

A DRAFT COMPREHENSIVE PLAN TO TACKLE ROAD TRAFFIC NOISE IN HONG KONG

THE DIGEST



Environmental Protection Department

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PREFACE

Hong Kong is one of the densest cities in the world with most of the 6.9 million people being housed in 225 square kilometers of development. Similar to other metropolitan cities, Hong Kong is facing significant road traffic noise problems. Excessive road traffic noise detracts from the quality of life.

The Government is committed to address the road traffic noise problems and has adopted proactive actions through a 4-pronged approach: prevention of traffic noise problems through planning and environmental impact assessment, legislative control of individual vehicles, abatement of noise from existing roads, and education, public engagement and partnership. The existing measures have benefited many people.

Nonetheless, many residents are still exposed to high levels of road traffic noise because of the continuous growth in the economy, population and transport demand. Actions are needed on all possible fronts by all sectors in the community. A comprehensive plan to tackle road traffic noise is necessary.

This digest presents the problems, the actions taken so far, the challenges we face and the proposed enhanced measures to tackle road traffic noise.

All views collected would be taken into account in further development and implementation of this comprehensive plan. We would engage various stakeholders throughout the process.

I INTRODUCTION

1. In many metropolitan cities, road traffic noise has become the most severe environmental noise problem that affects a large number of residents. Being a vibrant city with dense population and intense economic activities, Hong Kong is no exception. Excessive road traffic noise detracts from the quality of life. The immense road traffic noise problems in Hong Kong are due to a combination of factors including the scarcity of habitable land, the economic growth, a concentrated road transport network to support economic growth, a significant increase in population in the past 20 years, a huge housing demand and a lack of environmental concern in the past few decades. There are no simple answers to the road traffic noise problems. This digest presents the challenges we face in Hong Kong and a draft comprehensive plan to tackle the road traffic noise issues.

II WHAT HAS THE GOVERNMENT DONE?

The Policy Objectives

2. The Government's overall policy objectives for road traffic noise control are to ensure that a satisfactory noise environment is attained and maintained in order to safeguard the better quality of life for the public, and to protect people from excessive road traffic noise. The Government's objectives on environmental planning are to avoid creating new environmental problems and seize opportunities for environmental improvement as they arise.
3. When planning new roads, or projects involving substantial widening of existing roads, the relevant government department or developer must ensure that traffic noise at residential flats will stay within the noise standard. It is the Government's policy since 1989 that, as a general principle, equitable redress in the form of direct technical remedies should continue wherever practicable where people are adversely affected by the use of a new road. Also, the Environmental Impact Assessment Ordinance, which came into operation in 1998, requires all major new roads or major road modifications to meet the traffic noise standard.
4. To address the noise impact from existing roads, the Government introduced in November 2000 a policy to implement engineering solutions by way of retrofitting of barriers and enclosures, and resurfacing with low noise material, where practicable, at existing excessively noisy roads. Where engineering solutions are impracticable or where engineering solutions alone are inadequate in reducing the noise to a level below the noise limits, traffic management schemes would be explored wherever practicable on a case by case basis.

The 4-pronged Approach

5. The key milestones in tackling road traffic noise are presented at Appendix 1. The Government has adopted a 4-pronged approach described below to tackle road traffic noise:

- (a) To prevent noise problems through planning or environmental impact assessment at the outset of land use planning and project design wherever practicable;
- (b) To avoid importing noisy vehicles into Hong Kong through legislation;
- (c) To address the existing traffic noise problems through abatement programmes;
- (d) To get the public and other stakeholders involved through education, engagement and partnership programme.

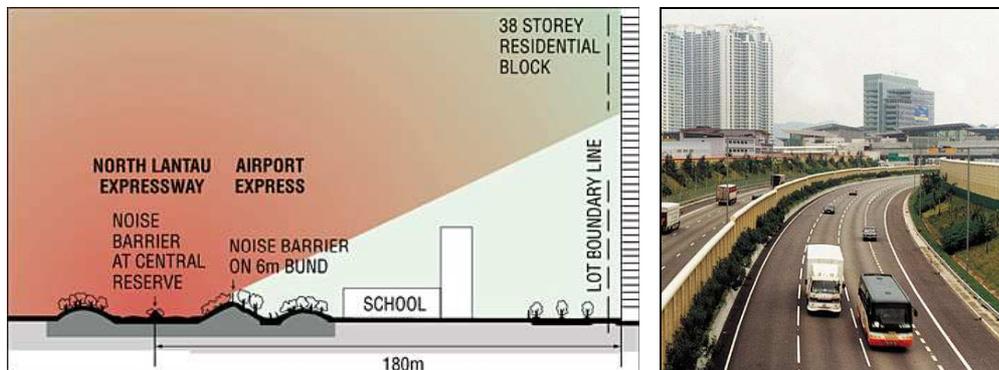
III THE PROGRESS AND SUCCESS OF THE EXISTING MEASURES

Prevention of Noise Problems through Planning and Environmental Impact Assessment

6. The preventive measures through actions at the outset of land use planning and project design planning are described in the following paragraphs.

New Land Uses

7. Planning of new land uses against noise is to provide an environment whereby noise impacts on sensitive uses can be maintained at an acceptable level. The principle is to ensure that new noise sensitive uses are located so as not to be exposed to excessive noise level and new noise emitters are located so as not to introduce excessive levels of noise to existing, committed or planned sensitive uses.



Tung Chung New Town - a good example in planning of new land use

New Roads

8. When planning new roads, the relevant government departments or developers must ensure that traffic noise at sensitive receivers will stay within the acceptable noise limit. If through a defined vigorous assessment procedure, the predicted traffic noise is found to exceed the noise limit, the project proponent must adopt all practicable direct measures,

including adjusting the alignment, considering alternative land use arrangements, using low noise material for surfacing and erecting barriers or enclosures to reduce the impact on users of noise sensitive buildings in the neighbourhood. There is a statutory process under the EIA Ordinance to ensure that the noise performance of new roads is acceptable if the new road project is a Designated

Project under the Ordinance. For those projects not classified as DP, administrative procedures are available requiring the evaluation of the potential environmental impacts and provision of practicable measures. In any case, the Environment, Transport and Works Bureau Technical Circular



West Kowloon Expressway was planned to separate from Mei Foo Sun Chuen by 150m landscape buffer. 3m high barriers were erected to reduce noise at Mei Foo Sun Chuen to meet the standard

(Works) No. 13/2003 provide detailed procedures for mitigation of residual traffic noise impacts from new roads on planning uses including a conflict resolution mechanism.

New Residential Developments

9. The Environment Chapter of Hong Kong Planning Standards and Guidelines (HKPSG) provides a guiding framework for the selection of sites, building disposition and design to reduce traffic noise exposure. A Professional Practice Note on Road Traffic Noise (ProPECC PN1/97) has been in place since 1997 to provide streamlined procedures for submission



Barrier extended from podium and other measures included at the planning of Tierra Verde, Tsing Yi

and vetting of residential development proposals in relation to road traffic noise.

Re-development

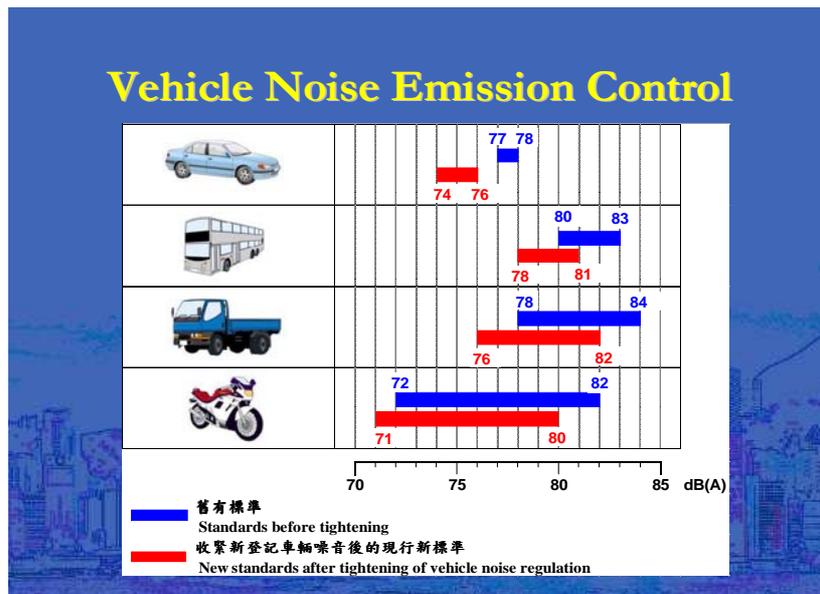
10. For most of the re-development projects, traffic noise mitigation measures are normally included at the project planning stage in order to enhance the quality and marketability of the development. These measures can include careful planning of the location and orientation of buildings, construction of podium, and setting-back of buildings. Construction of noise barrier/canopy may also be considered in more difficult sites. However, the incorporation of noise mitigation measures into building design is not mandatory. Incentive measures such as advertising better noise environment achieved in the sales brochure would encourage enhanced planning against road traffic noise.

