Environmental Measures and Outcomes

Preserving Hong Kong's Natural Heritage... A Ensuring a Brighter Future

As efforts continue to balance the needs of economic development against the preservation of the environment through the environmental impact assessment process, many gains often go unnoticed. A healthy environment is simply taken for granted.

Looking retrospectively at the more than 190 projects covered by the EIA Ordinance during the past 3-1/2 years, assessment under the Ordinance has proven an efficient and effective process. As careful consideration has been taken to explore and work towards the best possible options for the environment and for society, much has been achieved that will benefit present and future generations in Hong Kong.

With Hong Kong's population becoming more conscious to its environment, the task of ensuring developmental projects lead to a brighter and cleaner future has presented challenges and also opportunities for achievement.

Protecting the Environment for All of Hong Kong

The scope of projects passing through the EIA process has encompassed major development projects throughout most of the SAR's 18 districts in Hong Kong Island, Kowloon and the New Territories. A map outlining the locations of projects assessed so far under the statutory EIA Ordinance during past 3-1/2 years is shown in Figure 5A:

During the first 3-1/2 years of operation of the EIA Ordinance, a total of HK$326 billion worth of projects were managed to meet the environmental criteria set out in the technical memorandum covering 93km of roads, 75km of railways, 355ha of development projects and 164ha of decommissioning areas, protecting a total population of 1,564,450 residents. Through the EIA process, environmentally friendly transport modes such as railways have been promoted. The use of natural gas was also encouraged as fuel for a power station as a means of reducing air pollution. Conservation of valuable ecological systems was achieved through compensatory planting or alternative alignment of roads and railways.

Placement of noise barriers for residential developments and the evaluation of options for the best routing for traffic preserved a quieter living environment for numerous residents. To protect marine environments, the use of silt curtains and the creation of alternative habitats for coral have been used. A summary of the key impacts avoided or designs adopted to protect the environment is shown in Figure 5B:

Figure 5A: Location of Projects

1. New Contaminated Mud Marine Disposal Facility at Airport East / East Sha Chau Area
2. Peng Chau Sewage Treatment Works Upgrade
3. Peng Chau Helipad
4. Helipad at Yung Shue Wan, Lamma Island
5. Lamma Power Station Navigation Channel Improvement
6. Ngong Ping Sewage Treatment Works and Sewerage
7. Tung Chung - Ngong Ping Cable Car Project
8. Improvement to Tung Chung Road between Lung Tseng Tau and Cheung Sha
9. Decommissioning of Cheoy Lee Shipyard at Penny's Bay
10. 132kV Supply Circuit from Pui-O via Chi-Ma-Wan Peninsula via Sea Crossing towards Cheung Chau
11. 132kV Overhead Pole Line and Underground Cables from Tung Chung Town Substation to Cheung Sha Substation
12. Reclamation of Sai Wan Typhoon Shelter and Associated Engineering Works at Cheung Chau
13. Yung Shue Wan Development, Engineering Works, Phase 2
14. Siu Ho Wan Water Treatment Works Extension
15. Construction of an International Theme Park in Penny's Bay of North Lantau together with its essential associated infrastructures
16. 1,800 MW Gas-fired Power Station at Lamma Extension
17. Lantau North-South Road Link between Tai Ho Wan and Mui Wo
18. Tai O Sheltered Boat Anchorage - Environmental & Drainage Impact Assessment - Environmental Impact Assessment
19. Northshore Lantau Development Feasibility Study - Environmental Impact Assessment
20. Route 10 North Lantau to Yuen Long Highway Investigation and Preliminary Design (Southern Section)
21. Asbestos Abatement Work in Cheoy Lee Shipyard at Penny's Bay
22. Lamma Power Station Repowering of Unit 5
23. 10 Year Extended Landslip Preventive Measures Project, Phase 2, Package A - Lantau Island, Investigation, Design and Supervision of Landslip Preventive Works on Government Slopes
24. Submarine Cable Landing Installation at Tuen Mun for HGC Optical Fibre Submarine Cable System between Tuen Mun and Chek Lap Kok
25. FLAG North Asian Loop
26. Proposal to establish one temporary wind monitoring station on Lamma Island for evaluating wind power as a renewable energy source
27. Lamma Power Station Conversion of Two Existing Gas Turbines into a Combined Cycle Unit
28. Cable Landing Work in Tong Fuk Lantau for APCN 2 Fibre Optic Submarine Cable System
29. Telecommunication Installation at Lot 591SA in DD328, Tong Fuk, South Lantau Coast and the Associated Cable Landing Work in Tong Fuk, South Lantau for the North Asia Cable (NAC) Fibre Optic Submarine Cable System
30. Outlying Islands Sewerage Stage 1 Phase II - Peng Chau Village Sewerage Phase 1 - Peng Chau Sewage Pumping Station Replacement
31. Construction of Pier at Luk Chau Tsuen, Lamma Island
32. Extension of Pier at Lo Tik Wan, North Lamma
33. Local Improvement to Tung Chung Road at Pak Kung Au and near Cheung Sha
34. Improvement to the Stream Course at Pui O
35. Removal of Sediment in Lok Tik Wan, Sok Kwu Wan and Cheung Sha Wan Fish Culture Zones
36. Upgrading of Siu Ho Wan Sewage Treatment Plant
37. Cheung Chau Outfall Replacement
38. Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling
39. Shenzhen River Regulation Project Stage III - Environmental Impact Assessment
40. Installation of Mobile Phone Base Station at Bride's Pool Road within Pat Sin Leng Country Park
41. Drainage Improvements in Sai Kung
42. Fill Bank at Tseung Kwan O Area 137
43. Sai Kung Sewage Treatment Works Phase II Upgrading
44. Proposed Extension of Public Golf Course at Kau Sai Chau, Sai Kung
45. Proposed Roads D1, D8 and D10 and associated junctions in Tseung Kwan O
46. 132kV Overhead Pole Line and Underground Cable from the Existing Po Lam Substation to the Existing Tui Min Hoi - Circuit No. 2
47. Sai Kung Area 4 Sewage Pumping Station
48. East Asian Crossing (EAC) Cable System (TKO)
49. Proposed Temporary Bus Depot at Tseung Kwan O (TKO), Area 85 (New World First Bus Services Limited)
50. East Asian Crossing (EAC) Cable System
51. Installation of Radio Base Station at Kei Ling Ha (Sai Sha Road), Sai Kung
52. Proposed Pontoon System Royal Hong Kong Yacht Club at Shelter Cove Lot No. 341 DD212 Sai Kung
53. Artificial Reef Deployment in Outer Port Shelter
54. Extension Project for the Existing Tseung Kwan O 400 kV Substation
55. RPIS Minor Rural Improvement Works Package 5, SK-076 Improvement of Lung Mei Tsuen Road, Sai Kung
56. PWP Item 4272DS - Port Shelter Sewerage - Village Sewerage at Wong Chuk Wan & Environs to Sai Kung
57. Construction and Operation of Temporary Bus Depot at Area 85 Tseung Kwan O
    (The Kowloon Motor Bus (1933) Co. Ltd.)
58. PWP Item 4273DS - Port Shelter Sewerage, Stage 3 Tseng Lan Shue Sewerage
59. Reconstruction of Pak Sha Wan Public Pier, Sai Kung
60. Removal of Sediment in Sham Wan and Kau Sai Fish Culture Zones
61. Port Shelter Sewerage, Stage 2 Tai Chung Hau & Pak Sha Wan Sewerage

