

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 706 – HIGHWAYS

Transport – Roads

891TH – Tsing Yi-Lantau Link

876TH – Improvement of Lion Rock Tunnel

Members are invited to recommend to the Finance Committee –

- (a) the upgrading of part of **891TH** to Category A as **894TH** “Tsing Yi-Lantau Link – Investigation and Detailed Design” at an estimated cost of \$730.0 million in money-of-the-day prices; and
- (b) the upgrading of part of **876TH** to Category A as **893TH** “Improvement of Lion Rock Tunnel – First Stage Design and Site Investigation” at an estimated cost of \$250.1 million in money-of-the-day prices.

PROBLEM

We need to carry out the following works –

- (a) conduct investigation and detailed design for Tsing Yi-Lantau Link; and
- (b) conduct first stage design and site investigation for the Improvement of Lion Rock Tunnel project.

PROPOSAL

2. The Director of Highways proposes, with the support of the Secretary for Transport and Logistics, to upgrade the following projects to Category A –

- (a) part of **891TH** “Tsing Yi-Lantau Link” at an estimated cost of \$730.0 million in money-of-the-day (MOD) prices to conduct investigation and detailed design; and
- (b) part of **876TH** “Improvement of Lion Rock Tunnel” at an estimated cost of \$250.1 million in MOD prices to conduct first stage design and site investigation.

—— Details of the above projects are at **Enclosure 1** and **Enclosure 2** respectively.

Transport and Logistics Bureau
February 2023

891TH – Tsing Yi – Lantau Link

PROJECT SCOPE AND NATURE

We propose to upgrade part of **891TH** (i.e. **894TH**) (Proposed Project) to Category A which scope comprises –

- (a) review the findings of relevant studies¹ and examine the alignments and design options of the proposed long-span bridges and interchanges;
- (b) assess the impact on environment, traffic, marine, heritage, land and other related aspects of Tsing Yi – Lantau Link (TYLL);
- (c) carry out the preliminary and detailed designs of TYLL, including long-span bridge structures, viaduct structures at interchanges, roads, associated ancillary facilities and equipment designs, wind tunnel tests for stability assessment of the long-span bridges and designs of other relevant works, with an aim to acquiring sufficient information for the purposes of cost estimates, tendering and construction;
- (d) prepare tender documents and assess tenders for construction works contract of TYLL; and
- (e) carry out associated site investigations and works supervision.

2. Upon obtaining funding approval from the Finance Committee (FC), we will commence the Proposed Project for target completion in about 48 months. The tasks of the Proposed Project will be conducted in parallel whenever practicable with a view to expediting the delivery of the project. In order to meet the tight schedule, we have invited tenders in parallel so as to commence the Proposed Project as early as possible. We will update the estimated project cost and cash flow of the project with reference to the returned tender prices before the FC. The consultancy contract will only be awarded upon obtaining FC's funding approval. In the tendering stage of the Proposed Project, we invited the tenderers to propose shorter study programme and measures to expedite the study with a view to shortening the time required for the investigation study and detailed design.

/JUSTIFICATION

¹ Including the engineering study of Tsing Yi – Lantau Link, and the on-going engineering studies of the interfacing projects, which are Route 11, Kau Yi Chau Artificial Islands and Road P1, etc.

JUSTIFICATION

3. To meet the anticipated increase in traffic demands arising from the progressive developments in the Northwest New Territories (NWNT) (including the Hung Shui Kiu/Ha Tsuen New Development Area and the Yuen Long South Development), the Government is taking forward a group of major roads from Lam Tei to Tsing Yi passing through So Kwun Wat, Tai Lam Chung and North Lantau, which comprises Route 11 (section between Yuen Long and North Lantau), TYLL and widening of Yuen Long Highway (section between Lam Tei and Tong Yan San Tsuen). The entire group of the proposed strategic roads, connecting the NWNT with the urban areas, can improve the traffic conditions of major roads connecting the NWNT with the urban areas (including Tuen Mun Road, Tai Lam Tunnel and Ting Kau Bridge) and Lantau Link. It can also, by improving road infrastructure, further strengthen the connectivity of major roads and the capacity of interchanges, in order to enhance the scale and the connectivity of developments in the vicinity, and unleash the development potential of the NWNT and North Lantau effectively. After a detailed review of the implementation programmes of the above-mentioned proposed strategic roads, the Government's target is to commission the major roads as proposed above in phases on or before 2033. A layout plan showing the preliminary alignment of the relevant major roads is at **Annex 1 to Enclosure 1**.

