6. ASSESSMENT FOR MITIGATION MEASURES ON KWAI CHUNG ROAD FLYOVER

6.1 Identification of Noise Sensitive Receivers (NSRs)

6.1.1 Kwai Chung Road Flyover is a multi-lane carriageway which runs through Mei Foo Sun Chuen and connects Tsuen Wan Road with Cheung Sha Wan Road. On both sides of the flyover, there are high-rise residential and commercial developments. The space underneath the flyover is generally occupied by the market place, the elderly centre, mini-shops, bus terminus and various recreational facilities, etc. which play a very important part in the daily living of the local residents.

6.1.2 NSRs were identified mainly at the high-rise residential blocks of Mei Foo Sun Chuen on both sides of the flyover. NSRs adjacent to the northbound carriageway were situated above the level of the podium and flyover. NSRs adjacent to southbound carriageway were situated above the ground level and often with very little horizontal clearance from the flyover.

6.1.3 The general layout and features of the study area are shown in Fig. 6-1 & 6-2.

6.2 Traffic Data for Model Analysis

6.2.1 Surveys were undertaken to obtain necessary traffic data for the air/noise impact assessment in the study area (See Figure 6-17).

6.3 Development of Mitigation Measures

6.3.1 Development of Mitigation Scenarios

6.3.1.1 Kwai Chung Road Flyover and its associated roads form part of the heavily trafficked link in the area. Major constraints in term of buildability, potential conflicts with the existing MTR station and future West Rail station, etc. have been carefully investigated before the development of mitigation options.

6.3.1.2 Fig. 6-1 indicates the identified location of NSRs and the predicted road traffic noise levels at the NSRs under unmitigated conditions were presented in the following table :

NSR	Floor	Predicted Noise Levels, dB(A)
1	1	78
	5	77
	10	76
	15	75
	17	75
2	1	85
	5	84
	10	82
	15	81
	17	80
3	1	85
	5	83
	10	82
	15	81
	17	80
4	1	79
	5	79
	10	78
	15	77
	17	77
5	1	77
	5	78
	10	77
	15	77
	17	77
6	1	79
	5	81
	10	80
	15	79
	17	79
7	1	80
	5	81
	10	80
	15	79
	17	79
8	1	79
	5	81
	10	80
	15	79
	18	78
9	1	80
	5	82
	10	81
	15	80
	18	79
10	1	85
	5	83
	10	81
	15	79
11	1	81
	5	84
	10	81
	15	79
	18	79

NSR	Floor	Predicted Noise Levels, dB(A)
12	1	75
	5	80
	10	79
	15	77
	18	77
13	1	68
	5	74
	10	74
	15	74
	18	74
14	1	76
	5	76
	10	75
	15	75
	17	74
15	1	77
	5	83
	10	80
	15	79
	17	78
16	1	69
	5	79
	10	78
	15	77
	17	76
17	1	70
	5	80
	10	79
	15	78
	17	78
18	1	82
	5	82
	10	81
	15	80
	17	79
19	1	79
	5	80
	10	79
	15	78
	17	77
20	1	68
	5	71
	10	72
	15	72
	19	74
21	1	75
	5	77
	10	77
	15	77
	19	76
22	1	78
	5	79
	10	79
	15	78
	16	75

6.4 Engineering Feasibility

6.4.1 Mitigation options for protecting the identified NSRs at Mei Foo Sun Chuen generally require the installation of barriers or enclosures along the edges of the flyover. As the height of these barriers/enclosures would be substantial, i.e. about 5m high, significant additional loading would be imposed on the existing structure.

6.4.2 Checking the compliance of the latest design standards was the first step being taken in the assessment. Design calculations of the existing flyover have been examined at the HyD office. The original design was found to be carried out in 1966 and had been based on BS 153: Part 3A. As the current design standard in SDM regarding bridge loading is more demanding, the flyover may not meet the current design requirements even without any barriers/enclosures. Detailed structural assessment of a typical "land span" deck of the existing flyover are given in Appendix D. The assessment results indicated that the existing bridge deck would not be capable of taking the current design loading.

