Line Extension



Conceptual images of Tung Chung East Station concourse area featured with raised ceiling and large glazing area

The proposed TCE Station sits at a unique location surrounded by future development sites to the north and backed by the natural beauty of the Lantau Country Park to the south. It forms the transportation hub for the TCNTE development and adopts a "transit-oriented development" planning concept to guide the design of the development. The proposed TCE Station is located adjacent to the Metro Core Area which is a key centre for the entire TCE. The station is an above-ground station with elevated concourse.

The roof at both ends of the concourse provides a key focal point for the public plaza at the Metro Core Area. The raised ceiling levels at the paid and unpaid areas also create a dramatic sense of space to enhance passenger experience.

Sustainable Design for TCE Station

The proposed TCE Station will be a recognizable building at the future TCE new town. To promote sustainability and energy saving, the following sustainable designs will be adopted:

Sustainable Green Roof

With the adoption of a green roof design, the station could be well isolated from solar radiation. The energy required to cool the station could therefore be reduced, alleviating the overall heat island effect in the area. The proposed green roof also mitigates visual impact for the future commercial and residential neighbours by blending into the background of surrounding hillsides.

Adoption of Glazing Area and Use of Shading Devices for Concourse Area

The raised concourse roof allows the capture of natural daylight and overlooking of both the plaza and the surrounding hillsides. The roof also incorporates an overhang for shading the south façade and integrates skylights with openable glazing for natural ventilation. With the capture of natural daylight, the electricity consumption for lighting would be reduced. The shading devices could also prevent the penetration of solar radiation into the station in summer and allow certain solar heat gains in winter, which both lead to thermal comfort with significant energy savings.

Roof Mounted Photovoltaic (PV) Panels

The roof of the station provides spacious area for installation of PV panels. The electricity generated from the PV panels will be used for the station lightings, air conditioning, etc., and hence reducing the overall electricity consumption from the power grid.

Utilization of District Cooling System (DCS)

It is intended to utilize DCS in the TCNTE (East) to provide chilled water for the air-conditioning systems for the station. The DCS will have a much better energy efficiency performance than that of traditional isolated air-conditioning systems in individual buildings. The heat island effects at TCE could also be reduced with the adoption of DCS as the heat producing equipment and chillers of air-conditioning plants will not be required for individual user buildings within the TCE area.

ROAD MAINTENANCE MONITORING SYSTEM FOR ROAD MAINTENANCE WORKS

Introduction

The Government has determined to drive the modernization of the local construction industry by promulgating the "Construction 2.0" with a view to uplifting the productivity, capacity and sustainability of the industry. As one of the measures under "Construction 2.0", the Government launched in 2020 the Digital Works Supervision System (DWSS) for implementation in capital works contracts. Riding on the protocol of the DWSS and considering the unique characteristics of our road maintenance works, we take the initiative to introduce the Road Maintenance Monitoring System (RMMS) to support our road maintenance works.



What is RMMS

RMMS is essentially a workflow-enabled system to digitalize operation workflows and capture submissions, checking history and inspection records as well as to issue notifications to designated officers for timely follow-up actions.

Maintenance of Roads and Related Assets

Our road maintenance contractors carry out routine day-to-day maintenance works while our engineering staff conducts audits and inspections to assure the quality of works.

To cater for the expanding road network in tandem with the rapid development of Hong Kong, and maximize the effectiveness of road maintenance, a two-tier arrangement is adopted in the maintenance of road assets. Under the arrangement, routine inspections are carried out by the term maintenance contractors, who will classify the severity of the defects identified and complete small scale defect rectification works according to the time limits stipulated in the contracts. Our engineering staff will carry out audits to gauge the performance of the contractors in defect identification and timely completion of the rectification works. For defects of larger scale, we will issue works orders to the contractors for carrying out the rectification works.

Apart from auditing, our engineering staff will also conduct Engineer Inspections on critical works, such as placing of structural concrete, laying of bituminous materials, installation of soil nail, etc., to enhance the overall quality of the maintenance works.

Currently, the records of audit, site checking, inspection and defect rectification are partly paper-based. The transmittal of the non-digital records amongst the frontline and supervisory staff and the contractors not only takes time, limiting the effectiveness of data gathering and analysis, but also consumes considerable amount of paper.



Engineer Inspection - traffic sign



Engineer Inspection - road marking



Engineer Inspection - unwanted vegetation

Planned Phases of RMMS for Road Maintenance

With the expanding road network in association with the developments in the territory, we have been exploring different initiatives to uplift the capacity and sustainability in respect of road maintenance. Apart from adopting innovative construction and material technologies, we are looking into means to extend the digitization of the maintenance supervision system to smoothen the workflow, increase the work efficiency and reduce the amount of paper for record handling. In this connection, we plan to implement RMMS in our term road maintenance contracts in phases to manage the workflows of inspection and site activities more effectively.

With RMMS in place, the workflows related to Engineer Inspections, Engineer Audits, and checking of reports on completion of works will be digitalized to enhance efficiency in carrying out these works. As compared to the existing paper-based workflows, the system will be able to send our inspection and audit results to the contractors more expeditiously so that the contractors could follow up and rectify defects identified as soon as possible.

We have started a trial implementation of RMMS in an existing road maintenance contract. Subject to the successful implementation and incorporation of necessary refinements, we plan to incorporate the RMMS into upcoming new road maintenance contracts.

In the longer term, we will also explore the feasibility of checking the contractor's inspection programme and progress, and the progress of the associated defect rectification works digitally.

Environmental Benefits

The introduction of RMMS in road maintenance works not only improves the operational efficiency but also brings environmental benefits. As the need of paper-based processes (e.g. contractor's submissions and our subsequent approvals at various stages of works) will be substantially reduced, we anticipate that we could save 300kg of paper per year after the implementation of the first phase of RMMS.

Our Goal

The first phase of RMMS for road maintenance is largely limited to site supervision works. To achieve effective prioritization of maintenance works and management of maintenance activities, we plan to further extend the digitalization of our asset management with application of digitalized inspection technologies and real-time asset condition monitoring.