62. SK-078 Reconstruction of Pier at Pak A, Sai Kung
63. Tseung Kwan O Development Contract No. TK44 Dualling of Hang Hau Road
64. Hebe Haven Yacht Club Development - Phase 2 Environmental Impact Assessment Study
65. Tseung Kwan O Development - Contract F : Grade Separated Interchange T1/P1/P2
66. Feasibility Study on the Alternative Alignment for the Western Coast Road, Tseung Kwan O
67. Road and Drainage Works for Tiu Keng Leng
68. MTR Tseung Kwan O Extension - Phases I and II
69. Hiram's Highway Improvement Phase 3 : Improvement Between Nam Wai and Ho Chung and Upgrading Local Access Roads
70. Trunk Road T4 in Sha Tin
71. Replacement of Cremators at Fu Shan Crematorium, Shatin
72. Feasibility Study for Housing Development at Whitehead & Lee On in Ma On Shan, Sha Tin
73. Route 16 from West Kowloon to Sha Tin
74. Widening of T6 Bridge, Sha Tin
75. East Rail Extensions Tai Wai to Ma On Shan
76. Proposed Installation of Integrated Mobile Phone Base Station at Ma On Shan Country Park
77. Widening and Reconstruction of Tai Po Road (Sha Tin Section)
78. Sha Tin Sewage Treatment Works, Stage II Extension - Environmental Impact Assessment Study
79. Sai Sha Road Widening between Kam Ying Road and proposed Road T7 Junction
80. Trunk Road T7 in Ma On Shan
81. Widening of Fo Tan Road and Related Improvement Measures in Fo Tan
82. The Proposed Submarine Gas Pipelines from Cheng Tou Jiao Liquefied Natural Gas Receiving Terminal, Shenzhen to Tai Po Gas Production Plant, Hong Kong
83. Cement Silos Addition Work in Tai Po Cement Depot
84. Drainage Improvement in Sha Tin and Tai Po
85. Tai Po Sewage Treatment Works Stage V
86. Tung Tsz Road Sewage Pumping Station
87. Artificial Reef Deployment in Outer Long Harbour and East Tap Mun
88. Pak Shek Kok Development
89. Road D15 Linking Lok Shun Path and Tai Po Road
90. Widening of Tolo Highway between Island House Interchange and Ma Liu Shui Interchange
91. The Decommissioning of Underground Fuel Tanks at Tsuen Wan No. 1 Pumping Station
92. Tsuen Wan Road Upgrading
93. Widening of Yeung Uk Road Between Tai Ho Road and Ma Tau Pa Road, Tsuen Wan
94. 132kV Overhead Line From Tsuen Wan to Sham Tseng
95. Castle Peak Road Improvement between Ting Kau and Sham Tseng, Tsuen Wan Construction of Reclamation and Associated Seawall at Sham Tseng East
96. Planning and Engineering Feasibility Study for Sham Tseng Development
97. Tang Lung Chau Dangerous Goods Anchorage
98. Tsuen Wan Bay Further Reclamation, Area 35, Tsuen Wan Engineering, Planning and Environmental Investigation
99. West Rail - Final Assessment Report West Kowloon to Tuen Mun Centre
100. Upgrading of Pillar Point Sewage Treatment Works
101. Permanent Aviation Fuel Facility for Hong Kong International Airport
102. Proposed Joint User Complex and Wholesale Fish Market at Area 44 Tuen Mun
103. Construction of Lung Kwu Chau (LKC) Jetty
104. Animal Cremator
105. Essential Public Infrastructure Works associated with West Rail Stations in Yuen Long, Tin Shui Wai and Tuen Mun Centre
106. Planning and Development Review of The Harbour Centre in Area 27, Tuen Mun
107. Improvement to Castle Peak Road Between Ka Loon Tsuen and Siu Lam
108. Yuen Long, Kam Tin, Ngau Ta Mei and Tin Shui Wai Drainage Package Phase 1
109. Planning & Development Study of Potential Housing Site near Area 1, Tuen Mun
110. Dredging to Seabed at Castle Peak Beach
111. Castle Peak Road Improvement between Sham Tseng and Ka Loon Tsuen, Tsuen Wan Construction of Reclamation and Associated Seawall at Sham Tseng West
112. Contact No. HY/99/18 Castle Peak Road Improvement between Sham Tseng and Ka Loon Tsuen, Tsuen Wan : Construction of Reclamation and Associated Seawall at Tsing Lun Tau
113. Removal of Temporary Rock Bund from Existing Seabed at Ha Pak Nai
114. Construction of Pier at Angler's Beach, Sham Tseng
115. Improvement to castle Peak Road between Ka Loon Tsuen and Siu Lam
116. Tuen Mun Sewerage - Eastern coastal Sewerage Extension
117. Route 10 North Lantau to Yuen Long Highway Investigation and Preliminary Design (Southern Section)
118. Planning and Development Study of Potential Housing Site in Area 54, Tuen Mun
119. Yuen Long Bypass Floodway - Feasibility Study
120. Improvements to San Tin Interchange
121. PWP Item No. 471CL (Part) - Lau Fau Sha Development, Remaining Engineering Works Phase 1 - Hang Hau Tsuen Channel and Associated Works
122. Sheung Shui to Lok Ma Chau Spur Line
123. Yuen Long and Kam Tin Sewerage and Sewage Disposal Stage 2
124. Shenzhen Western Corridor
125. San Tin Western Main Drainage Channel
126. Flyover and Adjoining Footbridge between Yuen Long On Ning Road and Kau Yuk Road
127. Upgrading and Expansion of San Wai Sewage Treatment Works and Expansion of Ha Tsuen Pumping Station

