For Discussion
on 25 September 2007

The 24th Meeting of Tuen Mun District Council (2004-2007)

Northwest New Territories Traffic and Infrastructure Review

PURPOSE

This paper informs Members of the latest progress of the Northwest New Territories (NWNT) Traffic and Infrastructure Review (the Review) and seek Members' views of the proposed infrastructure projects identified in the Review.

BACKGROUND

2. The Review was set up to assess the "long-term" and "very long-term" needs[1] for transport infrastructure in NWNT and North Lantau, taking into account the impact of the major projects under construction or planning in these areas. The various highway projects considered in the Review are in **Enclosure 1**.

3. In May 2005, we reported to the Tuen Mun District Council that the Review had concluded that the "Base Network"[2] would be able to cope with the traffic (including those to be generated from HK-SWC and Hong

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1 "Long-term" and "very long-term" stand for year 2017 to 2022, and year 2023 and beyond respectively.

2 The "Based Network" refers to the road network assumed to be in place in NWNT and Lantau by 2016. At the time we presented the Review result in April 2005, the "Base Network" comprises North Lantau Highway Connection between HZMB and NLH, Lantau Road P1 from Tung Chung to Sham Shui Kok, the traffic improvement measure for the town centre section of TMR that consists of an additional interchange to connect TMR with Castle Peak Road near Sam Shing Estate to provide an alternative access for the existing road traffic to and from TMR, and other traffic management schemes, which include -

(a) lengthening of bus bays at Tuen Mun Road southbound near Tseng Choi Street;
(b) improvement of the merging lane from Tuen Hi Road into Tuen Mun Road;
(c) modification of the existing and provision of additional directional signs in the town centre of Tuen Mun;
(d) traffic control and surveillance system and variable message signs for incident management and diversion of traffic;
(e) widening of TMR at Tsing Tin Interchange; and
(f) reconstruction and improvement to TMR expressway section.

Kong-Zhuhai-Macao Bridge (HZMB)) up to at least 2016. The projected volume to capacity (v/c) ratios[3] of the Base Network in year 2016 and 2021 are shown in **Enclosure 2**.

4. The Review also identified three possible network options for further examination. To ascertain the feasibility and impact of the identified options, we have been conducting engineering feasibility studies on the following possible highways projects, including Tuen Mun Eastern Bypass (TMEB), Tuen Mun Western Bypass (TMWB) and Tuen Mun – Chek Lap Kok Link (TM-CLKL), Link Options between Tuen Mun and Lantau, and Tsing Yi - Lantau Link (TY-LL). The study on TY-LL is still in progress. In the course of conducting the feasibility study on alignment options between Tuen Mun and Lantau, we have developed a variation (Option 3A) from the original Option 3 with the Tuen Mun Lantau Link (TM-LL) added. We have also identified the options for north-south strategic link between NWNT and Lantau to meet the "long term" traffic demand up to 2022. Details of the options are listed below –

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[3] A v/c ratio is normally used to reflect traffic situation during peak hours. A v/c ratio below 1 is considered acceptable. A v/c ratio above 1.0 indicates the onset of mild congestion and a v/c ration between 1.0 and 1.2 would indicate a manageable degree of congestion. A v/c ratio above 1.2 indicates the onset of more serious congestion.

<table>
<tr><th></th><th colspan="2">Composition of Highways Projects</th></tr>
<tr><td rowspan="5">Option 1</td><td colspan="2">• Lam Tei Tunnel (LTT)</td></tr>
<tr><td colspan="2">• So Kwun Wat Interchange</td></tr>
<tr><td colspan="2">• Tai Lam Chung Tunnel (TLCT)</td></tr>
<tr><td colspan="2">• Tsing Lung Bridge (TLB) and interchanges at Tuen Mun Road (TMR) and North Lantau Highway (NLH)</td></tr>
<tr><td colspan="2">• Lantau Road P1 between Sham Shui Kok and Sunny Bay</td></tr>
<tr><td rowspan="2">Option 2</td><td colspan="2">• TMWB</td></tr>
<tr><td colspan="2">• TM–CLKL</td></tr>
<tr><td colspan="2">Option 3</td><td>Option 3A</td></tr>
<tr><td colspan="3">• TMEB</td></tr>
<tr><td colspan="2">• Widening TMR to dual four-lane between So Kwun Wat and Tsing Lung Tau</td><td>• Widening TMR to dual four-lane between So Kwun Wat and Siu Lam</td></tr>
<tr><td colspan="2">• TLB and interchanges at TMR and NLH</td><td>• TM-LL and interchange at TMR and NLH</td></tr>
<tr><td colspan="3">• Lantau Road P1 between Sham Shui Kok and Sunny Bay</td></tr>
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The locations of all the options are shown in **Enclosure 3 to 6**.

