



Agreement No. CE 42/96

**Route 16 Investigation Assignment
from West Kowloon to Sha Tin**

**Alternative Alignment
Environmental Impact Assessment**

Executive Summary

23 August 1999

Status - Final

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in association with
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1. INTRODUCTION

The need for Route 16 was established in the Updating of the Second Comprehensive Transport Study to overcome anticipated traffic problems at the Lion Rock Tunnel, Tate's Cairn Tunnel and Tai Po Road, and has been committed in the Sha Tin Outline Zoning Plan (S/ST/6). The Route 16 will connect the Lai Wan Interchange in West Kowloon to the future Trunk Road T3 and Che Kung Miu Road in Sha Tin (see Figure 1).

In April 1997, the Route 16 Study Team led by Scott Wilson (Hong Kong) Ltd and Parsons Brinckerhoff (Asia) Ltd was commissioned to carry out the Route 16 Investigation Assignment to produce a technically sound and optimum preliminary design for the Dual-3 lane tunnel scheme. The route alignment was designated as the Conforming Alignment. An Environmental Impact Assessment (EIA) was carried out by ERM Hong Kong Ltd during the Investigation Assignment to ensure the environmental acceptability of the Conforming Alignment. The *Route 16 from West Kowloon to Sha Tin - Investigation Assignment: EIA Study, Final Assessment Report (Jan 1998)* was endorsed by the Government and the EIA subcommittee of the Advisory Council on the Environment in February 1998. In addition, the Shum Shui Po District Board and the Sha Tin District Board were consulted regarding the findings of the EIA report on 15 January and 27 March 1998 respectively. The EIA report is formally logged under the Environmental Impact Assessment Ordinance register (reference number: EIA-135/BC).

The recently completed Detailed Feasibility Study for Route 9 between Tsing Yi and Cheung Sha Wan recommended that a direct connection between Route 9 and Route 16 should be provided in order to provide a direct route between the New Airport and the New Territories East, and to simplify the at-grade movement on Lai Wan Interchange. In order to meet the traffic demand of the design year and to accommodate the merging and diverging movement for traffic from the direct connection and those from the Lai Wan Interchange, the proposed Dual-2 lane Lai Chi Kok Viaduct (LCKV) of the Conforming Alignment is required to be widened to Dual-3 lane for most of its length to meet traffic operation standards.

As a consequence of such widening, it is necessary to undertake further investigation to allow merging/diverging traffic movement to take place on an open road section to meet road safety standards, instead of the tunnel section in the Conforming Alignment scheme.

Early in the Investigation Assignment, the Route 16 Study Team had come up with an Alternative Alignment option for the West Kowloon end, which had benefits in traffic operation and reduced construction cost and programme. However, due to programming difficulties in meeting the scheduled road completion date in 2004, the option was dropped from further consideration at that time. The new connection with Route 9 requirement has provided an opportunity for Highways Department to commission the Study Team to investigate further the Alternative Alignment option which would alleviate the road safety and traffic operation problems. Due to major design as shown below, an EIA study is required under the Environmental Impact Assessment Ordinance (EIAO).

In October 1998, an application for an EIA study brief under section 5(1) of the Environmental Impact Assessment Ordinance (EIAO) was submitted to Environmental Protection Department, together with a Project Profile (No. PP-031/1998), for the Route 16 Alternative Alignment. Pursuant to section 5(7)(a) of the EIAO, a study brief (ESB-021/1998) was issued by the Director of Environmental Protection (the Director).

The methodology and criteria stated in the Technical Memorandum on the Environmental Impact Assessment Process (TM-EIA) of the EIAO was used for the overall approach of this EIA. The EIA identifies Sensitive Receivers (SRs) within the Study Area, defines environmental parameters and features likely to be affected by the proposed project. Mitigation measures have been recommended for the environmental impacts arising from the Route 16 exceeding the criteria stipulated in the TM-EIA.