128. Proposed Development at Fung Lok Wai, Yuen Long at Lot 1457 R.P. in D.D. 123
129. Hong Kong Space Island
130. Yuen Long and Kam Tin Sewerage and Sewage Disposal Stage 1, Package 1A-1T and 1B-1T - Kam Tin Trunk Sewerage Phase I & II
131. Light Rail Transit (LRT) Extension in Tin Shui Wai Reserve Zone and Grade Separation of the LRT with Pui To Road and Tsing Lun Road in Tuen Mun
132. Deep Bay Link
133. Widening of Yuen Long Highways between Lam Tei and Shap Pat Heung Interchange
134. Tin Shui Wai Phase 4 Light Rail Extension
135. Expansion of Kiosks and Other Facilities at Lok Ma Chau Border Crossing
136. Essential Public infrastructure Works associated with West Rail Stations
137. Decommissioning of a clinical waste incinerator at Pok Oi Hospital
138. "Birds Paradise" Barbecue Spot and Refreshment Kiosk in Tsim Bei Tsui
139. Site Formation Works for a Temporary Vegetable Market at Nam Sang Wai Road, Au Tau, Yuen Long
140. Au Tau Sewage Pumping Station
141. Au Tau Pumping Station
142. Yuen Long South Sewage Pumping Station
143. Sewage Pumping Station at Tung Tau Industrial Area, Yuen Long
144. Main Drainage Channels and Poldered Village Protection Schemes for San Tin, NWNT EIA Study
145. Drainage Improvement in Tsuen Wan, Kwai Chung & Tsing Yi Tsuen Wan Drainage Tunnel
146. West Kowloon Reclamation Contract No. WK30-Remaining Roadworks Stage 4, Link Roads G & L
147. Demolition of Kwai Chung Incineration Plant
148. Extension of Kwai Chung Crematorium
149. In-house Wastewater Treatment Facility for Wastewater Collected from Oil Interceptors of Retail Stations
150. Felling of Five Power Station Chimneys at Tsing Yi Power Station
151. Route 9 between Tsing Yi and Cheung Sha Wan
152. Western Harbour Submarine Gas Pipeline and Associated Stations
153. Demolition of buildings and structures in the proposed Kennedy Town Comprehensive Development Area Site
154. Central - Wan Chai Bypass and Island Eastern Corridor Link
155. Central Reclamation Phase III - Studies, Site Investigation, Design and Construction
156. Dredging an Area of Kellett Bank for Reprovisioning of Six Government Mooring Buoys
157. North Hong Kong Island Line (NIL)
158. Strategic Sewage Disposal Scheme Stage III/IV
159. IMT Dredging Works
160. Wanchai Development Phase II
161. Proposed Headquarters and Bus Maintenance Depot in Chai Wan
162. Strategic Sewage Disposal Scheme Stage III/IV
163. Development at Mount Butler Quarry Site
164. Dredging Works for Cruiser Operation in North Point
165. New World First Bus Permanent Depot at Chai Wan
166. Improvements to Island Eastern Corridor Section between North Point Interchange and Sai Wan Ho
167. Aberdeen, Ap Lei Chau and Pok Fu Lam Sewerage - Stage 2
168. Drainage Improvement in Northern Hong Kong Island - Hong Kong West Drainage Tunnel
169. Cyberport Development Site Formation by Rock Blasting for Construction of Southern Access Road
170. 132kV Submarine Cable Installation for Wong Chuk Hang - Chung Hom Kok 132kV Circuits
171. C2C Cable Network - Hong Kong Section : Chung Hom Kok
172. New T&T Hong Kong Limited Domestic Cable Route
173. Cable Landing Work in Deep Water Bay for SEA-ME-WE 3 Fibre Optic Submarine Cable System
174. Proposed RMC concrete batching plant at Telegraph Bay for Cyberport Development
175. Infrastructural Woks for the Proposed Development at Telegraph Bay - Engineering Feasibility Study
176. Footbridge and Improvement to Ap Lei Chau Bridge Road and Ap Lei Chau Drive
177. Comprehensive Feasibility Study for the Revised Scheme of South East Kowloon Development
178. South East Kowloon Development Kai Tai Airport - Early Development Package Phase
179. Karting Mall at Kai Tak
180. Lei Yue Mun Road Underpass, Modification at Junction with Yau Tong Road and Associated Improvement Works, Kwun Tong, Kowloon
181. Yau Tong Bay Development - Engineering Feasibility Study for the Comprehensive Development at Yau Tong Bay
182. Proposed Road A connecting Sin Fat Road and Cha Kwo Ling Road at Cha Kwo Ling, Kwun Tong
183. Yau Tong Bay Development - Reclamation of Yau Tong Bay
184. Road Widening of Hing Wah Street
185. Proposed Cheung Sha Wan Wholesale Market Complex Phase II
186. KCRC- Essential Public Infrastructure Works for Sham Shui Po Section in association of West Rail Phase I
187. Reprovisioning of Diamond Hill Crematorium
188. Choi Hung Road Widening Feasibility Study
189. Western Harbour Submarine Gas Pipeline and Associated Stations
190. Modifications to MTRC Tsim Sha Tsui Station
191. East Rail Extensions KCR Extension from Hung Hom to Tsim Sha Tsui