6.4.3 HyD/Hong Kong Region has also commented in his letter ref. HH63/50(CE) dated 17/01/97 that the study section of Kwai Chung Flyover is structurally not feasible to cater for the addition of a noise enclosure. Either independent structure should be provided to support the noise enclosure or the flyover should be strengthened to enable the enclosures to rest on it.

However, for strengthening works, the amount of works involved and disruptions to the public in terms of social impacts and all possible consequential effects on traffic, and environment would be significant and should not be underestimated. It would also cause much inconvenience to and objections from the nearby residents during the construction stage. As a result, development of noise barrier/enclosure proposal with independent supports would be more preferable and feasible. Typical strengthening works involved are briefly indicated below:

- Enlarging/strengthening the existing bridge parapets to accommodate columns of the noise barriers/enclosures;
- strengthening the existing deck beams to support the additional vertical and lateral loads;
- replacing the existing bridge bearings by those which can resist higher lateral loads;
- strengthening the existing piers and piles caps;
- installing additional piles to strengthen the existing bridge foundation; and
- installing external support to strengthen the existing deck.

6.4.4 The use of external support to strengthen the existing deck would involve the external mounting of partial enclosure structural frame onto the bridge deck and installation of steel props and bracing along the span to support the bridge deck for the additional loading. However, the arrangement would not be considered as feasible due to the following constraints:

- the extent of structural interaction and load sharing between the existing support system and the external support system cannot be quantified.

- the space underneath the flyover is not available for the construction and installation of the external support system because of the existing road, bus terminus, market and facilities underneath the flyover.

- the construction traffic access and erection would be restricted by the available headroom underneath the flyover.

- the extensive use of steel frame underneath the flyovers would have adverse visual impact to the surrounding environment.

- the installation of external support system would pose constraints to future inspection and maintenance of the existing flyover.

6.4.5 In general, no noise mitigation measures could be erected directly on the flyover due to structural constraints and based on experience on other flyover projects, it would be unlikely practicable to install noise mitigation measures to existing flyovers as additional loading of the measures are usually not allowed in the flyover design. Strengthening of the flyover were also not considered as a feasible option. Therefore, it is recommended the proposed mitigation measures should be supported on independent structure located alongside the existing flyover without affecting the existing flyover structure. In the following section, the feasibility of providing the independent support structure is further examined.

6.4.6 The Scoping Study recommended that vertical barriers of 5m height above the level of the flyover would be the most effective option. In the light of the discussion in the preceding section, independent structure would need to be constructed at ground level to provide the barrier support. The construction will inevitably cause serious disruption to the residents and the public at Mei Foo Sun Chuen.

6.4.7 Due to the complexity of the site conditions and the large number of interface problems, the site are divided into several study areas (i.e. Areas A to J defined by the areas directly adjacent to the sections of barrier proposed on both sides the flyover) for ease of reference and further investigation. These labelled sections are also shown in Figures 6-1 & 6-2.

6.4.8 Buildability

6.4.8.1 Details of the existing utilities and services including storm water drains and sewers within the study area have been obtained from various utility companies and government departments. The existing utilities on the structure and at ground level are shown in Figures 6-3 to 6-8 and 6-11 to 6-16.

6.4.8.2 Two crucial physical constraints have been identified for the erection of barrier/enclosure at ground level, namely the MTR protected zone and the drainage reserve.

MTR Protected Zone

6.4.8.3 A large part of the study area lies within the Mass Transit Railway (MTR) protection zone surrounding Mei Foo Station which would be a sizeable obstacle to the construction of the at-grade barrier/enclosure because of potential conflicts with MTR's maintenance works.

6.4.8.4 As advised in MTRC's letter (ref. C/CWM/NP/0530/LAW 15 dated 9th January 1998) and Practice Note for Authorised Persons and Registered Structural Engineers (AP/RSE) No. 77 issued by the Building Authority, the erection of noise barrier/enclosures within the existing MTR protection zone shall be subject to special scrutiny by Government and under strict monitoring requirements.

