3

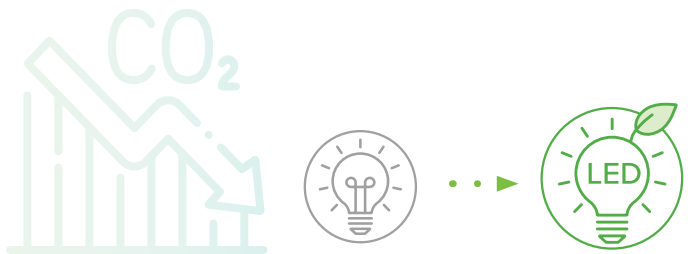
環境
Environmental

公共照明節約能源
Energy Saving in Public Lighting

對碳中和的承諾
Commitment to Carbon Neutrality

《香港氣候行動藍圖 2050》制定了長期的減碳目標，目標是在二零三五年前把香港的碳排放量較二零零五年的水平降低 50%。為此，我們已推行多種措施，以減少能源消耗及支持政府的淨零發電和節能目標。

Hong Kong's Climate Action Plan 2050 has set a long-term carbon reduction target, with an aim to reduce Hong Kong's carbon emission by 50% before 2035 as compared with the 2005 level. To this end, we have introduced various measures to reduce energy consumption and support the Government's net-zero electricity generation and energy saving goals.



發光二極管 (LED) 公共照明更換計劃
Light Emitting Diode Public Lighting Replacement Programme

為了進一步提升香港公共照明的能源效益，我們在二零一七至一八年度推出發光二極管公共照明更換計劃，把下列傳統照明系統更換為 LED 照明設備：

To further enhance the energy efficiency of public lighting in Hong Kong, we launched the Light Emitting Diode (LED) Public Lighting Replacement Programme in 2017/18 to replace the conventional illumination systems with LED luminaires for:

傳統路燈
Conventional road lights



路邊泛光燈
Roadside floodlights



高架道路標誌
Gantry signs



行人天橋和行人隧道的熒光燈管
Fluorescent tubes at footbridges and subways

二零二四至二五年度，計劃擴展至涵蓋所有公共照明，並以 LED 照明設備更換有關設施，目標於二零二九年完成。包括：

In 2024/25, the Programme was extended to cover all public lighting with LED luminaires, targeted for completion by 2029, including:

- 行人天橋和行人隧道照明燈
  Public lighting at footbridges and subways
- 公共運輸交匯處高懸燈
  High-bay lights at Public Transport Interchanges (PTIs)
- 地下行車通道照明燈
  Lighting fixtures at underpasses

透過這些低碳和節能措施，我們旨在為公眾提供安全、優質、可靠和可持續的公共照明服務。

Through these low-carbon and energy-efficient measures, we aim to provide safe, high-quality, reliable and sustainable public lighting services to the public.



橫跨佛光街的 KS21 號行人隧道的 LED 更換工程
LED replacement at pedestrian subway KS21 across Fat Kwong Street

LED 公共照明更換計劃的成效
LED Public Lighting Replacement Achievement

自有關計劃在二零一七至一八年度展開後
Since the commencement of the Programme in 2017/18

185,600 個照明點的燈具已更換 lighting points replaced

二零二五年四月一日至二零二六年三月三十一日
From 1 April 2025 to 31 March 2026

20,300 個照明點的燈具已更換 lighting points replaced

更換進度
Replacement progress:

- 路燈 Road Lights — ≈100%
- 行人天橋及行人隧道 Footbridges and Subways — 63%
- 公共運輸交匯處 PTIs — 37%
- 地下行車通道 Underpasses — 25%

電力節省
Energy saved

104,000,000 度（千瓦小時） kWh

溫室氣體排放減少
GHG emissions reduced

62,400 噸 tonnes

進展
Progress

由二零二五年四月一日至二零二六年三月三十一日，我們將約 20,300 個公共照明點更換為 LED 照明設備。

From 1 April 2025 to 31 March 2026, we replaced about 20,300 public lighting points with LED luminaires.

累計更換量
Cumulative Replacement

自計劃在二零一七至一八年度展開以來，我們在全港更換了各類約 185,600 個照明點，涵蓋幾乎所有路燈、63% 的行人天橋和行人隧道熒光燈管、37% 的公共運輸交匯處照明點和 25% 的地下行車通道照明點。

Since the commencement of the Programme in 2017/18, we have replaced about 185,600 lighting points of various kinds in Hong Kong, covering nearly all the road lights, 63% of the fluorescent tubes at footbridges and subways, 37% of the lighting points at PTIs and 25% of the lighting points in underpasses.

節能減排
Energy & Emission Savings

經我們嚴謹的內部監察程序驗證，計劃合共節省約 104,000,000 千瓦小時的電能，相當於減少 62,400 噸溫室氣體排放。

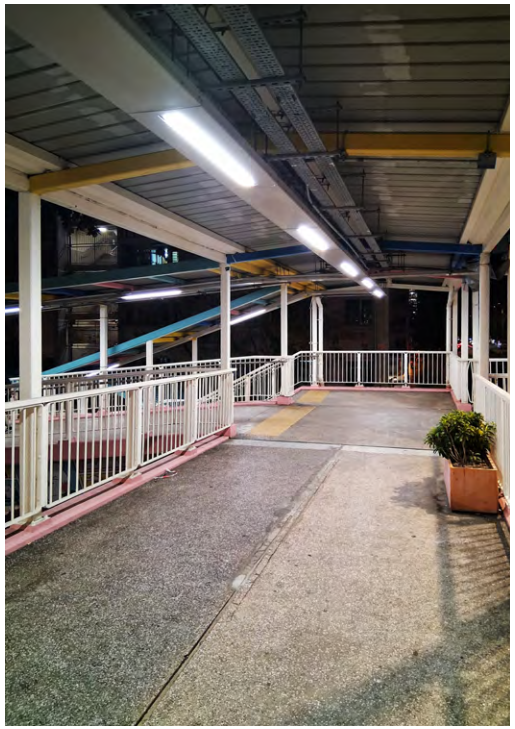
In total, about 104,000,000 kWh of energy has been saved, which is equivalent to a reduction of 62,400 tonnes of greenhouse gas emissions, verified through our robust internal monitoring processes.

