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Feasibility Study for Castle Peak Road Improvements

between Ka Loon Tsuen and Yau Kom Tau, Tsuen Wan

由嘉龍村至荃灣油柑頭的青山公路改善工程-可行性研究報告

Environmental Impact Assessment Executive Summary

環境影響評估摘要

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環境影響評估

摘要

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1 INTRODUCTION

1.1 Background to the Study

1.1.1 The Tuen Mun and Tsuen Wan areas have been experiencing intensive residential, commercial and industrial development over recent years. In addition, there has been much recent residential development along Castle Peak Road between Tsing Lung Tau and Yau Kom Tau, where lowrise residential properties have given way to highrise, high density complexes. This kind of development is set to continue along the corridor, placing an ever-increasing pressure on Castle Peak Road between Ka Loon Tsuen and Area 2, Tsuen Wan.

1.1.2 The existing Castle Peak Road is characterised by substandard geometry and frequent entry/egress points offering insufficient visibility. As a result of this, the Government has decided that, in order to enhance the level of service for the increasing number of users, the road needs to be improved to cope with traffic growth predicted by the year 2011. This study has examined the feasibility of widening and, where necessary, realigning an 8-km length of Castle Peak Road between Ka Loon Tsuen and Area 2, Tsuen Wan. The existing two-way single carriageway will be widened to a dual-two lane carriageway to cope with the increased Castle Peak Road traffic. The proposed improvements are shown in Figure 1.1.

1.1.3 The proposed improvements covered under this study extend the improvements to Castle Peak Road from So Kwun Tan to Siu Lam (west of the present study area), construction of which will commence in early 1997.

1.2 The Environmental Impact Assessment Study

1.2.1 The Environmental Impact Assessment (EIA) identifies Sensitive Receivers (SRs) within the study area, defines environmental parameters and features likely to be affected by the proposed project, and sets out the criteria and methodology on which noise, air quality, water quality, ecology, landscape and visual impact assessments were based. Mitigation measures will be recommended for the environmental impacts arising from the proposed improvements exceeding the HKPSG. The traffic flows on which the noise and air quality assessments were based, as well as results of a baseline noise and air quality monitoring programme, are also provided in the EIA. These components of the EIA are not included in the present Executive Summary, which summarises only the findings of the Study.

1.2.2 The Executive Summary summarises the following findings of the EIA:

Construction Phase Impacts

- noise
- construction dust
- water quality
- construction waste
- ecology
- landscape
- visual.

Operation Phase Impacts

- noise
- air quality
- water quality
- landscape
- visual.

1.2.3 The EIA describes the impacts arising from the proposed project, and recommends measures to mitigate them.

1.2.4 Preliminary construction monitoring and audit programmes have been provided in an appendix to the EIA Report, but are not presented in this Summary.

2 IDENTIFICATION OF SENSITIVE RECEIVERS

2.1 Air, Noise, and Water Quality Impacts

2.1.1 Sensitive receivers along the existing Castle Peak Road alignment have been identified in accordance with the definitions given in the Hong Kong Planning Standards and Guidelines (HKPSG).

2.1.2 The study area accommodates a variety of sensitive landuses:

- villages (Ka Loon Tsuen, Yuen Tun, Tsing Lung Tau, Sham Tseng, and Ting Kau),
- detached beach and luxury houses,
- lowrise, midrise and highrise residential developments,
- gazetted and ungazetted beaches.

2.1.3 In addition to the existing sensitive receivers, the proposed Sham Tseng Further Reclamation off Lido Garden will be developed for residential and other sensitive uses. Also at Sham Tseng, existing industrial landuses may be converted to Comprehensive Development Areas.

2.2 Ecology Impact

2.2.1 Ecologically sensitive areas are habitats which are natural with little or no human disturbance, and/or of conservation importance based on their support of plant or animal communities or

populations that are relatively rare or are protected by local and/or international regulations. In the study area, woodlands and natural shorelines were designated as sensitive receivers of ecological impacts, as recommended in HKPSG.

2.3 Landscape Impacts

2.3.1 Sensitive landscape areas are identified by assessing the natural elements of the existing landscape which collectively form the landscape 'quality' of a site. Country Park land and designated sites such as Green Belt or Landscape Protection Areas fall into 'high quality' landscape classification, and are therefore considered 'sensitive'. The landscape 'quality' is assessed upon the landform, vegetation, historical and cultural components, built structures, aesthetic quality and amenity value. Quality landscape areas are considered to be sensitive to impact.

Sensitive landscape areas in this study area include natural shorelines, established and mature woodland slopes, and Green Belt and Landscape Protection Areas of Ting Kau.

2.4 Visual Impact

2.4.1 Visually sensitive receivers are those areas within the study site with clear views toward the affected areas of the route that will suffer adverse visual intrusion as a consequence of the proposed works.

This considers all residential developments, villages and detached houses along the route corridor, as well as public areas such as parks, gardens and beaches.

3 CONSTRUCTION PHASE IMPACTS

Construction phase impacts will be regulated by an Environmental Monitoring and Audit (EM&A) programme, which will monitor air, noise, and water quality impacts. A Preliminary EM&A Manual forms an Appendix to the EIA Report, and outlines the monitoring requirements of the programme.