With a well-planned maintenance works strategy, we could reduce frequency and defer the need for extensive repair or reconstruction works. In this sense, road facilities will become more durable with longer service lives. This will reduce large-scale maintenance works, which in turn cut down the overall consumption of natural resources (e.g. sand, aggregate and fossil fuels), and minimize the environmental nuisance and inconvenience to the public during the life cycle of roads.

To shoulder our responsibility in conserving the nature and reducing carbon footprint, we strive to achieve our ultimate goal to create a paperless environment for the whole cycle of road maintenance works.

WOOD UPCYCLING

SUCCEED • SUSTAIN



Trees on vegetated slope maintained by the Highways Department

We maintain approximately 600,000 trees on our slopes and within expressway boundary. The vegetation maintenance works would inevitably generate certain amount of yardwaste. In order to minimize the yardwaste delivered to landfill sites, we have proactively recycled and upcycled the yardwaste generated as far as practicable through the SUCCEED • SUSTAIN SLOPESCAPE: Enhancement Programme of Vegetated Slopes.

Wood Recycling and Upcycling

Recycling is a process of converting waste into new materials for use while upcycling in general is a creative reuse process, in which materials originally considered as waste are transformed into new materials or higher quality products. Many of the upcycled materials have artistic or environmental values.

Tree twigs and leaves can be recycled as mulch and compost while tree trunks can be upcycled to wood planks and boards for making furniture, signage and other artwork.

Vegetation maintained by us is mostly located on roadside slopes and/or within expressway boundary, which poses limitations for on-site sorting of yardwaste, therefore on-site recycling or off-site upcycling are applied depending on different site contexts.

On-site Recycling

On-site recycling is applied to sites where shredding machines can be used. The machines can process tree twigs and leaves to produce mulches on site which will then be applied in-situ to improve soil conditions and avoid weeds growing.



On-site shredding of tree twigs and leaves



Shredded mulch for in-situ application

Off-site Upcycling

Upcycling of tree trunks will be adopted as far as practicable for tree diameter greater than 250mm. We will engage wood specialist to collect and bring tree trunks to workshop for processing.

Work stages of upcycling work



Cutting of tree trunks to wood planks or required sizes for artwork



Wood drying



Making of different types of wood products from dried wood



Wood cutting with sawmill machine



On-site sorting of tree trunks



Wood drying with wood dryer

Collaboration on the Use of Local Wood Products

Our intention is to recycle and upcycle locally, as yardwaste is indeed precious resource of the community. Since the commencement of the slope enhancement programme in 2016, about 230 tonnes of wood have been upcycled. We have been actively collaborating with different government departments and non-government organisations on using upcycled products, and at the same time promoting local recycling and upcycling opportunities to the public.



Outdoor furniture for the Environmental Protection Department



Upcycled wood used in outdoor furniture workshop in the Technological and Higher Education Institute of Hong Kong



Upcycled wood used for art workshop at local primary school



Wood compost



Wood planks delivered to the Correctional Services Department for further processing



Wood logs delivered to the Chinese University of Hong Kong for educational purpose



Plant label of new planting at our slope



Wood signage of a stonewall tree at Bonham Road



Wood signage for Enhancement Programme of Vegetated Slopes

GREEN OFFICE MANAGEMENT

Resources Reduction & Waste Recycling

In support of the Government's drive to save natural resources, we are committed to making every endeavour to pursue the "green office" concept in different aspects of our day-to-day operation. In addition to energy saving as mentioned in the previous chapter titled "Clean Air Charter", we have been making our best effort to put in place a series of green policies and measures to promote the environmental awareness of our staff.



100%

of toilets in HMTGO were installed with water saving devices

Water Saving

To maximise water conservation, we have adopted the use of dual-flush toilets, automatic low flow water taps and sensor type urinals. These components can effectively control the duration of water flow and keep the water flow at low level.



All of the
25,335 reams
of consumed paper
were recycled paper

Paper Saving

To align with the green office initiatives, we would continue with the following measures on paper saving:

- Photocopy/print documents only when it is unavoidable and both sides of paper should be used;
- Encourage the use of recycled paper and reuse of paper office items;
- Exclude leader page for outgoing fax documents;
- Send unclassified documents without envelopes;
- Use emails for communication as far as practicable and adopt electronic templates of letterheads, memoranda and forms to avoid frequent reprinting for adjustment; and
- Put up a single-sided paper collection box (yellow box) and a waste paper recycling box (green box) near the photocopiers.

In 2021/22, we consumed 25,335 reams of paper, all of which were recycled paper.

To enhance efficiency in preserving and managing government records, the Government announced in the Policy Address Supplement published in October 2019 the roll out of Electronic Recordkeeping System (ERKS) to all departments by end-2025. To this end, we have been promoting staff's awareness of paper saving during the focus group meetings and training. Staff are encouraged to adopt a wider use of emails or other electronic means for business communication, in order to foster a digital workplace culture that maximises the value of ERKS and minimises manual efforts in records management.



17,787 kg

waste paper were
collected for recycling

Waste Recycling

We treasure waste with recycling value by taking the following measures over the years:

- Place the separated recyclables into recycling bins for collection by cleansing contractor or local recyclers;
- 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.

In 2021/22, 17,787 kg of waste paper including ordinary paper and other paper (e.g. newspaper, cartoon paper and booklets) were collected and delivered to local recyclers by the Government-appointed contractor.

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



Invite staff to put forward suggestions on green management such as through the staff suggestions scheme



Display posters to promote economic use of resources and green housekeeping measures



Extend the green office concepts to daily life through activities such as recycling of used red packets, empty moon cakes/candy cans

Auditing: Environmental and Carbon

Annual Environmental Audit

We conduct annual environmental audits in all 25 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.

Audit results showed that our offices continued 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

Carbon audit was conducted for Ho Man Tin Government Offices by the Building Management Office in 2021 to monitor the effectiveness of greenhouse gas emission reduction effort. The relevant data are being studied by the Building Management Office.