CONFIGURATIONS OF THE OPTIONS

5. The engineering feasibility studies concluded that all the three Options are technically feasible with the following configurations.

6. Option 1 comprises basically LTT, TLCT, TLB and Lantau Road P1 between Sham Shui Kok and Sunny Bay. LTT is a 4 km long dual three-lane tunnel between Lam Tei Interchange of Deep Bay Link (DBL) and So Kwun Wat. TLCT is a 4 km long dual three-lane highway between So Kwun Wat and Tsing Lung Tau, and involves 1.6 km length of land tunnel. TLB is a 2.9 km long dual three-lane highway between Tsing Lung Tau and Kwai Shek of Lantau with a 1.7 km long suspension bridge crossing over the sea channel. Due to

inadequate space to provide necessary merging and weaving between TLCT and TMR, connection to TMR can be provided only for traffic to/from TLB. Lantau Road P1 is a dual 2-lane road connecting Sham Shui Kok and Sunny Bay. This option focuses on expanding the road networks for Lantau traffic and would release the capacity of the existing roads for urban bound traffic.

7. Option 2 comprises TMWB and TM-CLKL. TMWB is an 8.4 km long dual two-lane highway between DBL and Tuen Mun Area 40 and involves some 5.8 km length of land tunnels. TM-CLKL is a 9 km long dual two-lane highway between Tuen Mun River Trade Terminal and the Airport/Tung Chung of North Lantau with a 4 km long immersed tube tunnel between Tuen Mun west and Lantau, and sea viaducts connecting with the proposed North Lantau Highway Connection and the Airport. This option focuses on providing a more direct link between NWNT and northwest Lantau. It has the advantage of catering for the anticipated significant growth occurring in northwest Lantau, such as that arising from increase in airport related traffic, the proposed Lantau Logistics Park, traffic from HZMB and possibly a new container terminal.

8. Options 3 & 3A, which fall within the zone bounded by alignment Options 1 and 2, will provide alternative routes between NWNT and north Lantau. Option 3 comprises TMEB at the northern end of the route, widening of a section of TMR, TLB to link with the existing NLH at Lantau, and Lantau Road P1 between Sham Shui Kok and Sunny Bay on Lantau. TMEB, predominately a 3.8 km long dual two-lane tunnel under the Tai Lam Country Park, connects Lam Tei Interchange of DBL with TMR at So Kwun Wat. This option requires widening of a section of TMR between So Kwun Wat and Tsing Lung Tau to dual 4-lane. On the southern side, it connects TLB to link with NLH at Lantau. Option 3A is a modified scheme of Option 3 with TMEB as the building block. Similar to Option 3, Option 3A adopts TMEB at its northern end, and widening of a section of TMR between So Kwun Wat and Siu Lam to dual 4-lane. On the southern side, it uses TM-LL, which is a 6.6 km long dual two-lane highway between Siu Lam and Ta Pang Po at Lantau with a 3.9 km long tunnel, to link with NLH at Lantau.

KEY FINDINGS OF THE ENGINEERING FEASIBILITY STUDIES

9. The findings of the latest traffic impact assessments carried out under the engineering feasibility studies are similar to the findings of the Review. The assessments concluded that all major roads in the region would operate within manageable levels up to at least 2016 such that no new major infrastructure projects will be required before then. In the "long term", the

Base Network[4] could no longer meet the traffic demands of the region. The increasing traffic demand arising from the anticipated growth in passenger and air cargo throughput of the Airport, the proposed Lantau Logistics Park and HZMB would cause congestion along the TMR, TKB, Lantau Link (LL) and NLH corridors, indicating a need for the introduction of new highway infrastructures after 2016 (**Enclosure 2**).

COMPARISON OF THE OPTIONS

10. In terms of traffic performance, all three options can relieve the anticipated "long-term" traffic capacity problem in the region. However, each option has its own strengths and weaknesses.

Option 1

11. Option 1 will expand the road capacity for traffic between NWNT and Lantau and would release the capacity of the existing roads for urban bound traffic (**Enclosure 3**). TLB will provide an additional external road link to northeast Lantau and serve as an alternative access in case of incidents on LL.