Problems Avoided or Environmentally Friendly Designs Adopted to Protect the Environment

- The 100-year old Signal Hill tower is saved by an alignment change through the East Rail Extension EIA study in Tsim Sha Tsui
- About 560,000 existing and future residents to be protected by the West Rail Phase I Special Noise Reduction Design devised through the EIA Process
- Over 100,000 future residents benefit from the clean up programme to remove toxic chemicals as recommended in the Kai Tak Airport North Apron Decomissioning EIA
- Comprehensive environmental measures incorporated into the Theme Park Development Project which will create over 20,000 jobs and attract 20 million visitors per year
- Shifting from coal to gas as the main fuel for the new HEC Lamma Power Station to avoid major air pollution
- Environmentally friendly designs adopted by the Cyberport EIA for 6,000 existing residents and 23,000 future residents
- Electrified railway system used for West Rail (I) to avoid air pollution caused by road traffic equivalent to 2,500 bus trips/day.
- Installation of silt curtain recommended through the Cheung Sha Wan Fish Culture Zone (FCZ) EIA to protect 22 hectares of FCZ
- Avoided adverse impacts to 4 active fishponds of about 2 hectares
- Provided 11km road side noise barriers to protect 120,000 people
- Adopted buffers ranging from 29 to 67m wide to protect 14 hectares area for noise attenuation
- Used podium structures at residential development to segregate noise sources and receivers to protect 12,000 people
- Avoided adverse noise impact by adopting 13.5 km viaduct with 7 km noise barriers and 8.4 km rock tunnel, 2.3 km surface alignment, 3.0 km cut and cover tunnel, and 3.1 km enclosure structure at grade along West Rail (I)
- Compensated ecological losses in drainage channel projects by providing 6.5 ha grasscrete, 3.0 ha marshcrete, 13.5 ha reinstateds fish ponds, 12 ha recreated wetland, replanting of 1,500 trees along 4 km of river channels
- Provided 31,000m^2 rubble mound seawall to protect soft and gorgonian coral growth at Lamma Island during the construction of power plant
- Provided silt curtain enclosing the immediate grabbing area to avoid spillage of mudwater to surrounding water

Figure 5B: Key Outcomes of the EIA Ordinance from 1.4.1998 to 31.12.2001

Environmental Outcomes

The following project summaries illustrate some of the key environmental outcomes gained during the first 3-1/2 years of operation of the EIA Ordinance.

- Kai Tak Airport North Apron Decommissioning
- 1,800 Mega Watt Extension at Lamma Island Gas Fired Power Station
- West Rail - West Kowloon to Tuen Mun
- International Theme Park in Penny's Bay, North Lantau and Essential Associated Infrastructure
- Removal of Sediment in Cheung Sha Wan Fish Culture Zone
- Cyberport Development at Telegraph Bay
- Felling of Five Chimneys at Tsing Yi Power Station
- KCR East Rail Extension - Tai Wai to Ma On Shan
- East Rail Extension - Hung Hom to Tsui Sha Tsui

Kai Tak Airport North Apron Decontamination

Project Description

With the new Hong Kong International Airport commissioned at Chek Lap Kok in July 1998, the disused Kai Tak Airport, an area of about 160 hectares, would be redeveloped as housing flats, offices, parks and community facilities for about 115,000 residents. Three hotspots in the Kai Tak Airport North Apron, totaling about 11 hectares, were found to be contaminated by jet fuel leakage and had to be cleaned up before redevelopment. The scale of this decontamination work was the largest of its kind ever undertaken in Hong Kong.

An Environmental Permit was issued on 23 September 1998 for this project, which was started on 26 October 1998. Key activities included decontamination of the airport site, demolition of buildings and site preparation. The project would be completed in 2001.

Biopiles for the treatment of contaminated soil.

Air Sparging and Soil Vapour Extraction in-situ treatment for contaminated soil.

Kai Tak Airport before decommissioning.