我們會繼續留意 LED 照明設備及其他照明技術的發展，以提供更環保和節能的公共照明系統，從而支持香港轉型至碳中和。

We will continue to monitor the development of LED luminaires and other lighting technologies with a view to developing a more environmentally friendly and energy-saving public lighting system, thereby supporting Hong Kong's transition toward carbon neutrality.



黃埔花園公共運輸交匯處的 LED 更換工程
LED replacement at Whampoa Garden Public Transport Interchange



橫跨荔枝角道及東京街交界的 KF69 號行人天橋 LED 更換工程
LED replacement at footbridge KF69 across the junction of Lai Chi Kok Road and Tonkin Street

環境管理 Environmental Management



在環境易受破壞地區進行鄉郊路燈工作計劃
Implementation of Village Lighting Programme in Environmentally Sensitive Areas

路政署除了為轄下道路提供公共照明外，還會因應鄉郊村民的申請需要，於「鄉郊路燈工作計劃」下在鄉郊地區安裝公共照明設施。在連接榕樹澳村至西沙路的照明工程中，我們沿 3.2 公里長的現有通路安裝 48 支路燈，並積極採取措施以保護毗鄰的西貢西郊野公園。

Apart from the provision of public lighting on roads maintained by the Highways Department, we also provide public lighting in rural areas through applications by villagers under the Village Lighting Programme (VLP). For a lighting project connecting Yung Shue O Village to Sai Sha Road, comprising 48 lighting columns along an existing 3.2 km village access road, we adopted a proactive approach to safeguard the adjacent Sai Kung West Country Park.

雖然小型公共照明工程根據法例獲豁免受《環境影響評估條例》所規限，但我們仍主動聘請環境顧問，並諮詢郊野公園委員會。

Although minor public lighting works are statutorily excluded from the Environmental Impact Assessment (EIA) Ordinance, we voluntarily engaged an environmental consultant and consulted the Country Parks Committee.

連接榕樹澳村至西沙路的現有通路
Existing access road connecting Yung Shue O Village to Sai Sha Road

基線調查和主要生態調查結果
Baseline Survey and Key Ecological Findings

為建立可靠的基線，我們在施工工程展開前，針對當地的動植物進行了全面的生態調查。在路燈電纜走線的 500 米範圍內，已識別的主要陸上生態資源包括林地、灌木林、季節性濕草地、水道、農地及已發展／受干擾地區，以及相關野生生物。全面調查的結果清晰地呈現了當地的生物多樣性狀況：

To establish a reliable baseline, comprehensive ecological surveys of local flora and fauna were conducted prior to the commencement of construction works. The main terrestrial ecological resources identified within 500 m from the cable alignment comprised woodland, shrubland, seasonally wet grassland, watercourses, agricultural land and developed/disturbed area, and their associated wildlife. The comprehensive surveys established a clear picture of local biodiversity:

特定的植物保護
Targeted Flora Protection

在周邊的林地和灌木林記錄到 19 種具保育價值的植物物種。關鍵的是，所有經識別的植物均位於施工範圍以外，並予以原址保留。

19 flora species of conservation importance were recorded in surrounding woodlands and shrublands. Crucially, all identified individuals lie strictly outside the works area and were preserved in situ.

動物和夜行性野生生物
Fauna & Nocturnal Wildlife

調查記錄到具保育價值的哺乳類動物六種、鳥類六種、蝴蝶三種及淡水魚類一種，另外亦記錄到活躍的夜行性物種，尤其是處於交配期的螢火蟲。

Surveys recorded 6 mammal, 6 bird, 3 butterfly, and 1 freshwater fish species of conservation importance, alongside active nocturnal species, particularly mating fireflies.

直接影響輕微
Low Direct Impact

由於通道經常有車輛和行人來往，道路範圍內的整體物種豐富程度和野生生物的數量持續偏低。然而，項目在運作期間可能對夜行性物種造成間接的光污染和眩光，仍須採取專門的緩解措施。

Given the regular vehicular and pedestrian traffic along the access road, overall species richness and wildlife abundance within the immediate road footprint remain low. However, potential indirect operational light pollution and glare on nocturnal species required dedicated mitigation.

智能與環保緩解措施
Smart & Eco-Friendly Mitigation Measures

由於項目規模較小，且項目地點位於一條經常使用的道路，本已存在人為干擾。在實施下列建議的緩解措施後，預計在施工和運作階段對生態的潛在影響均屬輕微。

Given the small scale of the Project and the existing human disturbance as the project site is located at the regularly used road, and with the implementation of the proposed mitigation measures set out below, potential ecological impact is expected to be low during both the construction and operation phases.

1

施工階段：保護生境
Construction Phase: Safeguarding Habitats

劃定工地範圍
Site Demarcation

圍封施工範圍，並在具保育價值的植物物種周圍設立附有警告牌的保護區。

Fencing off works areas and establishing protective zones with warning signage around flora species of conservation importance.

將影響減至最低
Minimal Disruption

施工須限於平日日間進行，嚴格控制工地徑流，並在工程完成後即時將坑道恢復原狀。

Restricting construction to weekday daytime hours, strictly controlling site runoff, and reinstating disturbed trenches immediately after works.