12. However, for traffic from HK-SWC and the port back-up areas in NWNT to the Airport, the proposed Lantau Logistics Park, the possible new container terminal and HZMB, Option 1 is the longest route which relies heavily on the whole stretch of NLH. This will lower the cost effectiveness for the logistics industry. In addition, this option requires Lantau Road P1 to be in place in the "long term" in order to provide an alternative access against NLH connecting Tung Chung and Sunny Bay.

13. The estimated project cost of Option 1 is about $24.3 billion which is the highest amongst the options. It will take about 8 years from commencement of detailed design to completion of construction.

Option 2

14. Option 2 (**Enclosure 4**) will offer the strongest support to the logistics industry. It provides the most direct route linking, from north to south, HK-SWC, port back-up areas in NWNT, Tuen Mun River Trade Terminal,

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[4] In addition to the road network mentioned in paragraph 3 above, the "Base Network" has been further updated to include the widening of TMR from Yan Oi Town Square to Wong Chu Road as a replacement scheme of the proposed traffic improvement measure for the town centre section of TMR that consists of an additional interchange to connect TMR with Castle Peak Road near Sam Shing Estate to provide an alternative access for the existing road traffic to and from TMR.

EcoPark, the proposed Lantau Logistics Park, the Airport, HZMB and possibly a new container terminal in Lantau. Compared to the existing TMR-TKB-LL-NLH corridor, traffic between NWNT and Lantau using Option 2 can save a travelling distance by as much as 22 km.

15. The logistics industry is one of the four key pillars in the Hong Kong economy. In 2005, the logistics sector alone employed 204 000 persons, accounting for 6.0% of the total employment. It also generated $69.8 billion in value added or 5.2% of GDP. A direct road link between HK-SWC and the various logistics facilities on Lantau will enhance the connection between Hong Kong and its cargo hinterland, as the Shenzhen Bay Port connecting to the HK-SWC is planned to provide the largest handling capacities for cross-boundary goods vehicles. A direct north-south link saving the need to travel on the whole stretch of NLH will be important for the time critical delivery of cargoes to and from the Hong Kong International Airport and possibly the new container terminal. Option 2 will contribute to a more efficient road connection for just in time delivery which is critical to modern logistics development of Hong Kong.

16. Apart from optimizing the cargo flow, Option 2 also makes it more convenient for travellers from the eastern part of the Pearl River Delta (PRD) region to take international flights at the Airport, hence increasing the Airport's competitiveness. Moreover, Option 2 is the only option amongst the three to provide an alternative route to the Airport independent from the existing LL and NLH. This is particularly important when the NLH will otherwise reach its capacity beyond 2016. Traffic to and from the airport are time critical and traffic congestions will seriously compromise the efficiency and competitiveness of our air services and logistics sector.

17. Unlike the other Options, Option 2 does not require the section of Lantau Road P1 between Sham Shui Kok and Sunny Bay in the "long term" situation because the TM-CLKL would be able to relieve the traffic loading at NLH and LL.

18. Residents of Yuen Long and Tuen Mun going to and from Lantau, including the Airport, will also welcome Option 2. Residents of Lantau will also save travelling time to go to Yuen Long and Tuen Mun.

19. Option 2 would have the effect of releasing the capacity of the existing roads for urban bound traffic and it has relatively higher economic benefits amongst the options.

20. The estimated project cost of Option 2 is about $20.1 billion. It

will take about 9 years from commencement of detailed investigation and preliminary design to completion of construction.

Options 3 and 3A

21. Options 3 and 3A are alternative schemes in between Options 1 and 2. They aim at exploring alternative routes between NWNT and north Lantau by using TMEB as the building block connecting to either TLB or TM-LL (**Enclosures 5 and 6**).

22. Option 3 will perform similar functions as Option 1 in diverting traffic between NWNT and Lantau but fall short of connecting directly to the major logistics developments in Lantau as Option 2. Option 3A can improve the connection between NWNT and eastern part of north Lantau but at the expense of the Airport and urban areas.

23. A major downside of Options 3 and 3A is that both will require the widening a section of TMR which would become a bottleneck and major constraint for future expansion of road capacity. In the context of the project on reconstruction and improvement to TMR expressway section, we have carried out further study on the practicality of widening the entire length of the expressway section of TMR to dual 4-lane configuration. However, the study reveals that physical constraints have made it highly difficult to widen certain sections of TMR to dual 4-lane with hard shoulders, especially at Siu Lam, Sham Tseng and Ting Kau interchanges where either residential developments and/or other highway infrastructures are too close to the road. Besides the bottleneck on TMR, TMEB will also become a constraint to constructing new roads at Lam Tei. As a result, Options 3 and 3A have the lowest flexibility in terms of future road network expansion for urban bound traffic in the "very long term" compared to the other two options.