3.1 Noise Impacts

3.1.1 Due to the linear nature of the improvement works, and the close proximity of dwellings to the roadway, exceedances of the recommended daytime construction noise limit (75 dB(A) L_{eq}) are predicted. Except for works involving the placement of prefabricated superstructure, which requires closure of the road, evening and night-time works are not expected. Works are expected to require substantial noise mitigation to reduce them to acceptable levels at the closest NSRs, and the limited night-time construction works will also require a Construction Noise Permit. Appropriate mitigation measures are recommended in the EIA Report to reduce noise impacts to acceptable levels.

3.2 Construction Dust Impacts

3.2.1 With the adoption of normal site dust suppression measures, predicted 1-hour, 24-hour and annual average construction dust concentrations are consistently below the relevant

assessment criteria at all assessed sensitive receivers. The worst affected receivers are in Ting Kau, close to an area of fill. However, these receivers are not expected to be exposed to dust levels exceeding the Hong Kong Air Quality Objectives.

3.2.2 Recommended dust control measures that have been assumed in the air quality assessment are:

- pre-watering of the dropping surfaces of blasted material;
- twice-daily watering of exposed excavated or dusty surfaces to reduce dust generated from wind erosion and vehicle movements on dusty roads
- use of a ventilation system employing a fabric filter for concrete batching.

3.3 Water Quality Impacts

3.3.1 Changes to the alignment of the road will involve construction works, including excavation, cut and fill, and minor reclamation in very shallow waters. In addition, any proposed works areas operating during the construction phase may have a requirement for effluent discharge.

3.3.2 Minor reclamation will be required in two areas: approximately 1,900 m^2 at Sham Tseng, and approximately 12,000 m^2 at Tsing Lung Tau. Both reclamations are narrow. At Tsing Lung Tau, the maximum width will be about 60m in very shallow water (above about 0 mPD). At Sham Tseng, the maximum width is about 20m in similarly shallow water, and will slightly affect the existing gazetted beach (Angler's Beach). Both minor reclamations will not require dredging, since they are in very shallow water. The works will require filling of the foreshore and consolidation of the filled area using wick drains or surcharge. The reclamations are consequently not expected to result in substantial impacts. Mitigation measures to reduce water quality impacts have been recommended in the EIA Report.

3.3.3 The potential for contamination of the coastal zone during construction arises mainly from suspended solids contained in runoff from exposed areas, especially steep, freshly cut slopes, together with oils and other chemicals resulting from spills in active works areas, particularly from fuel storage sites, and with effluent from site facilities, such as toilets and canteens. Mitigation measures to reduce water quality impacts have been recommended in the EIA Report.

3.4 Construction Waste

3.4.1 Construction activities will result in the generation of various types of wastes including hard and soft spoil derived from site clearance and excavation for foundation works, waste derived from construction materials and processes, general refuse from workforce, and plant and equipment maintenance.

3.4.2 The works to improve this section of Castle Peak Road are expected to be split into two contracts, one for each half. It is estimated that approximately 0.95M m^3 and 0.3M m^3 of spoil will be generated from the eastern and western halves respectively.

3.4.3 Excavated spoil can be re-used on sites such as the worksyard (in the eastern half) and reclamations (in the western half). Approximately 0.86M m^3 of surplus spoil will be generated from the eastern half, and 0.24M m^3 of import fill will be required. Thus it is recommended that spoil excavated from the eastern half be re-used as fill. The balance of surplus spoil of approximately 0.6M m^3 will require off-site disposal.

3.4.4 Construction waste should be sorted on site into inert and non-inert fractions for reuse and recycling as far as practical. Non-inert fraction containing no more than 20% by volume of inert content can be disposed of at landfills, whilst the inert fraction should be delivered to public dumps or other reclamation sites.

3.5 Ecology Impacts

3.5.1 Field surveys along the proposed alignment and literature review of relevant documents were performed between February and June 1995 to investigate the ecological resources and to assess the conservation value of the area. The entire study area was extensively disturbed by human activities. Major habitats included woodland, shrubland, grassland, plantations (roadside and garden), sandy and rocky shores. No flora or fauna protected under local regulations or international conventions were recorded, except for birds which are all protected under Hong Kong ordinance.

3.5.2 Potential impacts of the road improvement include:

- loss of 2.83 ha of natural woodland, 5.86 ha of plantation woodland, and 2.64 ha of shrubland
- loss of 0.39 km of rocky shoreline and 0.29 km of sandy shoreline
- loss of 0.7 ha of intertidal area.

3.5.3 The most significant impact will be loss of about 2.7 ha of secondary woodland in the Ting Kau segment. The woodland is of a very early successional stage and supports common pioneer species. In the absence of disturbance it would develop into mature woodland over 15-30 years. Impacts on fauna are of minimal ecological significance due to the disturbed nature of the site and low species diversity.

3.5.4 The narrow and steep topography of the site creates constraints for alternative alignments and hence for impact avoidance. Compensatory woodland re-planting using native indigenous species is recommended. Three possible areas on site, with a total area of 2.45 ha, are available for woodland replanting to mitigate impacts of woodland loss. Impacts on natural shoreline should be alleviated by using viaduct structures rather than fill support throughout the stretch of seaward widening. A permanent loss of 0.7 ha of seabed will constitute residual impacts of the project. This is not considered a significant residual ecological impact due to the degraded nature of water quality and marine benthic communities in the area.

