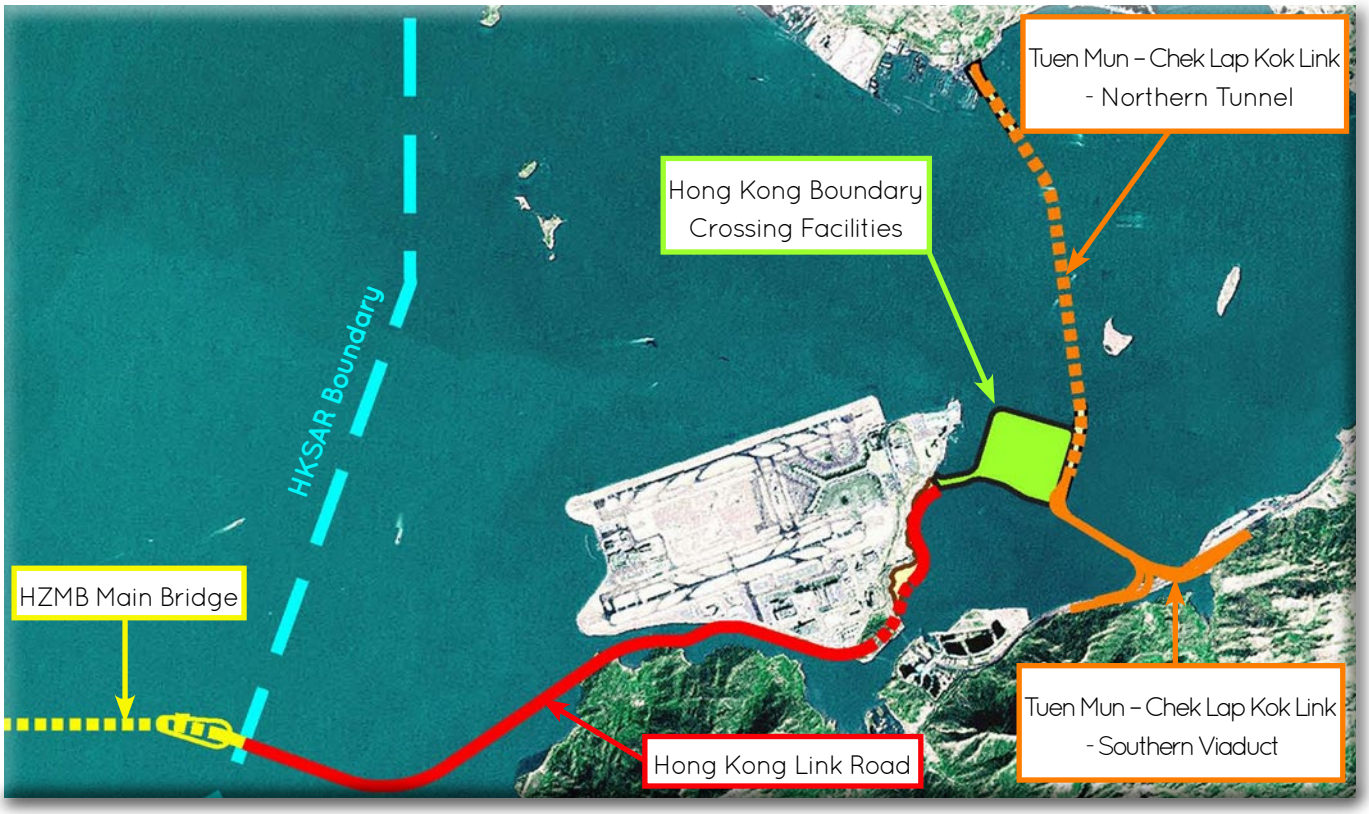
Environmental Management

Environmental considerations are at the heart of our day-to-day activities. We systematically manage impacts that our work may have on the environment and ensure that all our operations are carried out in an environmentally responsible manner.

Non-dredged Reclamation Method Adopted in the Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities Reclamation Works