RESEARCH & TECHNOLOGY

RESEARCH AND DEVELOPMENT

Enhanced road surface depression detection tools

Prototype of the tools to be released

in mid-2023

Low noise road surfacing material
- PMSMA6

100%

of site trials completed

Rubberized bituminous
pavement material

~20%

of site trials completed

Eco-paver with recycled glass cullet

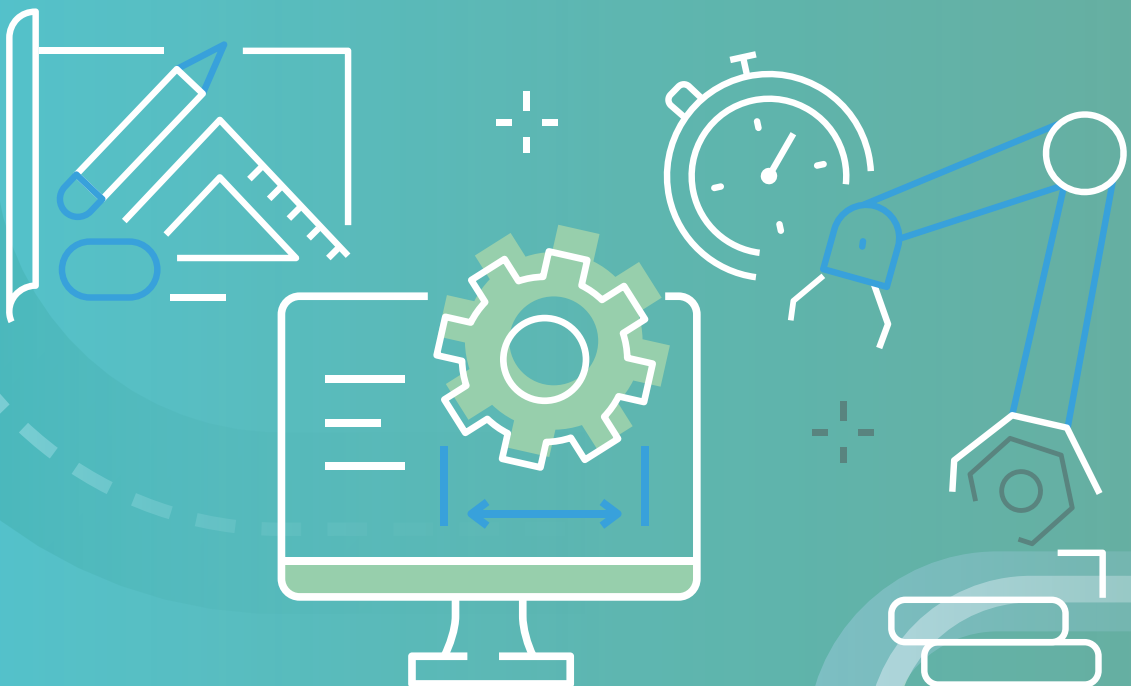
To increase the glass cullet content in eco-pavers to

30%-35%

Multi-functional smart lampposts

400

smart lampposts to be installed in 4 districts



RESEARCH AND DEVELOPMENT

Applications of Innovation and Technology for Road Condition Assessment

Mobile Laser Scanning and Imagery (MLSI) System

We have been utilizing the Mobile Laser Scanning and Imagery (MLSI) System to capture images and 3D Light Detection and Ranging (LiDAR) data of roads and surrounding environment. Benefited from the high data capturing capability of the MLSI system and mobility of Vehicle-based MLSI System (VMS), the number of field survey teams and field trips required to complete the survey is greatly reduced.

Road Surface Depression Detection using Artificial Intelligence (A.I.) Technology

In the past decades, various 2D image-based systems and associated algorithms for pavement measurement have been developed for collecting in-situ data to identify road defects. However, traditional 2D image-based analysis for road defects detection is often constrained by the illumination conditions. In addition, subtle road depressions are difficult to be identified using 2D images due to the homogenous color of the pavement and the insufficient information of the depression depth.

In light of that, we are collaborating with the Hong Kong Polytechnic University to study the development of an A.I. algorithm for road surface depression detection based on 3D LiDAR data collected by MLSI system, which is less vulnerable to poor illumination and contains 3D information of the road surface. The algorithm can help detect the road surface depression more precisely (e.g. rutting and potholes) which in turn improves the effectiveness and efficiency of road inspections and road audits.

Result Reporting in an Environmentally Friendly Manner

Currently, survey results are delivered to clients in the form of paper plans. Under the proposed algorithm, road defects will be reported via Geographic Information System (GIS) web platform. It could be further enhanced by importing the defect results into mobile devices to facilitate on-site inspection, which ultimately replace the conventional paper-based survey plans. In addition, it can effectively reduce the number of fieldwork teams and field trips for conducting on-site inspections, and in turn helps cut down fuel consumption, vehicle emission and road traffic.



Image taken by pavement camera of VMS



Overview of VMS

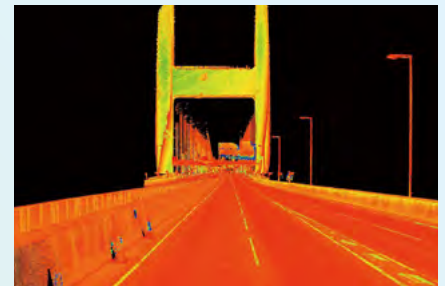
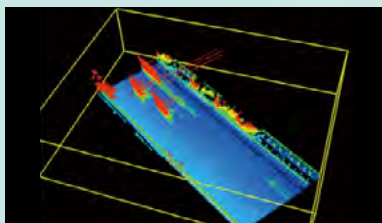
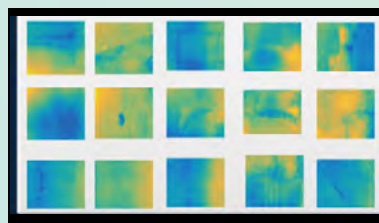