3.6 Landscape Impacts

3.6.1 As the predominant landscape character of the study area is that of steep vegetated / rocky slopes, mature vegetation and beach coastline, the construction works will generate severe disruption to the existing landscape character. The extensive engineering works required for the cutting of slopes and exposed rock faces, encroachment of construction works areas onto beaches, and temporary slope stabilisation methods will collectively incur detrimental change in the existing landscape character. Most notable impacts will be the extensive work to slope profile at Rhine Terrace area, and modification works to coastline and vegetation at Grand Bay and Casam beaches. The felling of significant areas of established woodland vegetation will also occur during the construction phase, resulting in severe disturbance to existing landscape character, notably at Ting Kau Village.

3.7 Visual Impacts

3.7.1 Due to the high number of visually sensitive receivers, i.e., housing development sites within close proximity to the study route, the impact, and disruption to the existing views will be high. At construction stage, the extensive engineering works and cutting of slopes will have detrimental impact on existing views of wooded hillside, and the felling of mature vegetation, will open up further views from residential areas to the construction route, notably in Ting Kau Village, where the fill site will also generate high levels of dust. Construction works associated with proposed viaducts will encroach upon coastline and beach areas which will incur a significant deterioration of visual quality, notably the coastline area of Casam Beach. In general, the construction works associated with the proposed improvements will incur short term visual intrusion to all areas where visually sensitive receivers have been identified.

4 OPERATIONAL PHASE IMPACTS

4.1 Noise Impacts

4.1.1 The traffic noise assessment was based on projected morning peak hour traffic flows for the year 2011.

4.1.2 There are presently a large number of Noise Sensitive Receivers (NSRs), both existing and under construction, along Castle Peak Road. Several constraints, including topography and the existing shoreline, have limited the options for aligning the improved road. For this reason, predicted traffic noise levels will exceed Hong Kong Planning Standards and Guidelines (HKPSG) at many sensitive facades, and extensive noise mitigation measures will be required.

4.1.3 A noise mitigation strategy involving both direct and indirect technical remedies is recommended. The opportunities for direct technical remedies were limited by the nature of the receivers (specifically, highrise residential towers, or lowrise dwellings on hills overlooking Castle Peak Road) and the topographical constraints on the alignment. Partial or full road enclosures were found to be the only effective direct technical remedies at most NSRs. However, in most cases, these enclosures were found to be infeasible to construct due to space limitations, or had unacceptable safety risks at access points and junctions. The recommended direct technical remedies are summarised in the following table.

Table 4.1 Summary of Recommended Direct Technical Remedies

Representative NSR and Unmitigated 2011 Facade Noise Level		Recommended Mitigation Measures	
NSR	dB(A)	Measure	Remarks
Lung Tang Court	74.4	5-m barrier (eastbound carriageway): Ch 2700-Lung Yue Rd	shields lower levels of Lung Tang Court
Yuen Tun and Tsing Lung Tau	75.1	3.5-m barrier (eastbound carriageway): Lung Yue Rd to Ch 3000	shields about 20 village houses
eastern Ting Kau Beach residences	72.6	0.8 m barrier (westbound carriageway): Ch 6700-7530	shields about 25 units
Greenview Terrace and Blossom Terrace	76.8	partial enclosure over eastbound and westbound carriageways: Ch 8480-8690	shields all levels of Greenview Terrace; Blossom Terrace to be redeveloped

4.1.4 Dwellings that are exposed to future residual traffic noise levels exceeding the limits recommended in the HKPSG (70 dB(A) L_{10} after all direct technical remedies) may be eligible for consideration for indirect technical remedies in terms of appropriate glazing and air conditioning. Approximately 2320 residential units are expected to be eligible for consideration for indirect technical remedies. Units that are not eligible for indirect technical remedies are primarily those in Sham Tseng Village, where no improvements to the present alignment of Castle Peak Road are planned. The total cost of the noise mitigation package is about $35 million.

4.2 Air Quality Impacts

4.2.1 The air quality assessment was based on projected morning peak hour traffic flows for the year 2011, the assessment year with the worst traffic emission impact.

4.2.2 The highest predicted 1-hour average NO_2 concentrations for year 2011, with estimated background concentration of 117.7 μgm^{-3}, is 263 μgm^{-3} at Sham Tseng Tsuen Village. Based on the modelling results, and using conservative modelling parameters, no exceedances of the one-hour average NO_2 AQO (300 μgm^{-3}) at the selected sensitive receivers for year 2011 are predicted.

4.3 Water Quality Impacts

4.3.1 Following construction and site restoration, the potential for contamination of the coastal waters arises mainly from storm runoff across the paved surfaces of the new road. Such runoff, particularly in the first flush following a prolonged dry period, would contain several different contaminants resulting from fuel combustion, as well as eroded brake linings, tyre deposits and discarded refuse. In addition, the road is likely to be used for transport of a

variety of materials, some of which may be polluting. The potential for spills, and their subsequent containment, should be allowed for in the design of pollution control mechanisms.

4.3.2 A preliminary assessment indicates that a number of pollutants may exist in road runoff at significant levels. Objectives set at the point of discharge may be breached for suspended solids, oils, and some metals. Allowing for the large volume of water in this region, and the vigorous tidal mixing, there should not, under normal circumstances, be any problems with meeting the water quality objectives. In the case of accidents, however, and for the protection of the local environment, there will be a need to install pollution control equipment such as sediment traps and oil interceptors. Particular attention should be paid to keep the discharge of storm runoff away from sensitive uses such as bathing beaches.

