

Agreement No. CE 8/96

# **Retroactive Road Traffic Noise Mitigation Measures Feasibility Study**

**Revised Final Report**

**August 1998**

**MAUNSELL CONSULTANTS ASIA LTD  
in associated with  
ENPAC Limited  
HASSELL Limited  
Consolidated Consulting Engineers Limited**

Issue 1  
August 1998

## DOCUMENT DISTRIBUTION REGISTER

CLIENT NAME	Environmental Protection Department - Noise Management Policy Group	
PROJECT NAME	Feasibility Study for Providing Retroactive Road Traffic Noise	PROJECT No
SECTION		95796
DOCUMENT	Revised Final Report	DOCUMENT No
		95796/RFR
SUBJECT		DATE OF FIRST ISSUE
		24 August 1998

COPY No	ISSUE No	REGISTERED HOLDER	LOCATION
1 to 2	1	Mr K.S. Chan	EPD(NMP)
3	1	Mr W.H. She	EPD(AP)
4	1	Mr S.K. Leung	BD
5	1	Mr P.G.D. Whiteside	CED
6	1	Mr C.M. Chan	DSD, Mainland South
7	1	Mr W.Y. Tsoi	DSD, Mainland North
8	1	Mr K.K. Sin	TD/NTE
9	1	Mr W.M. Tang	TD/NTW
10	1	Mr Fan Chan	EMSD
11	1	Mr Y.W. Ng	FSD
12	1	Mr W.M. Chan	HyD, HK
13	1	Mr Felix Leung	HyD, NT/East
14	1	Mr Y.M. Lee	HyD, NT/West
15	1	Ms Judy Chung	HAD
16	1	Mr K.K. Cheung	HD
17	1	Miss Stella Ho	LD
18	1	Mr Edwin Young	Plan D
19	1	Mr O.S. Osbourn	HKPF, CSP Traffic
20	1	Mr P.M. Tse	TDD
21	1	Mr B.R. Edwards	TD, RSSD
22	1	Mr Freeman Lui	WSD, Mainland SE
23	1	Mr H.C. Cheung	WSD, Mainland NE
24	1	Mr K.O. Tsui	WSD, Mainland SW
25	1	Mr T.Y. Leung	WSD, Mainland NW
26	1	Mr C.W. Tse	USD
27	1	Mr C.Y. Choi	RSD
28	1	Mr Michael Lai	MCAL
29	1	Mr N.C. Cheung	MCAL
30	1	Mr Stephen Lai	MCAL

# = Uncontrolled Copy



**Agreement No. CE 8/96**  
**Feasibility Study for Providing Retroactive Road**  
**Traffic Noise Mitigation Measures**

<b>CONTENTS</b>		<b>Page No.</b>
<b>1.</b>	<b>INTRODUCTION</b>	
1.1	Background	1
1.2	The Assignment	1
1.3	Structure of the Report	2
 <b>SECTION I : FORMULATION OF ROAD ASSESSMENT SCHEME</b> 		
<b>2.</b>	<b>GENERAL APPROACH TO RETROACTIVE NOISE MITIGATION</b>	
2.1	Strategy	4
2.2	Engineering Feasibility	4
<b>3.</b>	<b>DEVELOPMENT OF SCREENING CRITERIA</b>	
3.1	Identification of the Problem	6
3.2	Identification of Traffic Engineering and Road Safety Constraints	6
3.3	Identification of Fire Fighting and Emergency Access Constraints	7
3.4	Identification of Conflict with Existing Pedestrian Access and Street-Level Commercial Activities	7
3.5	Identification of Conflict with Existing Utilities and Services	7
3.6	Identification of Conflict with Existing Highway Structure	8
3.7	Evaluation of Side-Effects	8
3.8	Evaluation of Acoustic Effectiveness	8
3.9	Evaluation of Social Impact	8
3.10	Public Consultation	9
3.11	Assessment of Engineering Feasibility	9
<b>4.</b>	<b>DEVELOPMENT OF SCHEME EVALUATION SYSTEM</b>	
4.1	Overview	10
4.2	Engineering Category	10
4.3	Environmental Category	10
4.4	Cost Category	10
4.5	Weighting for Comparison of Schemes	10
<b>5.</b>	<b>DEVELOPMENT OF PRIORITY RANKING SYSTEM</b>	
5.1	Ranking based on Population Exposure	13
5.2	Ranking based on Cost-effectiveness	13
5.3	Recommended Ranking System	14
 <b>SECTION II : APPLICATION OF ROAD ASSESSMENT SCHEME</b> 		