4. The Highways Department (HyD) commenced the investigation study for Route 11 and the investigation and detailed design work for the Widening of Yuen Long Highway (section between Lam Tei and Tong Yan San Tsuen) in September 2021 and October 2022 respectively. As for TYLL, HyD commissioned an engineering study in March 2021, which studied a number of bridge and tunnel alignment options and comprehensively assessed these alignment options under various criteria, including the traffic benefits, engineering technical feasibility, land acquisition, environmental impact and project implementation programme, etc., to figure out the most appropriate scheme, and confirmed its benefits and preliminary engineering feasibility.

5. As the major roads connecting to both ends of TYLL (including the proposed Route 11, North Lantau Highway and Tsing Sha Highway) are located at relatively high level above principal datum, we propose to implement TYLL in the forms of bridge, with a total length of about 5.2 kilometres (km), on the south of the existing Lantau Link. The preliminary alignment comprises two long-span bridges crossing the Ma Wan Fairway and Kap Shui Mun Fairway, "Tsing Yi Connection" and "North Lantau Interchange". This option, adopting a long-span bridge with shorter main span crossing the Ma Wan Fairway, will not encroach onto the Ma Wan Fairway and Ma Wan Anchorage, and will not affect the operation of fairways and port. Impacts to the existing oil depots and various marine facilities located at west and southwest of Tsing Yi Island are also minimized. This alignment option eliminates the need of constructing an additional tunnel on Tsing Yi

Yi Island for connecting the Stonecutters Bridge. The proposed preliminary alignment is the most cost-effective option in view of transport planning, construction scale, project cost and operation requirements.

6. To proceed with the TYLL project, it is necessary to conduct the investigation study and detailed design. Based on the preliminary alignment and the results of the preliminary assessments of the engineering study as mentioned in paragraph 4 above, the investigation study will confirm the alignment, overall layout, design proposals of long-span bridges and land requirements of TYLL. The investigation study will assess the environmental impacts of the proposed works and recommend the required mitigation measures, and complete the Environment Impact Assessment (EIA) to fulfil the requirements of EIA Ordinance (EIAO) (Chapter 499). We will also carry out site investigation to gather geotechnical and geological information for the design of the proposed works.

7. We will conduct a series of preliminary and detailed designs for TYLL. We will review the design of the long-span bridges in details (including bridge tower height, bridge deck gradient, air draft, appropriate form and arrangement of the bridges) to determine the spatial locations of the bridges, the locations of the navigation channels underneath the bridges and the associated requirements on net width and net height, bridge tower foundation and the overall arrangement of the bridges to meet the height restrictions for navigation, aviation, etc., and to match the designs of the interchanges on both ends of the bridges. Based on the coastal climate change, geology, traffic impact, marine impact and environmental impact of the bridge sites and the relevant design codes and standards, as well as the wind stability analysis and validation by wind tunnel tests, we will carry out preliminary and detailed designs of the various bridge components, including suspension cables, bridge decks, bridge towers, anchorages, foundations, ship collision protection facilities, and equipment and facilities for bridge operation, maintenance and management. We will also conduct preliminary and detailed designs of “Tsing Yi Connection”, “North Lantau Interchange” and other works, including realignment of Cheung Tsing Highway and Tsing Sha Highway northbound, roads, viaduct structures at interchanges and retaining structures, etc. Thereafter, we will estimate the project costs, establish the procurement strategy for construction works and conduct tendering exercise for works contract.

8. TYLL can relieve the forecast traffic impact on Lantau Link, creating capacity to cope with the long term development of the NWNT, Lantau Island and Hong Kong International Airport (HKIA). TYLL, being part of the group of strategic roads, together with the implementation of Route 11 and other relevant major roads, can improve the traffic conditions of major roads plying the NWNT and the urban areas, increase the route choices for the traffic commuting Lantau Island and the urban areas, and strengthen the resilience of the entire road network.

A. Improve Traffic Conditions of the Lantau Link

9. The Lantau Link is currently the most direct connection between Lantau Island and the urban areas. According to the preliminary traffic impact assessment, the traffic capacity of the Lantau Link will not be able to cope with the additional traffic commuting between the NWNT and the urban areas via Route 11 and Lantau Island after the completion of Route 11. The Lantau Link will suffer traffic congestion during peak hours in due course², regardless of the presence of the proposed road links connecting Kau Yi Chau Artificial Islands. Hence, we need to implement TYLL to relieve the forecast traffic impact on Lantau Link.