Illustration of 3D LiDAR data captured at Tsing Ma Bridge

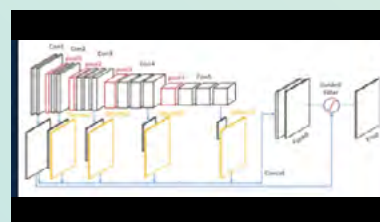
Methodology of the Study



3D LiDAR data acquisition



3D road surface depression library



Depression detection algorithm based on deep learning



Road surface depression detection tools

Low Noise Road Surfacing Material - PMSMA6

- ~2.5dB(A) tyre noise reduction
- 100% of totally 53 trial road sections completed



PMSMA6 laid at Queensway

To reduce road traffic noise, we have been working closely with EPD in developing a more durable low noise road surfacing (LNRS) material for use in Hong Kong. We continued site trials of a new LNRS material - 6mm Polymer Modified Stone Mastic Asphalt (PMSMA6). Since the commencement of the site trial programme in 2019, we have completed laying PMSMA6 at 53 road sections in 2022. The laboratory and site trial results revealed that the performance of PMSMA6 in reducing tyre noise (about 2.5dB(A)) is similar to the existing LNRS material - Polymer Modified Friction Course (PMFC), while its performance on durability is better. We have summarized the road characteristics which are suitable for applying PMSMA6 in our final technical report for reference by other government departments. Also, the technical guidelines on the application of PMSMA6 on local roads in Hong Kong have already been included in the latest HyD Guidance Notes.



PMSMA6 laid at Tai Tam Road

Rubberized Bituminous Pavement Material

- 2 feasibility studies completed
- ~20% of totally 25 trial road sections completed



Rubberized bituminous pavement material laid at Hoi Fai Road

In Hong Kong, more than 22,000 tonnes of waste vehicle tyres are generated every year, disposal of these waste tyres has been a very difficult problem for a few decades. With the vision to tackle this problem and bring in both environmental and engineering benefits, we engaged the Hong Kong Polytechnic University in 2018 to carry out 2 collaboration studies on the use of rubberized bituminous pavement materials in Hong Kong road network and the feasibility of incorporating reclaimed rubberized bituminous pavements to the new rubberized bituminous pavement materials. The studies concluded and confirmed the technical feasibility of adding crumb rubber into conventional bituminous pavement materials, including wearing course, base course and road base, and the recyclability of the rubberized bituminous pavements at the end of their service lives. In 2021, we commenced a site trial programme to test its performance in public roads. 5 trial road sections have been laid with rubberized bituminous pavement materials by Q1 2022. In the coming years, we will endeavor to expedite our site trial programme to collect sufficient data to conclude the site trial results as early as possible.



Rubberized bituminous pavement material laid at Bride's Pool Road

Eco-pavers

- Started the use of recycled aggregates in concrete pavers in 2004
- Started the use of recycled glass cullet in concrete pavers in 2010



Site trial of eco-pavers at Tai Pak Tin Street, Kwai Chung

Developing environmentally friendly paving materials for footpath is also high on our agenda. From 2004, we have mandated the use of recycled aggregates in concrete pavers (eco-pavers), in which recycled aggregates are crushed concrete or crushed rocks generated from construction or demolition works. From 2010, we have taken further initiative to use recycled glass cullet in eco-pavers and mandated the use of glass cullet of 20% to 25% by weight of the total aggregates in road maintenance contracts.

As per the collaboration study of EPD and the Hong Kong Polytechnic University on "Enhancing the Application of Local Recycled Glass Cullet in Production of Concrete Paving Blocks", it is noted that by controlling the size of recycled glass cullet to contain the undesirable effect of alkali-silica reaction, the glass cullet content can be raised to the level of 30% to 35% by weight of the total aggregates. To facilitate further consumption of recycled glass cullet, we commenced the site trials to verify the real-life performance of eco-pavers with recycled glass cullet of 30% to 35% by weight of the total aggregates. With the satisfactory results obtained in the site trials, the use of eco-pavers with higher glass cullet will then be mandated in road maintenance contracts.

Development of Multi-functional Smart Lampposts

- 400 smart lampposts to be installed in 4 districts
- ~120 sensors to be installed for collecting environmental and meteorological data

The 2017 Policy Address announced the launch of the Multi-functional Smart Lampposts Pilot Scheme at selected urban locations to support the building of a smart city with city-wide coverage of data and network. The smart lampposts aim to provide convenient data services and collect various real-time city data, enhance city and traffic management, and complement the digital infrastructure development for the fifth generation (5G) mobile communications services in Hong Kong.

Under the Pilot Scheme, some 400 multi-functional smart lampposts will be equipped in phases with smart devices in four selected urban locations in Central/Admiralty, Wan Chai, Yau Tsim Mong and Kwun Tong/Kai Tak Development Area to collect real-time city data.

To better monitor the air quality at district level, we have been working closely with EPD in the Pilot Scheme to install air quality sensors on the smart lampposts for real-time tracking of the concentrations of key air pollutants, fine suspended particulates and nitrogen dioxide, at roadside. Furthermore, the Hong Kong Observatory has also installed different sensors at the smart lampposts to monitor the temperature, humidity, wind speed and wind direction in the vicinity. It is planned under the Pilot Scheme to install approximately 120 number of these sensors across the districts to collect the environmental and meteorological data in real-time. With the environmental and micro-meteorological data of various regions, the regional environmental changes in Hong Kong can be assessed and monitored. This information can facilitate our understanding of the impacts of different urban activities and the impacts due to changes of the environment and cityscape.

All data collected will be released to the public as open data via the Public Sector Information portal (data.gov.hk). The data will be useful for supporting government services and development of innovative applications by the industry, such as providing citizens and tourists with information about public facilities in their vicinity.