Mitigation Measures and Outcomes

1. Soil Vapour Extraction and Air Sparging (SVE/AS) method was adopted to treat contaminated soil in-situ to avoid large-scale excavation and the associated escape of vaporized contaminants into the atmosphere.
2. Heavily contaminated soil was excavated and treated in “biopiles”, which were piles of soil lined with impervious plastic sheets on top and bottom to allow biodegradation of the contaminants while avoiding the escape of vaporized pollutants as well as containing any leachate runoff.
3. The SVE/AS and biopile systems were connected to a catalytic incinerator by piping network to burn off any pollutants in the extracted soil vapour.
4. Proper soil decontamination using these two methods protected about 700,000 people, including workers and nearby residents, from any excessive air pollutants and noise impacts associated with other cleanup methods that employ large-scale excavation.
5. Good housekeeping measures were adopted on site to include:
   - Scheduling excavation work to avoid the rainy season in order to reduce the potential of generating contaminated surface runoff.
   - Using quieter plants to reduce construction noise impact.
   - Watering to suppress dust during the demolition stage.
   - Collecting all waste, including chemical wastes and oil, by licensed chemical waste contractors.

1,800 Mega Watt Extension at Lamma Island Gas-fired Power Station

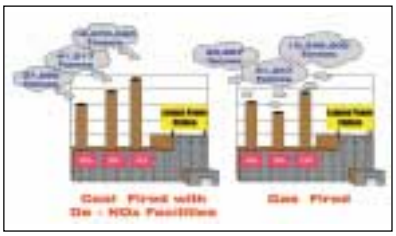
Project Description

The HongKong Electric Company Limited (HEC) is committed to providing a reliable and cost-effective electricity supply to meet current and future power requirements of Lamma and Hong Kong Islands. A new 1,800MW power station with six 300MW units will need to be fully developed by 2012, with the first unit to begin operation by 2004.

A Site Search Study concluded that an extension to Lamma Power Station was the preferred site on condition that units were to be fired by the more environmental-friendly fuel of natural gas rather than coal. Natural gas was chosen as it could reduce the potential adverse air quality impacts by shifting of the base-load operation of existing coal-fired plants to new gas-fired units in phases while the total electricity generation in the year 2012 would be increased to 2.57 times that of 1990.

Aerial view of future power station

Based on the outcomes of this Site Search Study, an EIA study was conducted to determine the environmental acceptability of the proposed new extension at Lamma Island Power Station.



Comparison between coal fired and gas fired options

Mitigation Measures and Outcomes

1. By shifting the base load from the existing coal-fired units to new gas-fired units, a total of 6.5 million tonnes of CO_2 emissions will be avoided in 2012. This means that the estimated greenhouse gas emissions per unit of electricity produced will be reduced by 37% below the 1990 level in 2012 despite the increase in power generating capacity.
2. Reductions in 61% of SO_2 and 40% of NOx emissions will benefit local air quality in 2012 when compared to 2002. From a regional perspective, the contribution to acid deposition in the Pearl River Delta by this new power station would be 3% and 1% for the years 2002 and 2012 respectively, a reduction of 2%.
3. Deployment of no less than 400m^3 of artificial reefs could enhance coral habitation. Provision of greater than 31,000m^2 of rubble mound seawalls on the western and southern edges of the reclamation will be employed to facilitate re-colonization of soft corals and gorgonians that might be damaged or disturbed as a result of reclamation activity at Lamma Island.
4. The use of silt curtains and reduced dredging rates at certain stages of the tidal cycle prevented unacceptable impacts to the water quality while protecting marine ecology resources.
5. Construction of seawalls to above sea level before backfilling of the site platform commenced prevented the loss of excessive fine to the water column during sand filling.
6. To avoid adverse impact to the Finless porpoise, jet laying for the gas pipeline would be prohibited in southeastern Lamma Island from April to June. The routing of all construction related vessels would avoid disturbance of the finless porpoise in southern waters.

Lamma Island Power Station

West Rail - West Kowloon to Tuen Mun

Project Description

Following the Railway Development Strategy published in 1994 by the SAR Government, Kowloon Canton Railway Corporation was invited to provide passenger train services and interchange facilities between West Kowloon and Tuen Mun. The West Rail will be a 30.3 km railway with nine stations as well as a major maintenance depot in Kam Tin valley at a cost of HK$64 billion. The line is expected to carry 340,000 passengers daily by 2003 and over 500,000 by 2011.