Drainage Reserve

6.4.8.5 As advised by Drainage Services Department (DSD), certain areas would also be constrained by defined drainage reserve. Construction in these areas again be subject to approval. Figures 6-11 to 6-16 show the extent of these drainage zones.

Area A

6.4.8.6 The area to the west of Lai Wan Road adjacent to Kwai Chung Flyover would be further confined by the proposed West Rail, Mei Foo station. This station was proposed to be a piled structure with lowest finished ground level at -2.0 mPD and highest finished ground level at +17.7mPD spanning underneath and across the flyover. Thus, the erection of noise mitigation measures in this area would be almost impossible. The extent of the proposed West Rail, Mei Foo station is shown in Figure 6-10.

6.4.8.7 This area locates alongside the southbound slip road fronting Phase VII Block No. 10 of Mei Foo Sun Chuen. The existing underground utilities and services along this section include a 200ϕ gas main and a 150ϕ freshwater main. Diversion of these utilities would be required for the erection of barrier/enclosure.

6.4.8.8 This area also includes a 6m wide drainage reserve zone surrounding 225ϕ drainage pipes and manholes which span the area beneath the flyover. The provision of structural supports for the barrier within this reserve would need to be agreed by DSD. A continuous barrier would only be possible if the pipes and manholes could be diverted. This would prove to be difficult as they are situated in the market area. It is unlikely that the barrier could be repositioned due to a lack of space.

6.4.8.9 Permanent market buildings are situated along this section right up to the boundary with the car park of the commercial complex. Due to the limited space between the two structures, the construction of the proposed barrier would necessitate the demolition, relocation and reconstruction of the affected buildings at a significant cost (See Figure 6-2)

6.4.8.10 The situation has been further complicated by the extremely congested pipe works scattered across the wall of the commercial complex. In addition, the bottom one metre of the wall of Mei Foo Sun Chuen extends outwards by approximately 200mm.

6.4.8.11 The parapet of the flyover is also located very close to Mei Foo Sun Chuen. Clearance is often less than one metre and this would obstruct the construction and maintenance of the proposed barrier.

Area B

6.4.8.12 This area is located adjacent to Area A and fronting the existing podium of Phase VII at Mei Foo Sun Chuen.

6.4.8.13 The existing underground utilities and services along this section include a 200ϕ gas main, a 150ϕ freshwater main, public lighting cables, CLP cables and MV cables. The erection of proposed barrier/enclosure would require the diversion of these utilities.

6.4.8.14 A small drainage channel runs along the length of this section parallel to the footpath. The proposed barrier would encroach into the drainage reserve around this channel.

6.4.8.15 The proposed barrier also encroached into the 6m wide drainage reserve, the surrounding area of 225ϕ drainage pipes and manholes. Permission will have to be obtained from DSD for the erection of the barrier supports. Without the permission from DSD, this could make a continuous barrier impossible unless the pipes and the manholes could be diverted. Relocation of the barrier supports to avoid the encroachment would not be possible due to the limited space between the flyover and the commercial complex (See Figure 6-2).

6.4.8.16 The clearance between the flyover and Mei Foo Sun Chuen is often less than one metre and this would obstruct the construction and the necessary maintenance of the proposed barrier. The steps extending from the shops beyond the boundary of the commercial complex create another obstacle to the space for providing barrier supports.

Area C

6.4.8.17 This is an area located adjacent to Area B fronting Phase VII Block No. 7 of Mei Foo Sun Chuen.

6.4.8.18 The existing underground utilities and services along this section are the same as those in Area B. Again a small drainage channel and a drainage reserve are need to be taken into consideration for any barrier provision..

6.4.8.19 There are a few retail outlets in this area consist of catering business. The necessary ventilation outlets, air-conditioning and extraction equipment extend outwards from Mei Foo Sun Chuen right up to the edge of the flyover. This would further reduce the already limited space available for the proposed noise barrier. Relocation of the equipment or establishments might be the only solution but this would affect the business of the commercial development and the cost could be prohibitive.