Legislative Control of Individual Vehicles

11. The general cause of concern about road traffic noise mainly lies with the stream of traffic running close to residential buildings. Similar to practice in the oversea countries, this is not amenable through legislative control. However, noise emission from individual vehicles could be controlled legislatively. There are provisions under Noise Control Ordinance (NCO) and Road Traffic Ordinance (RTO) for this purpose.

Noise Control Ordinance (NCO)

12. As of 1 August 1996, section 27 of the Noise Control (Motor Vehicles) Regulation requires only the motor vehicle complying with the noise emission standards shall be allowed for first registration in Hong Kong to prevent Hong Kong becoming dumping ground of noisy vehicles. Tightened noise emission standards for vehicles came into operation in 2002 to bring them in line with those of the international standards. However, the regulation does not extend to control the in-use vehicles.



Stringent emission standards bring tangible noise reduction

Road Traffic Ordinance (RTO)

13. There are provisions under RTO to deliver noise control purpose. Regulations 30 and 38 of the Road Traffic (Construction and Maintenance of Vehicles) Regulations control the silencer, expansion chamber etc. and the warning instruments respectively. Regulation 43 of the Road Traffic (Traffic Control) Regulations controls audible warning devices.

Noise Abatement Programmes

14. There are different programmes implemented by the Government to address the traffic noise problem inherited from the past. Some have been completed and some are underway.

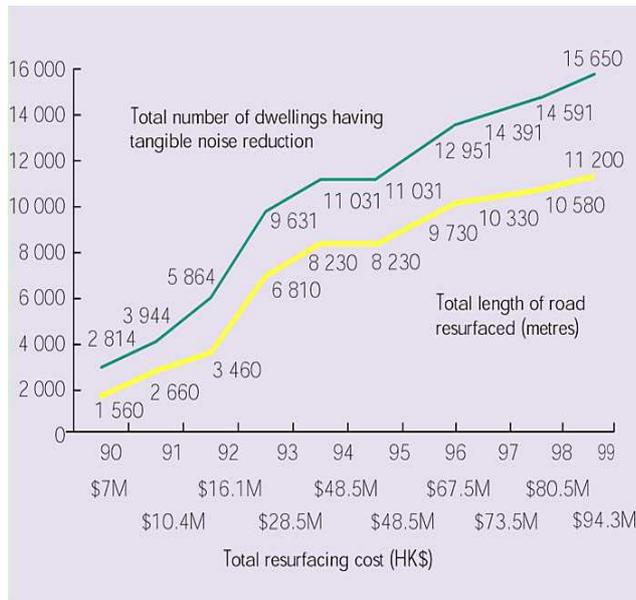
Noise Abatement in Schools Programme

15. The Government spent about \$658 million to insulate 10,900 classrooms against excessive transportation noise including road traffic providing quieter learning environment for 500,000 students.



Highway Resurfacing Programme

16. The Government also completed resurfacing 11 km of suitable highway sections with low noise material at cost of HK\$94 million bringing some relief to 15,600 dwellings. Both programmes came to an end in the late nineties. The low noise material is now the standard for the surfacing of all high speed roads to increase the skid resistance while reduce noise impact. Research and study have been carrying out for improving the durability and noise performance of the low noise material.



Retrofitting Noise Barrier Programme

17. In November 2000, the Government introduced a policy to address noise impact of existing roads on residents in their neighbourhood through retrofitting of barriers and enclosures, and resurfacing with low noise material. Subject to the availability of resources, engineering solutions should be implemented where practicable and technically feasible at existing excessively noisy roads. This policy is implemented through administrative arrangements.

18. So far, the Government has identified 36 existing road sections where retrofitting works are technically feasible. Of these 36 road sections, retrofitting works along Fanling Highway near Choi Yuen Estate and Fanling Centre were substantially completed in February 2006. The construction works for retrofitting works along Cheung Pei Shan Road commenced for completion in 2008. Funds for retrofitting works along 18 existing road sections at HK\$1,100 million have been earmarked. The total indicative cost of retrofitting the 36 road sections with noise barriers / enclosures is about \$2,400 million. Upon full implementation, the annual recurrent maintenance cost of the barriers/enclosures will be around \$15.8 million. About 26,000 dwellings will benefit from the retrofit programme with majority experiencing reduction in noise below the noise limit [Appendix 2]. Barriers would be designed to visually compatible with the vicinity to avoid creating eyesore in landscape.



*Retrofitting
barriers at
Fanling
Highway*

Low Noise Material Resurfacing

19. The Government has also identified 72 existing road sections for further feasibility studies on their suitability to be resurfaced with low noise surfacing material. By February 2006, the resurfacing works for 25 road sections have been completed. Subject to the availability of resources, the road resurfacing programme is scheduled for completion by 2010. The whole resurfacing programme will benefit about 40,000 dwellings and cost about \$80 million. The estimated annual recurrent maintenance cost of the measure is about \$20M [Appendix 3].



Overlaying low noise road surfacing materials on one of the trial sections

Traffic Management Scheme

20. Banning certain vehicles for example heavy vehicles from entering an area or running on a particular road either the whole day or at night could bring substantial noise benefit.



Banning heavy vehicles using Tsing Fung Street at night time

Currently, there are limited numbers of schemes implemented owing to strong objection from the transport trades. Such schemes could only be devised when alternative routes are available and the noise nuisance would not be transferred to residents along the diverted routes.

Pedestrianization

21. Pedestrianization can enhance road safety for pedestrians and improve the overall environment for pedestrians. Against this background, a number of pedestrianization schemes have been implemented in various districts, such as Central, Causeway Bay, Jordan, Mong Kok and Sham Shui Po. While traffic noise at



Pedestrianization scheme at Causeway Bay

the pedestrianised street may be reduced during the pedestrianised period, there may be increase in traffic noise at its surrounding roads due to traffic diversion.

Education, Public Engagement and Partnership

22. We developed an education package for school children and the public for dissemination of general knowledge about acoustics, noise and its generation, minimization and prevention of noise problems. Also, 3-Dimensional (3D) noise modeling tool has been devised to facilitate public engagement and understanding of the noise impact results through advanced modeling and visualization of noise information in 3D color format. Through the tool, the public would easily grasp the noise information and hence discussion during consultation would be greatly facilitated. This tool was deployed the first time in Hong Kong and probably in the world at a consultation meeting with local district council for one of the retrofitting barrier projects. This 3D noise modeling tool has now been recognized by many professionals as a very versatile and convenient tool in public engagement and consultation. Also we regularly host roundtable forum on

noise policy issues to promote interactive, constructive dialogues with professional institutions and known noise experts and academics in Hong Kong, with a view to building rapport, partnership and understanding. The forum is very useful for exchanging of ideas and views, and help to map out the directions in dealing with the problem.

Environmental Protection Department
The Government of the Hong Kong
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Environmental Noise
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What are the principles of controlling noise?

How does noise become a problem?

The following diagram shows a common noise situation in many populated cities:

A noise problem starts with a noise source such as a stream of traffic on a highway. The noise is transmitted through a path and then arrives at the receiver. The noise will be perceived as a problem when the noise is so high as to be a nuisance to the receiver. The severity of the problem depends on the strength of the noise source (such as heavy or light traffic) or the length of the path, that is, how large is the separation between the noise source and the receiver.

