## CHAPTER ELEVEN TRANSPORT LINKS

### Road Networks

1. It has been forecast that an additional 87 km of new road will be required over and above committed projects to support development at the year 2006. An estimated 483,000 private cars and 243,000 goods vehicles are expected to be on the road at 2006. The implications of such forecasts are reviewed in the following sections with particular emphasis on air quality.

### Water Movements and Water Quality

2. The only proposed road crossing which could have an adverse impact on water quality, circulation and sedimentation patterns would be new highways between the PRD and Hong Kong (via Shenzhen and Zhuhai). It is pertinent to note that such proposals are not contingent on any of the three medium-term strategies and are being examined in a separate, ongoing study.

### Air Quality

3. From the transport modelling which was carried out it was predicted that peak velocities will be lowest under the HB-Biased Option (26km/h) and highest under the Recommended Strategy (27 km/h). The implication of this is that potential congestion and the associated environmental problems are greatest under the HB-Biased Option. While the differences in the peak velocities are of the order of 5% this still indicates a trend especially when all other factors, such as the increase in noise and air pollution, are taken into consideration.

4. The number of vehicles passing through individual ACZs are summarised in Table 11.1 with the number of goods vehicles shown in Table 11.2.

5. During the peak hour the model forecasts that under that NT-Biased Options 40% of the traffic in Tuen Mun (ACZ) are goods vehicles, with 43% under the HB-Biased and 44% under the Recommended Strategy. Considering the annual average number of vehicles travelling through the Tuen Mun ACZ under both the NT and HB-Biased Options the average number of goods vehicles is 56%, with 57% under the Recommended Strategy.

6. In the Yuen Long ACZ the relative annual percentage of goods vehicles is forecast to be 51%, 55% and 54% for the NT-Biased, HB-Biased, and Recommended Options respectively. In Harbour ACZ the number of goods vehicles (annual) amount to 34% and 35% under the NT-Biased and HB-Biased Options respectively.

7. The major contributor to the air pollution problem is the number of goods vehicles travelling through each ACZ and most especially the Tuen Mun and Harbour ACZ's. The Tuen Mun ACZ will be most adversely affected by the emissions from traffic, with the $NO_2$ AQO trigger level exceeded in the medium term regardless of the scenario considered.

## Table 11.1 Total Vehicle Kilometre

| AM Peak Hour ($x10^3$) | | | |
|---|---|---|---|
| **Air Control Zone** | **NT-Biased Option** | **HB-Biased Option** | **Recommended Strategy** |
| 1. Harbour | 950 | 1,028 | 1,006 |
| 2. Tseung Kwan O | 80 | 75 | 76 |
| 3. Lantau | 80 | 76 | 76 |
| 4. Fanling/Sha Tau Kok | 120 | 90 | 92 |
| 5. Port Shelter | 23 | 21 | 22 |
| 6. South HK Island/Lamma | 61 | 65 | 66 |
| 7. Tolo | 301 | 279 | 280 |
| 8. Tsuen Wan/Kwai Chung | 433 | 447 | 432 |
| 9. Tuen Mun | 250 | 231 | 234 |
| 10. Yuen Long | 326 | 284 | 294 |
| **TOTAL** | **2,627** | **2,601** | **2,584** |

| Annual ($x10^6$) | | | |
|---|---|---|---|
| **Air Control Zone** | **NT-Biased Option** | **HB-Biased Option** | **Recommended Strategy** |
| 1. Harbour | 5,566 | 5,859 | 5,674 |
| 2. Tseung Kwan O | 375 | 360 | 370 |
| 3. Lantau | 548 | 520 | 532 |
| 4. Fanling/Sha Tau Kok | 603 | 467 | 474 |
| 5. Port Shelter | 107 | 105 | 105 |
| 6. South HK Island/Lamma | 366 | 389 | 390 |
| 7. Tolo | 1,599 | 1,515 | 1,522 |
| 8. Tsuen Wan/Kwai Chung | 2,382 | 2,438 | 2,353 |
| 9. Tuen Mun | 1,254 | 1,225 | 1,217 |
| 10. Yuen Long | 1,667 | 1,432 | 1,509 |
| **TOTAL** | **14,472** | **14,314** | **14,151** |

## Table 11.2 Goods Vehciles-Kilometre

| AM Peak Hour ($x10^3$) | | | |
|---|---|---|---|
| **Air Control Zone** | **NT-Biased Option** | **HB-Biased Option** | **Recommended Strategy** |
| 1. Harbour | 238 | 250 | 252 |
| 2. Tseung Kwan O | 17 | 16 | 16 |
| 3. Lantau | 33 | 31 | 33 |
| 4. Fanling/Sha Tau Kok | 52 | 45 | 48 |
| 5. Port Shelter | 4 | 4 | 4 |
| 6. South HK Island/Lamma | 13 | 14 | 14 |
| 7. Tolo | 89 | 85 | 88 |
| 8. Tsuen Wan/Kwai Chung | 186 | 186 | 188 |
| 9. Tuen Mun | 105 | 99 | 103 |
| 10. Yuen Long | 134 | 122 | 127 |
| **TOTAL** | **875** | **854** | **877** |

| Annual ($x10^6$) | | | |
|---|---|---|---|
| **Air Control Zone** | **NT-Biased Option** | **HB-Biased Option** | **Recommended Strategy** |
| 1. Harbour | 1938 | 2043 | 1981 |
| 2. Tseung Kwan O | 118 | 116 | 118 |
| 3. Lantau | 238 | 224 | 234 |
| 4. Fanling/Sha Tau Kok | 322 | 294 | 297 |
| 5. Port Shelter | 30 | 31 | 30 |
| 6. South HK Island/Lamma | 1 | 1 | 1 |
| 7. Tolo | 638 | 632 | 618 |
| 8. Tsuen Wan/Kwai Chung | 1257 | 1281 | 1256 |
| 9. Tuen Mun | 701 | 688 | 692 |
| 10. Yuen Long | 849 | 791 | 814 |
| **TOTAL** | **6217** | **6233** | **6172** |