2

運作階段：創新智能照明
Operation Phase: Smart Lighting Innovation

智能燈光調節
Adaptive Smart Dimming

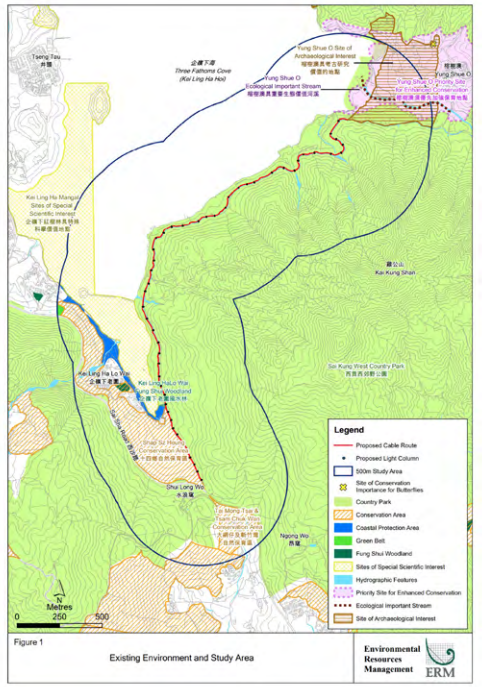
在螢火蟲交配高峰期期間，燈光將會調暗。當有車輛駛近時，內置的交通偵測感應器會自動恢復全亮度照明，從而在保障行車安全的同時，避免造成不必要的光污染。

Lights are dimmed during peak firefly mating seasons. Integrated traffic detection sensors automatically restore full illumination when a vehicle approaches, ensuring road safety without unnecessary light pollution.

野生動植物友善照明裝置
Wildlife-Friendly Fixtures

選用色調柔和的發光二極管燈具（色溫低於3,000K），安裝於零度支架上並配備遮光板，使光線僅向下照射，消除向上及側向散發的眩光。

Adopting soft-tone LED lanterns (colour temperature below 3,000 K) mounted on 0-degree brackets with light shields to direct light strictly downward and eliminate upward and lateral glare.



現有環境與研究範圍
Existing environment and study area

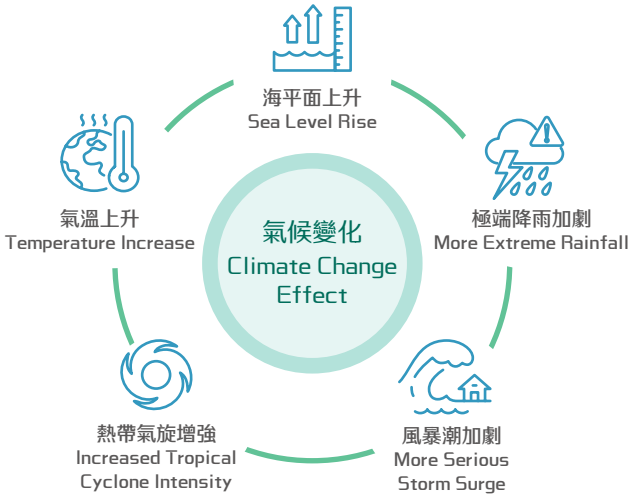
榕樹澳村照明工程證明，積極的生態規劃能有效平衡公眾安全需要和該處的保育生物多樣性。通過全面的基線調查、周全的施工管控和創新智能照明技術，我們在為當地社區提供必要基建設施的同時，亦將此項目對西貢西郊野公園的潛在影響減至最低。此模式為在環境易受破壞地區進行的類似鄉郊照明工程，提供了切實可行的參考。

The Yung Shue O Village lighting project demonstrates that proactive ecological planning can effectively balance public safety needs with biodiversity conservation. Through comprehensive baseline surveys, thoughtful construction controls, and innovative smart lighting technologies, we have minimised potential impacts on Sai Kung West Country Park while delivering essential infrastructure for the local community. This approach offers a practical model for similar rural lighting projects in environmentally sensitive areas.

氣候變化研究顧問合約
Consultancy Agreement Study on Climate Change

政府十分重視基礎建設應對氣候變化和極端天氣的能力。二零一六年，政府成立了「氣候變化基建工作小組」，協調各工務部門在適應氣候變化方面的工作。作為氣候變化基建工作小組的成員，路政署與多個政府決策局和部門合作，推行減碳政策，從而協助應對極端天氣帶來的挑戰。

The Government attaches great importance to the capability of its infrastructure in combating climate change and extreme weather. In 2016, it established the Climate Change Working Group on Infrastructure (CCWGI) to coordinate the efforts of the works departments in adapting to climate change. As a member of the CCWGI, we collaborate with various government bureaux and departments to implement decarbonisation policies, helping to address the challenges posed by extreme weather.



《道路及鐵路結構設計手冊》標準更新
SDM Standards Updates

《道路及鐵路結構設計手冊》提供香港各類道路及鐵路構築物的設計指引及標準。為確保基礎設施能持續應對不斷演變的氣候風險，我們作出兩項主要更新：

The Structures Design Manual for Highways and Railways (SDM) provides guidance and sets out standards for the design of highway and railway structures in Hong Kong. To ensure our infrastructure remains resilient against evolving climate risks, two major updates were introduced:

二零二三年十二月
December 2023

為應對氣溫上升及風力增強等氣候變化對公路橋樑的影響而作出更新。

Updates were made to address the impacts of climate change on highway bridges, including temperature rise and increased wind force.

二零二五年六月
June 2025

引入新增要求，未來的地下行車通道項目須在初步設計階段進行水浸風險評估，從而大幅提升其防洪韌性。

Requirements for flood risk assessment at the preliminary design stage of future underpass projects were introduced, significantly enhancing underpass resilience against flooding.

道路抗禦力檢討 – 75 個重要基礎設施
Road Resilience Review — 75 Critical Infrastructures

我們已完成檢討轄下 75 個重要道路基礎設施（包括主要公共道路和行車隧道）抵禦水浸威脅的能力。我們參考了政府間氣候變化專門委員會 (IPCC) 的《第六次評估報告》及政府部門就本地最新氣候變化進行的相關研究，並已對相應的建議措施進行技術評估。至關重要的一點是，所有為應對二零五零年前的氣候災害而建議的改善工程，已於二零二六年一月全部順利完成。

Our Department completed a review of the resilience of 75 critical road infrastructures under our purview, including major public roads and road tunnels, against the threat of flooding. With reference to the Intergovernmental Panel on Climate Change (IPCC)'s Sixth Assessment Report and relevant studies on the latest local climate change conducted by government departments, a technical assessment of the relevant proposed measures was conducted. Crucially, all recommended improvement works to cater for climate hazards up to a time horizon of 2050 were successfully completed in January 2026.