24. Although both options will provide an additional external road link capacity to Lantau and serve as an alternative access in case of incidents on LL, the effectiveness of serving as an alternative route to the Airport is inferior to that of Option 2 in case of incidence on the existing NLH. Similar to Option 1, both Options 3 and 3A will require Lantau Road P1 between Sham Shui Kok and Sunny Bay to be in place in the "long-term" to ensure NLH will not be overloaded.

25. The estimated project cost of Option 3 or Option 3A is $16.3 billion and $18.3 billion respectively, which is lower than the other two options. It will take about 8 years from commencement of detailed investigation and preliminary design to completion of construction.

CONCLUSION

26. Each of the four options can provide a new strategic north-south corridor to meet the traffic demand of the region up to at least 2022 and each has its own strengths and weaknesses.

27. Options 1 and 2 have different strategic functions with Option 1 featuring the expansion of road capacity for Lantau bound traffic and the release of existing road capacity for urban traffic while Option 2 on the provision of more direct linkage to the Airport, the proposed Lantau Logistics Park, HZMB and the possible new container terminal in Lantau and hence enhancing the overall efficiency of the intermodal transportation connectivity of Hong Kong, especially for the delivery of time critical and high value cargoes and travellers between the PRD region and international destinations via the Airport. Options 3 and 3A can improve the connection with the eastern part of Lantau, but could not perform as well as Option 2 in providing a more direct and alternative access to the Airport, nor Option 1 in diverting traffic away from TMR. Options 3 and 3A also have the lowest flexibility for future road expansion for urban bound traffic for the "very long term" situation as TMEB and the widened section of TMR would become constraints to building new road projects in the area.

RECOMMENDATION

28. From the perspective of providing a direct and alternative access to the Airport and the various proposed major logistics developments at Lantau, thus reinforcing the Airport as an international and regional aviation hub and Hong Kong as a regional logistics centre, Option 2 clearly stands out in terms of traffic and economic benefit. It will also provide greatest planning flexibility allowing for further expansion of the road network to the urban areas to cope with the traffic demand arising from the "very long term" planning horizon.

29. In view of the above, we propose to proceed with detailed investigation and preliminary design of the TMWB and TM-CLKL Corridor under Option 2 to ensure that new transport infrastructure will be made available to cope with the "long-term" traffic demand in the area. For the "very long term" situation, it may be possible that some further infrastructure projects, such as the TYLL and some components in Options 1, 3 and 3A, may be required. We will continue to monitor the progress of various major developments in the region to facilitate the future planning of various highways projects.