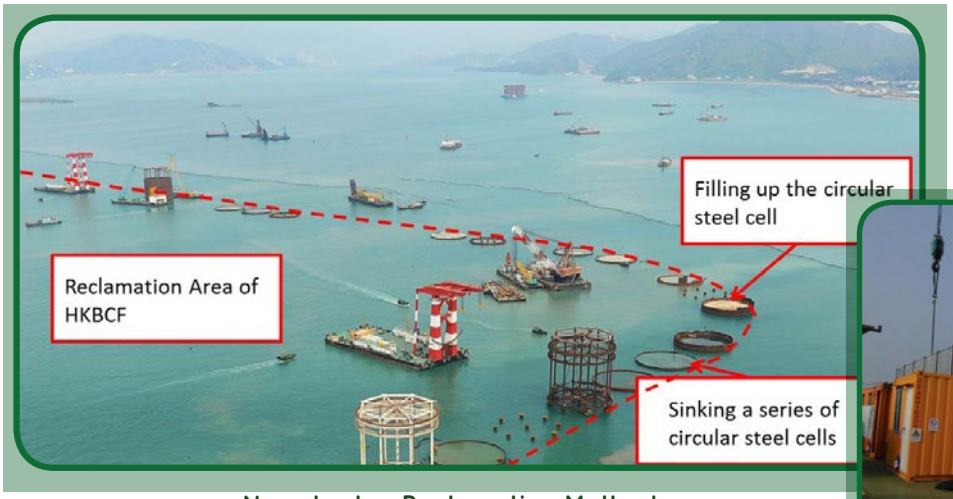
The Hong Kong-Zhuhai-Macao Bridge (HZMB) Hong Kong Boundary Crossing Facilities (HKBCF) reclamation works provide reclamation for an artificial island of about 150 hectares (including about 20 hectares for the Tuen Mun-Chek Lap Kok Link (TM-CLKL) southern landfall) from the open waters off the northeast of the Hong Kong International Airport. The reclaimed land will house clearance and transport facilities. With the HZMB/Hong Kong Link Road and TM-CLKL, and its proximity to the Hong Kong International Airport, HKBCF will also serve as an important transportation hub.



HZMB Hong Kong Boundary Crossing Facilities – Project Location Plan

With a view to minimizing the environmental impacts, a new non-dredged method consists of non-dredged seawall and non-dredged reclamation to construct the artificial island of the HKBCF has been developed, which is the first of its kind in Hong Kong. In brief, the non-dredged seawall comprises about 3.6 km long non-dredged seawall with steel cells and rubble mound and about 2.5 km long non-dredged rubble mound seawall. For both types of non-dredged seawall, 1-metre diameter stone columns would have to be installed along the footprint of seawall. For the construction of the non-dredged seawall with steel cells and rubble mound, in general, it is designed that the large diameter (~31m) steel cells, together with their connecting arcs, will penetrate through the marine sediment and key in the alluvium layer underneath using vibratory method. All steel cells, together with the spaces formed by the connecting arcs, will be backfilled using inert construction and demolition materials. For the non-dredged reclamation, the commonly used band drains and preloading method without dredging are used. With this non-dredged method consists of non-dredged seawall and non-dredged reclamation, dredging and disposal of marine mud are avoided, backfilling material can be reduced by about one half, marine traffic can be reduced by about 50% and the amount of released suspended particles at sea during reclamation can be reduced by about 70%. Hence, it is more environmentally friendly and meets the principle of sustainable development.

Together with other mitigation measures recommended under the Environmental Impact Assessment report, the reclamation works have been carried out with minimum impacts on our environment.



Non-dredge Reclamation Method
- Overview for Construction of Seawall

Noise Mitigation
- Noise Barrier on Working Barges

Air Pollution Abatement
- Dust Suppression by Watering

Water Pollution Abatement - Perimeter Silt Curtain Enclosing the Site and Localized Silt Curtain for Major Construction Works

Tree Preservation in the "Central-Wan Chai Bypass – Tunnel (Slip Road 8 Section)" Contract of the "Central-Wan Chai Bypass and Island Eastern Corridor Link" Project

The Central - Wan Chai Bypass and Island Eastern Corridor Link (CWB) is a strategic road along the north shore of Hong Kong Island targeted to alleviate the traffic congestion along the existing Gloucester Road - Harcourt Road - Connaught Road Central corridor. The need has also been reaffirmed in the statutory procedures and supported in the public engagement process.

CWB Project Overview

The Central-Wan Chai Bypass – Tunnel (Slip Road 8 Section) mainly includes:

- Construction of a 300-metre-long tunnel in the Causeway Bay Typhoon Shelter;
- Construction of Slip Road 8 tunnel beneath existing Victoria Park Road;
- Construction of Slip Road 8 approach road and modification to the existing Hing Fat Street and ancillary junctions;
- Re-provisioning of the existing Victoria Park facilities including Bowling Green, Bowling Green Office, Children's Playground and Nursery Compound; and
- Associated works including landscaping works.