行人保護網絡
Pedestrian Protection Network

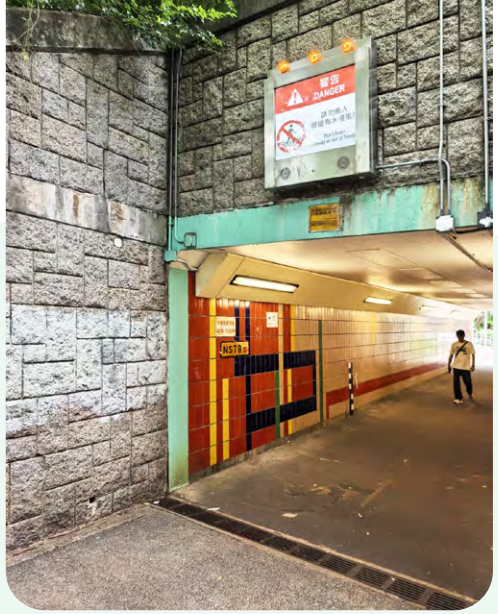
由二零二四年起，我們為城門河、林村河及大埔河沿岸的 16 條行人隧道安裝了水浸警告系統。

Since 2024, we have installed flood warning systems for 16 pedestrian subways along the Shing Mun River, Lam Tsuen River, and Tai Po River.

大埔行人隧道 Tai Po Subway

於大埔一條行人隧道安裝的智能水浸警告系統，以提升極端天氣下的社區安全。

Smart flood warning system installed at a pedestrian subway in Tai Po to enhance community safety under extreme weather.



海堤街 Hoi Tai Street

沿海堤街圍牆安裝的透明防洪板（設有兩道通道門），以防止溢流進入東區海底隧道。

Transparent flood panels with two access doors installed along the fence wall at Hoi Tai Street to prevent overflow into the Eastern Harbour Crossing.



清風街 Tsing Fung Street

沿清風街安裝的透明防洪板，以防止溢流進入中環及灣仔繞道。

Transparent flood panels installed along Tsing Fung Street to prevent overflow into the Central-Wan Chai Bypass.



研究及技術 Research and Technology

將建築信息模擬整合至地理信息系統以實現更智能的道路資產管理
Integrating BIM with GIS for Smarter Road Asset Management

為配合政府在工務計劃的整個工程生命週期中採用建築信息模擬 (BIM) 技術的政策，我們一直積極將建築信息模擬整合至內部的地理信息系統 (GIS)，包括內聯網地圖系統 (IMS) 和道路數據維護系統 (RDMS)。通過將建築信息模擬模型和三維空間數據同時展示，維修保養團隊可更了解結構布局和及早識別潛在的問題或衝突，從而避免多餘的工作、更有效運用資源和將浪費減至最少。

To align with the Government's policy on adopting Building Information Modelling (BIM) technology throughout the entire life cycle of public works projects, we have been actively integrating BIM with our internal Geographic Information System (GIS), including the Intranet Mapping System (IMS) and the Road Data Maintenance System (RDMS). By visualising BIM models together with 3D spatial data, maintenance teams can better understand structural layouts and identify potential issues or conflicts early. This helps them avoid redundant work, use resources more efficiently, and minimise waste.

甚麼是內聯網地圖系統和道路數據維護系統？
What are IMS and RDMS?

內聯網地圖系統
IMS (Intranet Mapping System)

內聯網地圖系統是本署內部一個建基於網絡的地理信息系統，用於互通道路資產信息。系統整合來自本署內多個系統和其他政府部門的道路數據和相關信息，提供網上工具和應用程式予用戶，讓他們可查閱、檢索、查詢和下載空間數據和道路狀況信息，以及進行基本的地理信息系統分析。

IMS is a web-based GIS used within our Department to share road asset information. It integrates road data and related information from various systems in our Department and other government departments. IMS provides online tools and applications that allow users to access, retrieve, query, and download spatial data and road condition information, as well as perform basic GIS analysis.

道路數據維護系統
RDMS (Road Data Maintenance System)

道路數據維護系統是一個建基於虛擬桌面的地理信息系統，可用於管理二維和三維空間數據。系統的設計目的是用於創建、更新和處理本署的道路數據，包括本署繪圖室和維修承建商的道路設施數據和維修保養記錄。

RDMS is a virtual desktop-based GIS that supports both 2D and 3D spatial data management. It is designed for creating, updating, and processing our Department's road data, including road inventory data and maintenance records from our drawing offices and maintenance contractors.

地理空間數據和建築信息模擬如何相互配合運作？
How Geospatial Data and BIM Work Together?

為了支援使用建築信息模擬的資產管理，道路數據維護系統和內聯網地圖系統均須設有三維數據庫，以管理和儲存建築信息模擬數據：

To support BIM-enabled asset management, both RDMS and IMS have to include a 3D database for managing and storing BIM data:

- 道路數據維護系統提供工具把建築信息模擬數據轉換為地理信息系統格式，並檢查建築信息模擬數據的質素。
  RDMS provides tools to convert BIM data into GIS format and check BIM data quality.

- 內聯網地圖系統可結合建築信息模擬數據和地政總署的三維空間數據，以三維視角完整展示本署的道路數據。
  IMS allows BIM data to be combined with 3D spatial data from the Lands Department, enabling full 3D views of our Department's road data.