WAY FORWARD

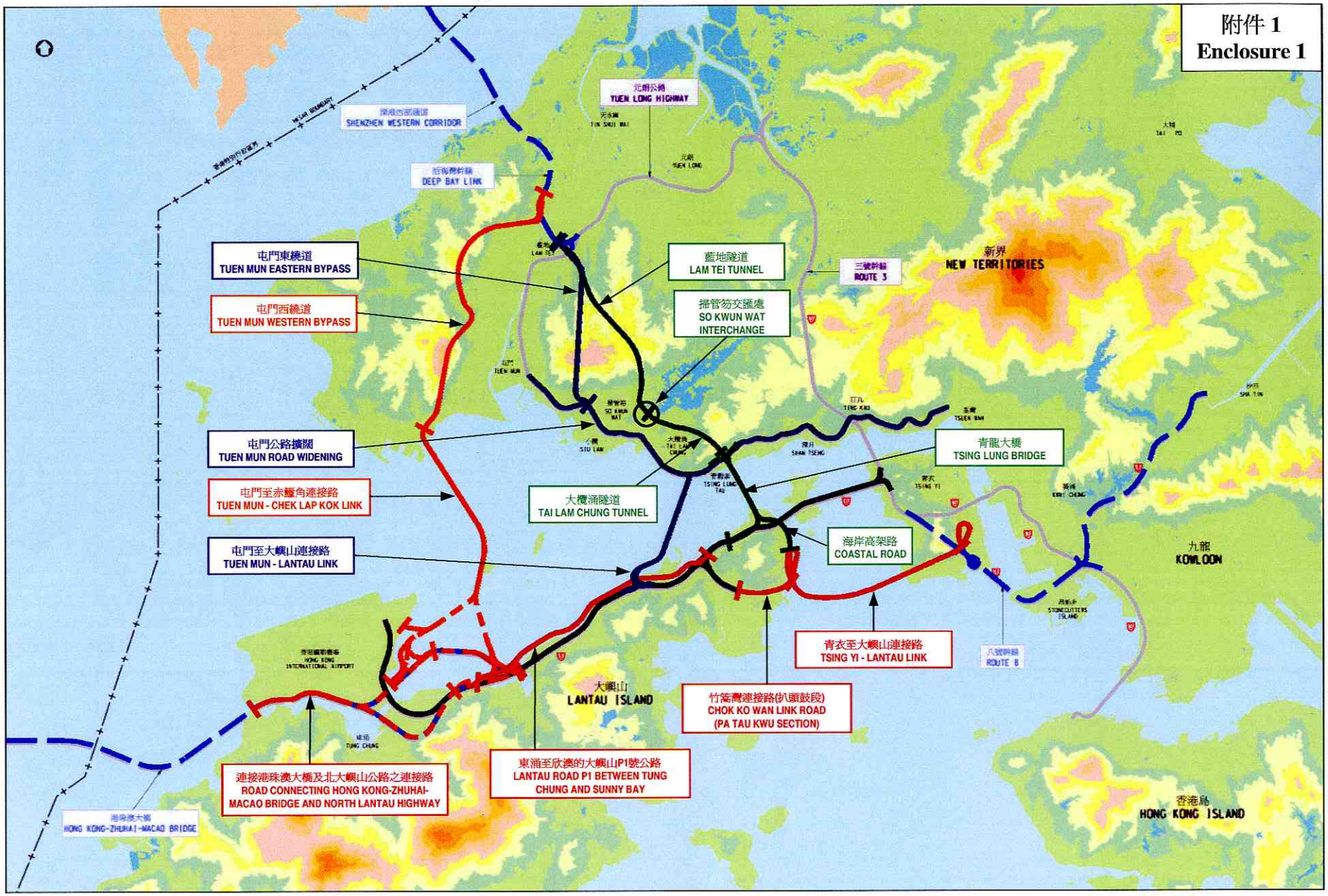
30. Based on the findings and recommendation of the engineering feasibility studies, we will submit funding application for the detailed investigation and preliminary design of the TMWB and TM-CLKL under Option 2.