<b>6.</b>	<b>APPLICATION OF SCREENING CRITERIA</b>	
6.1	Identification of "Noisy Roads"	15
6.2	Identification of Roads With Potential for Mitigation	15
6.3	Identification of Road Sections with Potential for Noise Mitigation	15
<b>7.</b>	<b>PRELIMINARY FEASIBILITY STUDY OF IDENTIFIED ROAD SECTIONS</b>	
7.1	Cheung Pei Shan Road	16
7.2	Tung Tau Tsuen Road	17
7.3	Fung Shue Wo Road	19
7.4	Yuen Wo Road	20
7.5	Tai Chung Kiu Road	21
7.6	Ma On Shan Road	22
7.7	Che Kung Miu Road	23
7.8	Tin Sam Street	24
7.9	Junction of Che Kung Miu Road and Hung Mui Kuk Road	25
7.10	Tseung Kwan O Road	27
7.11	Po Lam Road North and Po Hong Road	28
7.12	Tuen Mun Road (Tsuen Wan)	30
7.13	Tuen Mun Road (Tsing Lung Tau)	31
7.14	Tuen Mun Road (Sam Shing Hui)	32
7.15	Castle Peak Road (Hung Shui Kiu)	33
7.16	Castle Peak Road (Ping Shan)	34
7.17	Environmental Gains and Losses Account	36
7.18	Preliminary Landscape and Townscape suitable for submission to ACABAS	41
7.19	Priority Ranking of the Recommended Schemes	42
	<b>SECTION III : DEVELOPMENT OF SIMPLIFIED ROAD ASSESSMENT SCHEME</b>	
<b>8.</b>	<b>DEVELOPMENT OF WORKING TOOLS FOR ROAD ASSESSMENT</b>	
8.1	Overview	49
8.2	Identification of Problems	50
8.3	Selection of Barrier Form	50
8.4	Emergency Access Consideration	50
8.5	Road Safety Considerations	51
8.6	Socio-Economic Considerations	51
8.7	Land Availability	51
8.8	Acoustic Effectiveness	52
<b>9.</b>	<b>IMPLEMENTATION STRATEGY</b>	
9.1	Overview	53
9.2	Key Statutory, Administrative and Consultative Steps	53
9.3	Staffing	54
9.4	Funding for Consultants	54
9.5	Process	55

<b>10</b>	<b>CONCLUSIONS AND RECOMMENDATIONS</b>	
10.1	Summary of Findings	56
10.2	Conclusions	57
10.3	Recommendations	58

### List of Tables

Table 1	Weighting Factors and Assessment Criteria for Identified Attributes
Table 2	Environmental Gains and Losses Account
Table 2.1	Recurrent Financial and Staffing Implication
Table 3.1	Summary of Mitigation
Table 3.2	Summary of Cost Estimates
Table 3.3	Mitigation Priority Table
Table 4	Minimum Distance between Road Kerb and Receiver to Achieve 50% Noise Protection
Table 5	Project Implementation Table

### List of Figures

Figure 2.1	Flow Chart for Selection of Noisy Roads with Potential for Retroactive Noise Mitigation
Figure 2.2	Scheme Establishment Flow Chart
Figure 2.3 to 2.10A and 2.11 to 2.17	Typical Noise Barrier Sections
Figure 7.1	Key Plan for Selected Locations
Figure 7.2A	Mitigation Measures for Cheung Pei Shan Road - Recommended Option
Figure 7.3	Mitigation Measures for Fung Shue Wo Road - Recommended Option
Figure 7.4A	Mitigation Measures for Yuen Wo Road - Recommended Option
Figure 7.5A	Mitigation Measures for Tai Chung Kiu Road - Recommended Option
Figure 7.6A	Mitigation Measures for Ma On Shan Road - Recommended Option
Figure 7.7	Mitigation Measures for Che Kung Miu Road - Recommended Option
Figure 7.8	Mitigation Measures for Tin Sam Street - Recommended Option
Figure 7.9A	Mitigation Measures for Che Kung Miu Road and Hung Mui Kuk Road - Recommended Option