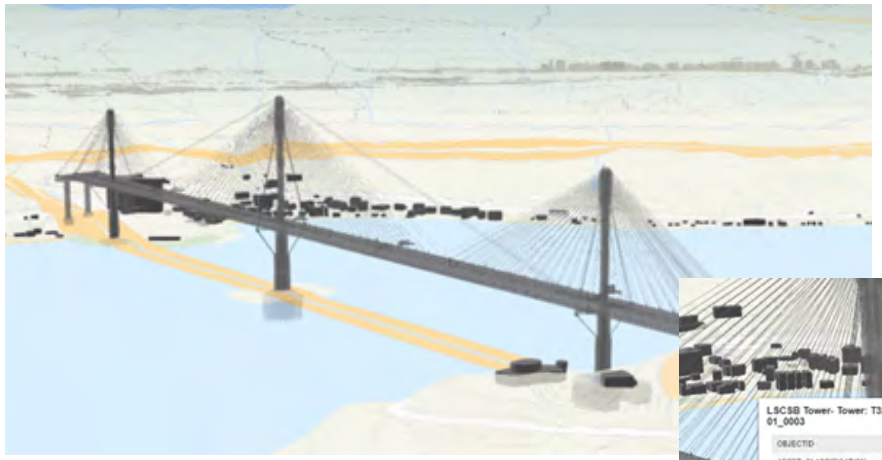
這項整合有助維修保養團隊以三維視角了解道路資產全貌。

This integration helps maintenance teams see a complete picture of road assets in three dimensions.

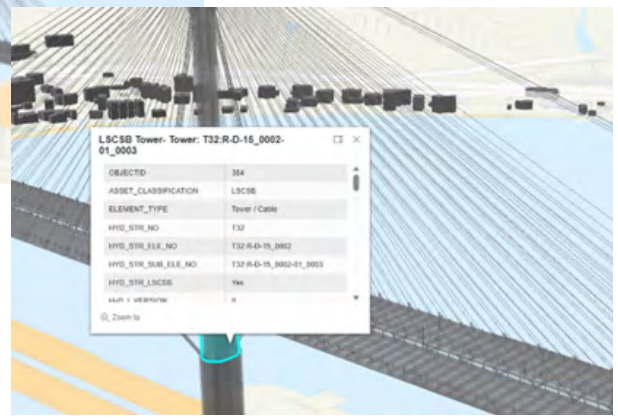
由建築信息模擬模型到資產信息模型
From BIM Models to Asset Information Models

一般工程的建築信息模擬模型會經歷設計、建造和竣工三個階段。為了支援長期的資產管理，我們會簡化竣工建築信息模擬模型，並把其轉換為資產信息模型 (AIM)，然後將該模型整合至內聯網地圖系統和道路數據維護系統，以供持續的維修保養和營運之用。

A typical project goes through three stages of BIM models: design, construction, and as-built. To support long-term asset management, we simplify and convert the as-built BIM model into an Asset Information Model (AIM). This AIM is then integrated into IMS and RDMS for ongoing maintenance and operations.



內聯網地圖系統中汀九橋的資產信息模型示例
An example of Ting Kau Bridge AIM in IMS



資產信息模型的全面屬性資訊
Comprehensive attribute information of the AIM

環保和效率方面的得益
Environmental and Efficiency Gains

我們自二零二六年起逐步將新的資產信息模型整合至內聯網地圖系統和道路數據維護系統。把地理空間數據整合至建築信息模擬為本署的維修保養工作帶來兩個主要好處：

Starting from 2026, we have progressively incorporated new AIMs into IMS and RDMS. Integrating geospatial data with BIM brings two key benefits to our maintenance work:

提升效率
Improved efficiency

維修保養團隊能夠以完整的三維視角查閱道路資產，有助他們更快捷和準確地規劃和進行工作。

Maintenance teams can access complete 3D views of road assets, helping them plan and carry out work more quickly and accurately.

減少浪費
Reduced waste

通過把竣工建築信息模擬模型轉換為資產信息模型，並將模型加入至內聯網地圖系統和道路數據維護系統，我們可避免多次創建相同的數據。此舉節省了資源，並將不必要的數碼和營運浪費減至最少。

By converting as-built BIM models into AIMs and adding them to IMS and RDMS, we avoid creating the same data multiple times. This saves resources and minimises unnecessary digital and operational waste.

提升道路維修保養質素的創新科技 — 路面狀況評估系統
Innovative Technology for Road Maintenance Quality — Road Condition Assessment System

在道路維修保養中發展「新質生產力」
Development of "New Quality Productive Forces" in Road Maintenance

為了主動對接國家發展策略，我們正通過在日常運作中發展「新質生產力」以推動創新。由於近來在三維雷射掃描和以人工智能 (AI) 識別圖像、影片和雷射掃描數據方面的進展，我們現在能夠以有系統、客觀和全面的方式，在所有公共道路上自動偵測道路缺陷和評估路面狀況。這項科技能夠提升規劃維修保養的效率、減少施工程序所產生的碳排放和延長道路基建的生命週期，從而支持政府的減碳目標。

To actively align with the national development strategy, we have been driving innovation through the development of "New Quality Productive Forces" in routine operations. Thanks to recent advancements in 3D laser scanning and Artificial Intelligence (AI) recognition of images, videos and laser scan data, we can now automatically detect road defects and assess the pavement conditions across all public roads in a systematic, objective and comprehensive way. This technology supports the Government's decarbonisation goals by enabling more efficient maintenance planning, lowering carbon emissions from construction logistics, and extending the lifecycle of road infrastructure.

整合幾何分析和人工智能以從路面的三維掃描數據中識別道路缺陷
Geometry Analysis Integrated with AI to Recognize Road Defects on 3D Scanning Pavement Data

路面狀況評估系統 (RCAS) 能夠偵測大部分的道路缺陷，包括裂縫、坑洞或碎裂、變形（例如車轍或凸起）和路面紋理不足（例如路面物料流失或防滑層耗損）。偵測所得會用作評估路面狀況指數 (PCI)。系統亦可量度道路缺陷的範圍，從而判斷其嚴重程度。

The Road Condition Assessment System (RCAS) can detect most defects for the assessment of the Pavement Condition Index (PCI), including cracks, potholes or spalling, deformation like rutting or shoving, and texture deficiency such as raveling or anti-skid wear. It can also measure the extent of defects to determine their severity.