B. Improve Traffic Conditions of Major Roads between NWNT and Urban Areas and Increase Route Choice for Traffic commuting NWNT and Urban Areas in conjunction with Route 11

10. TYLL in conjunction with Route 11 will form an express route between the NWNT and urban areas via Lantau Island and Tsing Yi. This express route will also serve as a reliable and convenient alternative route, in addition to Tai Lam Tunnel, Ting Kau Bridge and Tuen Mun Road, to improve the urban-bound traffic condition.

C. Increase Route Choice for Traffic commuting Lantau Island and Urban Areas and Strengthen Resilience of Road Network Connecting Lantau Island and Urban Areas

11. TYLL, serving as an alternative route to the existing Lantau Link for the vehicles commuting between Lantau Island and the urban areas, will strengthen resilience of the road network connecting to the HKIA and Hong Kong – Zhuhai – Macau Bridge to traffic incidents. In the event of emergencies on Tsing Ma Bridge or Kap Shui Mun Bridge, the Lantau – urban bound traffic can pass through Stonecutters Bridge, Nam Wan Tunnel and TYLL. In addition, in case there are emergencies on Lantau Link or Ting Kau Bridge, the traffic from Cheung Tsing Tunnel heading for Lantau Island or the NWNT can be diverted to TYLL by an emergency/contingency crossing to be provided between TYLL and Cheung Tsing Highway northbound.

/12.

² A volume to capacity (v/c) ratio is used to reflect the traffic situation during peak hours. A v/c ratio less than 1.0 means the situation is acceptable. A v/c ratio above 1.0 indicates the onset of mild congestion and a v/c ratio between 1.0 and 1.2 indicates a manageable degree of congestion. A v/c ratio higher than 1.2 means the congestion is getting serious. According to the preliminary traffic impact assessment, after the commissioning of Route 11, the morning peak v/c ratio for the Lantau Link will approach 1.2 in 2036 if there are no additional roads to connect the southern end of Route 11 to other destinations; if the proposed road links connecting Kau Yi Chau Artificial Islands have been commissioned at that time under the scenario without TYLL, the v/c ratio for the Lantau Link will still approach 1.1. The implementation of TYLL can effectively reduce the morning peak v/c ratio of the Lantau Link to about 0.8.

12. Taking into consideration the above traffic impact assessment and the anticipated traffic congestion on Lantau Link and having reviewed the implementation programmes of Route 11 and TYLL, the Government's latest target is to commission the entire group of major roads (including TYLL) connecting the NWNT and the urban areas in phases on or before 2033.

FINANCIAL IMPLICATIONS

13. We estimate the cost of the Proposed Project to be \$730.0 million in MOD prices, which includes the expenditure on associated site investigation works, broken down as follows –

	\$ million (in MOD prices)
(a) Consultants' fees	391.0
(i) a review of the findings of relevant studies and examination of alignments and design options	11.0
(ii) assessments of impacts on environment, traffic, marine, heritage, land and other related aspects	56.0
(iii) preliminary design of two long-span bridges, "Tsing Yi Connection", "North Lantau Interchange" and other works	83.0
(iv) detailed design of two long-span bridges, "Tsing Yi Connection", "North Lantau Interchange" and other works ³	207.0
(v) preparation of tender documents and tender assessment for TYLL works	34.0
(b) Fees related to supervision of site investigation works	14.0
	/(c)

³ The detailed design of TYLL includes design of long-span bridges (including suspension cables, bridge decks, bridge towers, anchorages, foundations, reclamation works, ship impact protection facilities as well as equipment and facilities for operation, maintenance and management of the bridges) and design of "Tsing Yi Connection" and "North Lantau Interchange" (including realignment of Tsing Sha Highway and Cheung Tsing Highway northbound, roads, viaduct structures at interchanges and retaining structures, etc.).

		\$ million (in MOD prices)
(c)	Site investigation ⁴	259.0
(d)	Contingencies	66.0
Total		730.0

14. In view of the scale of TYLL, the complexity and multi-disciplinary nature of the Proposed Project (including design of long-span bridges, grade-separated interchanges and expressway, necessity of realignment of Tsing Sha Highway and Cheung Tsing Highway with busy traffic, geotechnical engineering design and EIA, etc.), we plan to engage consultants to undertake the Proposed Project and supervise the associated site investigation works. The basis for the estimate of the consultants' fees and fees associated with the supervision of site investigation works is set out in **Annex 2 to Enclosure 1**.

15. Subject to funding approval, we plan to phase the expenditure as follows –

Year	\$ million (in MOD prices)
2023 – 24	60.0
2024 – 25	160.0
2025 – 26	280.0
2026 – 27	220.0
2027 – 28	10.0
730.0	

/16.

⁴ Site investigation includes ground investigation works at offshore areas and on the slopes adjacent to major roads, and wind tunnel tests to verify the wind-resistant stability of long-span bridge structures.