6.4.8.20 Again, similarly to Area A, space at ground level is reduced in some sections. The commercial complex at the ground level extends outwards by approximately 200mm.

Area D

6.4.8.21 This area locates alongside the southbound carriageway of the flyover fronting Block Nos. 1 and 3 of Phase VII at Mei Foo Sun Chuen.

6.4.8.22 There are no major existing underground utilities or services located in the area other than a small section of public lighting cable. The cable would require relocation to accommodate the proposed barrier.

6.4.8.23 Area D is intersected by drainage reserve zones for 225ϕ drainage pipes and manholes. This would make a continuous barrier more complicated to construct unless DSD allows barriers to be erected within the affected drainage reserve area. Alternatively, the barrier could sit at a distance away from the flyover to allow the foundations lie outside of the drainage reserves.

6.4.8.24 A concrete basketball court located beneath the flyover may require either relocation or re-orientation to accommodate the barrier. The alternative could again be positioning the barrier at a distance away from the flyover. This might however reduce the effectiveness of the barrier.

6.4.8.25 Construction of the barrier might also require the rearrangement the existing refuse collection point (See Figures 6-1 & 6-2). The existing pedestrian access underneath the flyover next to the refuse collection point would be blocked and therefore, the removal of refuse at this collection point will be seriously affected. An alternative would be to reduce the length of the barrier but this might reduce its effectiveness.

Area E

6.4.8.26 This area is located alongside the northbound carriageway of the flyover fronting Phase II Block Nos. 5 and 9 of Mei Foo Sun Chuen.

6.4.8.27 The drainage reserves of 225ϕ sewer, 225ϕ drainage pipes and manholes are passing this area. The extent of drainage reserves restricts the possibility of positioning the barrier if no permission is granted by DSD for the erection of barriers within the drainage reserve area. There are no other existing underground utilities or services in the area.

6.4.8.28 The constraints imposed by the existing basketball court described in Area D also apply to Area E.

Area F

6.4.8.29 This area runs alongside the slip road and carriageway in the southbound direction fronting Phase II Block Nos. 5 and 9, and Phase I Block Nos. 9, 15 and 21.

6.4.8.30 The existing underground utilities and services along the southern side of the flyover include a 250ϕ gas main, telephone cables and electricity cables.

6.4.8.31 A covered U-channel and its surrounding of a 6m wide drainage reserve zone runs along the entire length of this section. This drainage reserve effectively covers the entire width of the footpath in this area. This means that relocating this drainage channel would not create space free from the drainage reserve.

6.4.8.32 This section is also intersected at various points by drainage reserves for 225ϕ drainage pipes and manholes spanning the area beneath the flyover. The drainage reserve for the U-channel would further confine the alignment of barrier.

6.4.8.33 Towards Lai Wan Road, the identified barrier would need to sit at a distance from the flyover to accommodate the permanent market buildings extending outwards beyond the boundary of the above flyover.. This solution would however require the relocation of the U-channel. The alternative would require the demolition, relocation and reconstruction of these affected buildings. The drainage channels in this area are very important to the operation of the shops which create a large flow of water from cleaning fish, vegetables and the premises themselves (See Figure 6-2).

6.4.8.34 The lack of space experienced by the other areas due to the flyover in close proximity with Mei Foo Sun Chuen also applies to Area F. Clearance again is sometimes less than one metre which would impede the construction and maintenance of the barrier. This would rule out construction in this area as the Fire Services Department has commented (letter ref. (20) in FSD4/130/94 on the Scoping Study) that the horizontal clearance between the outer edge of the flyover structure and the building facade should be at least 4.5m.

Area G

6.4.8.35 This area is located alongside the southbound carriageway of the flyover fronting Phase IV Block No. 81.

6.4.8.36 A short freshwater main section is located within this area. However it would be relatively easy to have it diverted as the freshwater main does not extend too far into the area that would be used by the identified barrier. There are no other existing underground utilities or services in the area.