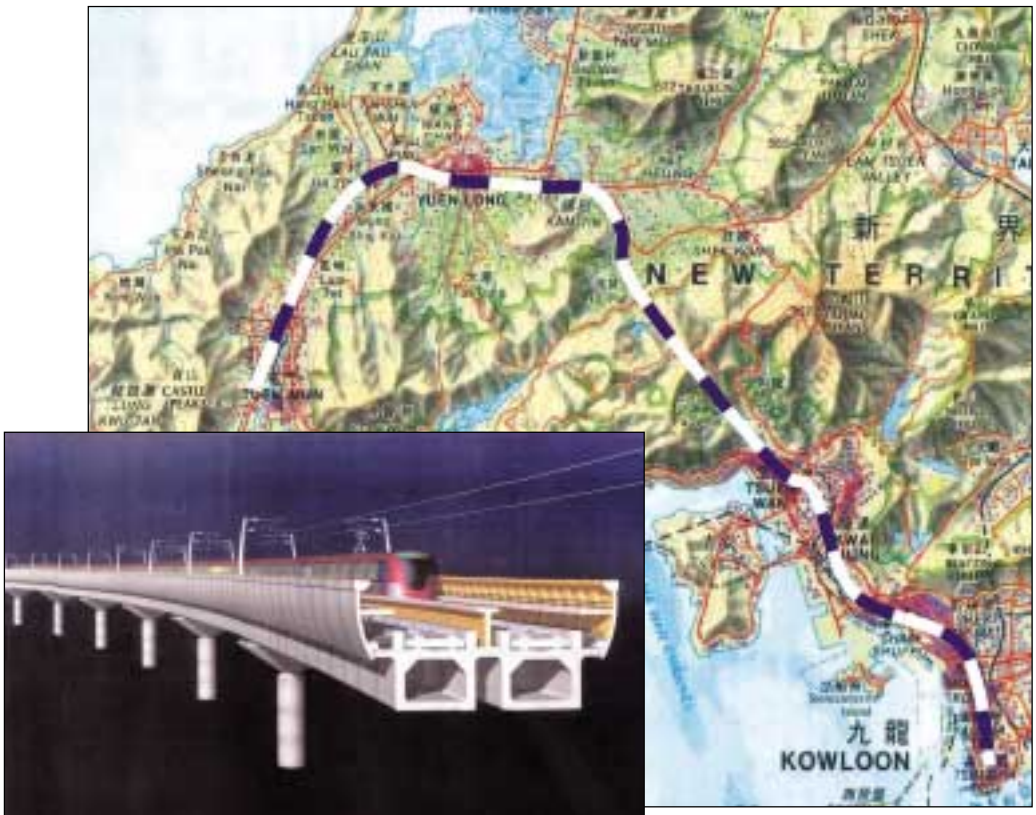
Mitigation Measures and Outcomes

1. The railway will reduce air pollution by reducing the equivalent of 2,500 bus trips daily.
2. To minimize operational noise, 14.4 km of tunnels and 7 km of noise barriers with incremental extensions, from 1.2 m to full enclosure, will be built in addition to the use of a multi-plenum design to reduce noise and vibration on viaducts. Such measures ensure the protection of 560,000 residents along the railway.
3. The use of tunnels totaling 7 km in length along the alignment of the railway will reduce long-term visual impact while reducing dust and noise impact during the construction stage.
4. The unavoidable wetland loss located between Kam Tin Station and Au Tau in Yuen Long will be compensated by 12 hectares of newly created and actively managed wetland.

Use of tunnels to minimise visual impact.

Habitat loss will be compensated by wetland creation.

Alignment of West Rail and its multi-plenum design.



The West Rail Alignment

Use of multi-plenum system to reduce noise and vibration.

International Theme Park in Penny's Bay, North Lantau and Essential Associated Infrastructure

Project Description

This 180-hectare world-class theme park consisting of five distinctive theme areas is scheduled to open in 2005. This international and regional tourist attraction and its associated essential infrastructures include reclamation of 290 hectares of land, building of 9 km of roads, 3.6 km of railway, 15 km of drainage channels and the construction of a water recreation centre. The theme park is expected to attract 20 million visitors annually and provide over 20,000 employment opportunities.

Different types of concrete reefs.

The installation of artificial tyre reefs.

Pitcher plants.

Mitigation Measures and Outcomes

1. Restriction on the rate of and plants used for dredging/filling operations.
2. 4,350 m^3 of artificial reefs were deployed to act as a marine habitat for the enhancement of fish stocks and make available food sources in the lower food chain of the marine environment.
3. Several rare and protected plant species (including pitcher plants) were conserved during construction work and 6 ha of compensatory woodlands will be planted at Ngong Shuen Au.
4. 13 million m^3 of public fill material would be utilized for the reclamation to promote the recycling of construction waste and the conservation of valuable landfill resources.
5. 6 km of landscaped earth bunds were incorporated in the theme park layout plan to protect 25,000 and 11,000 residents at Discovery Bay and Peng Chau respectively from visual and noise impacts.
6. An ecologically sensitive area will be protected by zoning the Pa Tau Kwu headland and nearby waters as a Conservation Area as recommended by the EIA sudy.
7. A 2 km long natural coastline is preserved by adopting an open channel design.
8. An armour rock sloping seawall design was adopted to facilitate recolonisation of inter-tidal and sub-tidal hard surface assemblage.

Artist's impression of the theme park.

Removal of Sediment in Cheung Sha Wan Fish Culture Zone

Project Description

The Cheung Sha Wan Fish Culture Zone is located near Chi Ma Wan Penunsula off the coast of Lantau Island. Bottom sediment under the Cheung Sha Wan Fish Culture Zone (FCZ) contains a large amount of organic matter accumulated over the years. The organic sediment adversely affects the surrounding marine habitats, the associated marine life and the productivity of the FCZ.

To achieve improvements in the marine environment, the removal of bottom sediments at FCZ by dredging was proposed. The zone area and dredged area of Cheung Sha Wan FCZ were 214,200m^2 and 228,000m^2. The proposed sediment volume to be dredged was about 147,000 m^3, and the average dredging rate was 175 m^3/hr. The removal of anoxic sediments and the bulk of trapped nutrients would improve the local water quality and reduce the risk of local red tide and upwelling of anoxic and toxic gases.

The Environmental Permit (EP), EP-008/1998, was issued on 9 November 1998 and conditions set out in the Permit were implemented. Site inspections were conducted during construction and post project monitoring. The dredging work was started on 20 November 1998 and completed on 20 January 1999.

Mitigation Measures and Outcomes

Tightly sealed mechanical grabs to minimise spillage.

1. Silt curtains were installed between the dredging site and the temporary relocation site and placed not more than 100 metres away from dredging operation throughout the dredging process.
2. To shorten the period of disturbance to the FCZ and the environment, the dredging operation was carried out within the shortest time possible and finished within two and a half months.
3. Mechanical grabs were used throughout to avoid spillage and to seal tightly while being lifted.
4. Barges and grab dredgers were fitted with tight-fitting seals.
5. Adequate freeboard was maintained on barges to prevent spillage of material into the sea.