16. We have derived the MOD estimate on the basis of the Government's latest set of assumptions on the trend rate of change in the prices of public sector building and construction output for the period of 2023 to 2028. Subject to funding approval, we will engage consultants to undertake the Proposed Project on a lump sum basis. As for the site investigation works under the Proposed Project, it will be tendered under a standard re-measurement contract because the quantity of works involved may vary depending on actual ground conditions. The Proposed Project will be delivered under New Engineering Contract⁵. The contracts will provide for price adjustments.

17. The Proposed Project will not give rise to any recurrent expenditure.

PUBLIC CONSULTATION

18. We consulted Kwai Tsing District Council (DC), Traffic and Transport Committee of Islands DC and Tsuen Wan DC on 8, 21 November and 29 November 2022 respectively about the TYLL project. The concerned DCs expressed their support to the project and provided comments on the project related to the preliminary alignment, environmental impact and project implementation programme, etc., and requested the concerned departments to commission Route 11 and TYLL as soon as possible.

19. We noted the DCs' comments on TYLL and would follow up on the comments on the project in the investigation and detailed design study as appropriate.

20. We consulted the Legislative Council (LegCo) Panel on Transport about the Proposed Project on 6 December 2022. Members generally supported the implementation of TYLL. We provided supplementary information to the LegCo Panel on Transport on 14 February 2023 (LC Paper No. CB(4)108/2023(01)).

ENVIRONMENTAL IMPLICATIONS

21. TYLL is a designated project under Schedule 2 of the EIAO, and HyD has to apply for an environmental permit for the construction and operation of TYLL. We will complete the EIA study in the investigation study to comply with the requirements of EIAO, and assess the environmental impacts arising from the proposed works, covering the aspects of air quality, water quality, ecology, fisheries, cultural heritage, noise, landscape and visual impact, etc. Nevertheless,
/the

⁵ New Engineering Contract is a suite of contracts developed by the Institution of Civil Engineers, United Kingdom. It is a contract form that emphasises cooperation, mutual trust and collaborative risk management between contract parties.

the investigation study, site investigation works and detailed design are not designated projects and will not cause any long-term adverse environmental impact. We have included in the project estimates the cost of implementing suitable pollution control measures to mitigate short-term environmental impacts arising from the site investigation works under the Proposed Project.

22. The Proposed Project will only generate minimal construction waste. We will require the consultants to fully consider measures to minimise the generation of construction waste and to reuse or recycle construction waste as much as possible in the future implementation of the construction works.

HERITAGE IMPLICATIONS

23. The Proposed Project will not affect any heritage site, i.e. all declared monuments, proposed monuments, graded heritage sites/historic buildings or structures, sites of archaeological interest, all newly proposed graded heritage sites/historic buildings or structures and government historic sites identified by the Antiquities and Monuments Office. We will conduct cultural heritage impact assessment under the EIA study of the Proposed Project, and recommend appropriate mitigation measures if necessary.

LAND ACQUISITION

24. The Proposed Project will not require any land acquisition.

BACKGROUND INFORMATION

25. The proposed scope of works under PWP Item **891TH** – TYLL mainly comprises two long-span bridges and two large-scale interchanges with details given below –

- (a) construction of a dual three-lane long-span bridge of about 2.3 km long crossing the Ma Wan Fairway. The eastern end of the bridge will connect to Tsing Sha Highway at Tsing Yi west, while the western end of the bridge will connect to the proposed long-span bridge crossing the Kap Shui Mun Fairway as mentioned in paragraph 25(b) below at south of Ma Wan;

/(b)