6.4.8.37 The land is being used as a landscape area with trees, shrubs and grass. This would have to be cleared for the construction of the barrier, if necessary (See Figure 6-2).

Area H

6.4.8.38 This area is located alongside the southbound carriageway of the flyover over the existing bus terminus next to Area D.

6.4.8.39 The existing underground utilities and services within this area include electricity, telephone and public lighting cables together with a gas main. A few 250ϕ storm water pipes with manholes situated in a drainage reserve have been found in this area. An existing 450ϕ storm water pipe also runs across this area towards the manhole underneath the flyover.

6.4.8.40 This section intersects the existing bus terminus, a latrine to the west, Mei Lai Road and a road which connects Lai Chi Kok Road and Cheung Sha Wan Road to the east. It falls within the MTR protection zone with 16m minimum clearance from the MTR tunnel. The erection of barrier along this section would seriously affect the existing latrine and the operation of the bus terminus.

Area I

6.4.8.41 This section is located opposite to Area H and along the westbound carriageway of the flyover at the existing bus terminus between Area E and Area G.

6.4.8.42 The existing underground utilities and services which include 600ϕ and 250ϕ storm water pipes are found within the drainage reserve of this section. The affected area includes the existing bus terminus and the service roads that fall inside the MTR protection zone.

Area J

6.4.8.43 This area is located along the northbound carriageway of the flyover abutment fronting Phase IV Block Nos. 113, 115, 117 and 119 adjacent to Lai Chi Kok Road.

6.4.8.44 No utilities or services were found inside this area. However, this section falls inside the MTR protection zone. The existing slope shown on Figure 6-1 and respective figures has been amended to retaining wall to cope with the widening of Lai Chi Kok Road at that section. Thus, there is insufficient road space to incorporate a barrier along that widened road section. In addition, the

existing parapet on top of this retaining wall has found to be insufficient to accommodate a noise barrier.

Area K

6.4.8.45 This section is located along the southbound carriageway of the flyover and opposite to Area G. Besides a telephone cable and few 250ϕ storm water pipes with manholes have been encroached in the drainage reserve. No other existing utilities or services has been found in this area.

6.4.8.46 This section encroaches into the MTR protection zone with a 8m minimum clearance from the MTR tunnel. The land is currently used as a landscape area with trees.

6.4.9 Traffic Engineering

6.4.9.1 In general, the siting of the roadside barriers should not degrade the existing highway standards to fall below the absolute minimum requirement as stated in the Transport Planning and Design Manual (TPDM). These include visibility requirements for signing, siting of pedestrian crossings and bus stops, etc.

6.4.9.2 At the flyover level, the road sections under consideration are generally straight with no junctions, crossings, bus stops or pedestrians. Under the flyover is an existing bus terminus, a bustling market and recreational area. The barrier could seriously affect the pedestrian and traffic flow and the livelihoods of all those who work or live in the vicinity of the flyover.

Area A

6.4.9.3 Traffic on the flyover would not be severely affected by the implementation of the proposed barrier. The section is generally straight with no junctions, crossings, bus stops or pedestrians. Currently there is no access for pedestrians available beneath the flyover so the erection of the proposed barrier/enclosure would not have major impact to pedestrians.

Area B

6.4.9.4 In terms of traffic impact on Area B it would be similar to those on Area A at the flyover level. Beneath the flyover, pedestrians flows from the two main entrances of the shopping complex to the market area are heavy. The structural supports of the proposed noise barrier could block the pedestrian flows and would need to repositioned to avoid the disruption. It is important to maintain the current interaction between the north side of Mei Foo Sun Chuen and the area under the flyover. Additionally, the passageway between the shopping complex and Mei Foo Centre For the Elderly would be blocked by the proposed barrier.