8. The proposal of setting up a freight/goods marshalling yard in the SSEZ should be given serious consideration as it would reduce the number of goods vehicles entering through the border crossings, and would reduce the extent of vehicle emissions to be assimilated in the New Territories and Metro Area. This would thereby be of benefit to all three scenarios considered.

9. Other intra-territorial measures to reduce the emissions in the Harbour ACZ could include restricting access of goods vehicles to the Metro Area. This would not be practical with the HB-Biased Option, except with the introduction of more marine-based facilities. In Tuen Mun, however, such measures are more complex and difficult to implement, as they have far reaching regional as well as territorial implications.

**Traffic Noise**

10. Strategic road links were broadly examined using the transport model results. In many instances the predicted noise levels were in excess of 75 dB(A) even outside the Metro Area.

11. The traffic implications associated with the three medium-term options need to be considered in terms of noise, congestion on roads, actual capacities of the roads as well as the overall environmental quality of the area being developed. While not seeking to restrict traffic movements, the aim should be to consider ways to reduce the ambient noise levels in the Metro Area, and restrict the noise impacts of development in the New Territories using mechanisms such as the HKPSG and Noise Control Ordinance.

**Guidelines for the Future Development of a Sustainable Transport Policy**

12. In order to aim for a sustainable transport policy the following issues were given priority in the development of the TDS Preferred Options and are appropriate for the medium term:

(a) integration of the land use - transport - environment planning as promulgated by the TDS. Feedback from the environmental studies into the transport model and needs for future development will be critical for the development of sustainable transport strategies. Using the results obtained from the air quality model it was identified that the goods vehicles constituted the key concern with respect to $NO_2$ emissions. Such information needs to be used to determine ways to reduce this contribution with subsequent testing carried out using more sophisticated modelling techniques;

(b) minimising the need for transport and increasing the number of trips made on the least harmful (environmentally) nodes;

(c) to aim for air quality standards which will prevent damage to health, including reduction in dust, $NO_2$, and $SO_2$ especially in connection with emissions from goods vehicles;

(d) increasing the amount of personal travel and freight transport by less environmentally damaging routes; and

(e) preservation of conservation, protected scenic and amenity areas has been built into the land use - transport and environment scenarios and wherever possible new infrastructure has avoided encroachment on such areas.

13. Other strategies which aim to make the transport strategies sustainable include:

(a) the reduction in noise from all modes of transport;

(b) the reduction in the demands placed by transport and industry on non renewable resources;

(c) provide legislation controls to reduce noise levels; and

(d) research and develop new technology.

14. In addition to the foregoing, the following recommendations are also made in connection with future transport policies:

(a) investment in public transport should be enhanced over the next decade, particulary in view of the measures to be in place for restricting private car ownership;

(b) recycled materials should be used wherever possible in road building schemes, noise reducing materials should be applied to road surfaces and maintained in peak condition;

(c) early investment in light rail schemes is desirable although it is understood there is a time constraint on the development of such schemes;

(d) profits from any tolls or revenues collected by Government should be reinvested in developing a sustainable transport policy;

(e) if strategic roads have to cut through built up areas, the feasibility of putting them in tunnel or underpass should be seriously considered. The air and noise benefits accrued can be significant if these are designed properly. Such environmental considerations need to be included in the overall cost-benefit analyses carried out for any new scheme.

(f) wherever practicable, through traffic should be diverted from roads passing through densely populated areas to bypass routes to reduce traffic flows in those areas;

(g) in the cost comparison between environmentally friendly options (such as well planned underground railway, underground expressways) and their open road equivalent, external costs such as the loss of land premium due to the constraints imposed by an open road option, the capital and maintenance costs of the mitigation measures associated with the open road option, visual impacts should all be considered;

(h) practicable technology should be fully exploited to reduce the tail pipe emissions from vehicles. Evolving technology, for example, ultra low or zero emission (such as electric vehicles) which requires the establishment of special infrastructure should be investigated;

(i) porous asphalt or whisper concrete should be used wherever practicable in resurfacing and should be mandatory for all new road construction;

(j) all new proposals should be examined in a regional context rather than in terms of the territorial impacts as the development of the linkages between Hong Kong and the Pearl River Delta will undoubtedly strengthen;

(k) in recognition of the existing concerns with regard to air quality, and recognising the limitations of the present modelling study, it is imperative that a regional air quality model, and Geographical Information System database are developed for use in planning for the protection of the environment. This model should be, inter alia, integrated with the transport models currently in use to allow a proactive environment - transport strategy to be developed rather than reactive measures.