CD-ROM produced by EPD to promote awareness of general public on environmental noise

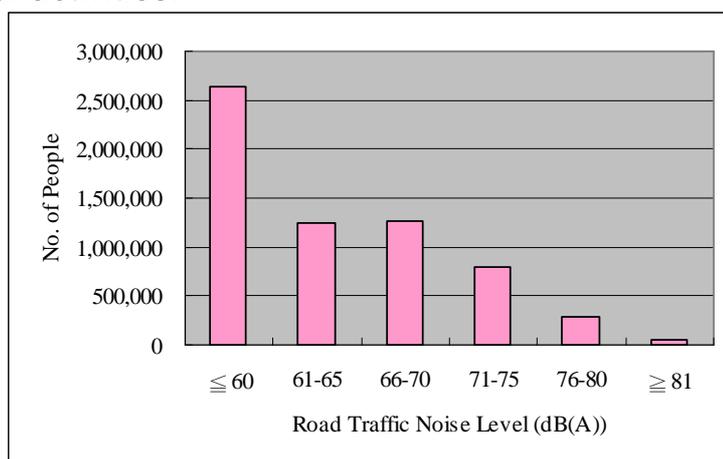
The Successes

23. The traffic noise measures in the past have altogether benefited some 757,000 residents while another 193,000 residents would be benefited upon full completion of the entire noise barrier retrofitting programme and low noise road surfacing programme. However, in the light of population and economic growth and the high density development nature in Hong Kong, it is not possible to resolve all traffic noise problems. Whilst there is no panacea to the road traffic noise problem, the Government is committed to do all it can to improve the noise environment.

IV THE EXTENT OF RESIDUAL ROAD TRAFFIC NOISE PROBLEM IN HONG KONG

The Extent of the Residual Problem

24. Despite the actions and measures taken by the Government, about 1.1 million people in Hong Kong are still exposed daily at home to high levels of road traffic noise exceeding 70 dB(A)L₁₀(1 hour)¹ (Appendix 4). This is due to a combination of factors including the scarcity of habitable land, a significant increase in population and housing needs in the past 20 years, and a huge transportation demand to support economic growth and social activities.



Histogram outlining the population exposure to road traffic noise in Hong Kong

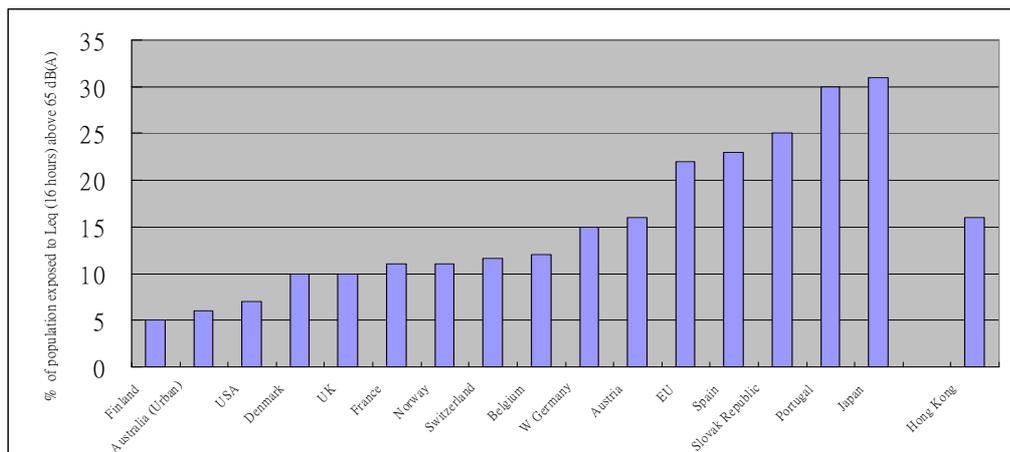
25. Alongside the economic growth, there is a rising community aspiration for a better noise environment for a more sustainable living. In the past 5 years, Environmental Protection Department received an average of some 400 complaints each year. Besides, the LegCo members are very concerned about road traffic noise affecting the general public. There have been 8 LegCo case conferences held since April 2005 and many calls for actions by the District Councils. LegCo members and District

¹ L₁₀(1 hour) is the noise level exceeded for 10% of a one-hour period, generally used for road noise at peak traffic flow. The limit adopted in EIAO and HKPSG for assessing road traffic noise affecting residential buildings.

Councilors have requested the Government to adopt more proactive and comprehensive means to resolve the problems.

Comparison with Other Countries and Regions

26. The population exposed to excessive road traffic noise hinges on many factors such as population density, growth of economic activities, transport demand as well as the strategies adopted to cope with such pressures. Around the world, there is limited information published on the percentage of population exposed to road traffic noise, and a variety of estimation methods have been used in different countries and at different times. An attempt has however been made to analyse where we stand. While road traffic noise problem is generally less severe in some countries or regions with less pressure on the environment, the noise situation in Hong Kong is on a par with, other countries or region², notwithstanding the fact that the density of development in Hong Kong is much higher than other places.



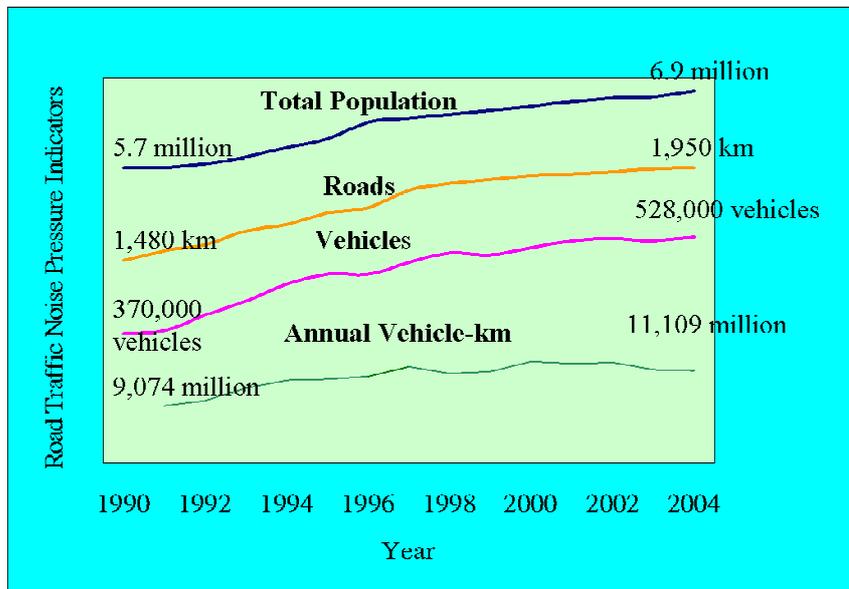
Road traffic noise population exposure in overseas countries

² Comparison based on:

- OECD Environmental Data, Compendium 1993 (except for Australia and EU)
- EC Green paper, Brussels 1996
- "Road Traffic Noise Exposure in Australian Capital Cities", Vol. 31 April (2003) No. 1-11, Acoustics Australia
- Annual Report on Environment in Japan 2005, Ministry of the Environment
- A 2003 review in Japan showed that 19.3 % and 30.1 % of the assessed households in areas facing roads and truck roads would respectively exceed the respective day and/or night time Environmental Quality Standards
- Data for Hong Kong based on 2005 estimate

V THE RATIONALE – WHY ACTION NOW

27. Our road traffic noise situation is expected to get worse. The strategic Environmental Assessment in the Third Comprehensive Transport Study (completed in 1999) has predicted that by 2016 the traffic noise situation, with no restraint on the growth in traffic, could lead to 50% increase in population exposed to excessive traffic noise as compared with the situation in 1997. Besides, by 2016, the exposure period would be prolonged and excessive traffic noise would intrude from early in the morning to nighttime hours. The latest review indicates a possible improvement but there could still be some 10% increase in population exposed to excessive traffic noise around 2016.



The Pressure on our Environment

28. It is difficult to stand still under continuous enormous development pressures. The situation would significantly deteriorate in future if development trends continue. Immediate proactive action plans are required to prevent worsening of the situation and improve the situation. A comprehensive action plan is therefore required to prevent worsening of the situation and improve the noise environment.

VI THE REMAINING PROBLEMS AND CHALLENGES

29. There is no panacea to the road traffic noise problems particularly in a densely populated metropolitan city like Hong Kong. In light of population and economic growth, it is not possible to resolve all the noise problems. For instance, the noise barrier retrofit programme and the low noise material resurfacing programme would only benefit some 70,000 dwellings. Upon full implementation, there are still some 300,000 dwellings, equivalent to about one million people, not benefiting from these measures. The Government is committed to do all it can within the constraints to improve the noise environment. More proactive actions are required on all possible fronts by all sectors. New policy instruments would need to be considered. Controlling and minimizing the traffic noise problems require shared responsibilities and partnership among all sectors in the community.