Area C

6.4.9.5 The impact on Area A would apply to Area C at flyover level. Shops are located beneath this section of the flyover. The supports for the proposed barrier could block the pedestrians gaining access to these shops. This could mean that the shops and the residents would be impeded by the proposed barrier and it would need to be repositioned to avoid the blockage.

6.4.9.6 The footpath located beneath the flyover beside the commercial complex is very narrow. The proposed barrier would take up some of the available space possibly hindering an important pedestrian route.

Area D

6.4.9.7 No major impact would be anticipated on the flyover level in terms of traffic engineering and it would be similar to Area A. The area under the flyover is a junction connecting both sides of Mei Foo Sun Chuen. The pedestrian and vehicular traffic should not be impeded by the proposed barrier/enclosure.

6.4.9.8 The relocation of the basketball court under the flyover would need to be reviewed if its would be warranted.

Area E

6.4.9.9 On the flyover, visibility for vehicles joining Kwai Chung Road Flyover from the adjoining slip-road would be adversely affected if the barrier were to be constructed. This would be an important safety consideration as Kwai Chung Road Flyover is a particularly busy stretch of road with an hourly flow of 5382 vehicles (in both directions) during the morning peak hour.

6.4.9.10 Similarly to Area D, the area beneath the flyover is a major junction connecting both sides of Mei Foo Sun Chuen. The proposed barrier should not impede the pedestrian flow because a large area is available beneath the flyover.

Area F

6.4.9.11 The impact on Area F in terms of traffic engineering would be similar to that of Areas A to E above the level of the flyover. Shops are located at ground level along the whole length of this section. The proposed barrier would restrict access to and from certain shops which could seriously affect the livelihoods of the shop-owners and residents.

6.4.9.12 There is a large pedestrian flow from this side of the flyover into the market area especially during noon time. Any barriers along this area may restrict the pedestrian flow and possibly causing congestion.

Area G

6.4.9.13 No major impact is anticipated at the flyover due to the provision of the possible noise barrier. At ground level, the barrier would not encroach onto the paved areas and the existing landscape. Pedestrians will not be affected by the implementation of the noise barrier. However, the visibility for traffic vehicle turning from Lai Chi Kok Road to Cheung Sha Wan Road would be seriously affected and it would not comply with TPDM requirements.

Area H

6.4.9.14 Since the section of road under consideration are generally straight with no junctions, pedestrian crossing, bus stops or pedestrians, no adverse impact on traffic using the flyover would be expected from the proposed barrier.

6.4.9.15 The area under the flyover consists of a refuse collection point, a latrine at the west end, a bus terminus in the middle section with connections to Mei Lai Road, Lai Chi Kok Road and Cheung Sha Wan Road.

6.4.9.16 The erection of barriers along this section of road would block the internal roads of the existing bus terminus, minibus stop, the adjacent road link and Mei Lai Road. Re-provisioning of the bus terminus and mini-bus stop would be required.

Area I

6.4.9.17 The traffic impact on Area I would be similar to Area H on the flyover. Similarly, the internal roads of the existing bus terminus and the mini-bus stop together with Mei Lai Road and the adjacent link road would be blocked by the proposed barrier along this section of road.

Area J

6.4.9.18 The bridge abutment as shown on the base of Figure 6-1 has recently been changed to a retaining wall for the widening of Lai Chi Kok Road. There is no sufficient clearance between the edge of the widened Lai Chi Kok Road and the newly constructed retaining wall to incorporate of the proposed barrier. In fact, the width of widened carriageway would be further reduced by the erection of the barrier along this section.

6.4.9.19 The visibility of traffic turning from Lai Chi Kok Road to Cheung Sha Wan Road through the existing link road adjacent to Area J would be impeded by supports of the proposed barriers.

Area K

6.4.9.20 No major impact is expected on the flyover due to the provision of barriers. The situation is similar to Area G. Pedestrians would not be affected by the erection of a noise barrier but the visibility for vehicle turning from Cheung

Sha Wan Road to Lai Chi Kok Road through the road link would be adversely affected.