ADVICE SOUGHT

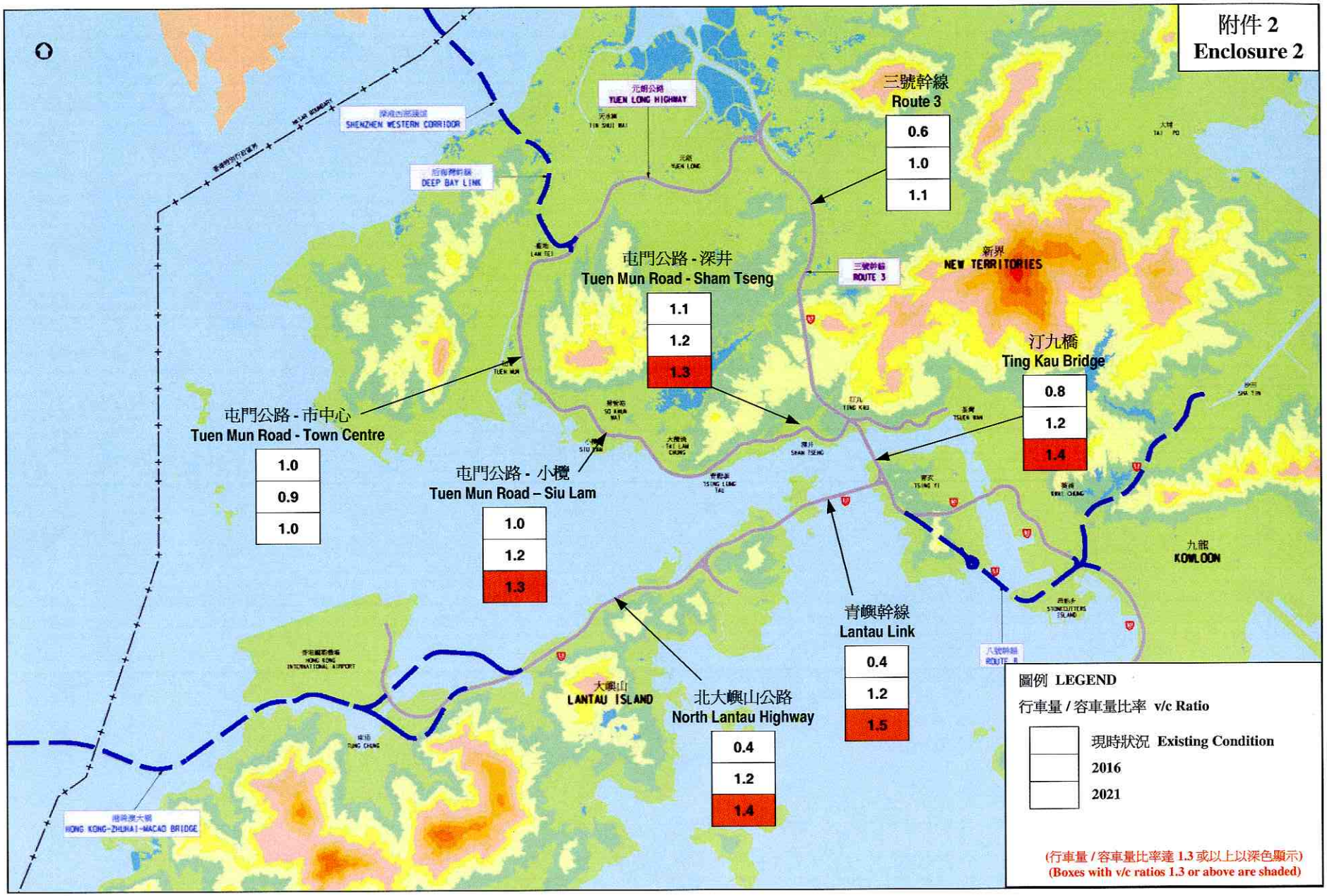
31. Members are invited to note the findings of the engineering feasibility studies under the Review and comment on the recommendations set out in the paper.