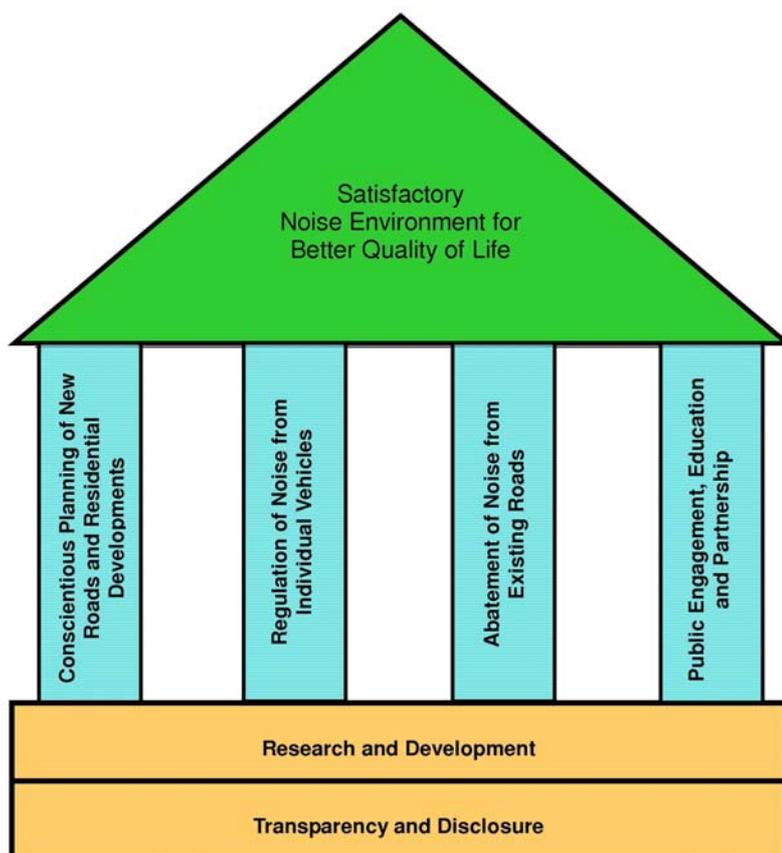
VII THE KEY PRINCIPLES AND DRIVING CONCEPTS

30. In line with the latest policy framework and approaches adopted in Organisation for Economic Cooperation and Development (OECD) countries and other advanced countries, a pressure-state-response-effect (PSRE) framework ([Appendix 5](#)) and a range of policy instruments ([Appendix 6](#)) have been considered and adopted to tackle road traffic noise and to identify enhanced measures. In particular, information instruments will be fully deployed to promote environmental best practices, inform decision-making, facilitate the market to operate, and educate and engage the stakeholders.
31. The following principles and concepts have been applied to guide the formulation of strategy and measures to tackle the traffic noise problems:
 - Regulatory control at source
 - Information-based instruments and market tools
 - Planning for strategic and infrastructure developments, land use, new roads, new residential developments and re-development
 - Infrastructural investments
 - Adoption of the latest noise mitigation technologies
 - Education and partnership programmes to enhance the public understanding

VIII THE PROPOSED ENHANCED MEASURES

FORMULATING ENHANCED MEASURES

32. In the context of Hong Kong, a balanced, integrated, proactive and transparent strategy is needed to tackle road traffic noise problems. The long term goal is to achieve satisfactory noise environment for better quality of life.



The "Balanced, Integrated, Proactive and Transparent" strategy towards road traffic noise

33. We will continue to vigorously apply the noise guidelines in the Environmental Chapter of Hong Kong Planning Standards and Guidelines, enforce the EIA Ordinance, prevent the import of noise vehicles, abate the noise from the existing roads and engage the public. In addition to these existing measures and based on the principles and concepts described above, we

propose the following enhanced measures in tackling road traffic noise problem in Hong Kong:

- Extending the trial of low noise road surfacing materials;
- Exploring new design of low noise road surfacing materials;
- Exploring optimum barrier design for territory-wide use;
- Exploring the control of noise emission from in-use vehicles;
- Reviewing the Professional Practice Note on Road Traffic Noise (ProPECC PN1/97);
- Promoting the disclosure of noise information in sales brochure;
- Improving joints at flyover;
- Exploring night-time traffic noise standard; and
- Enhancing public engagement and partnership.

Extending the Trial of Low Noise Road Surfacing Materials

34. Low noise road surfacing material is now a standard material for high speed road in the territory. However, due to various limitations such as durability and porous nature, its application of local low speed road is restricted to certain road geometric and traffic parameters. The trial for 72 road sections currently underway is to test out the effect in terms of noise reduction and engineering ability. Notwithstanding that the trial results would be made available by 2010, it is considered worthwhile and promising to go beyond the restriction by including another phase of trial so that road sections which were originally excluded due to incompatibility in engineering terms would be put into trial. Information on the number of road section eligible, the associated cost and number of dwellings protected would be available in second half of 2006.

Exploring New Design of Low Noise Road Surfacing Materials

35. The Government is commissioning a comprehensive study involving world renowned expert in designing low noise road surfacing material and local academics in reviewing the application of low noise road surfacing materials in Hong Kong in order to develop a durable material with enhanced noise reduction ability for wider application in the territory. It is

expected that the study would commence in the second half of 2006 and would take about 16 months for completion.

Exploring Optimum Barrier Design for Territory-wide Use

36. The Government would continue to liaise with and keep in view the overseas and local researchers in developing new types of barriers with enhanced performance and pleasant outlook. The Government would also collaborate with international renowned specialists, local academia and researchers in deriving optimum designs for local situation and putting the designs into application. The Government would commission a focus study involving world renowned expert and local academics to look into the design of road side barriers in Hong Kong with a view to developing an optimum system and design with enhanced noise reduction ability for wider application in the territory. It is scheduled to kick-start the study in late of 2006 and would take 12 - 18 months for completion.

Controlling Noise Emission from In-use Vehicles

37. Whilst the cause of concern regarding road traffic noise mainly lies with the stream of traffic running close to residential buildings, the noise emission of vehicle or to some extent the noisy vehicle should not be taken lightly. It is noted that a small number of in-use vehicles are creating different degrees of disturbances to the community. Apart from poor driving habits, the cause of concerns is likely due to illegal tampering and lack of proper maintenance of engines, mufflers, brakes etc. Notwithstanding that the problem may not be a widespread one in similar nature as to the general road traffic noise; there is a need to address the impacts of excessive noise from vehicles. The Government has included a new clause in the newly granted bus franchises requiring the franchisees to adopt commercially available technologies and products as specified by the Commissioner for Transport, with a view to reducing noise emission from buses for both new and in-use vehicles.
38. The Government would consider providing a Code of Practice and Education Pack for trade and franchisees on noise conscientious driving habits and proper maintenance of vehicle

in particular the mufflers and brakes. As a medium and longer-term measure, the Government would also look into the feasibility of controlling noise from in-use vehicles. It is expected that the study would commence in late 2006.

Review of the Professional Practice Note on Road Traffic Noise (ProPECC PN1/97)

39. The Professional Practice Note would be reviewed and amended with a view to improving the environmental performance of new residential developments protecting more number for dwellings from excessive road traffic noise and providing more noise performance information to the public in a more transparent manner. The revision is to explore measures to provide more protection to the future residents. It is expected that the revision would be available for consultation in the first half of 2007.

Promotion of Disclosure of Noise Information in Sales Brochure

40. There is now a community demand for disclosing environmental information to the prospective property purchasers so that they can be better informed and when making their choices. In consultation with other policy bureaux and departments and other stakeholders we would explore the feasibility of this arrangement and the best means to meet the community demand.

Improving Joints at Flyovers

41. To some extent, the noise arising from heavy vehicles running on joints at flyovers causes concerns to residents living next to flyovers at early morning or late night. To improve the situation, the Government would look into improving the design and maintenance of the joints.

Exploring Night-time Traffic Noise Standard

42. Strategic Environmental Assessment of CTS3 has identified that by 2016, the hourly noise levels could not comply with the

relevant standard during most time of the day and residents have to endure excessive traffic noise from early in the morning to nighttime hours. From this perspective, there is a need to investigate the feasibility and practicability of introducing night-time traffic noise standard to protect residents from high level of traffic noise disturbing their sleeps. The Government would study the pros and cons of introducing such standard in the context of Hong Kong and benchmark with overseas practice. The effectiveness of such measures would certainly be the focal point of study. Also, the manner of applying and administering the standard, if established, would require due consideration to the practicability in the local situation. The study is expected to commence study by early 2007.