Smart lamppost with weather stations installed at Shing Kai Road, Kai Tak

STAKEHOLDER ENGAGEMENT

GREEN TRAINING FOR STAFF

34
courses arranged

1,365
training hours

256
staff attendance

Covering staff in
13 offices

SERVING THE COMMUNITY

Attained HKCSS Caring
Organisation Logo for
13 years

Attained Construction Industry
Caring Organisation Logo for
4 years

CUSTOMER SATISFACTION MEASUREMENT 2021

84%
of the general public were quite/very satisfied with
our overall performance



OUR STAFF



34 courses arranged



256 staff attended



1,365 training hours



Covering staff in 13 offices

Green Training

We place emphasis on the adequacy of training provided to our staff for their effective discharge of duties. To keep abreast with the latest knowledge in environmental management, we continued to arrange various targeted training programme in 2021/22 to different users.



Certification Programme

- Tree Risk Assessment and Management Training Course
- Training Programme and Arrangement on Recertification for Trainees with ISA CA Qualification - Aerial Assessment on Trees
- Training Programme and Arrangement on Recertification for Trainees with ISA CA Qualification - Water and Soil Management and Tree Nutrition
- Training Programme and Recertification for ISA CA / CA Municipal Specialist Qualification
- Recertification Programme for International Society of Arboriculture Certified Arborist for Government Staff 2021



Workshop

- Sustainable Development Workshop
- Tree Management and Protection
- Tree Identification and Proper Tree Planting
- Occupational Health and Safety in Arboriculture
- Tree Pruning and Use of Chainsaw



Experience Sharing

- Acacia Enhancement Programme
- Construction of Temporary Sewage Treatment Plant under 'Expansion of Sha Tau Kok Sewage Treatment Works' Project
- Deploying Design Thinking Approach in the Design on Revitalisation of Tung O Ancient Trail and Nearby Villages
- Improvement Works at Tai O
- Inter-reservoirs Transfer Scheme
- Noise Enclosures at Gascoigne Road Flyover
- Proposed Grey Water Recycling System
- River Inspection using Drones and Digital Water in Hong Kong
- Zero Irrigation System – Design and Application
- Diagnosis of Abiotic and Biotic Disorder on Trees
- Management of Old & Valuable Tree and Stone Wall Tree
- Introduction to Station & Tunnel Environmental Control System
- Design and Application of Station & Tunnel Environmental Control System



Seminar/Webinar

- Hong Kong 2022 International Urban Forestry Conference
- Water Conference 2021 on Future Intelligent / Smart Water Resources Management
- Latest Tree Risk Assessment & Management Guidelines and Review of Assessment Skills
- Identification of Common Tree Species in Hong Kong and their Characteristics
- Tree Selection in Hong Kong
- Street Tree Identification, Selection and Maintenance
- Proper Tree Care before Wet Season
- Tree Management and Protection
- Sharing of Master Dissertation on Tree Management
- Occupational Health and Safety in Arboriculture
- Occupational and Safety and Health on Tree Works



Green Activity

Our Recreation and Sports Committee organised various green activities for our colleagues and their family members to enjoy the nature and relax. These activities can also strengthen rapport and promote work-life balance among colleagues.



Participated in Trailwalker



Participated in marathon events

We continued to support various green events organised by different non-governmental organisations in 2021/22. We helped disseminate event information and encouraged colleagues to take part in these meaningful events, which aim at promoting public awareness and calling for switching to a greener lifestyle.



No Air Con Night 2021



Biz-Green Dress Day 2021



Earth Hour 2021



Green Low Carbon Day 2021



Voluntary Services and Charity Activities

As a way to give back to the community, our colleagues and their family have been keen on participating in voluntary services and charity activities in their spare time. During the year, our Volunteer Team engaged in a number of voluntary services to the needy.



Participated in "Life Buddies" mentoring Scheme



Participated in flag selling events



Participated in gift donating events to child from low incomes families



Participated in inter-departmental joint "restriction - testing declaration" operation



Provided administrative support at community vaccination centre



Supported packaging work of the anti-epidemic service bags

THE INDUSTRY



The Construction Industry Caring Organisations logo

Construction Industry Caring Organisations Scheme

We offered our longstanding support to corporate social responsibility initiatives and promoting the positive image of the construction industry. In 2021/22, we continued to join the Construction Industry Caring Organisations Scheme launched by the Construction Industry Council.

The award of Construction Industry Caring Organisations logo recognises our commitment in "Serving the Industry" and "Serving the Community" in the past four years.



Participated in Virtual Happy Run 2021 organised by the Construction Industry Council

Industry Activity

To promote the development of local engineering and construction industry, we maintained a close connection with the industry by supporting different industry activities, such as site visits by different professional bodies or academic institutes, and recreational activities organised by the industry.



Virtual site visit by the Hong Kong Institution of Engineers



Site visit by the Hong Kong Institution of Highways and Transportation



Site visit by Engineering Alumni Association of the University of Hong Kong



Site visit by the Hong Kong Institute of Vocational Education students

THE GENERAL PUBLIC

Despite the persistent challenges of COVID-19 pandemic in 2021/22, we continued to participate in a wide range of activities to maintain close ties with the community. Through these activities, we aimed to enhance neighbourliness and collect opinions for continuous improvement. We also took opportunities to publicize project details in particular the environmental benefits of the projects, and share technical knowledge including innovative construction methods and technologies adopted in work sites.



Sharing to HKU students on sustainable development



Consultation with stakeholders



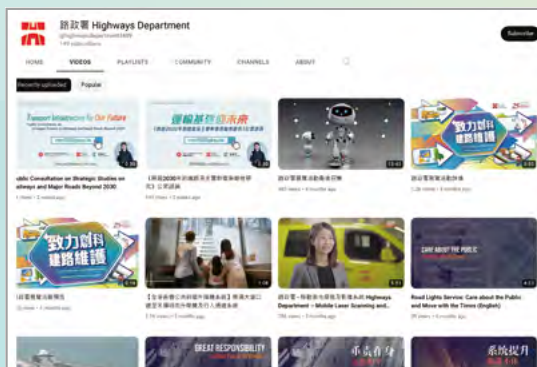
Eco Expo Asia 2021



Photo exhibition for "Picture Your Central Kowloon Route" event



Public engagement activities for the community



Highways Department's Youtube channel

Customer Satisfaction Measurement 2021

In order to continuously enhance our services and devising strategies for effective communication with the public, a bi-annual market research exercise in the form of telephone survey and customer liaison group discussions is regularly conducted to measure the degree of satisfaction among the public towards the services provided by the Highways Department.