6.4.10 Safety

6.4.10.1 The implementation of the mitigation option should not impose potential hazard or reduce the degree of safety. Impact assessment on pedestrian safety, accessibility for emergency vehicles, fire fighting and rescue operations, loading/unloading activities, bus stopping operation, etc. have been conducted at the affected areas.

6.4.10.2 The extent of rectification works will be addressed in the preliminary design if the degree of road safety to the road users and residents need to be compromised.

Area A

6.4.10.2 There are windows facing from the car park of the commercial complex at the flyover level. Fire fighting operations through these windows would be impossible if the barrier is implemented.

6.4.10.3 Emergency access to the car park above the commercial complex would be blocked by the noise barrier. The residential properties might not be affected too significantly as the wall around the boundary of the complex is already a few meters above the level of the flyover.

6.4.10.4 There is currently no pedestrians or vehicles access above or below the flyover so the proposed barrier would not have adverse impact on safety in general.

Area B

6.4.10.5 The two main entrances to the commercial complex from the market are located at this section at ground level. The structural supports for the proposed barrier could block these two entrances which would eliminate the major escape exits from the north side of Mei Foo Sun Chuen. Access for fire fighting or emergency operations would no longer be possible from this side of the commercial complex if these entrances were blocked.

6.4.10.6 Lighting would need to be provided as the barrier would block most of the natural light that falls from the gap between the flyover and the commercial complex. Addition lighting would be needed in the passageway between the shopping complex and Mei Foo Centre for the elderly. Without this additional lighting, the passageway would be almost entirely cloaked in darkness.

6.4.10.7 There are no bus stopping or large scale loading/unloading activities so the barrier would have no negative impact on those activities.

Area C

6.4.10.8 There are windows from the catering establishments of the adjacent building. The blocking of these windows would have a vitally impact on fire fighting operation during emergency.

6.4.10.9 Many smaller retail outlets have their main entrances along this section at ground level. Constructing the noise barrier here would cause the shops be cut off from the rest of the surrounding area. The barrier's supports would block the footpath running alongside the shops of the complex possibly eliminating access. The supports would also create large obstacles to the pedestrians using this footpath.

6.4.10.10 The barrier would also block a large percentage of the daylight that falls onto this area. Sufficient lighting would need to be provided to avoid degradation to pedestrian safety.

6.4.10.11 There are no bus stopping or large scale loading/unloading activities so the barrier would not have any further negative impact to these activities.

Area D

6.4.10.12 Above the flyover, there is no access to Mei Foo Sun Chuen so the implementation of the barrier would not reduce the safety aspect during emergencies. The access to the existing refuse collection point underneath the flyover would be blocked. There are no bus stopping or large scale loading/unloading activities so the barrier would not have any further negative impact.

Area E

6.4.10.13 Apart from the blockage of access to the existing refuse collection point, the comments for Area D apply to Area E for both above and below the level of the flyover.

Area F

6.4.10.14 The Fire Services Department commented on the Scoping Study and recommended that there should be a minimum clearance of 4.5m between the flyover and the Noise Sensitive Receivers. In Area F the clearance is often less than one metre which is significantly below the recommended minimum. The Fire Services Department has advised that no direct noise mitigation measures should be implemented along the northbound carriageway of Kwai Chung Road Flyover immediately adjacent to Phase I of Mei Foo Sun Chuen.

6.4.10.15 The barrier would block a number of residential windows which would render external fire fighting operations to these properties impossible. The proposed barrier would also block some of the daylight for the market and recreational

areas below the flyover. Additional lighting would probably not be required as a number of existing lights are present at this location.

6.4.10.16 There are no bus stopping operations or large scale loading/unloading activities so the barrier would not have any further negative impact.

Area G

6.4.10.17 There is no access to Mei Foo Sun Chuen from the level of the flyover so the implementation of the barrier would not reduce the safety aspect during emergency operations. No access for pedestrians to the flyover is allowed so pedestrian safety would not be an issue.

6.4.10.18 Beneath the flyover, there are no bus stopping operations or large scale loading/unloading activities so the barrier would not have any negative impact.