Enhancing Public Engagement and Partnership

43. The Government would promote research and development on various noise reduction measures including low-noise road surfacing, noise barriers materials and designs, and the application of multi-media, 3D noise planning techniques for public engagement and better planning and design. In this regard, the Government would build partnership with the research institutions, universities and professional bodies.

IX THE WAY FORWARD

The Implementation Issues

44. Given the massive nature of the problem and the likely enormous substantial capital and manpower resource involvements arising from the proposed enhanced measure to tackle road traffic noise, it is necessary to give due consideration to the various implementation issues.

The Necessary Studies to Support Actions or Proposals

45. It is necessary to establish the scope of application and its effectiveness before the particular measures could be fully implemented. These could be done through studies. Such studies would also help to develop the optimum scenario of applying the measures. The studies can be categorized into a research type and a design for implementation type study. The former relates to those that aim to establish the feasibility, whereas the latter looks at the procedures and the appropriate design of measures etc.
46. In exploring new design of low noise road surfacing materials and optimum barrier design for territory-wide application, overseas renowned experts would be teamed up with local research academics to comprehensively review the application of the materials in the peculiar situation of Hong Kong.
47. For controlling noise emission from in-use vehicles, a feasibility study would be commissioned to look into the testing procedures, the testing equipment, the necessary amendments in respective and related legislations and the strategies of implementation etc. As for the night time traffic noise issue, a feasibility study would be conducted to benchmark overseas experience, evaluate its feasibility in local situation and the setting of the standards etc.

The Capacity and Support Required

48. It is likely that some of the enhanced measures would be the cutting edge research outcomes while some may pose wider implications. Supports from relevant bureaux and departments and members of public, relevant professionals, relevant trades, public transport operators would be of paramount importance.

The Funding Issues

49. Additional funding would be needed for commissioning the studies and the implementation of enhanced measures such as wider application of low noise road surfacing materials, noise barriers and annual inspection of in-use vehicles. This would be sought through normal resources allocation exercises.

The Stakeholders

50. Given the wider scope of the enhanced measures, the public, various professionals, the trades and the public transportation (except rail and tram) operators would be included as the stakeholders.

Noise Profession, the Related Industry, the Necessary Research and Professional Development Required

51. To support conducting the studies and implementation of the measures, it is necessary to have adequate noise profession and reliable noise mitigation industry so that the necessary research and professional development can be maintained in a sustainable manner.

The Engagement, Consultation and Communication Strategy and Plan

52. As the enhanced measures would affect almost all residents in Hong Kong, many trades, public transport operators and various professionals, we plan to develop a comprehensive consultation and communication strategy for each and every enhanced measure. Implementation would take place upon completion of satisfactory consultation.

The Timetable and Detailed Action Plan

53. It would likely take 6 months to 18 months for the studies of various types of enhanced measures. When the study results are in place, the consultation and communication plan can be developed. Detail action plans would be drafted in parallel, taking into account the results of the consultation. Depending on the availability of resources, our rough estimate indicates that some enhanced measures could likely be implemented at 18 months from now and some may take years. We would devise the timetable and detailed action plans when more information is available and after the relevant stakeholders have been consulted.

The Budget and Manpower Requirements

54. To conduct the above studies and to implement the enhanced measures, additional resources and the appropriate professional supports in the related bureaux and departments would be necessary. Sufficient staff resources need to be in place to oversee the studies and implementation.

Research and Development

55. Some of the enhanced measures would likely require in-depth if not extensive research involvement. The research and development required would also promote and serve as catalyst for the development of the related professionals in the territory which could be considered as an additional benefit to the local professionals and industries.

Monitoring and Review Process and Mechanism

56. A high-level steering committee to be chaired by Permanent Secretary for the Environment, Transport and Works (Environment) with the participation of senior level colleagues from the bureaux and departments involved would be established to oversee, monitor and review the progress of studies and implementation. Technical working groups would be set up to follow through the measures or actions in this

comprehensive plan. Liaison group meetings would also be convened to engage the stakeholders and gauge their responses.

X SUMMARY

57. Similar to other metropolitan cities, many residents in Hong Kong are exposed to high level of road traffic noise. Although the Government has taken many proactive actions, road traffic noise still remains the most severe environmental noise problem. The Government would continue to adopt a "balanced, integrated, proactive and transparent" strategy in tackling road traffic noise. We would consult all relevant stakeholders, conduct necessary feasibility studies and seek funding and resources to develop and implement the proposed enhanced measures to tackle the road traffic noise problems. Support from and partnership with all stakeholders are crucial in this common endeavour to pursue a satisfactory noise environment for better quality of life for all citizens in Hong Kong.

Appendix 1

Key Milestones of Government Efforts in Tackling Road Traffic Noise in Hong Kong

Year	Milestones
1985	the Environment Chapter of the Hong Kong Planning Standards and Guidelines (HKPSG) endorsed by the Land Development Policy Committee (LDPC), setting out, inter alia, the traffic noise standard of L10(1hr) 70 dB(A) for planning against road traffic noise
1989	Established the Government policy that direct mitigation measures be incorporated into new roads where practicable.
1990	the Environment Chapter of the HKPSG comprehensively revised and endorsed by LDPC, reaffirming the adoption of the traffic noise standard of L10(1hr) 70 dB(A) and included a hierarchy of planning measures and guidelines for prevention of road traffic noise problems.
1994	The government transparency policy, which was endorsed by the Chief Secretary's Committee, on the release of EIA reports established and issued, requiring all government owned EIA reports or EIA reported owned by public corporations to be released to the public through public libraries and to the Advisory Council on the Environment.
1996	Regulation on noise emission from first registered vehicles approved by the Legislative Council, required compliance with stringent noise standards similar to Europe and Japan .
1997	Professional Practice Note on Road Traffic Noise issued as a pragmatic response to the housing demands at that time.
1998	The Environmental Impact Assessment Ordinance (EIAO) came into operation, requiring all major new roads or road modifications to meet the traffic noise standard set out in the Technical Memorandum on EIA process issued under the EIAO. Also, feasibility studies involving developments more than 20 hectares or population more than 100,000 people are required under the EIAO to be subject to a statutory EIA study to demonstrate that the traffic noise standard can be met. The EIA process became fully transparent and all EIA reports are required to be made available through the Register Office and the EIAO web site.
2000	The Government policy to deal with existing roads established and promulgated, announcing a programme to retrofitting suitable existing roads with barriers or low noise surfacing materials
2002	Amended regulation on noise emission from first registered vehicles approved by Legislative Council to require compliance with tightened noise standards in line with the latest standards adopted by Europe and Japan.
2003	The 5 policy principles to deal with new and existing roads promulgated, requiring (a) major new roads and developments to fully abide by EIAO and (b) the measures for existing roads to take account of the technical feasibility, severity of noise problems, population affected, visual impacts and cost-effectiveness consideration
2006	A draft comprehensive plan to tackle road traffic noise launched for consultation.

Appendix 2

List of Retrofit Projects and Implementation Schedule (as at March 2006)

Group I - Funding has been approved by the Finance Committee (3 sections)

Ref No.	Road Section	PWP Category	Tentative Schedule	
			Commencement	Completion
1	Fanling Highway (near Choi Yuen Estate) ¹	A	Aug 2004	Feb 2006
2	Fanling Highway (near Fanling Centre) ¹	A	Aug 2004	Feb 2006
3	Cheung Pei Shan Road ²	A	Sept 2005	Mar 2008

¹ The installation of noise barriers was completed in February 2006.

² Retrofitting works are being carried out by Civil Engineering and Development Department to tie in with adjoining road works.