1.1 Project Description

The Route 16 is shown in Figure 1 and comprises the following sections:

- starting from Kowloon end at the Lai Wan Interchange, a Dual-3 lane Lai Chi Kok Viaduct (1350m long), with Dual-2 lane slip roads connecting down to the Interchange and a Dual-2 lane high level viaduct connecting to the Route 9 between Tsing Yi and Cheung Sha Wan project;
- the Lai Chi Kok Viaduct will pass over Ching Cheung Road, and an interchange with Ching Cheung Road will be provided;
- after passing over Ching Cheung Road, a 500m long Dual-3 lane approach road on embankment within the Butterfly Valley will be constructed;
- the trunk road will then enter a 2-km Dual-3 lane tunnel (the Eagle's Nest Tunnel);
- the northern end of Eagle's Nest Tunnel will connect to a toll plaza situated within the Sha Tin valley;
- the trunk road will again enter a 900m long Dual-3 lane tunnel (the Sha Tin Heights Tunnel);
- the northern end of the Sha Tin Heights Tunnel will be located in the Tai Wai area, with a Dual-2 lane viaduct connecting to the proposed Road T3 and slip roads linking to Che Kung Miu Road;
- a ventilation building will be located adjacent to Tai Po Road.

1.2 Alternative Alignment

The key modifications made on the Conforming Alignment are:

- a) widening of the Lai Chi Kok Viaduct from Dual-2 lane to Dual-3 lane;
- b) addition of Dual-2 lane connection to the "Route 9 between Tsing Yi and Cheung Sha Wan" trunk road; and
- c) adoption of a new alignment along the Butterfly Valley area, with associated modification of the interchange at Ching Cheung Road.

Beyond the Eagle's Nest Tunnel, there are no differences (including traffic projections) between the Conforming Alignment and Alternative Alignment. Hence assessment for the Sha Tin Section is excluded from the present EIA study.

1.3 Construction Phase

The preliminary construction programme of Route 16 is expected to last approximately 3.5 years from September 2001 to April 2005, with the following main construction activities:

- Earthworks excavation and construction of road embankment;
- Tunnel portal construction;
- Tunnel excavation; and
- Viaduct construction.

1.4 Operation Phase

The main operational activities of Route 16 involve:

- Traffic
- Toll Plaza
- Tunnel Ventilation

2. Construction Impacts

2.1 Air Quality

Dust generated from the cut & fill works and tunnel excavation will be the main pollutant during construction of Route 16. Without mitigation measures, Air sensitive receivers (ASRs) that are located within 100m of the construction site may be exposed to dust nuisance. The *Air Pollution Control (Construction Dust) Regulation* requires that environmental control and mitigation measures as stipulated in the Regulation shall be implemented for all construction sites under the Air Pollution Control Ordinance. Hence, the dust levels at all ASRs will be controlled to within the Air Quality Objectives (AQO) criteria. Dust monitoring and audit is recommended to ensure compliance with the AQO during the construction of Route 16.

2.2 Noise

The main noisy construction activities are portal construction, earthwork excavation, viaduct construction, embankment construction, and removal of spoil. Unmitigated construction activities of Route 16 would cause exceedances of the daytime construction criteria at most of the nearby noise sensitive receivers (NSRs) such as village houses in Miu Kong Village and Tai Ching Cheung, Lai Chi Kok Reception Centre Staff Quarters and Lai Chi Kok Hospital.

Therefore, adequate control measures will be necessary for the works to meet the criteria. Mitigation measures including the use of quiet plant, on-site movable noise barriers, limiting the number of plant operating concurrently are required. It is also recommended that regular monitoring of noise at NSRs will be required during the construction phase. If construction works are to be carried out during restricted hours (19:00 - 07:00 hours on weekdays and all hours on Sundays and Public Holidays), further mitigation measures will be required. Such work will require the granting of a Construction Noise Permit by the Environmental Protection Department.

2.3 Waste Management

No adverse impacts upon the environment, in terms of specified government regulations and guidelines, were identified arising from the storage, handling, collection, transport and disposal of wastes from the construction of Route 16. In most cases the waste material can be easily re-used on other fill sites or disposed of to Public Filling Areas. Measures recommended as good construction practices should be incorporated into Contract Specifications.

2.4 Water Quality

Potential water quality impacts from Route 16 construction activities will be from typically land based construction activities involving : construction runoff and drainage; litter and debris; and spillages. With the implementation of proper site management and good construction practices such as the use of sediment traps and oil interceptors, it is unlikely that construction

activities would result in incompliances with the Water Quality Objectives (WQO). The recommended mitigation measures should be incorporated into the Contract Specifications.

2.5 Ecology

The ecological habitats within the Study Area comprises secondary woodland, shrubland, orchard/village, plantation, wasteland and freshwater stream. Two rare/protected plant species were identified during the field surveys but no impact is expected as they are well outside the work limit and will not be affected by the Route 16 project. Animal wildlife recorded within the study area was limited and no species of conservation interest was found.