Silt curtains were installed at the dredging site next to the fish culture zone

Cyberport Development at Telegraph Bay

Project Description

The proposed Cyberport development will be built as a world-class facility for information technology companies. It involves the construction of office buildings, distributor roads, a sewage treatment plant and a 300m long submarine sewage outfall, together with housing blocks on 26 hectares of reclaimed land at Telegraph Bay (Kong Sin Wan), which is located on the western side of Hong Kong Island.

Construction work commenced in September 1999 and is scheduled for completion in 2007.

Mitigation Measures and Outcomes

1. About 2.9km of roadside noise barriers will be provided to protect 5,600 people from excessive traffic noise.
2. A sewage treatment plant will be built, not only to properly treat sewage generated from an existing population of 6,000 in Baguio Villa, but also to treat that from the planned population of 23,000 within the Cyberport development. This will bring improvements in the long term to the marine water quality of the Southern District where there are many gazetted public beaches.
3. All residential blocks within the Cyberport development have been designed to meet established traffic noise criteria.
4. Barges have been used for transporting surcharge materials to avoid the environmental nuisance associated with bulk transport on land.
5. Adequate buffers, as confirmed by assessment findings, will separate a temporary concrete batching plant from Baguio Villa to avoid dust and noise impacts associated with the plant's operation. On-site concrete batching will help reduce the need for road transport of concreting material, along with associated traffic problems and environmental nuisance.
6. Since commencement of site activities, an environmental monitoring and audit programme has been implemented to actively monitor compliance with EIA recommendations and to activate speedy remedial measures as soon as praticable.

Artist's Impression of the Cyberport Development.

Key environmental outcomes of the Cyberport EIA study.

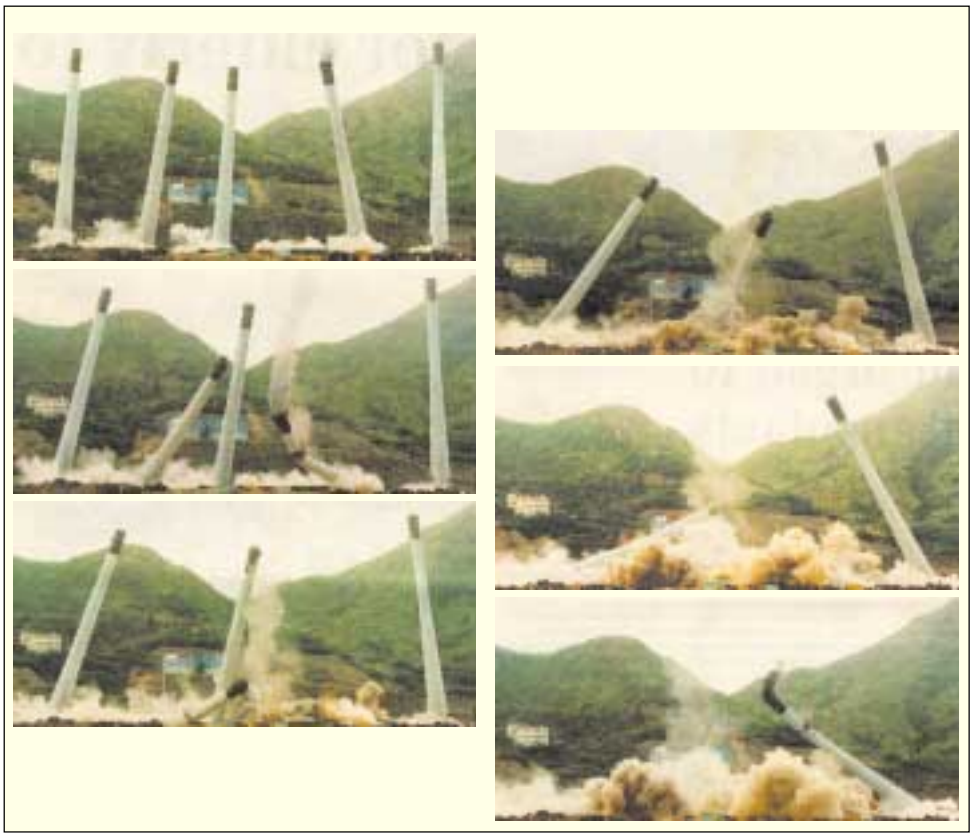
Felling of Five Chimneys at Tsing Yi Power Station

Project Description

Five chimneys from the decommissioned Tsing Yi Power Station were demolished on 15 November 1998. The project called for the demolition and removal of all chimneys structures associated with the former oil-fired power station. China Light & Power Company Limited (CLP) will return part of the site to the Government and retain part of the site. The chimneys were demolished using directional felling by controlled structural weakening via explosives planted at the bottom of the chimneys.

Mitigation Measures and Outcomes

1. Major conditions to reduce hazards in the environmental permit included:
   - reduction of inventory of three ESSO Hong Kong Ltd Liquefied Petroleum Gas (LPG) spheres to below 200 tonnes,
   - removal of all LPG road tankers from the terminal,
   - three chimney-height exclusion zones enforced to minimise the chance of ejecta or debris hitting any spectators,
   - the nearest Mobil Oil Tank was emptied for the duration of the felling.
2. The site was watered to reduce air emissions from the impact of debris.
3. The nearby population protected included 1,899 persons. Population considered in the Hazard Assessment included 8,208 persons (day) and 7,156 persons (night) under the EIA Process.



Stages of felling of five power station chimneys.