Group II - Funding has been earmarked in RAE (18 road sections)

Ref No.	Road Section	PWP Category	Tentative Schedule	
			Commencement	Completion
4	Ma On Shan Road ³	B (2005 RAE)	Under review	
5	Yuen Shin Road (near Kwong Fuk Estate) ⁴	B (2005 RAE)	Dec 2007	Jun 2009
6	Tseung Kwan O Road (near Hing Tin Estate)	B (2005 RAE)	Dec 2007	Dec 2009
7	Tseung Kwan O Road (near Tsui Ping (South) Estate)			
8	Tuen Mun Road (Tsuen Wan) ⁵	B (2005 RAE)	To be implemented under Tuen Mun Road Reconstruction and Improvement contract (Jul 2007 to Mar 2012 in stages)	
9	Tuen Mun Road (Sam Shing Hui) ⁵			
10	Tuen Mun Road (Tsing Lung Tau) ⁵			
11	Tuen Mun Road (Castle Peak Bay) ⁵			
12	Tuen Mun Road (Anglers' Beach) ⁵			
13	Tuen Mun Road (Sham Tseng) ⁵			
14	Tuen Mun Road (Yau Kom Tau) ⁵			
15	Tsing Tsuen Bridge (Tsuen Wan and Tsing Yi)	B (2005 RAE)	Dec 2007	Dec 2010
16	Tai Chung Kiu Road	B (2005 RAE)	Jun 2008	Nov 2010
17	Che Kung Miu Road	B (2005 RAE)	Jun 2008	Nov 2010
18	Hung Mui Kuk Road / Che Kung Miu Road	B (2005 RAE)	Jun 2008	Nov 2010
19	Tin Sam Street	B (2005 RAE)	Jun 2008	Nov 2010
20	Sha Tin Road	B (2005 RAE)	Jun 2008	Nov 2010

³ Sha Tin District Council was consulted on 10 November 2005 on the proposal of trial paving of low noise surface at the section of Ma On Shan Road near Yiu On Estate and to defer construction of retrofit barriers. Views from members were divided but a motion was passed to request the Government to construct the retrofit barriers. Implementation programme of the retrofitting works will be reviewed after the district councilors and residents reach consensus on the noise mitigation measures.

⁴ In view of residents' concerns, the road section near Kwong Fuk Estate has been resurfaced with low noise material. Tai Po District Council was consulted on 17 March 2006 and supported the installation of the retrofit barrier. The concerned district councilors and committees of incorporated owners will be consulted on the barrier design.

⁵ Retrofitting works for seven sections of Tuen Mun Road will be implemented under the "Reconstruction and Improvement of Tuen Mun Road" project. Implementation programme will be subject to further review to tie in with the latest development of the road project.

Ref No.	Road Section	PWP Category	Tentative Schedule	
			Commencement	Completion
21	Kwun Tong Bypass	B (2005 RAE)	Jun 2008	Jun 2010

Group III - Funding to be sought through Resources Allocation Exercise (2 road sections)

Ref No.	Road Section	PWP Category	Tentative Schedule
22	Hoi On Road	C	Funding will be sought through the normal resources allocation mechanism under the public works programme
23	Po Lam Road North		

Group IV - Not yet included in the public works programme (13 road sections)

Ref No.	Road Section	PWP Category	Tentative Schedule
24	Fung Shue Wo Road (Tsing Yi Estate to Tsing King Road Roundabout)	N/A	Preliminary investigations identified retrofitting works are technically feasible and arrangement will be made for inclusion in the public works programme
25	Po Ning Road		
26	Shun Lee Tsuen Road		
27	Yuen Wo Road		
28	West Kowloon Corridor (near Nam Cheong Estate)		
29	Heung Yip Road		
30	Ma Wang Road		
31	Sau Mau Ping Road		
32	Tai Po Road (Sham Shui Po)		
33	Chai Wan Road		
34	Castle Peak Road (Ping Shan)		
35	Castle Peak Road (Hung Shui Kiu)		
36	Ap Lei Chau Bridge (near Shan Ming Street)		

Appendix 3

Low Noise Resurfacing Programme

(as at March 2006)

Road No	Road	From	To	Implementation Timetable
Phase I (24 sections)				
1	Pik Wan Road	Tak Shing House	Tak Shui House	Works completed.
2	Cox's Road	Austin Road	Jordan Road	Works completed
3	Fa Yuen Street	Prince Edward Road West	Boundary Street	Works completed.
4	Hing Wah Street	Cheung Sha Wan Road	Un Chau Street	Works completed.
5	Kimberley Road	Nathan Road	Observatory Road	Works completed.
6	Mong Kok Road	Shanghai Street	Tong Mi Road	Works completed.
7	Nam Cheong Street	Cheung Sha Wan Road	Lai Chi Kok Road	Commencement delayed due to other works in the area. Works tentatively to complete by 2007/08.
8	Oak Street	Cherry Street	Ivy Street	Works completed.
9	Portland Street	Argyle Street	Waterloo Road	Commencement delayed due to other works in the area. Works tentatively to complete by 2007/08.
10	Public Square Street	Ferry Street	Canton Road	Works completed.
11	Reclamation Street	Public Square Street	Argyle Street	Commencement delayed due to other works in the area. Works tentatively to complete by 2007/08.
12	Sai Yee Street	Prince Edward Road West	Boundary Street	Works completed.
13	Un Chau Street	Hing Wah Street	Tonkin Street	Works completed.
14	Waterloo Road	Ferry Street	Shanghai Street	Works has commenced and tentatively to complete in 2006

Road No	Road	From	To	Implementation Timetable
15	Yen Chow Street	Hai Tan St	Lai Chi Kok Rd	Commencement delayed due to other works in the area. Works tentatively to complete by 2005/06.
16	Lai Chi Kok Road	Tonkin Street	Hing Wah Street	Technical feasibility under review.
17	Tonkin Street	Cheung Sha Wan Road	Un Chau Street	Works completed.
18	Shanghai Street	Public Square Street	Kansu Street	Technical feasibility under review.
19	Un Chau Street	Tonkin Street	Yen Chow Street	Works completed.
20	Shanghai Street	Argyle Street	Dundas Street	Works completed.
21	Embankment Road	Prince Edward Road West	Boundary Street	Works completed.
22	Shek Kip Mei St	Tai Po Road	Woh Chai Street	Works completed..
23	Tai Hang Tung Road	Tong Yam Street	Tat Chee Avenue	Works has commenced but due to other works in the area completion has deferred to 2007/08.
24	Yim Po Fong Street	Shantung Street	Waterloo Road	Works completed.
Phase II (22 sections)				
25	Aberdeen Main Road	Aberdeen Praya Road	Aberdeen Reservoir Road	Technical feasibility under review.
26	Connaught Road West	Des Voeux Road West	Water Street	Technical feasibility under review.
27	Electric Road	Gordon Road	Wing Hing Street (Tsing Fung Street)	Commencement delayed due to other works in the area. Works tentatively to complete by 2007/08.
28	Java Road	Tong Shui Road	Tin Chiu Street	
29	King's Road	Healthy Street West	Java Road	Works tentatively to complete by 2006/07.
30	Kingston Street	Paterson Street	Gloucester Road	Works completed.
31	Lockhart Road	Arsenal Street	Percival Street	Commencement delayed due to other works in the area. Works tentatively to complete by 2008/09.

Road No	Road	From	To	Implementation Timetable
32	Queen's Road West	Des Voeux Road West	Hill Road	Commencement delayed due to other works in the area. Works tentatively to complete by 2006/07.
33	Whitty Street	Des Voeux Road West	Queen's Road West	Works completed.
34	Johnston Road	Luard Road	Fleming Road	Works completed.
35	Wong Nai Chung Road	Sing Woo Road	Broadwood Road	Commencement delayed due to other works in the area. Works tentatively to complete by 2007/08.
36	Queen's Road West	Western Street	Water Street	
37	Wong Nai Chung Road	Sports Road	Broadwood Road	
38	Hennessy Road	Fleming Road	Stewart Road	Works completed.
39	Queen's Road East	Queensway	Kennedy Road	Commencement delayed due to other works in the area. Works tentatively to commence and complete in early 2006.
40	Chi Kiang Street	To Kwa Wan Road	Ma Tau Wai Road	Commencement delayed due to other works in the area. Works tentatively to complete by 2006/07.
41	Ma Tau Kok Road	Kowloon City Road	Ma Tau Chung Road	Works has commenced and tentatively to complete 2006/07.
42	Wuhu Street	Gillies Ave. South	Chatham Road North	Technical feasibility under review.
43	To Kwa Wan Road	Kwei Chow Street	Chi Kiang Street	To tie in with the adjoining road works to be carried out by KCRC. Works tentatively to complete in 2010.
44	To Kwa Wan Road	Mok Cheong Street	Ma Tau Kok Road	
45	Lomond Road	Argyle Street	Prince Edward Road	Works completed.
46	Nga Tsin Wai Road	Tak Ku Ling Road	Junction Road	Technical feasibility under review.
Phase III (New Territories East - 12 sections)				
47	Jockey Club Road	Po Shek Wu Rd	Man Kam To Road	Technical feasibility under review.