The proposed alignment will encroach into part of the secondary woodland but on-site compensatory planting on the cut slope will adequately mitigate the impact. Stream habitat creation is also recommended to compensate for the loss of the freshwater stream within Butterfly Valley. For the other habitats, given their low ecological value and small size to be affected, the impact is considered limited.

2.6 Hazard

The Alternative Alignment will pass within the Consultation Zones of the Tai Po Road Water Treatment Works (WTW) and Shek Lei Pui WTW, all of which are classified as Potentially Hazardous Installations (PHIs) due to the use of liquid chlorine in 1 tonne containers. Due to the close proximity of the Route 16 alignment to the Tai Po Road WTW and the vulnerability of the outdoor workers, the unmitigated construction phase risks from chlorine gas release from the Tai Po Road WTW are considered significant. Therefore a package of mitigation measures such as restrictions on construction work in the vicinity of the WTW and various emergency measures have been recommended to reduce the potential risk to acceptable levels.

2.7 Landscape and Visual

Key landscape and visual impacts will be related to the loss of part of the existing natural green valley and impact upon the townscape. The landscape impacts will be reduced by woodland replanting on cut slopes, screen planting on retaining walls, appropriate landscaping of the area under and around the viaduct and careful architectural treatment of highway structures.

2.8 Cultural Heritage

No known archaeological sites are to be impacted by Route 16. The Lai Chi Kok Hospital and the historical buildings in Tin Sam Village are the only known historical buildings identified within the study area. Since both these buildings are located at least 100m away from the alignment, no direct impact due to the construction or operation of the Route 16 is expected.

Low vibration piling method, such as bore piling, will be employed to ensure that the noise and vibration induced from the construction of the Route 16 will not affect these historical buildings.

3. Operational Impacts

3.1 Air Quality

Vehicular emissions from open section of the road and emissions from tunnel portals/ventilation building are the major air pollutant sources of Route 16. The tunnel ventilation system has been designed to meet the Tunnel Air Quality Guidelines. Emissions generated within the Eagle's Nest tunnel will be dispersed via the ventilation building at Tai

Po Road and therefore, no emissions will be emitted from the portal end. Modelling results indicate that cumulative aerial emissions from the tunnel section and the open sections of Route 16 will comply with the AQO criteria at all air sensitive receivers and further mitigation measures are not required. Air quality monitoring and audit requirements have been recommended to monitor the air quality within the tunnel.

3.2 Noise

This assessment has predicted that the worst case traffic noise levels from Route 16 in year 2019 will result in exceedances of the road traffic noise criterion at certain NSRs such as Lai Chi Kok Reception Centre Staff Quarters, village houses in Tai Ching Cheung, housing development Site 10 and Lai Chi Kok Hospital.

The best practicable mitigation package is recommended to comply with the road traffic noise criterion, comprising a combination of 3 to 7m high roadside noise barriers, semi and full enclosures as shown in Figure 2.

With the implementation of the recommended direct mitigation measures, the residual impact will comply with the current insulation noise criteria.

The ventilation building fans should be specified to the $L_{eq, 30 min}$ 68 dB(A) at 1m from the main louvres area to ensure no exceedance of the NCO criteria at the nearby NSRs.