由於車載三維雷射掃描器收集到的路面三維掃描數據的解像度和準確度高，我們能夠結合人工智能的力量和幾何分析，偵測各種類型的道路缺陷。精確計算道路缺陷的參數和嚴重程度有助我們對道路狀況進行完整的評估。

The 3D scanning pavement data collected by the vehicle-mounted 3D scanner possesses high resolution and accuracy. Therefore, it is possible to detect various types of defects with a combination of AI power and geometry analysis. Precise calculation of defect parameters and severities facilitates a complete assessment of road conditions.



路面狀況評估系統巡路檢測車在港珠澳大橋運行中
Inspection vehicle of RCAS operating on the Hong Kong-Zhuhai-Macao Bridge (HZMB)

系統會生成載有道路缺陷偵測結果的詳細報告，提供個別問題的資訊和整體的路面狀況指數評分。報告包含螢幕截圖和高解像度的圖像，記錄道路狀況隨時間的變化，以助進行以數據為主導的維修保養規劃及預算編列。

The system generates detailed reports that include defect detection results, providing information on individual issues and an overall PCI score. These reports include screen captures and high-resolution images that document road conditions over time, enabling data-driven maintenance planning and budgeting.

路面狀況評估系統的高精確度不但提升偵測道路缺陷的準確程度，而且提升我們進行預防性維修的能力，從而增強公共道路網絡的長期應變能力和可持續性，同時支持低碳和循環經濟的方式。

The high precision of RCAS not only improves the accuracy of defect detection but also enhances the ability to carry out preventive maintenance, thereby strengthening the long-term resilience and sustainability of the public road network while supporting a low-carbon and circular economy approach.

預期日後這項科技將會有助區域辦事處有策略地安排維修保養工作的優先次序，並以更有效率和以數據為主導的方式選擇最適合的維修方法。

In the future, it is envisioned that this technology will empower regional offices to prioritize maintenance work strategically and choose the optimal repair methods in a more efficient and data-driven manner.



路面狀況評估系統數據視像化和實地偵測道路缺陷結果的重點
Highlights of RCAS data visualization and field defect detection results

高性能超薄磨耗層：路面維修保養的可持續解決方案
Ultra-thin Overlay: A Sustainable Solution for Pavement Maintenance

高性能超薄磨耗層運用具高黏性和高彈性的改性瀝青物料為表層，其厚度僅約 20 毫米。這項科技具備極為出色的高溫穩定性、耐用性和行車舒適性，適用於維修瀝青和混凝土路面，能夠顯著提升道路使用者的出行體驗。高性能超薄磨耗層可延長路面壽命、改善摩擦力以提升安全，並減少對交通的干擾；在大幅減少物料消耗量和相關碳足跡的同時，此替代方案比全面重建更具成本效益。

Ultra-thin overlay (UTO) utilizes a high-viscosity and high-elasticity modified bituminous material as a surface layer with a thickness of only about 20 mm. Suitable for repairing both bituminous and concrete pavements, this technology boasts exceptional high-temperature stability, durability, and riding comfort, significantly enhancing the travel experience for road users. It extends pavement life, improves friction for enhanced safety, and minimises traffic disruption, offering a cost-effective alternative to full reconstruction while drastically reducing material consumption and the associated carbon footprint.



現有混凝土路面上的超薄瀝青面層
Ultra-thin overlay on existing concrete surface

大灣區的協同效應和實地試驗
Greater Bay Area Synergy and Site Trials

有見於高性能超薄磨耗層所帶來的好處，我們參考廣東省的地方標準引入高性能超薄磨耗層，並在二零二五年開展實地試驗。兩段本地路段的試驗分別於柴灣盛泰道和黃竹坑道天橋進行，並已在二零二五年十二月成功完成，展現了我們就採用創新科技節能減廢的承諾。

In view of its benefits, we introduced UTO, making reference to Guangdong Province's local standards, and commenced site trials in 2025. Two local trial road sections, at Shing Tai Road in Chai Wan and Wong Chuk Hang Road Flyover, were successfully completed in December 2025, demonstrating our commitment to adopting innovative technologies for waste reduction and energy saving.



黃竹坑道天橋的高性能超薄磨耗層實地試驗
Site trial of UTO at Wong Chuk Hang Road Flyover

先進環保建築設備首次亮相
Debuting Advanced Green Construction Equipment

我們引入多種首次在香港使用的先進設備：

We introduced several pieces of advanced equipment utilized for the first time in Hong Kong:

配備控塵功能和特製刨鼓的銑刨機
Milling Machine with Dust Control and Specialised Drum

配備先進抑塵系統和為銑刨混凝土路面而特製的刨鼓。

Equipped with an advanced dust suppression system and a dedicated milling drum tailored for concrete pavements.



配備控塵系統和混凝土路面銑刨專用刨鼓的銑刨機
Milling machine equipped with dust control system and milling drum for concrete pavement

噴灑攤鋪機
Spray Paver

能夠同時進行黏油噴灑和瀝青鋪設，可大幅縮短施工時間、減少塵土飛揚的情況和善用能源。

Capable of executing the tack coat spraying and asphalt laying simultaneously, drastically shortening construction time, reducing dust emissions, and optimizing energy use.