4.4 Landscape Impacts

4.4.1 Loss of established vegetation and general alteration to the existing profile of the topography of the site will incur long term adverse impact to the existing landscape character of the site. Proposed methods of retaining slopes using shotcrete or retaining walls will have a detrimental effect on the character of the topography and the significant loss of woodland vegetation will require extensive mitigation works in order to ameliorate the long term impacts.

The encroachment of viaduct structures upon, and destruction of natural coastline and beach areas will have a detrimental impact upon the quality and amenity landscape value of the beach and coastline areas, notably Casam Beach.

The introduction of noise barriers within some sections of the route will cause moderate to severe impact to the character of the affected areas and will notably cause a severe change to the Lido Beach area.

A mitigation strategy comprising detailed planting proposals and sensitive hardworks / finishes treatment will contribute to restoring a naturalistic edge to the road corridor and restore disturbed hillside areas in keeping with the existing character.

4.5 Visual Impacts

4.5.1 The loss of mature vegetative screens will increase direct visual intrusion to the road corridor for many of the residential sensitive receivers, notably Bayside Villa, Sea Crest Villa, private residences at Casam / Lido Beaches and Ting Kau Village. The closer proximity of the proposed carriageways will also restrict the area available for visual mitigation measures.

The introduction of noise barriers within some sections of the route will cause moderate to severe impact to the visual character of the affected area, and will notably cause severe visual intrusion to the Lido Beach area.

The modifications to landscape character, such as slope cutting, loss of mature woodland vegetation and damage to coastal areas will subsequently cause some moderate to severe deterioration of existing views of the landscape.

Mitigation measures are required to visually enhance the affected areas through re-planting and re-establishment works, cosmetic landscape treatment to cut slopes, and sensitive use of finishes and materials for noise barriers, footbridges, etc.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Construction Phase Impacts

5.1.1 During construction, mitigation measures will be required to reduce noise and dust levels. Night-time construction works (which will require a Construction Noise Permit) are expected to be limited to those works which require closure of the existing road. Statutory and recommended dust and noise limits are expected to be achievable with the adoption of strict controls. Water quality impacts during construction are expected to be readily mitigatable.

5.1.2 Construction activities will result in the generation of various types of waste, including hard and soft spoil. It is estimated that approximately 0.95M m^3 and 0.3M m^3 of spoil will be generated from the eastern and western halves of the project respectively. To a limited extent, excavated spoil can be re-used on site, and spoil excavated from the eastern half of the works can be re-used as fill in the western half. The balance of surplus spoil (approximately 0.6M $m^{3)}$ will require off-site disposal.

5.1.3 Ecologically, the entire study area is extensively disturbed by human activities. The most significant impact will be loss of about 2.7 ha of secondary woodland near Ting Kau. Impacts on fauna are of minimal ecological significance due to the disturbed nature of the site and low species diversity. The narrow and steep topography of the site creates constraints for alternative alignments and hence for impact avoidance. On-site replanting using native indigenous species is recommended. Impacts on natural shoreline should be alleviated by using viaduct structures rather than fill support throughout the stretch of seaward widening. A permanent loss of 0.7 ha of seabed will constitute residual impacts of the project.

5.2 Operation Phase Impacts

5.2.1 There are presently a large number of NSRs, both existing and under construction, along Castle Peak Road. Several constraints, including topography and the existing shoreline, have limited the options for aligning the improved road. For this reason, predicted traffic noise impacts are significant and will require extensive mitigation. A mitigation strategy involving both direct and indirect technical remedies is recommended. Direct technical remedies are summarised above in Table 4.1, and are restricted to barriers and a partial enclosure. Approximately 2320 residential units that are not protected by these direct technical remedies to meet HKPSG noise limits, may be eligible for indirect technical remedies (appropriate glazing and air conditioning).

5.2.2 Exceedances of the AQOs from road traffic are not anticipated.

5.2.3 Following construction and site restoration, the potential for contamination of the coastal waters arises from storm runoff and from spills associated with the transport of materials, some of which may be polluting. However, allowing for the large volume of water in this region and the vigorous tidal mixing, there should not be any problems with meeting the

water quality objectives. In the case of accidents, however, and for the protection of the local environment, installation of pollution control equipment such as sediment traps and oil interceptors is recommended. Particular attention should be paid to keep the discharge of storm runoff away from sensitive uses such as bathing beaches.