Figure 7.10A	Mitigation Measures for Tseung Kwan O Road - Recommended Option
Figure 7.11A	Mitigation Measures for Po Lam Road North at Po Lam Estate and Ying Ming Court - Recommended Option
Figure 7.12	Mitigation Measures for Po Lam Road North at Po Lam Estate and Ying Ming Court and King Lam Estate - Recommended Option
Figure 7.13	Mitigation Measures for Tuen Mun Road, Sam Shing Hui - Recommended Option
Figure 7.14A	Mitigation Measures for Tuen Mun Road, Tsuen Wan - Recommended Option
Figure 7.15A	Mitigation Measures for Tuen Mun Road, Tsing Lung Lau - Recommended Option
Figure 7.16	Mitigation Measures for Castle Peak Road, Hung Shui Kiu - Recommended Option
Figure 7.17	Mitigation Measures for Castle Peak Road, Ping Shan - Recommended Option
Figure 7.18A	Mitigation Measures for Castle Peak Road, Ping Shan - Recommended Option
Figure 7.19	Vertical Noise Barrier (Absorptive)
Figure 7.20	Vertical Noise Barrier (Reflective)
Figure 7.21	Cantilevered Noise Barrier (Absorptive)
Figure 7.22	Cantilevered Noise Barrier (Reflective)
Figure 7.23	Partical Enclosure Noise Barrier
Figure 7.24	Full Enclosure Noise Barrier
Figure 8.1	Simplified Assessment Procedures
Figure 8.2	Chart 1 - Identified of Problems
Figure 8.3	Chart 2 - Selection of Barrier Forms
Figure 8.4	Chart 3 - Emergency Access Considerations
Figure 8.5	Chart 4 - Road Safety Considerations
Figure 8.6	Chart 5 - Socio-Economic Considerations
Figure 8.7	Chart 6 - Land Availability

Figure 8.8                      Chart 7 - Acoustic Effectiveness

### List of Appendices

Appendix A	<ul style="list-style-type: none"> <li>Application of the proposed Working Tools for Cheung Pei Shan Road</li> <li>Application of the proposed Working Tools for Tung Tau Tsuen Road</li> <li>Application of the proposed Working Tools for Fung Shue Wo Road</li> <li>Application of the proposed Working Tools for Yuen Wo Road</li> <li>Application of the proposed Working Tools for Tai Chung Kiu Road</li> <li>Application of the proposed Working Tools for Ma On Shan Road</li> <li>Application of the proposed Working Tools for Che Kung Miu Road</li> <li>Application of the proposed Working Tools for Che Kung Miu Road J/O Hung Mui Kuk Road</li> <li>Application of the proposed Working Tools for Tin Sam Street</li> <li>Application of the proposed Working Tools for Tseung Kwan O Road</li> <li>Application of the proposed Working Tools for Po Lam Road North</li> <li>Application of the proposed Working Tools for Tuen Mun Road, Sam Shing Hui</li> <li>Application of the proposed Working Tools for Tuen Mun Road, Tsuen Wan</li> <li>Application of the proposed Working Tools for Tuen Mun Road, Tsing Lung Tau</li> <li>Application of the proposed Working Tools for Castle Peak Road, Hung Shui Kiu</li> <li>Application of the proposed Working Tools for Castle Peak Road, Ping Shan</li> </ul>
Appendix B	Derivation of Chart 1
Appendix C	Derivation of Chart 2
Appendix D	<ul style="list-style-type: none"> <li>Visibility Splays at Priority Junctions</li> <li>Visibility Area at Run-ins</li> <li>Grade Separated Interchange</li> <li>Siting of Signal Equipments</li> <li>Sight Distance</li> <li>Visibility at Roundabout</li> </ul>