噴灑攤鋪機
Spray paver

「白轉黑」鋪設工程和長期可持續性
"White-to-Black" Resurfacing and Long-Term Sustainability

高性能超薄磨耗層（黑）尤其適合用於修復現有的混凝土路面（白）（即「白轉黑」鋪設工程），提供一項極具可持續性的工程策略。通過以薄而耐用的面層保護現有路面，而非依靠傳統的厚層重鋪，高性能超薄磨耗層大幅減少工程對石料和瀝青等自然資源的需求。這種環保做法有效減緩道路的損壞速度，提升整體耐用性，以及減低維修保養頻率和相關的環境影響，與政府的碳中和目標完全一致，亦能促進可持續的基建發展。

UTO (black) is particularly suitable for restoring existing concrete pavement (white) (i.e. "white-to-black" resurfacing works), offering a highly sustainable engineering strategy. By preserving the existing pavement with a thin, durable surfacing rather than relying on traditional thick-layer repaving, UTO drastically reduces the demand for natural resources such as aggregates and bitumen. This eco-friendly approach effectively slows down the road deterioration, enhances overall durability, and reduces both maintenance frequency and the associated environmental impacts. This fully aligns with the Government's carbon neutrality goal and promotes sustainable infrastructure development.



在柴灣盛泰道的高性能超薄磨耗層實地試驗涉及「白轉黑」鋪設工程
Site trial of UTO at Shing Tai Road, Chai Wan involving "white-to-black" resurfacing works

應用人工智能建築信息模擬建模系統在自動製作現況環境模型
Application of AI BIM Modeller for Automated Existing Condition Modelling



呈交予二零二五年度香港建築信息模擬學會大獎的團體照
Group photo for submission to the HKBIM Award 2025

我們致力採納創新科技，以提升運作效率，同時盡量減少對環境的影響。作為這項措施的一部分，我們研發了人工智能建築信息模擬（BIM）建模系統。該系統由人工智能（AI）驅動，用於自動製作現況環境模型（ECM），可減少以人手製作模型所涉及的人手密集且繁瑣的工序，從而加快模型的製作進度。系統在二零二五年度香港建築信息模擬學會大獎的「類別 B – BIM 機構」中榮獲「大獎」，可見其獲業界廣泛認可。

We are committed to embracing innovative technologies that enhance operational efficiency while minimising environmental impact. As part of this initiative, we have developed the Artificial Intelligence (AI) Building Information Modelling (BIM) Modeller, an AI-driven system for automating the creation of Existing Condition Models (ECM). The AI BIM Modeller expedites ECM creation by reducing the labour-intensive and tedious work associated with manual modelling. Demonstrating industry-wide recognition, the system received the "Grand Award" under "Category B – BIM Organization" in the HKBIM Award 2025.



使用背包式移動測量系統收集數據
Data Collection Process with the use of Backpack Mobile Mapping System

環境和可持續性方面的效益
Environmental and Sustainability Benefits

1
節能減排以達致淨零碳排放
Energy Consumption and Emission Reduction Towards Net-Zero Carbon Emissions:

人工智能建築信息模擬建模系統能減少電腦運算時間和能源消耗。採用先進的測量科技亦能提升收集數據的效率，並減少重複進行實地視察。上述效率提升轉化為較低的交通能源消耗量，並帶來可量度的碳排放減幅，從而支持政府的減碳策略。

The AI BIM Modeller reduces computing time and energy use. The adoption of advanced survey technology also increases the efficiency of data collection and reduces repeated site visits. These efficiencies translate into lower transport energy consumption and a quantifiable reduction in carbon emissions, supporting the Government's decarbonisation strategy.



使用手提式激光掃描器收集數據
Data collection process with the use of handheld laser scanner

2
整合數碼化的工作流程以達致可持續營運
Digital Integration for Sustainable Operations

人工智能建築信息模擬建模系統支援全面數碼化的工作流程，可減少對紙質測量圖和文件的依賴，從而減少紙張消耗量和促進更具可持續性和有效率的營運。

The AI BIM Modeller supports a fully digital workflow that reduces reliance on paper-based survey plans and deliverables, thereby lowering paper consumption and promoting more sustainable and efficient operations.

3
減少重新施工所耗資源
Reduction in Resource Use for Rework

人工智能建築信息模擬建模系統有助我們在設計階段及早進行碰撞分析，以降低在工程較後階段重新施工的需求。如此我們便可更有效運用資源，並將不必要的建築物料消耗減至最低。

The AI BIM Modeller facilitates early clash detection during the design stage, reducing the need for rework in later project stages. This supports more efficient resource use and helps to minimise unnecessary consumption of construction materials.



為設計大埔廣福行車橋而製作現況環境模型的過程：點雲數據
ECM production process for the design of Kwong Fuk vehicular bridge at Tai Po Point cloud data



數碼化以製成現況環境模型
Digitisation to ECM





擬議位於小瀝源路的行人斜道的現況環境模型：（上）實地照片；及（下）數碼化以製成現況環境模型
ECM for the proposed pedestrian ramp at Siu Lek Yuen Road: (top) site photo; and (bottom) Digitisation to ECM

以小型無人機測量和檢查道路、斜坡和橋樑:大埔新娘潭路山泥傾瀉的維修工程
Small Unmanned Aircraft Survey and Inspection of Roads, Slopes & Bridges: Landslide Repair Works at Bride's Pool Road, Tai Po

大埔新娘潭路在二零二五年八月五日發生嚴重山泥傾瀉，導致道路被完全阻塞。因應上述情況，路政署除了進行傳統的土木工程以鞏固倒塌的斜坡，還啟動緊急小型無人機測量，以迅速展開災害評估。通過使用小型無人機進行即時緊急空中偵察，我們的測量隊伍無需進入現場地面作業，即可安全地繞過不穩定的地形，收集關鍵的空間數據，並在操作小型無人機後的數小時內提交附有坐標信息的初步結果。

A serious landslide occurred at Bride's Pool Road in Tai Po on 5 August 2025, resulting in a complete road blockage. In response, apart from conventional civil works to stabilize the collapsed slope, an emergency Small Unmanned Aircraft (SUA) survey was activated to enable rapid-deployment disaster assessment. By utilizing SUA for immediate emergency aerial reconnaissance, our survey team safely bypassed unstable terrain, eliminated the need for intrusive ground access, captured critical spatial data, and delivered preliminary results with coordinate information within a few hours of the SUA operation.