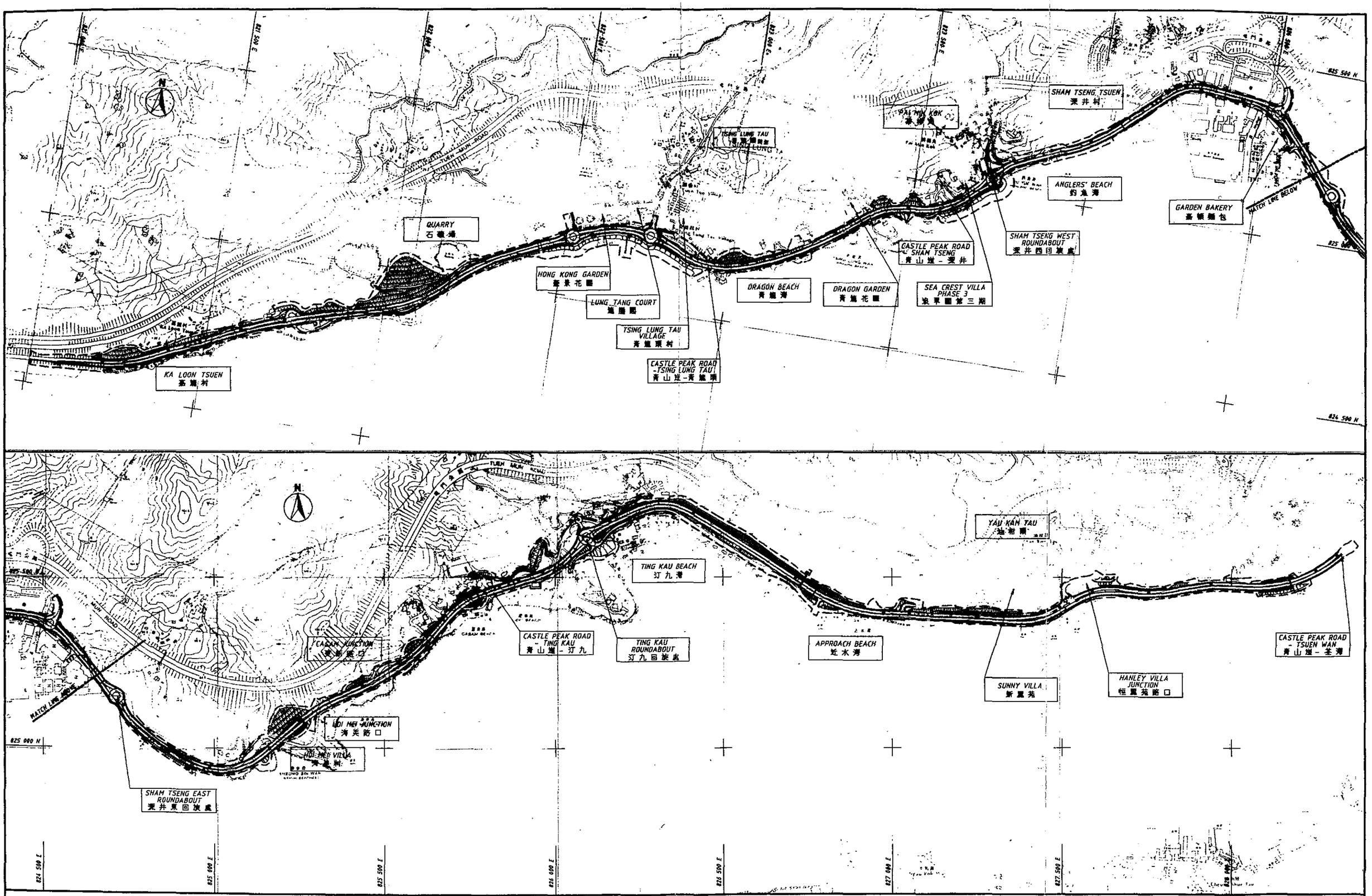

FIGURE 1.1 - KEY PLAN

圖一.一 索引圖

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目　錄

1 引 言

1.1 研究背景

1.1.1 近年來在屯門及荃灣區內均有很大型的住宅、商業及工業發展工程；其中尤以介乎青龍頭及油柑頭之間的一段青山公路沿路兩旁住宅發展為甚。該處有很多低層住宅用地已改建成高層及高密度住宅 。由於預期這類發展會繼續沿青山公路進行，所以將會對介乎嘉龍村及荃灣第二區之間的一段公路構成額外的交通壓力。

1.1.2 現有青山公路的彎度設計被視為低於標準，而沿路有很多路口亦沒有足夠的安全視野。為改善現有情況及有鑑於未來交通流量的增加，政府決定於該處進行道路改善工程，以應付預期於2011年的交通情況。本研究對介乎嘉龍村及荃灣第二區之間的一段公路進行擴闊或在有需要情況下進行改道工程的可行性作出評估。現有單線雙程行車路面將會擴建至雙線雙程，以應付預期交通流量的增加。擬建中的改善工程列明在圖1.1中。

1.1.3 在本研究中擬建工程亦是掃管灘至小欖之間的一段青山公路（即在本研究範圍以西一段）改善工程的延續。上述工程將會於一九九七年初展開。

1.2 環境影響評估研究

1.2.1 在本環境影響評估研究（環評研究）中確認了研究範圍內的敏感受體、列明可能會受建議工程影響的環境參數、以及在研究中對噪音、空氣質素、水質、生態、園林和景觀等影響評估所採用的方法及標準。對建議中改善工程所引至超出「香港規劃標準與準則」指標水平的環境影響，本報告將提出緩解措施的方案。環評研究報告內亦包括在進行噪音及空氣質素影響評估中使用的交通流量數據，以及噪音和空氣質素基線水平監測結果。在本摘要報告中只總結了整個環評研究的主要結論，因此並沒有詳述以上資料。

1.2.2 本摘要報告總結以下在環評研究中的主要結論:

在建築期間的影響

- 噪音
- 建築塵埃
- 水質
- 建築廢物
- 生態
- 園林
- 景觀

在運作期間的影響

- 噪音
- 空氣質素
- 水質
- 園林
- 景觀

1.2.3 環評研究中詳述了以上各種因擬建工程引起的影響，亦建議相應的緩解措施。

1.2.4 在建築期間環境監測及審核計劃的初稿已列明在環評報告附件內，因此亦不會在本摘要中說明。

2 確認敏感受體

2.1 空氣質素、噪音及水質影響

2.1.1 顧問公司根據『香港規劃標準與準則』內指引，確認了在青山公路沿路的敏感受體。

2.1.2 本研究範圍內包括了不同類別的土地用途：

- 村落 （嘉龍村、圓墩村、青龍頭、深井及汀九）；
- 獨立的豪華洋房；
- 低層、中層及高層的住宅發展；及
- 憲報公佈及非憲報公佈的海灘。

2.1.3 除了現有的敏感受體以外，在深井近麗都花園填海區亦將會發展成住宅區及其他敏感受體。另外，現時在深井的工業用地將來也可能改作綜合發展用途。

2.2 生態影響

2.2.1 對生態影響敏感的受體是指一些自然或不受人為騷擾的地區，或是因為區內生長有受本地或國際規例保護的稀有生物品種，使該處成有為具保存價值的地區。在本研究範圍中，生態敏感受體包括了如在『香港規劃標準與準則』建議的樹林和天然岸灘。

2.3 園林影響

2.3.1 園林影響的敏感受體是經由評估現有自然園林質素而確認。郊野公園及如綠色地帶或園林保護區等特定地區，均被列為具高園林質素；所以亦被視作園林影響的敏感受體。園林質素評估是根據地貌、植物、歷史及文化背景、建築物、

外觀及休憩園林價值等來釐訂。具園林質素的地區亦會被列為受園林影響的敏感受體。

在研究範圍內對園林影響敏感的地區包括天然岸灘、覆蓋著樹林的斜坡及在汀九的綠色地帶和園林保護區等。

2.4 景觀影響

2.4.1 對景觀敏感的受體是指在研究範圍內，可清楚看見擬建工程又因而受到景觀影響的地區。

在本研究中，所有在青山公路沿路的住宅區、村落、獨立洋房及其他如公園、花園和海灘均被列為對景觀影響敏感的受體。

3 建築期間影響

建築期間的影響將會經由一項環境監測及審核計劃作出監管及控制，這項計劃內列明監測空氣質素、噪音和水質影響的要求。在環評報告附件中，顧問公司已草擬了環境監測及審核計劃的大綱。

3.1 噪音影響

3.1.1 因為道路改善工程沿青山公路進行，而工地將會十分接近沿路的住宅，所以預期在日間的建築噪音將超出指標水平〔75分貝〕。除了因放置預先製成的組件而需要封路外，預期不需要進行其他的晚間工程。為使工程噪音能減低至可接受的水平，研究建議採用大量的噪音消減措施，而這些措施已詳細列明在環評報告之內。此外，如需要在晚間施工的話，則必須事先申領建築噪音許可証。

3.2 建築塵埃影響

3.2.1 只要採用一般的工地抑止塵埃措施，預計在所有敏感受體因工程產生的塵埃將不會超越一小時、二十四小時及全年平均的指標水平。最受工程塵埃影響的敏感受體位於汀九建議填土區的鄰近。但該處的塵埃影響依然不會超過香港空氣質素指標水平。

3.2.2 在評估中已假設採取的控制塵埃措施包括：

- 預先在將要進行爆破的石面上灑水；
- 在露天的工地上每天灑水兩次，以避免因風吹及工程車輛而揚起的塵埃；

- 在混凝土製造廠中使用設有空氣隔濾器的排風系統。

3.3 水質影響

3.3.1 路面擴闊及改變現有公路路線將涉及挖土、堆土及在淺水地帶進行的小型填海工程。此外，在施工期間工地中亦會有污水排放。

3.3.2 小規模填海將在下列兩個工地進行：在深井約一千九百平方米及在青龍頭約一萬二千平方米的填海工程；該兩項填海工程均十分窄長。在青龍頭，最闊的地方只約為六十米，而該處的水十分淺。而在深井填海區則只約闊二十米，水深亦很淺；但可能會輕微影響鄰近的釣魚灣（憲報公佈的泳灘）。因為在淺水區填海，所以將不需要挖掘海床中的淤泥，只須在近岸地方堆填物料並利用排水帶或重物幫助使泥土壓實。因此上述兩項填海工程預料不會構成嚴重的水質影響。環評報告中亦已建議減少水質影響的緩解措施。

3.3.3 在施工期間對近岸地區的潛在影響主要來自工地徑流的懸浮固體，特別是從剛挖掘的斜坡；其他的污染源亦包括從工地燃料儲存區中溢漏的化學品，以及如食堂等工地設施排出的污水。在環評報告中已就緩減污水影響建議了合適的措施。

3.4 建築廢物

3.4.1 建築活動將會產生不同種類的廢物，當中包括了工地平整及地基工程中挖掘出來的泥土、工程原料和建造過程中所產生的廢物；以及工作人員和維修機械所產生的廢物。

3.4.2 青山公路改善工程預料將會分由兩份工程合約進行。估計東面工程和西面工程分別會產生約九十五萬立方米及三十萬立方米的廢物。

3.4.3 在東面工程，挖掘出來的泥土可被用作築建工作平台；而在西面工程，泥土將可被作填海之用。估計東面工程將產生八十六萬立方米的剩餘物料。但因需約二十四萬立方米的堆填物料，所以研究建議將工程中作產生的剩餘物料作為堆填物料；而餘下約六十萬立方米的廢料將須運往別處處理。