Area H

6.4.10.19 The impacts in terms of safety by the erection of barriers along section H would be similar to that of Area G at the flyover level. However, the buses and mini-bus stoppings would be seriously affected by the barriers at ground level. The existing latrine could be relocated to accommodate the foundation and supports of the barrier along this section of road.

Area I

6.4.10.20 The impacts generated by the erection of a barrier along this section of road will be similar to that of Area H.

Area J

6.4.10.21 Apart from the traffic safety mentioned previously, no other impacts on road users in terms of safety would be foreseen by the erection of a barrier along this section.

Area K

6.4.10.22 The impacts on Area K with respect to safety would be similarly to that of Area G.

6.5 Summary

6.5.1 In view of the above findings, judgement can be rendered at this stage to identify possible locations for the erection of noise mitigation measures. Findings for the areas under consideration are summarised as follows:

Areas A & B

6.5.2 The lack of space in Areas A & B is the main constraint which renders the barrier construction not feasible. It would be unlikely that the barrier could be constructed without blocking part of the main entrances.

Area C

6.5.3 Again the lack of space would not allow the implementation of a barrier/enclosure. The safety implications during emergency situations would also be unacceptable.

Area D

6.5.4 Construction of a barrier along this section of road would intersect with the existing drainage reserve zone surrounding 225ϕ drainage manholes, thus approval on the alignment of the barrier should be sought from DSD. Alternatively, the length of the barrier may have to be reduced to avoid encroachment into the drainage reserve zones.

6.5.5 The proposed barrier would also affect the livelihood of Mei Foo Sun Chuen residents by blocking the access to the existing refuse collection point and affecting the usage of the existing basketball court located underneath the flyover.

Area E

6.5.6 Similar to Area D, the existence of drainage reserves is one of the principal constraints in this area. The proposed barrier would severely reduce the visibility of vehicles entering Kwai Chung Road Flyover from the northbound slip road of Lai Chi Kok Road. As a result, the construction of a barrier along this section would obstruct the visibility of road users.

Area F

6.5.7 Construction of a barrier in Area F would not be practical. The main constraint would be the 4.5m horizontal clearance between the outer edge of the flyover and the building facade required by the Fire Services Department.

Area G

6.5.8 The visibility for traffic turning from Lai Chi Kok Road to Cheung Sha Wan Road through the road beneath the flyover would be an insurmountable constraint as a result of the construction of the barrier supports.

Areas H & I

6.5.9 Blockage of the existing bus terminus and mini-bus stop beneath the flyover together with Mei Lai Road and the adjacent link road rules out the construction of barriers along these two sections. Furthermore, these barriers would encroach into the existing drainage reserve and fall inside the MTR protection zone so that the requirements as stated in 6.4.8.3 and 6.4.8.4 should also be considered.

Area J

6.5.10 The lack of clearance between the flyover and the edge of the widened Lai Chi Kok Road would render the construction of a barrier along this section of road not feasible.

Area K

6.5.11 Once again, reduction of visibility for traffic turning from Cheung Sha Wan Road to Lai Chi Kok Road through the link road underneath the flyover leaves the implementation of a barrier along this section not practical. In addition, this area is located close to the MTR tunnel and the requirements as stated in 6.4.8.3 should be followed.

6.5.12 In view of the above, it is noted that the majority of the study areas along Kwai Chung Road Flyover near Mei Foo Sun Chuen cannot be mitigated by direct noise mitigation measures such as barriers and enclosures owing to the presence of insurmountable constraints. Area D is considered to be the only engineering feasible location for the implementation of barriers/enclosures provided that the requirements of MTRC can be fulfilled and impacts on livelihood of residents can be resolved or minimised.

6.5.13 However, the erection of a barrier/enclosure along Area D only would be insignificant to the overall acoustic effectiveness because of its very limited extent. As a result, no direct mitigation measures has been recommended for Kwai Chung Road Flyover near Mei Foo Sun Chuen.