The latest exercise was conducted in late 2021 to keep track of the public's perception on our services performance and to identify areas for further improvement. The results of telephone survey were released in early 2022 which revealed that 84% of the general public claimed that they were "quite / very satisfied" with the overall performance of the Highways Department. Several customer liaison group discussions were also arranged under the exercise to collect customer feedback on our pledge items in a qualitative approach. Through this open and interactive communication platform, members of the public expressed in-depth opinions on our pledge items, which help us understand the public's expectation on the performance.

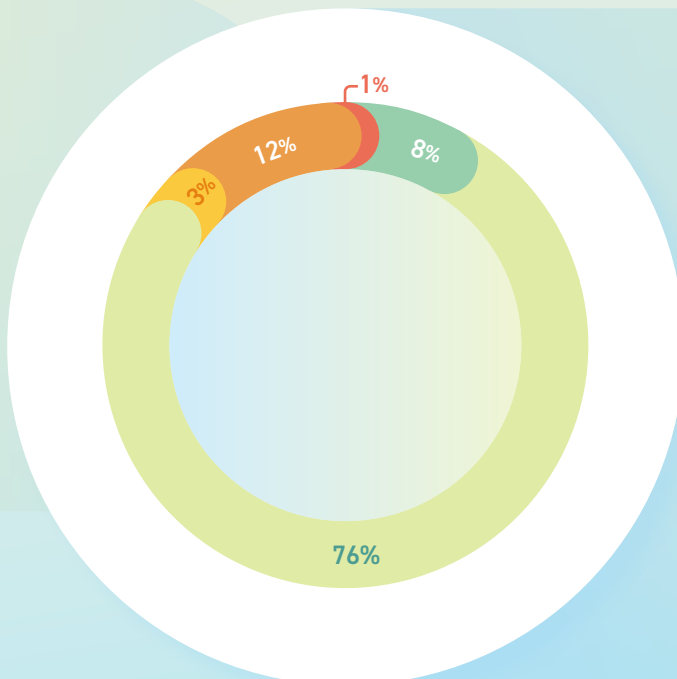
The outcome of the exercise enables us to carry out a holistic review of our performance pledges and to consider appropriate follow-up actions so as to enhance the overall performance and public acceptability.



Telephone Survey



Customer Liaison Group Discussions



Result of Telephone Survey in Customer Satisfaction Measurement 2021

- Very satisfied
- Quite satisfied
- Average
- Quite dissatisfied
- Very dissatisfied

ENVIRONMENTAL PERFORMANCE

ENVIRONMENTAL AWARDS AND RECOGNITION

Outstanding Environmental Management and Performance Award 2021



Considerate Contractors Site Award 2021



Hong Kong Awards for Environmental Excellence 2020



Hong Kong Green Awards 2021



Wastewi\$e Certificate



Energywi\$e Certificate



ENVIRONMENTAL ACHIEVEMENTS

100%

of our environmental targets for 2021 achieved





AWARDS

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

The Development Bureau and the Construction Industry Council jointly organised the Considerate Contractors Site Award Scheme to recognise construction sites with good site safety and environmental performance and considerate attitude towards the neighbourhood and the public. In 2021, our construction sites received four CCSA and three OEMPA awards, including one Silver, one Bronze and two Merit Prizes from CCSA and one Bronze and two Merit Prizes from OEMPA. Moreover, three of our subcontractors received Model Subcontractor Award including one Gold, one Silver and one Merit Prizes.

公德地盤獎(工務工程—新建工程)
Considerate Contractors Site Award (Public Works-New Works)

合約 Contract: HY/2014/20
Central Kowloon Route - Yau Ma Tei West

承辦商 Contractor: 利基-SKEC 聯營 Building-SKEC Joint Venture

地盤監督公司 Supervising Company: ARUP

模範分包商 Model Subcontractor: 顯森建築有限公司 Hui Sun Construction Company Limited

Winner of CCSA (New Works) Silver Prize and OEMPA Bronze Prize
Contract No. HY/2014/20
"Central Kowloon Route - Yau Ma Tei West"

第27屆公德地盤獎(工務工程—新建工程)
27th Considerate Contractors Site Award (Public Works-New Works)

合約 Contract: HY/2014/16
西貢公路改善工程第一期 - 清水灣與區區線段 Hiram's Highway Improvement Stage 1 - Between Clear Water Bay and Marina Cove

承辦商 Contractor: 中國建築工程(香港)有限公司 CHINA STATE CONSTRUCTION ENGINEERING (HONG KONG) LIMITED

地盤監督公司 Supervising Company: MEINHARDT

模範分包商 Model Subcontractor: VTEC

Winner of CCSA (New Works) Bronze Prize and OEMPA Merit Prize
Contract No. HY/2014/16
"Hiram's Highway Improvement Stage 1 - Between Clear Water Bay Road and Marina Cove"

公德地盤獎(工務工程—新建工程)
 Considerate Contractors Site Award (Public Works-New Works)

合約 Contract: 中九龍幹線—啟德東
 Central Kowloon Route - Kai Tak East

承辦商 Contractor: 愛銘—保華聯營
 Alchmax - Paul Y Joint Venture

地盤監督公司 Supervising Company: ARUP M
 Arup-Mott MacDonald Joint Venture

模範分包商 Model Subcontractor: GME 駿傑工程有限公司
 Good Mind Engineering Limited

工程簡介 Works Description

環境管理 Environmental Management

創新安全 Safety Innovation

公共關係 Public Relations

員工福利 Welfare for Workers

工務安全管理 Site Safety Management

公德地盤獎(工務工程—維修、保養、改建及加建工程)
 Considerate Contractors Site Award (Public Works-RMAA Works)

合約 Contract: 路政署定期合約: 05/HY/2018
 新界東、九龍東及香港新快速公路及高速公路之管理及維修 2019 - 2025
 Highways Department Term Contract
 Management and Maintenance of Expressways and High Speed Roads in New Territories East, Kowloon East and Hong Kong Island 2019 - 2025

承辦商 Contractor: 偉全建築有限公司
 Welcome Construction Co., Ltd.