整合科技: 攝影測量和收集空間數據
Technology Integration: Photogrammetry & Spatial Data Capture

小型無人機配備高解像度的數碼相機載荷和機載全球導航衛星系統實時動態定位模組 (GNSS-RTK)。整合上述設備對緊急測量至關重要，可讓我們無需親身前往危險而且持續移動的斜坡面，亦能夠獲取高準確度、具備地理位置定位參考和近距離的圖像。通過以先進的攝影測量技術處理這些圖像，我們可以暢順地生成高密度的三維點雲和具有紋理的三維網格模型。

The SUA is equipped with high-resolution digital camera payloads and onboard Global Navigation Satellite System Real-Time Kinematic (GNSS-RTK) modules. This integration is crucial for emergency surveys, as it enables the acquisition of highly accurate, geo-referenced, close-range imagery without requiring physical access to the hazardous, actively moving slope face. By processing these captured images through advanced photogrammetry technology, high-density 3D point clouds and textured 3D mesh models can be generated seamlessly.

環保和可持續性方面的好處
Environmental and Sustainability Benefits

1 整合數碼化的工作流程以達致可持續營運
Digital integration for sustainable operations

小型無人機測量能夠製作高質素的三維數碼模型以全面展示山泥傾瀉現場，支援先進的地理空間分析和準確的三維測量。這種數碼化的工作流程使我們無須重複進行實地視察和依賴紙質文件，同時提升規劃維修保養的準確度，從而最大限度地降低重新施工的風險，並推動可持續的工程營運。

SUA surveys produce high-quality 3D digital models that provide a comprehensive view of the landslide site to support advanced geospatial analysis and accurate 3D measurements. This digital workflow eliminates the need for repeated site visits and reliance on paper deliverables, while enhancing maintenance planning accuracy to minimise rework risks and promote sustainable engineering operations.

2 減少碳排放和空氣污染
Reduction in Carbon Emissions and Air Pollution

相較於傳統方法（例如檢驗車、移動式升降工作平台、直升機或定翼機），小型無人機主要以電力驅動，無須消耗化石燃料，與依賴化石燃料的其他方法相比，可大幅減少空氣污染物和碳足跡。

Compared to conventional methods such as inspection vehicles, mobile elevated working platforms, helicopters, or fixed-wing aircraft, SUA is primarily electric-powered, eliminating the consumption of fossil fuels. This significantly reduces air pollutants and the carbon footprint compared to those fossil-fuel-dependent alternatives.

3 最大限度地減少對現場造成的影響
Minimised site disruption

小型無人機能夠以遙距方式靠近陡峭、不穩定或難以抵達的斜坡，無需重型機械、臨時道路工程或大批地面人員。相比傳統基於地面的測量方法或載人航空測量方法，操作小型無人機的噪音影響較低，並對交通和周邊環境造成較少滋擾。

SUA can remotely access steep, unstable, or hard-to-reach slopes without the need for heavy machinery, temporary road works, or large ground crews. SUA operations lower noise impacts and cause less disturbance to traffic and the surrounding environment than conventional ground-based or manned aerial survey methods.



完成斜坡鞏固工程
Completion of slope stabilization works

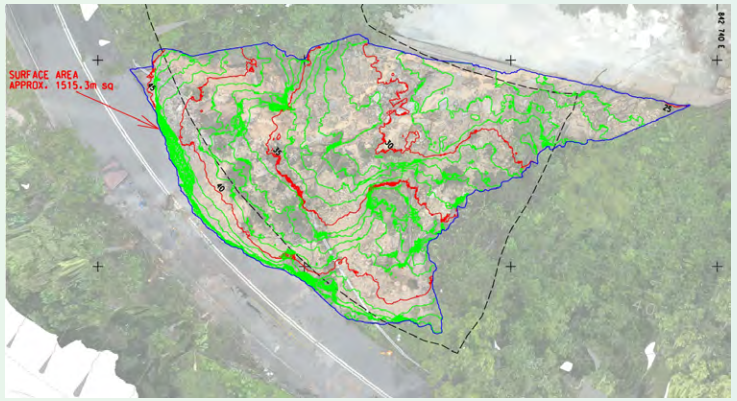
技術提升成效
Enhanced Effectiveness through Technology

透過利用小型無人機，斜坡穩定工程的進度得以加快，從而促進了封閉道路及時重開。此行動展示了基於小型無人機的檢查如何支援政府的環境報告、氣候韌性及可持續工程目標。

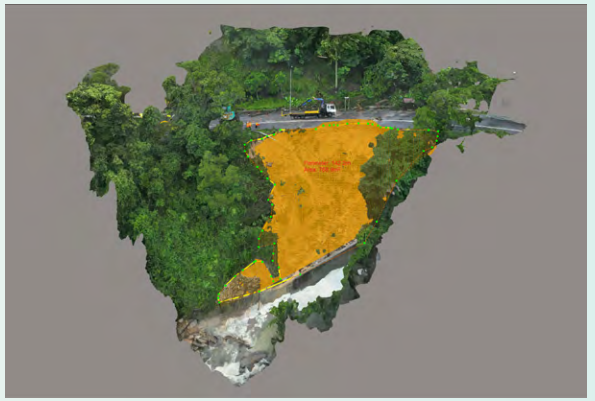
With the utilization of SUA, the progress of slope stabilization works was expedited, facilitating the timely re-opening of the blocked road. This operation demonstrates how SUA-based inspection supports the Government's environmental reporting, climate resilience, and sustainable engineering objectives.



大埔新娘潭路山泥傾瀉的航空照片
Aerial photos of landslide at Bride's Pool Road in Tai Po



在小型無人機測量得出的正射影像地圖上量度面積
Area measurement on orthophoto derived from SUA survey



在小型無人機測量得出的三維模型上進行量度
Measurement on 3D model derived from SUA survey