3.5 生態影響

3.5.1 顧問公司在一九九五年二月至六月間，已在擬建工程附近範圍進行實地考察及翻查有關的資料，以檢討區內生態資源及評估其保存價值。結果顯示區內已受到很多人為騷擾，主要的生態環境有樹林、叢林、草地、在路旁及花園的植物、沙灘及石灘等。除了所有雀鳥（因全受香港法例保護）外，在區內並沒有發現其他受保護生物的記錄。

3.5.2 因工程而引致的潛在影響包括：

- 損失2.83公頃天然樹林、5.86公頃人工樹林及2.64公頃叢林；
- 損失0.39公里石灘及0.29公里沙灘；
- 損失0.7公頃的潮汐地區。

3.5.3 最主要的生態影響是在汀九段所損失約2.7公頃的二級樹林。該處生長著常見的樹木品種，如沒有受到人為騷擾，應可在十五至三十年內發展為成熟樹林。但因為區內並未存在稀有的生物品種，所以對生態的影響並不算嚴重。

3.5.4 因公路的地形窄長而陡斜，限制了路線的選擇，亦限制了避免對生態影響的方案。為彌補對樹林損失的影響，顧問公司建議在三個選址使用本土的植物品種進行保償性種植，面積共約為2.54公頃。至於對岸灘的影響，可透過採用高架道路設計代替填海以減低影響。預期工程將會引致約0.7公頃海床永久損失，但因就該處現有水質及海洋生態而言，海床的損失並不算嚴重。

3.6 園林影響

3.6.1 因研究範圍的地貌主要為陡斜的石坡或長有植物的斜坡及沙灘和石灘，所以擬建工程將對現在的園林構成嚴重影響。擬建發展的削坡工程，建在岸灘上的工地及臨時鞏固斜坡工程等均會對園林造成負面影響；其中較嚴重地區包括受削坡工程影響的海韻臺一帶及受岸灘附近工程影響的更生灣一帶。此外，於施工期間的樹木砍伐工程亦將會影響汀九村附近地區的園林。

3.7 景觀影響

3.7.1 工地毗鄰住宅發展及其他很多對景觀敏感的地方，因此擬建發展對現有景觀的影響很大。在施工期間，大型的工程及削坡活動會影響現有的林木景觀，而樹木的砍伐將會使大部份在汀九村的敏感受體看見更多的工地範圍，特別是在工地中揚起的塵埃。在灘岸地區築建高架道路將會減低沿岸一帶的景觀價值，尤其是更生灣附近住宅。總括而言，擬建工程將會對所有對景敏感受體造成短暫的景觀影響。

4 運作期間影響

4.1 噪音影響

4.1.1 交通噪音是根據預期在2011年早上繁忙時間時的交通流量的數據所出評估。

4.1.2 現時青山公路沿途有頗多對噪音敏感的受體，如前文所述，研究範圍內的地形對改善道路工程造成很大的限制。因此預料將來的交通噪音將超越『香港規劃標準與準則』內水平；因而需要實施大規模的噪音消減措施。

4.1.3 研究中建議的緩減策略包括直接及間接消減噪音技術，就地形所限及區內敏感受體的位置（特別是一些高層住宅和在山上俯瞰青山公路的低層住宅），可以採用直接緩減措施的選擇不多。在大部份情況下，設置局部或全部密封隔音罩是唯一有效的方案；可惜因工地面積並不容許這些建築，而隔音罩亦會對支路及路口的交通構成危險。建議採用的直接消減噪音技術總結如下：

表4.1　　建議直接消減噪音技術

具代表性的敏感受體及估計在未實施噪音消減措施前於2011年的噪音聲級		建議的噪音消減措施	
敏感受體	分貝(A)	噪音消減措施	備　註
龍騰閣	74.4	在龍如路(CH2700)東行線設置五米高的隔音屏障	遮擋著龍騰閣低層住戶
圓墩及青龍頭	75.1	在龍如路(CH3000)東行線設置三點五米高的隔音屏障	遮擋著約二十戶村屋
汀九東面住宅	72.6	在公路(CH6700-7530)處西行線設置零點八米高的隔音屏障	遮擋著約二十五戶住宅
翠景臺及寶豐臺	76.8	在公路(CH8400-8690)處東西行線設置局部密封的隔音罩	遮擋翠景臺各層住宅；寶豐臺將會重建

4.1.4 一些交通噪音將會超過『香港規劃標準與準則』內建議水平（即在加設直接消減噪音措施後仍超過70分貝）的住宅將可設置如隔音玻璃和空調等間接噪音消減措施。約有二千三百二十户住宅可被考慮加設這些措施。由於計劃中並沒有在深井村一帶進行路面擴闊工程，所以該處住户將不會被考慮加設間接噪音消減措施。估計整項工程中所有消減噪音措施的費用約為三千五百萬元。