地盤監督公司 Supervising Company: 路政署 HIGHWAYS DEPARTMENT

工程簡介 Project Description

圍欄隔音可安神、照明系統時更新、裝設監控動態路、遺棄修橋掃塵、修葺斜坡復堅固、除草修樹綠草、處理急事毋怠慢、快速保養路邊群。
 Maintain and repair the roads, bridges, underpasses, tunnels, drainages, slopes, vegetation, ground anchor, hard landscape works, road sweeping, cleansing works and emergency works along route 1, 2, 4, 8 and 9 of Expressways and High Speed Roads in NT East, KLN East and HK Island from 1st April 2019 to 31st March 2025.

工程相片 Project Photo

Winner of CCSA (New Works) Merit Prize and OEMPA Merit Prize
 Contract No. HY/2018/02
 "Central Kowloon Route - Kai Tak East"

Winner of CCSA (RMAA) Merit Prize
 Contract No. 05/HY/2018
 "Management and Maintenance of Expressways and High Speed Roads in New Territories, Kowloon East and Hong Kong Island 2019 - 2025"

OEMPA Bronze Award was granted to Contract No. HY/2014/20 for the good environmental performance achieved. It was the first construction site in Hong Kong to use recycled HDPE plastic mats as paving material for site haul roads to suppress dust emission. Compared with concrete slab and metal decking, HDPE mats are lightweight and less prone to noise emission. In addition, approximately 700m² of solar panels were installed on the roof of the site office and car park areas to generate renewable energy for the Feed-in Tariff Scheme. The annual production rate was over 140,000 kWh which was equivalent to reduction of 110 tonnes of CO₂ emission.



Use of recycled HDPE mats for site haul roads in Contract No. HY/2014/20



Solar panels on the roof of the site office and car park of Contract No. HY/2014/20

Environmental Promotion Campaign on Construction Site

We strive for continuous improvement in our environmental performance on sites by encouraging our contractors to participate in various environmental promotion campaigns and activities including the Hong Kong Awards for Environmental Excellence and Hong Kong Green Awards.

The Hong Kong Awards for Environmental Excellence is a well-recognised campaign organised by the Environmental Campaign Committee, the Environmental Protection Department and other organisations. To honour the outstanding environmental performance in the construction industry sector, Contract No. HY/2014/20 was granted the Bronze Award in the Sectoral Awards of Hong Kong Awards for Environmental Excellence in 2021.

Hong Kong Green Awards organised by the Green Council is another highly regarded environmental awards in the industry which recognise companies with exceptional performance on green management and notable contribution to sustainable development. In 2021, our Contract Nos. HY/2014/20 and HY/2014/08 were granted Gold Award and Silver Award respectively in the category of Green Management Award – Project Management (Large Corporation).

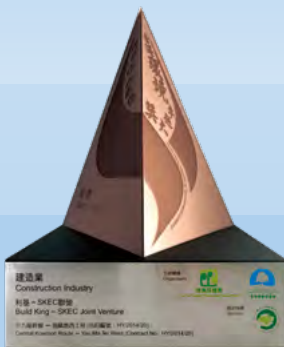
The Hong Kong Green Organization Certification scheme is a prestigious scheme which encourages participants to strive for self-improvement in specific environmental aspects. Under the scheme, the Wastewi\$e and Energywi\$e certificates are granted to well performed organisations in recognition of their efforts in adopting measures to reduce the amount of waste generated and to save energy within their establishments respectively. In 2021, Contract No. HY/2014/20 attained the Good Level and Basic Level in Wastewi\$e Certificate and Energywi\$e Certificate respectively, and for Contract Nos. HY/2014/07 and HY/2009/19, they attained the Basic Level in Wastewi\$e Certificate and Energywi\$e Certificate respectively.



Good Level
Wastewi\$e Certificate



Basic Level
Energywi\$e Certificate



BRONZE AWARD
Hong Kong Awards for Environmental Excellence 2020
by the Environmental Campaign Committee alongside the Environmental Protection Department



GOLD AWARD
Hong Kong Green Awards 2021
by the Green Council



SILVER AWARD
Hong Kong Green Awards 2021
by the Green Council

ENVIRONMENTAL OBJECTIVES AND TARGETS

ACHIEVEMENT IN 2021

(1.1.2021-31.12.2021)

Objective	Target	Achievement (as at 31 Dec 2021)
Reducing the energy consumption in public lighting	To replace 10,000 lighting points with LED lights/LED tubes.	Replaced 36,000 lighting points with LED lights/LED tubes.
Saving 6% electricity consumption in the Highways Department (HyD) offices by FY 2024/25 (comparing with the baseline electricity consumption in FY 2018/19)	To continue implementing housekeeping measures and best practices for energy saving.	Comparing with the baseline in FY2018/19, electricity consumption of HyD offices in 2021 has achieved the saving target. Nevertheless, electricity consumption will be monitored closely with a view to achieving the 6% saving target by 2024/25. Housekeeping measures and best practices for energy saving are being implemented.
Adopting measures in water conservation	To continue implementing measures in water conservation and exploring the appropriate installation of latest water saving devices in HyD offices.	Measures in water conservation are being adopted continuously.
Improving indoor air quality	To continue upkeeping the indoor air quality at or above Good Class level in HyD offices.	HyD offices' air quality attained the Excellent Class or Good Class.
Carrying out carbon audit and implementing measures to reduce greenhouse gas emission	To continue carrying out carbon audit annually. To explore energy conservation opportunities by identifying our major emission source from the carbon audit result.	Carbon audit was arranged by the Building Management Office of Ho Man Tin Government Offices in 2021.
Encouraging the use of recycled paper in the Department	To upkeep percentage usage of recycled paper at 98% or above of the total paper consumption.	21,235 reams of paper were consumed in the year, and all of them were recycled paper.
Setting target in reducing photocopying paper consumption	To maintain the consumption of photocopying paper per staff member at a level not exceeding the consumption level of 2020.	The consumption of photocopying paper per staff member in 2021 is lower than the consumption level of 2020.
Promoting the wider use of recycled materials	(i) To introduce the use of full depth recycled materials as sub-base of local distributors and feeder roads in more maintenance contracts; and (ii) To use paving blocks containing recycled glass materials for at least 97% of the newly laid concrete paving block pavements.	(i) 2 road maintenance contracts which were awarded in 2021 have included the specification clauses for the use of full depth recycled materials as sub-base of local distributors and feeder roads; and (ii) 100% of the newly laid concrete paving blocks contain recycled glass materials.
Planting trees and shrubs	To plant 94,000 additional trees/shrubs in capital works contracts of Major Works Project Management Offices (MWPMOs).	188,511 additional trees/shrubs have been planted.