Highways Department
September 2007

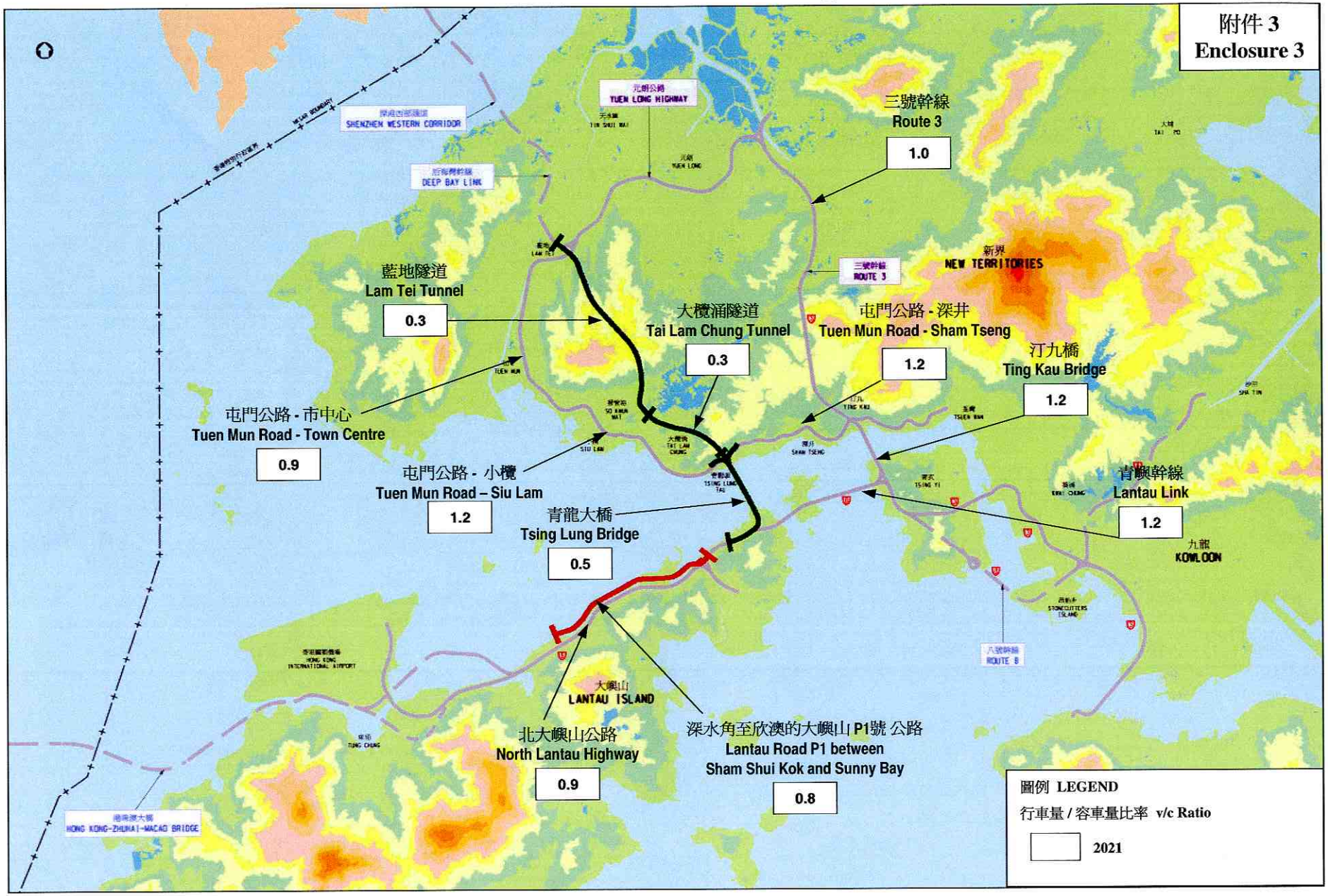
擬議公路發展組合
Proposed Highway Network



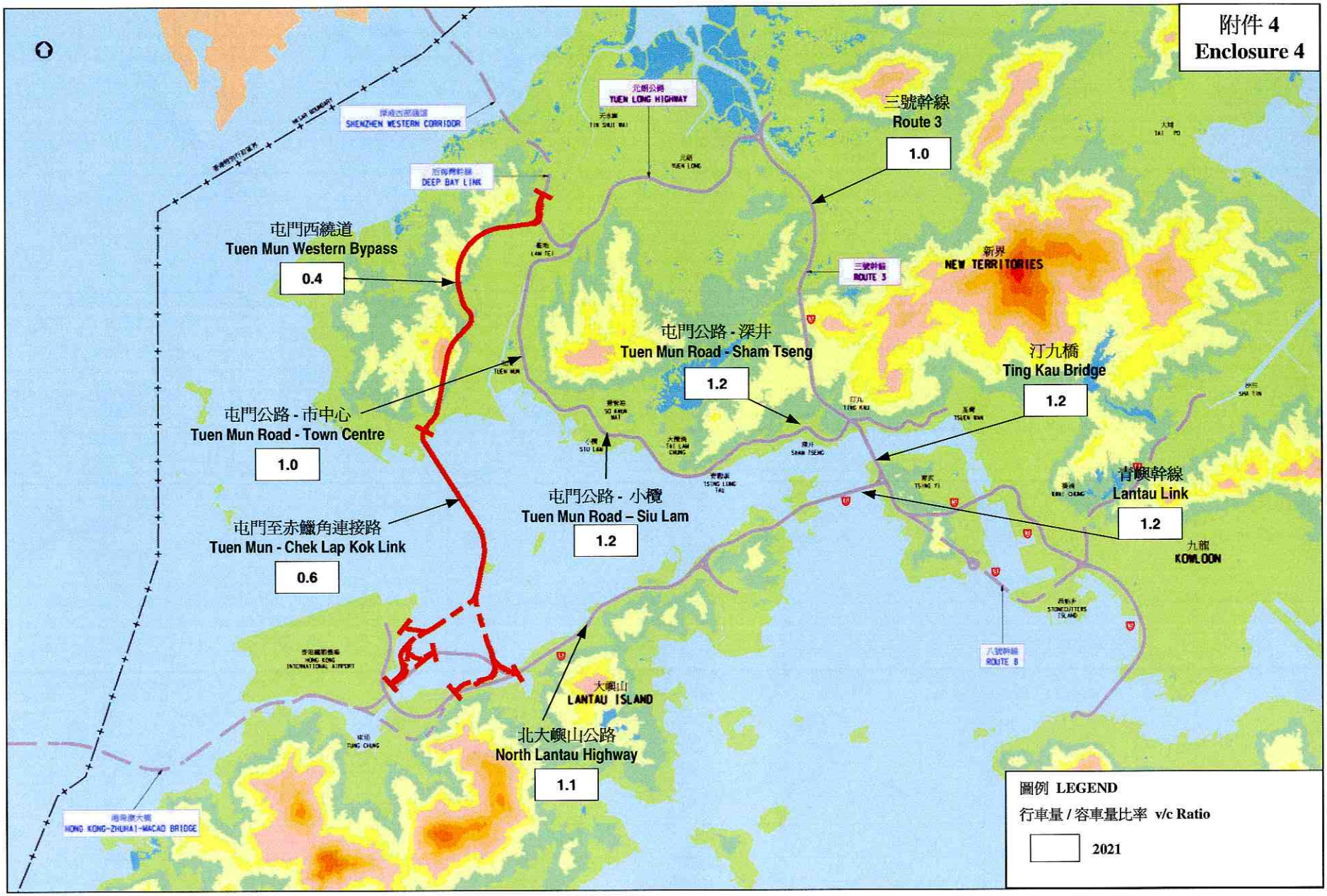
基本公路網的交通狀況
Traffic Condition under Base Network