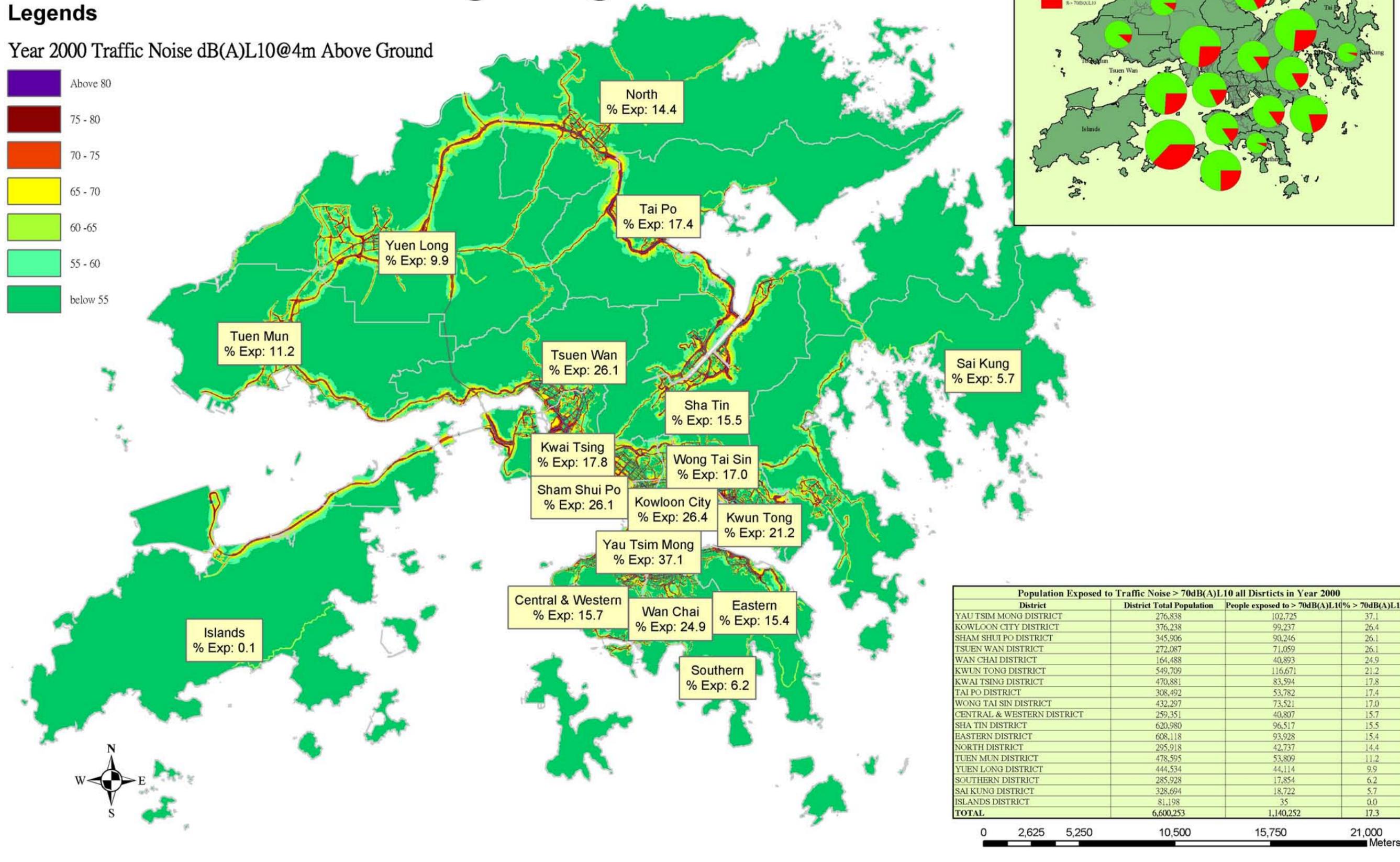
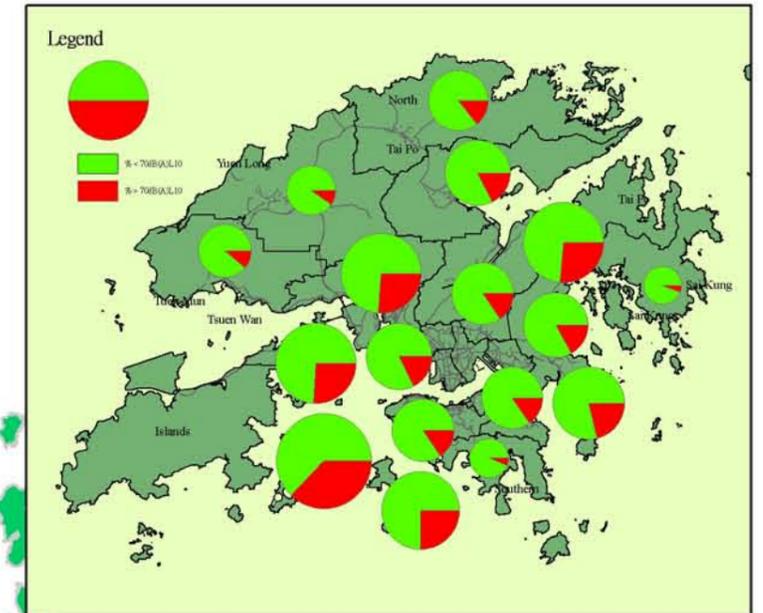
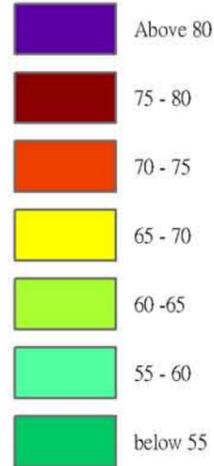
Road No	Road	From	To	Implementation Timetable
48	Jockey Club Road	Lung Sum Avenue	San Fung Avenue	Works tentatively to complete by 2006/07.
49	Ma Sik Road	Jockey Club Road	Tin Ping Road	Works tentatively to complete by 2006/07.
50	Tai Po Tai Wo Road	On Cheung Road	Nam Wan Road	Works completed.
51	Tai Po Tai Wo Road	Ting Kok Road	Ting Tai Road	Works completed.
52	Nam Wan Road	Nga Wan Road	Pan Chung Road	Works tentatively to complete in early 2006.
53	Shatin Rural Committee Road	Tai Po Road – Shatin Section	Yuen Wo Road	Technical feasibility under review.
54	Sha Tin Wai Road	Ngan Shing Street	Ngau Pei Sha Street	Commencement delayed due to other works in the area.
55	Sha Tin Wai Road	Sha Tin Road	Ngan Shing Street	Works tentatively to complete by 2008/09.
56	Tai Chung Kiu Road	Sha Kok Street	Sha Tin Wai Road	Works tentatively to complete by 2006/07.
57	Chiu Shun Road	Po Ning Road	Ngan O Road	Works completed.
58	Chui Tin Street	Che Kung Miu Road	Cul-de-sac	Works completed.
Phase III (New Territories West - 14 sections)				
59	Castle Peak Road	Tuen Mun Heung Sze Wui Road	Hing Ping Road	Works has commenced and tentatively to complete in 2006/07.
60	Castle Peak Road	Pui To Road	Tuen Mun Heung Sze Wui Road	
61	Tuen Mun Heung Sze Wui Road	Tuen Hing Road	Siu Lun Street	Works tentatively to complete by 2006/07.
62	Tuen Mun Heung Sze Wui Road	Siu Lun Street	Hoi Chu Road	Works tentatively to complete by 2007/08.
63	Wu Shan Road	Lung Mun Road	Wu King Road	Works has commenced and tentatively to complete in early 2006.
64	Long Ping Road	Fung Chi Road	Long Ping Road INT.	Works has commenced and tentatively to complete in 2006/07.
65	Yuen Long Main Road	Tai Tong Road	Fung Cheung Road	Technical feasibility under review.