4.2　空氣質素影響

4.2.1 因交通產生的空氣質污染是根據預期在2011年早上繁忙時間時的交通流量的數據所出評估。

4.2.2 評估結果顯示在2011年，於深井村內二氧化氮濃度每小時的平均值為260ugm^{-3}，當中包括了背景污染濃度117.7 ugm^{-3}在內。根據電腦模擬結果及在評估中採用了保守的參數，顧問公司預期於2011年在所確認的敏感受體中並不會超過二氧化氮的空氣質素指標水平（每小時平均值300 ugm^{-3}）。

4.3 水質影響

4.3.1 在工程峻工及工地修復後，有可能影響沿岸水質的污染源主要是來自新建路面的徑流。這些徑流（特別是當經過長時間乾旱後下雨的初段）通常含有因氣油燃燒、煞車、車呔損耗及棄置廢物引致的污染物。除此以外，部份利用公路運輸的貨物亦有可能含有污染物。這些貨物溢漏的可能性及其引起的污染亦應在設計控制污染機制時詳加考慮。

4.3.2 初步評估顯示在公路上的徑流可能含有頗高的污染物，因而導致於排放處的水質會超過如油脂和金屬等水質指標。但有鑑於在該處有大量的潮汐稀釋作用，相信在普通情況下將仍可符合水質指標水平。但在意外溢漏的情況下，為避免對附近環境可能引起的污染，有需要設置如隔沙池之類的防污設施。應特別注意將雨水排放處遠離如泳灘之類的敏感水體。

4.4 園林影響

4.4.1 工程中砍伐樹林和更改現有路線及地貌均會影響區內現有園林特色。建議在削坡上噴混凝土或是築建護土牆亦將會對附近地貌造成負面影響；加上在區內砍伐樹木，所以必須實施大規模的緩解措施以減輕對園林景觀的長遠影響。

建在岸灘上的高架道路和對天然海岸及沙灘的破壞均令區內岸灘（特別是在更生灣附近）的休憩園林價值造成影響。

在某些路段加設隔音屏障會對鄰近地區構成中等至嚴重程度的影響，尤其是位於麗都灣一帶。

緩解措施策略包括了詳細植樹設計及新建設施的外觀美化，務求修復受影響的山坡及保存公路沿線的自然影觀。

4.5 景觀影響

4.5.1 擴闊工程將會令如海濤花園、浪翠園、更生灣和麗都灣一帶的私人住宅及汀九村等地區與公路的天然屏障消失。而由於公路很接近受影響者，限制了可行緩解措施的選擇。

在某些路段加設隔音屏障會對鄰近地區構成中等至嚴重程度的影響，尤其是位於麗都灣一帶。
工程亦涉及改變現有園林景觀的活動，如削坡、砍伐樹木和破壞岸灘地區等。這些活動將對現存的園林景觀構成中等至嚴重的影響。

環評研究建議透過樹木移植及修復工程、在設計隔音屏障和行人天橋時考慮其外觀，以及美化削坡上的園景等措施，以改善受影響地區的景觀。

5 總結及建議

5.1 建築期間影響

5.1.1 在施工階段將需要實施合適緩解措施以減輕噪音及空氣質素的影響。晚間工程只局限於需要封路進行的工序，而承建商亦須申領建築噪音許可証。預期如切實執行控制污染措施，將可合符法定及建議的環保指標。至於在施工期間的水質污染應可以緩解至可接受的水平。

5.1.2 預計工程中將會產生不同類別的廢物。估計東面工程和西面工程分別會產生約九十五萬立方米及三十萬立方米的廢物。挖掘出來的廢料應盡量循環再用。在東面工程挖掘出來的泥土可被用作西面工地填海之用。而餘下約六十萬立方米的廢料將須運往別處處理。

5.1.3 區內已受到很多人為騷擾。最主要的生態影響是在汀九段所損失約2.7公頃的二級樹林。但因為區內並未存在稀有生物品種，所以對生態環境的影響並不算嚴重。因公路地形窄長而陡斜，限制了路線的選擇，亦限制了減少對生態影響的方案。顧問公司建議使用本土植物品種進行保償性種植。至於對岸灘的影響，可透過採用高架道路設計代替填海以減低影響。預期工程將會引致約0.7公頃海床永久損失。

5.2 運作期間影響

5.2.1 現時青山公路沿途有頗多對噪音敏感的受體，研究範圍內的地形對改善道路工程造成很大的限制。固此預料將來的交通噪音將超越『香港規劃標準與準則』內水平；因而需要實施大規模的噪音消減措施。建議的緩減噪音策略包括直接及間接消減噪音技術，將會採用的直接消減噪音技術於表4.1 中列明；當中只包括隔音屏障及局部密封的隔音罩。約有二千三百二十户不受上述措施保護的住宅將可設置如隔音玻璃和空調等間接噪音消減措施。

5.2.2 預料在運作階段的空氣質素將可合符空氣質素指標的要求。

5.2.3 在工程峻工及工地修復後，可能影響沿岸水質的污染源主要來自新建路面的徑流及從公路上運輸污染物車輛上的溢漏。但有鑑於在該處有大量的潮汐稀釋作用，相信在普通情況下將仍可符合水質指標水平。但在意外溢漏污染物的情況下，為避免對附近環境可能引起的污染，有需要設置如隔沙池之類的防污設施。應特別注意將雨水排放處遠離如泳灘之類的敏感水體。