KCR East Rail Extension - Tai Wai to Ma On Shan

Project Description

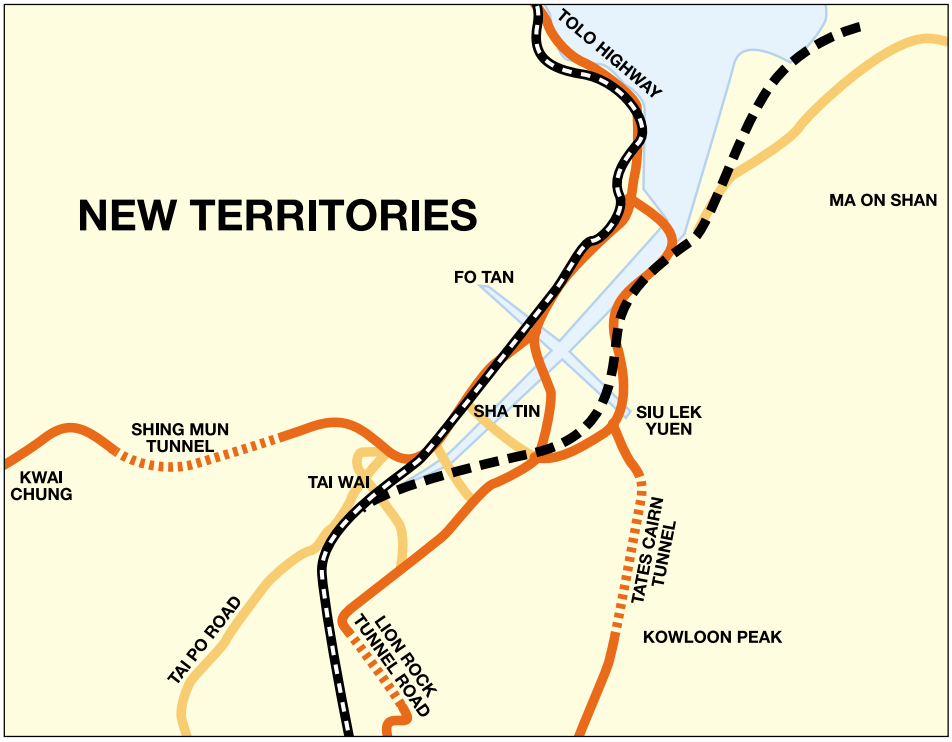
The Ma On Shan Extension project involves the construction and operation of approximately 11.4 km of railway track from Tai Wai to Lee On. This included nine stations (at Tai Wai, Sha Tin Tau, Sha Kok Street, City One, Shek Mun, Chevalier Garden, Heng On, Ma On Shan and Lee On), a depot at Tai Wai and two infeed substations.

Mitigation Measures

1. Various types of nose barriers were required along the entire railway alignment, including the use of a multi-plenum system along the viaduct sections, to protect about 100,000 people.
2. Landscaping along all viaduct sections and elevated stations was included to alleviate visual and landscape impacts on the surrounding areas.

Typical Noise Enclosure on Viaduct.

Ma On Shan station with landscaping.



The alignment of Tai Wai to Ma On Shan.

East Rail Extension - Hung Hom to Tsim Sha Tsui

Project Description:

The 1994 Railway Development Strategy identified the rail extension as a high priority project to provide a direct rail link between the New Territories and the heart of the Kowloon Peninsula. It also serves as an interchange with the Mass Transit Railway (MTR) at Tsim Sha Tsui to relieve the increasingly overcrowded interchange at Kowloon Tong.

The works include a 1.5km underground railway, a new East Tsim Sha Tsui (ETST) Station, a traction substation at Ho Man Tin, and a pedestrian subway system running under Mody Road, Blenheim Avenue, Signal Hill and Middle Road linking the new ETST station with the MTR Tsim Sha Tsui Station.

Mitigation Measures and Outcomes

1. The EIA recommended to change the original rail alignment from Middle Road to Salisbury Road in order not to cut Signal Hill, and to thus:
   - better protect Signal Hill Tower and other cultural heritage structures and objects;
   - keep Signal Hill Garden intact and open for the public (including 250 regular Tai Chi practitioners);
   - reduce the volume of construction spoil by 40% (from about 613,000m^3 to 371,000m^3);
   - preserve a valuable 100 year-old Champion Tree, and over 100 other mature trees on the southern part of Signal Hill; and
   - increase the total number of trees within the project boundary from 1044 to at least 1500 after the completion of the project.
2. The EIA has recommended measures to alleviate noise impact during both construction and operation:
   - With quiet construction plants and appropriate phasing of the construction programme, the worst residual construction noise impacts at Blenheim Avenue, Chatham Road, Mody Road and Middle Road will be lowered from 91-97dB(A) for 11-20 months to 84-86dB(A) for 10-11 months.
   - Continuous construction noise monitoring information will be made available on KCRC's website within two working days for public inspection. This is the first project in Hong Kong with such a monitoring system. The system speeds up the monitoring process and enhances public participation in noise monitoring.
   - A floating track slab will be installed at the rail tracks to mitigate the operational ground borne noise impact on the Sheraton Hotel, the New World Hotel and the Mariner's Club.
3. The EIA has also recommended the following improvements over the original scheme:
   - removal of land contaminants to protect construction workers and future users of the Middle Road Children's Playground; and
   - elimination of a visually intrusive conveyor system over Salisbury Road and a marine platform at the waterfront promenade (which were proposed for transporting construction spoil).

Preservation of Signal Hill, monuments and historical objects.

Conceptual alignment options for the rail extension.

The polygonal Eduardian Style Signal Hill Tower built in 1907.