Works under Central-Wan Chai Bypass – Tunnel (Slip Road 8 Section)

Tree Preservation and Reuse

There are 289 trees to be transplanted and 61 trees to be felled among 580 trees within the site boundary. The majority of the transplanted and felled trees are within Victoria Park. The Specification for the tree works has been circulated to and subsequently approved by the concerned Government departments. To ensure successful transplanting and increase the survival rate upon transplanting, root pruning is carried out in 4 stages. The preparation period for the whole root pruning process lasts for 3 to 9 months, depending on the size of tree. Trees to be felled have been assessed as having low survival rate after transplantation, poor health, poor tree form and/or poor amenity value, or are situated at locations where proper root ball preparation is not practical. The concerned species include Acacia confusa, Macaranga tanarius and Hibiscus tiliaceus.

Root hormone being sprayed right after root pruning operation.

Trees with diameter larger than 500mm would undergo a 9-month preparation period before transplant.

Mobile crane with lifting capacity of 500 ton is used for tree transplanting. Steel container is fabricated to house the root ball for transplant.

Suitable lifting gear was used to avoid any damage on tree trunks.

Transplanted trees have been used to enhance the current landscape at Victoria Park as far as practicable. For example, palm trees like Ravenala madagascariensis and Elaeis guineensis have been transplanted from the original Children's Playground and previous nursery area to the existing Palm Garden inside Victoria Park. Together with some newly planted shrubs, the Palm Garden area has been enhanced with an entirely new look!

Palm Garden Before Landscape Enhancement

Palm Garden After Landscape Enhancement

There are two registered Old and Valuable Trees (OVT) near the Bowling Green Office of Victoria Park. Both are Ficus viren with OVT Register IDs. These two OVTs are retained and no construction work is allowed within the tree protection zone in accordance with the requirements of Works Technical Circulars.

There are also compensatory planting for compensation of the felled trees. A total of 146 heavy standard trees are to be planted as compensatory trees. They include Bauhinia blakeana, Bauhinia variegata, Lagerstroemia speciosa, Tabebuia chrysantha, Callistemon viminalis and Archontophoenix alexandrae. Moreover, over 220,000 shrubs, groundcover and bamboo will be planted in Victoria Park. Species of shrub include Calliandra haematocephala, Codiaeum variegatum, Ixora chinensis, Jasminum sambac, Osmanthus fragrans, Ophiopogon japonicus and Bambusa vulgaris cv. wamin.

To promote reuse, some felled tree trunks have been transformed to be used as planters at Natural Network's (a social enterprise) farm. Moreover, parts of the felled tree trunks and branches have been used by Toi Shan Association College as training materials for the visual arts subject, whilst the others have been used by a local artist Dr. Kacey Wong for his craft creations, one of which is shown in the photo below.

Craft Creation by Artist Dr. Kacey Wong

Typical Environmental Measures Taken in Construction Sites

Dust Control

Provide Dust Screen Covers for Piling Works

Cover Stockpiled Construction and Demolition Materials with Impervious Sheet

Noise Mitigation

Employ Quiet Plant (Hydraulic Crushing Plant) for Pavilion Demolition Works

Install Noise Absorption Materials Along Site Hoarding

Water Pollution Control

Deploy Silt Curtain for Marine Works

Maintain Sufficient Spare Silt Curtains and Impermeable Barries in Stock for Contingency Use

Wastewater Management

Deploy Wastewater Treatment Units on Site

Treat Wastewater Properly Before Discharging

Waste Management

Donate Chopped Materials to NGO for Campus Establishment

Reuse Broken Water-filled Barriers for Containing Mosquito Repelling Plants

Site Cleanliness

Wash the Public Road Adjoining to the Site Regularly

Provide Wheel Washing Facility at Site Entrances

Sustainable Measures

Construct Green Wall for Engineer's Site Office

Install Solar Energy Powered Hand Key Device for Engineer's Site Office

Development of Environmentally Friendly Railway System

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

Railway Development Strategy 2014

On 17 September 2014, the Railway Development Strategy 2014 was announced recommending that seven new railway projects would be completed in the planning horizon up to 2031 having regard to transport demand, cost-effectiveness and the development needs of New Development Areas. These railway projects include Northern Link and Kwu Tung Station, Tuen Mun South Extension, East Kowloon Line, Tung Chung West Extension, Hung Shui Kiu Station, South Island Line (West), and North Island Line.

Environmental Benefits of the Expanded Railway Network

Railway can save land, minimise the reliance on road travel and reduce the use of energy. It will also help curbing roadside pollutant emissions. With the implementation of these railway projects, the rail share in the public transport patronage would rise to some 45% to 50% of the total number of trips by 2031, and a reduction in road-based transport is expected. On the assumption that the switch from road-based transport to the railway is proportional to the decrease in the total distance travelled by vehicles, this would translate into environmental benefits amounting to a reduction in roadside air pollutants by some 190 tonnes of nitrogen oxide per year, and 143 000 tonnes of green house gases per year, i.e. reduction of about 2% to 4% of the roadside air pollutants and green house gases per year.