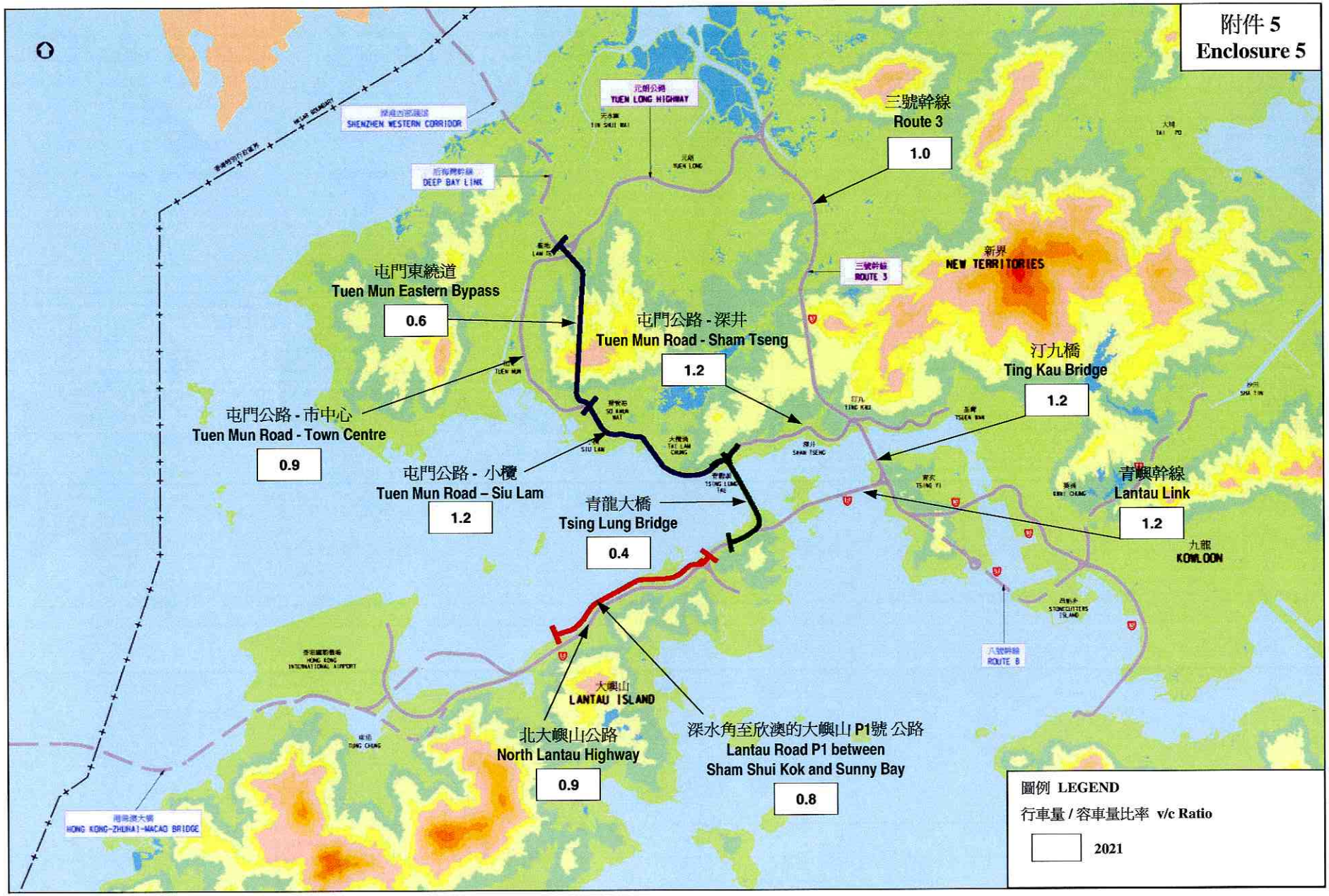
方案1 的交通狀況
Traffic Condition under Option 1



方案2 的交通狀況
Traffic Condition under Option 2



方案3 的交通狀況
Traffic Condition under Option 3



方案3A 的交通狀況
Traffic Condition under Option 3A