3.3 Water Quality

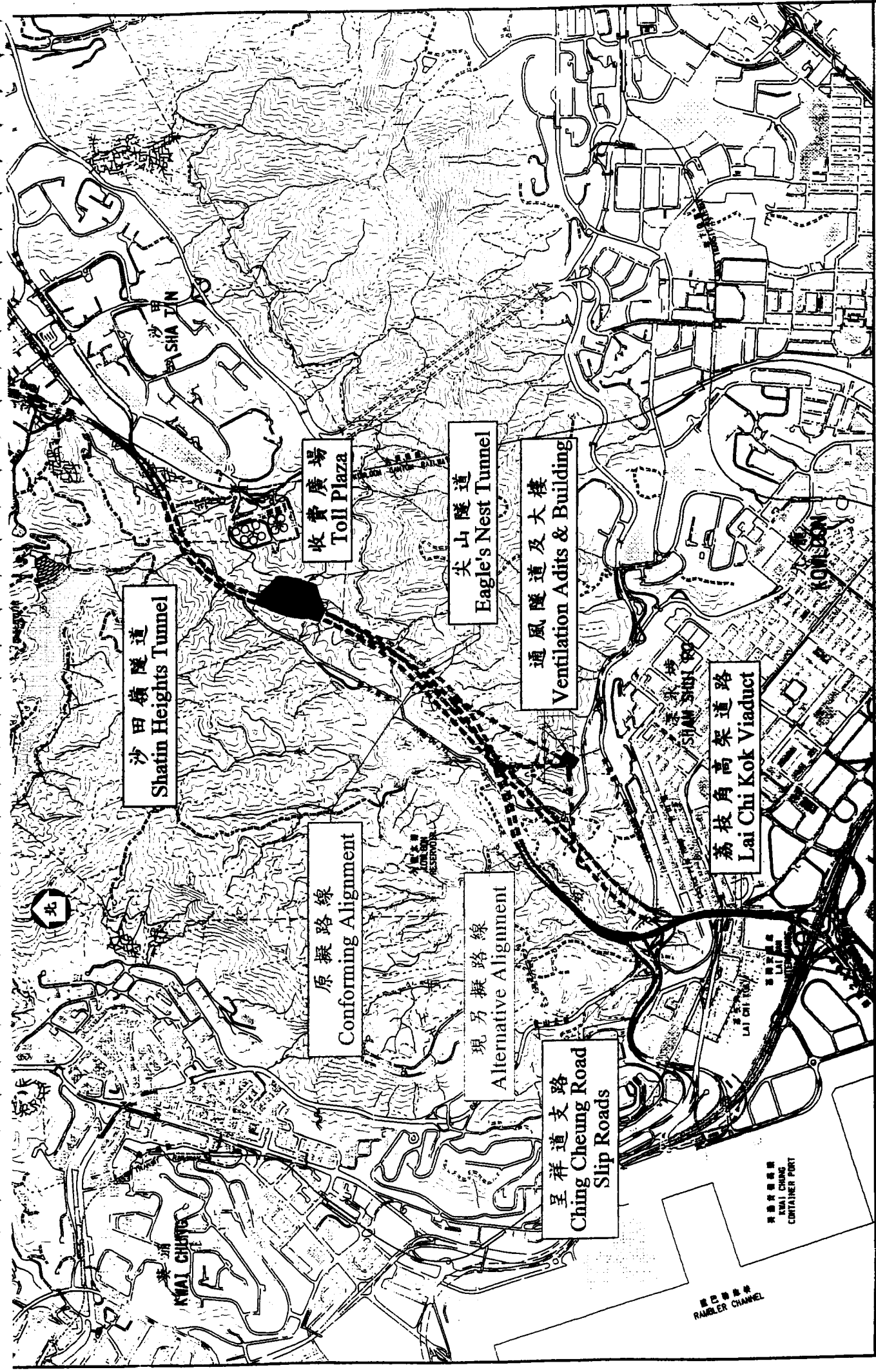
The operation of Route 16 will result in discharges such as road run-off and tunnel seepage, but these effluent sources will have minimal water quality impacts provided that the measures are implemented such as silt traps and oil interceptors to control road run-off.

3.4 Hazard

The key considerations during the operational phase will be the impact of chlorine releases from the Tai Po Road WTW and Shek Lei Pui WTW on the road users. To mitigate the risks to Route 16 during the operational phase, a new chlorine building with indoor unloading bay and using 50 kg cylinders at a new location approximately 100m west of the existing building is recommended. Enhanced emergency response arrangements are also recommended to minimise the impact of any chlorine release which may occur.

4. Overall Conclusions

This EIA Report has assessed the potential environmental impacts associated with the construction and operation of the proposed Route 16 Alternative Alignment, in accordance with the requirements in the Study Brief and the EIA Ordinance. Environmental issues including air quality, noise, waste management, water quality, ecology, hazard, landscape & visual and cultural heritage have been assessed in the report. With the implementation of the recommended mitigation measures, the proposed Route 16 Alternative Alignment will comply with the established environmental criteria and there would not be adverse residual impact. The recommended environmental monitoring and audit procedures will ensure the efficacy of the environmental control measures which should be incorporated into the Contract Specifications of the Route 16 project.