ACHIEVEMENT IN 2021 (1.1.2021-31.12.2021)

Objective	Target	Achievement (as at 31 Dec 2021)
Adopting site office equipment with energy saving labels	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 offices (excluding those using existing premises) of capital works contracts of MWPMOs to be tendered during the calendar year of 2021.	All 5 applicable capital works contracts tendered in 2021 have included the particular specification clauses for using site office equipment with energy saving labels and water consuming appliances with WSD water efficiency labels.
Using environment-friendly vehicles in capital works projects	<ul style="list-style-type: none"> (i) To procure at least two electric or hybrid electric vehicles of approved types under each capital works contract of MWPMOs to be tendered during the calendar year of 2021; and (ii) To procure at least three electric or hybrid electric vehicles of approved types under each road maintenance term contract to be tendered during the calendar year of 2021. 	<ul style="list-style-type: none"> (i) All 5 capital works contracts tendered in 2021 have procured at least two electric or hybrid electric vehicles of approved types; and (ii) All road maintenance term contracts tendered during the calendar year of 2021 have procured at least three electric or hybrid electric vehicles of approved types.
Reducing dust emission	To include a particular specification clause for dust emission reduction in all capital works contracts at MWPMOs to be tendered during the calendar year of 2021.	All 5 capital works contracts tendered in 2021 have included the dust emission reduction particular specification clause.
Adopting energy efficient features and renewable energy technologies	<p>In all capital works consultancy agreements of MWPMOs for which invitation to submit Technical and Fee Proposals during the calendar year of 2021 to include requirements for the consultants:</p> <ul style="list-style-type: none"> (i) To identify opportunities to utilize energy efficient features and renewable energy technologies; and (ii) To assess carbon footprint of the road works project during design stage and to provide recommendations on measures to reduce carbon footprint. 	All 5 consultancy agreements tendered in 2021 have included the requirements (i) and (ii).
Green roof and/or green wall at the Engineer's site office	To include a particular specification clause for construction of green roof and/or green wall in all capital works contracts of MWPMOs to be tendered during the calendar year of 2021 with Engineer's site office (excluding those using existing premises) exposed in sunlight.	All 4 applicable capital works contracts tendered in 2021 have included the particular specification clause for construction of green roof and/or green wall.
Promoting the use of renewable energy on highway structures	To install photovoltaic (PV) panels on existing and new highway structures.	PV panels have been installed on selected existing and new highway structures.
Encouraging the use of "zero/low emission" plants in construction sites in capital works projects	To use "zero/low emission" plants in construction sites in capital works contracts of MWPMOs.	3 applicable capital works contracts have used "zero/low emission" plants in construction sites.

LOOKING AHEAD FOR 2022-23

(1.1.2022-31.3.2023)

Objective	Target
Reducing the energy consumption in public lighting	To replace 14,000 lighting points with LED lights.
Saving electricity consumption in HyD Offices	To continue implementing housekeeping measures and best practices for energy saving.
Adopting measures in water conservation	To continue implementing measures in water conservation and exploring the appropriate installation of latest water saving devices in HyD offices.
Improving indoor air quality	To continue up-keeping the indoor air quality at or above Good Class level in HyD offices.
Carrying out carbon audit and implementing measures to reduce greenhouse gas emission	To continue carrying out carbon audit annually. To explore energy conservation opportunities by identifying our major emission source from the carbon audit result.
Encouraging the use of recycled paper in the Department	To upkeep percentage usage of recycled paper at 98% or above of the total paper consumption.
Setting target in reducing photocopying paper consumption	To maintain the consumption of photocopying paper per staff member at a level not exceeding the consumption level of 2021.
Promoting the wider use of recycled materials	To use paving blocks containing recycled glass materials for at least 97% of the newly laid concrete paving block pavements.
Planting trees and shrubs	To plant 36,000 additional trees/shrubs in capital works contracts of MWPMO.
Adopting site office equipment with energy saving labels	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 offices (excluding those using existing premises) of capital works contracts of MWPMO to be tendered during the year of 2022/23.
Using environment-friendly vehicles in capital works projects	To procure at least two electric or hybrid electric vehicles of approved types under each capital works contract of MWPMO to be tendered during the year of 2022/23.



LOOKING AHEAD FOR 2022-23 (1.1.2022-31.3.2023)

Objective	Target
Reducing dust emission	To include a particular specification clause for dust emission reduction in all capital works contracts of MWPMO to be tendered during the year of 2022/23.
Adopting energy efficient features and renewable energy technologies	In all capital works consultancy agreements of MWPMO for which invitation to submit Technical and Fee Proposals during the year of 2022/23 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 works project during design stage and to provide recommendations on measures to reduce carbon footprint.
Green roof and/or green wall at the Engineer's site office	To include a particular specification clause for construction of green roof and/or green wall in all capital works contracts of MWPMO to be tendered during the year of 2022/23 with Engineer's site office (excluding those using existing premises) exposed in sunlight.
Promoting the use of renewable energy on highway structures	To install photovoltaic panels on existing and new highway structures.
Encouraging the use of electric-powered plants/equipment in construction sites in capital works contracts	To use electric-powered plants/equipment in construction sites in capital works contracts of MWPMO.



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