Road No	Road	From	To	Implementation Timetable
66	Yuen Long On Ning Road	Tai Kiu Road	Wang Chau Road	Works tentatively to complete by 2006/07.
67	Ma Miu Road	Yuen Long On Ning Road	Ma Wang Road	
68	Castle Peak Road	Ping Ha Road	Tin Ha Road	Works tentatively to complete by 2007/08.
69	Chung On Street	Sha Tsui Road	Yeung Uk Road	Technical feasibility under review.
70	Yeung Uk Road	Tai Ho Road	Chung On Street	Works tentatively to complete by 2006/07.
71	Kwai Foo Road	Kwai Chung Road	Hing Fong Road	Works tentatively to complete by 2006/07.
72	Kwai Yik Road	Kwai Chung Road	Hing Fong Road	

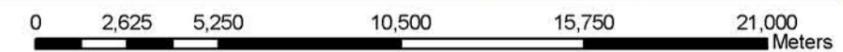
Spatial Distribution of Traffic Noise Problem in Hong Kong

Legends

Year 2000 Traffic Noise dB(A)L10@4m Above Ground

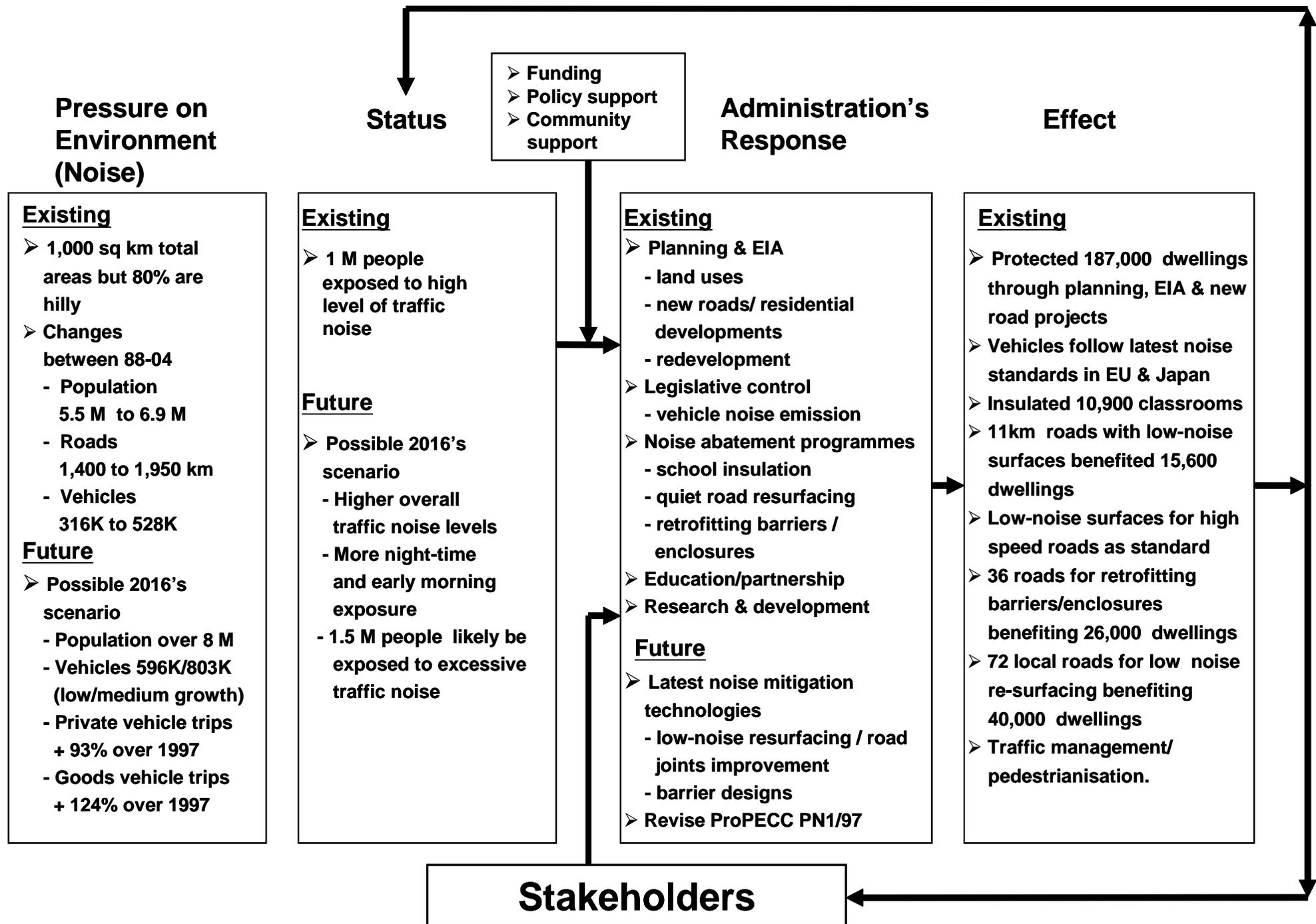


Population Exposed to Traffic Noise > 70dB(A)L10 all Districts in Year 2000			
District	District Total Population	People exposed to > 70dB(A)L10	%
YAU TSIM MONG DISTRICT	276,838	102,725	37.1
KOWLOON CITY DISTRICT	376,238	99,237	26.4
SHAM SHUI PO DISTRICT	345,906	90,246	26.1
TSUEN WAN DISTRICT	272,087	71,059	26.1
WAN CHAI DISTRICT	164,488	40,893	24.9
KWUN TONG DISTRICT	549,709	116,671	21.2
KWAI TSING DISTRICT	470,881	83,594	17.8
TAI PO DISTRICT	308,492	53,782	17.4
WONG TAI SIN DISTRICT	432,297	73,521	17.0
CENTRAL & WESTERN DISTRICT	259,351	40,807	15.7
SHA TIN DISTRICT	620,980	96,517	15.5
EASTERN DISTRICT	608,118	93,928	15.4
NORTH DISTRICT	295,918	42,737	14.4
TUEN MUN DISTRICT	478,595	53,809	11.2
YUEN LONG DISTRICT	444,534	44,114	9.9
SOUTHERN DISTRICT	285,928	17,854	6.2
SAI KUNG DISTRICT	328,694	18,722	5.7
ISLANDS DISTRICT	81,198	35	0.0
TOTAL	6,600,253	1,140,252	17.3



Pressure-State-Response-Effect Framework

Residual Problem



Appendix 6

A Framework of Policy Instruments for Tackling Road Traffic Noise in Hong Kong

Policy Tools or Instruments	Existing Measures	Further Measures	Remarks
Regulatory Tools	Noise Control Ordinance covers the following related to road traffic noise: <ul style="list-style-type: none">• noise from intruder alarm system installed in any vehicles; and• noise emission standards for motor vehicles on first registration.• Directors' Liability on NCO offences	<ul style="list-style-type: none">• Control of noise emission from in-use vehicles (need further study before discussion with TB/TD)	
Information-based instrument or Market Tools	<ul style="list-style-type: none">• Web based information on noise emission of Type-Approved Vehicles/ Noise Emission Label system• 3D Noise Modeling tools	<ul style="list-style-type: none">• Road traffic noise situations in Hong Kong• Disclosure of noise information for purchasers of residential premises	
Planning Tools	<ul style="list-style-type: none">• Land use planning• Planning of new roads• Planning of new residential developments• Redevelopment	<ul style="list-style-type: none">• Revision of ProPECC PN1/97	
Infrastructural Investments	<ul style="list-style-type: none">• Advocate the use of mass transit transport system• Highway resurfacing programme• Retrofitting barrier programme• LNRS Trial programme on 72 road sections	<ul style="list-style-type: none">• Extensive application of Low Noise Road Surfacing (subject to outcome of the LNRS trial programme)	

Policy Tools or Instruments	Existing Measures	Further Measures	Remarks
Technological Tools or Instruments	<ul style="list-style-type: none"> • Resurfacing with quieter road surface 	<ul style="list-style-type: none"> • Exploration to apply latest design of mitigation measures (barriers and low noise road surfacing in Hong Kong) • Technical aspects under the control of noise emission from in-use vehicles (need further study before discussion with TB/TD) • Improving joints at flyovers (to be discussed with HyD) 	
Educational Tools	<ul style="list-style-type: none"> • Educational Package on environmental noise • Assisted in the production of ETV programme on noise for education purposes • Education material for schools • Course/training on noise measurement in collaboration with HKIOA. • Production of Guidance Note on noise assessment. 	<ul style="list-style-type: none"> • Public engagement in traffic noise modeling 	
Voluntary Agreements or Partnership Tools	<ul style="list-style-type: none"> • Partnership with various trades including vehicle repair workshops • Guidelines and References • Codes of Practice for bodies corporate to prevent NCO offences 		
Others	<ul style="list-style-type: none"> • Traffic Management Scheme • Pedestrianisation 		