7. SIMPLIFIED WORKING TOOLS FOR FLYOVER ASSESSMENT

7.1 Introduction

7.1.1 The feasibility of mitigating noise from existing flyovers is generally dependent on the local site constraints and the type of sensitive developments to be protected. While it is desirable to undertake a detailed feasibility study to identify all these site constraints for direct noise mitigation measures on existing flyovers, it is useful to adopt simplified procedures for initial assessment, since the study usually takes time to complete. To this end, a working tool is developed to enable an assessor to carry out a desk-top study to assess if the required mitigation is at all feasible before the mitigation is subject to a detailed feasibility study.

7.1.2 This working tool involves a set of simple assessment procedures, which require no complicated modelling and lengthy calculations. The assessor is guided systematically through these procedures to identify and classify the problem and, where appropriate, to recommend further investigation.

7.1.3 The simplified assessment procedures are illustrated in six flow charts which cover the following aspects of the investigation :

- identification of problems at the subject site;
- selection of a barrier form for the identified problems;
- availability of space and land for the likely barrier provision;
- implication of the identified barrier form on the provision of existing emergency access and fire fighting requirements; and
- implication of the identified barrier form on road safety, pedestrian and vehicular movements.

The procedures are summarised in the form of flow charts and the basis for the procedures are described in subsequent sections.

7.1.4 This set of assessment procedures can serve as a quick working tool to identify any initial feasible extent and location of noise mitigation measures before any detailed assessment is put forward. If the assessment is positive, a preliminary engineering feasibility study should then be carried out to confirm the viability of the proposal and the acoustic effectiveness should be evaluated. An overview of the simplified procedures is shown in Appendix E1. The applicability of these procedures to the 3 existing flyovers, namely Ap Lei Chau Bridge, Tsing Tsuen Bridge and Kwai Chung Road Flyover, is illustrated in Appendix E2.

7.2 Identification of Problems

7.2.1 Problem identification procedures are given in Chart 1 of Appendix E1. The identification is based on the number of lanes (L) and the distance of the subject road from the affected facade (D). Annex I of Appendix E1 gives the technical basis for the formulation of Chart 1.

7.2.2 The number of lanes in a road gives an indication of the likely volume of traffic using the road. In general, a single two-lane carriageway carries 800 vehicles per hour in two directions while a four-lane single carriageway or a dual two-lane carriageway carries 2,400 to 2,800 vehicles per hour in one direction. This is a simplified approach to define the range of basic noise level generated from the subject flyover, although the vehicle composition, geometry of road on flyover and speed of traffic also determine the noise level.

7.2.3 As a quick screening process, these factors can be ignored. Distance is also a useful parameter to assist the identification. If the flyover is identified as a possible noisy flyover, the next step should be to identify the form of noise barrier for the particular site conditions and the type of sensitive receivers and, furthermore, the chance of providing such barrier in an effective manner. If the subject road is not found to be a noisy flyover, no immediate noise mitigation measures should be applied.

7.3 Selection of Barrier Form

7.3.1 When a flyover has been identified as noisy, the next step is to review the site conditions and determine the form of noise barrier to mitigate the noise impact on the affected buildings. Plain vertical noise barriers would be effective to protect up to about 5th floor receivers above carriageway level in the flyover. For receivers in the mid floor range, i.e. from 5th to 10th floor, a bend top barrier would normally be required. Receivers at floors above 10th would need semi-enclosures to be installed on the subject road. Chart 2 provides a quick procedure to assist the assessor to identify the likely form of barrier on the subject site. Annex II of Appendix E1 gives the technical basis for formulation of Chart 2.

7.3.2 Once the barrier forms are determined, initial assessment of the flyover structure shall be followed. However, from experience on other flyover project and engineering assessment in this study, it would be in general unlikely practicable to install noise mitigation measures to existing flyovers as additional loading of the measures are usually not allowed in the flyover design. Therefore, it is recommended that the approach of using independent support structure shall be adopted in retrofitting existing flyovers.

7.4 Space/Land Availability

7.4.1 Having established the possibility of providing barriers on independent structures to mitigate the noise impact, the available space or lands on site for construction of the proposed noise barrier should be examined. Independent

support structure for the barriers will require lands for its installation on ground. This is to confirm the space/land requirements for the installation of the proposed barrier independent support on ground. Chart 3 provides a quick process to identify the minimum space required for installation of the proposed barrier at ground level from the consultants' experience in other projects.

7.5 Emergency Access and Fire Fighting Considerations

7.5.1 Provision of noise barriers may often create an obstruction between the carriageway and the affected development. This is especially the case in an existing development where usually no provision is made for any noise barrier in the emergency vehicle access (EVA) for fire fighting and emergency vehicles.

7.5.2 For fire fighting, it is essential that the affected facades should be within reach of the fire engines. In general, a minimum horizontal clearance of 4.5m shall be maintained between the outer edge of the proposed noise barrier and the building facade as indicated in Chart 4.

7.6 Road Safety Considerations

7.6.1 Chart 6 focuses on the road safety aspects, which cover the basic traffic engineering requirements, stipulated in the TPDM. A detailed investigation would involve the measurements of visibility splays and speed of traffic. As a quick assessment, Chart 5 has been designed to provide a step-by-step procedure to identify a suitable a scheme which duly considers all likely implication of the scheme to road safety and pedestrian and vehicle access.

7.6.2 Provision of a noise barrier close to an existing junction could obstruct the visibility splays of the junction and would violate the principle of "Seeing and be seen". Installation of a barrier along a bend on road could also obstruct the sight line for safe stopping should there be a stationary object on the carriageway.

7.6.3 The proposed noise barrier may often intercept existing pedestrian and vehicular access at the carriageway. Junction visibility requirements would need to be observed and the scheme would need to be modified accordingly.

7.7 Preliminary Engineering Feasibility Study and Acoustic Effectiveness.

7.7.1 When no insurmountable obstacle appears to exist in the first six rounds of quick assessment, the identified mitigation measures would be recommended for preliminary engineering feasibility study and the following key issues should be assessed in detailed in order to confirm their viability :

- traffic engineering and road safety appraisal;
- interfacing with utilities;
- structural engineering appraisal;
- landscape appraisal;

- air quality assessment;
- side effects;
- costing; and
- implementation strategy.

7.7.2 Apart from the above engineering assessment, the noise assessment should be carried out and the level of protection to the affected NSRs should be evaluated. This would provide a useful reference on the acoustic effectiveness of the mitigation measures and contribute to the consideration of implementation priority.