沙田嶺隧道
Shain Heights Tunnel

收費廣場
Toll Plaza

尖山隧道
Eagle's Nest Tunnel

通風隧道及大樓
Ventilation Adits & Building

荔枝角高架道路
Lai Chi Kok Viaduct

原擬路線
Conforming Alignment

現另擬路線
Alternative Alignment

呈祥道支路
Ching Cheung Road
Slip Roads

LEGEND
VIADUCT OR AT GRADE ROAD
TUNNEL

6694TH - ROUTE 9 FROM WEST KOWLOON TO SHA TIN

FIGURE 1
1

Scale 1:25,000 (Horizontal) 1:10,000 (Vertical)

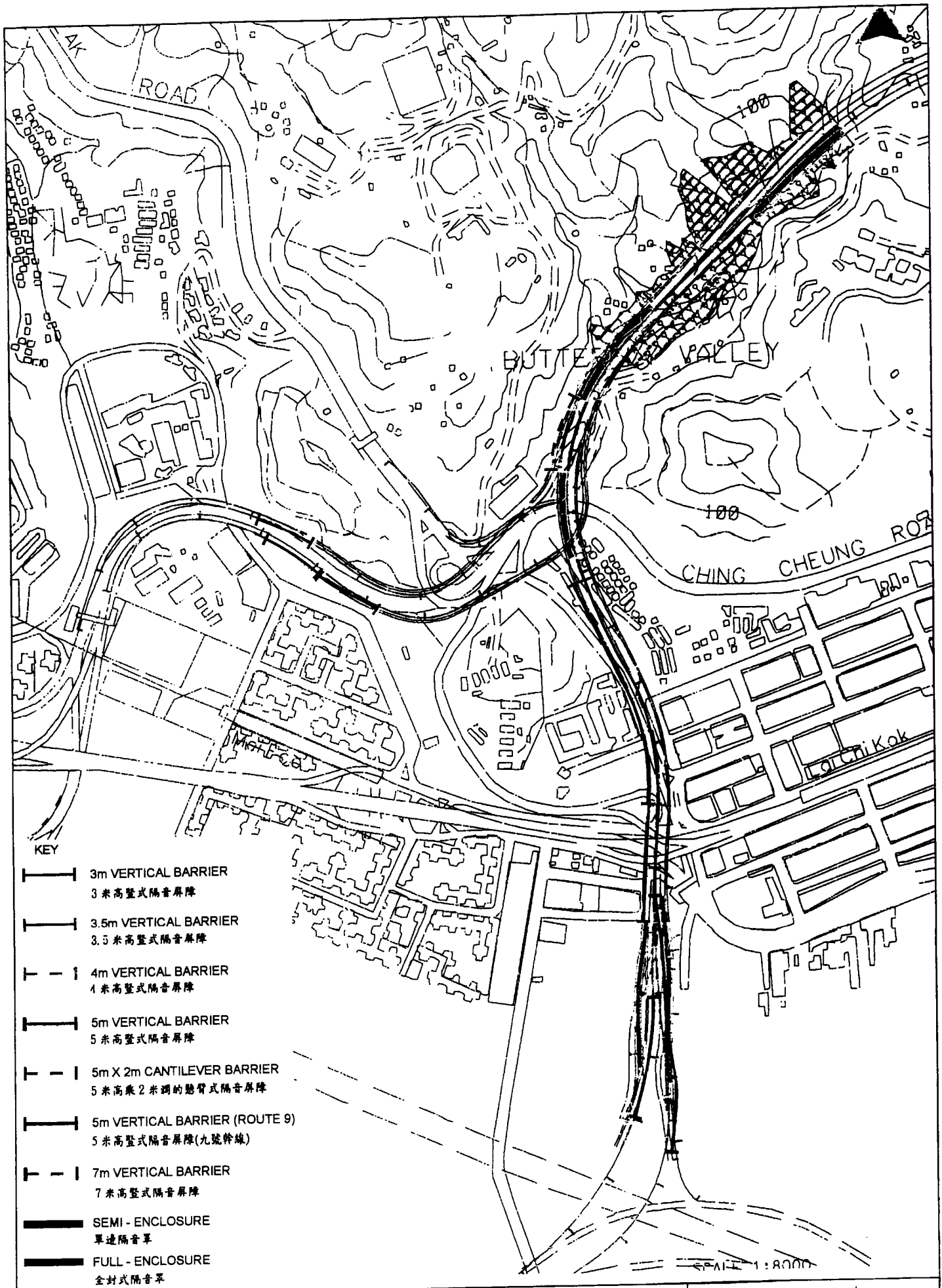


FIGURE 2
圖 2

PROPOSED MITIGATION MEASURES
建議的緩解措施

Environmental
Resources
Management