Hong Kong's Railway Network in 2031

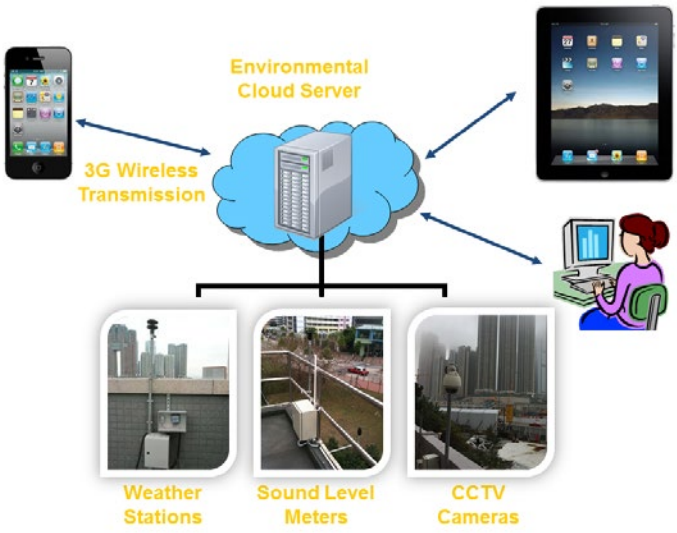
Environmental Noise Monitoring, Trees Preservation and Green Measures during the Construction of the Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link

With a total length of 26km, the Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) runs along a dedicated underground rail corridor from a new terminus at West Kowloon to the boundary near Mai Po.

Environmental Noise Monitoring

As part of the commitment to environmental protection, the project team endeavours to minimise the noise impact during construction of the project. This is not an easy task as the high-speed rail link runs across five districts, and noise monitoring has to be conducted weekly throughout the entire construction stage. This tremendous challenge has provided the team with the impetus to reach out and develop a solution to improve the efficiency of the environmental management team.

The Automatic Noise Data Management E-system (ANDANTE) is an innovative web-based noise monitoring system with a network of CCTV and noise and weather monitoring equipment. The system uses automatic monitoring and is supported by a technology platform that allows access by authorised



ANDANTE's System Architecture

parties through a spectrum of IT devices including smart phones and tablets. It automatically alerts users to noise level breaches and facilitates the prompt investigation of noise-related complaints.

As compared to traditional noise monitoring, this innovative system provides substantial savings in manpower and costs for site monitoring works and improves information sharing within the team. Whilst there have been similar applications of environmental monitoring technology in the past, the implementation of ANDANTE on XRL construction is the first large-scale deployment of its kind. In recognition of the system's innovative use of information technology and its benefits, it had been awarded with the Merit at the Hong Kong Information and Communications Technology (ICT) Awards.

Screen Shots from ANDANTE

Mobile Version of ANDANTE

Trees Preservation and Green Measures

The XRL project team strives to minimise its impact to the environment, and felling of trees has been minimised as far as practicable. Nursery sites are established for trees affected by the construction works but yet to be transplanted. Siu Lang Shui Temporary Holding Nursery is one of the two nursery sites for the project. Located in Tuen Mun and occupying approximately 1 hectare area, the site is providing nursery for more than 800 trees that were transported from the construction sites at early stage of the project.

Arboricultural work is conducted regularly to nurture and maintain the trees in healthy and vigorous condition until such time the receptor sites are available for tree transplanting. The arboricultural maintenance works includes watering, fertilizing, pruning, diseases control, weeding, etc.

Roystonea regia

Ficus benjamina

Irrigation System

Pesticides Application and Pruning

Green Office Management

Resources Saving: Water, Paper & Waste recycling

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

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 new components can effectively control the duration of water flow and keep the water flow at low level. We would continue to adopt these water saving measures in the forthcoming renovation works.

Waste Recycling

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

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

Paper Saving

To align with the green office initiative, we have promulgated and would continue with the following measures on paper saving:

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

In 2014, we consumed 17,851 reams of paper (representing a saving of 2.57% of that of 2013) of which 99.94% were recycled paper.

Auditing: Environmental and Carbon Auditing

Annual Environmental Audit

We conduct annual environmental audits in all 17 offices located in different premises with a view to maintaining the impetus of green measures in housekeeping. The objectives of conducting annual environmental audits are:

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

Our offices have 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

A Carbon audit was conducted for Ho Man Tin Government Offices by the Building Management Office (BMO) in 2014 to monitor the effectiveness of Green House Gas reduction efforts. The relevant data are being studied by BMO.