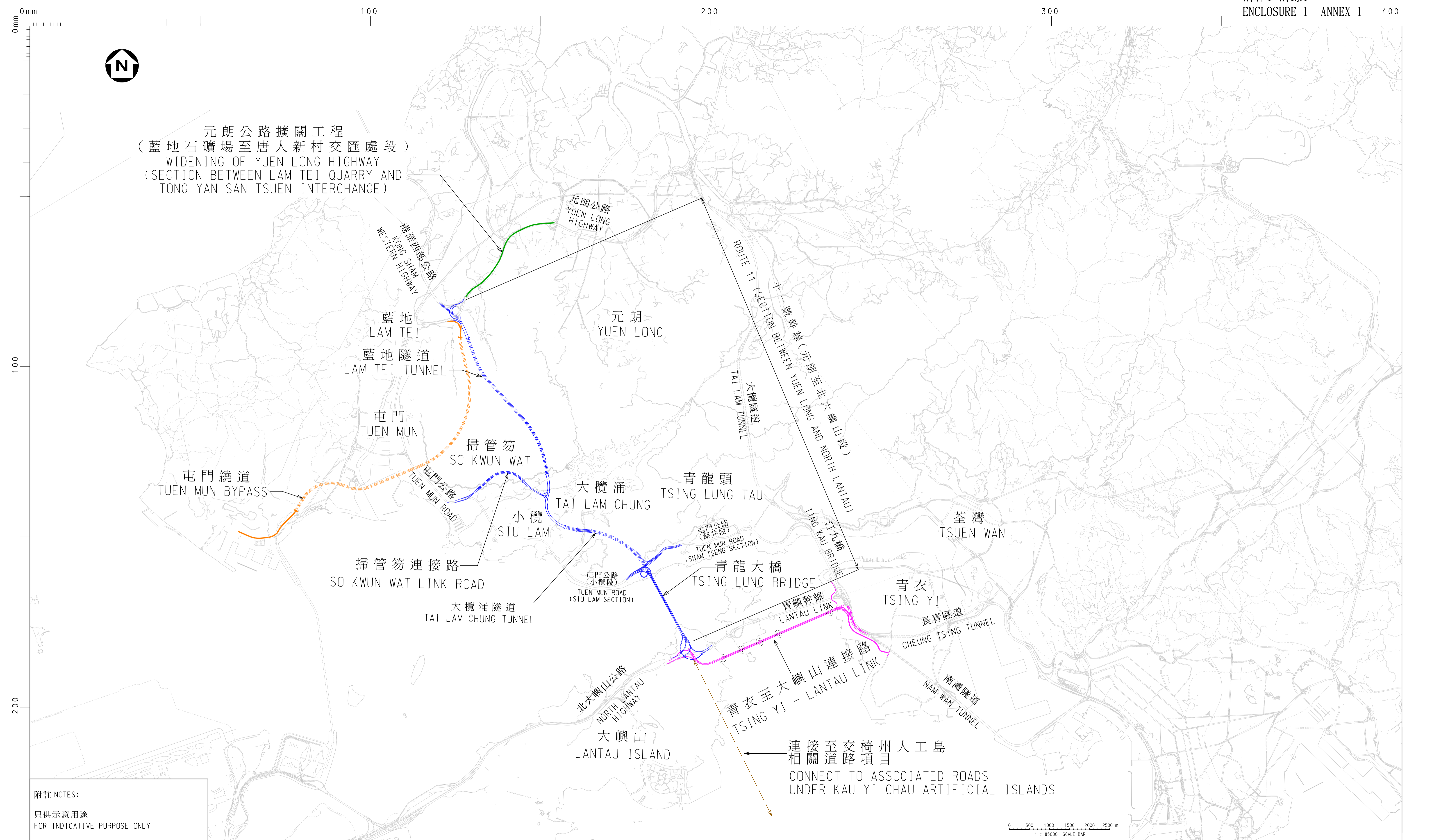
- (b) construction of a dual three-lane long-span bridge of about 1 km long crossing the Kap Shui Mun Fairway. The eastern end of the bridge will connect to the proposed long-span bridge crossing the Ma Wan Fairway as mentioned in paragraph 25(a) above at south of Ma Wan, while the western end of the bridge will connect to North Lantau Highway, the proposed Route 11 and the associated road links to the proposed Kau Yi Chau Artificial Islands at North Lantau;
- (c) construction of the “Tsing Yi Connection”, connecting the long-span bridge as mentioned in paragraph 25(a) above with Tsing Sha Highway and the local roads at Tsing Yi including Tsing Yi North Coastal Road and Tsing Yi Road West. The associated works will involve realignment of Tsing Sha Highway and Cheung Tsing Highway;
- (d) construction of the “North Lantau Interchange”, connecting the long-span bridge as mentioned in paragraph 25(b) above with North Lantau Highway, the proposed Route 11, and the associated road links of the proposed Kau Yi Chau Artificial Islands; and
- (e) construction of associated ancillary facilities, including administration and ancillary buildings, traffic control and surveillance system, etc., and implementation of associated civil, structural, electrical and mechanical, environmental mitigation and other relevant engineering works.

26. HyD ascertained the transport need of TYLL under the feasibility study on Route 11 and subsequently commissioned an engineering study of TYLL under block allocation **Subhead 6100TX** “Highway engineering works, studies and investigations for items in Category D of the Public Works Programme” in March 2021, at a cost of \$29.3 million. The engineering study assists in determining the scope of works and facilitates the funding application from LegCo.

27. The Proposed Project will not directly involve any tree removal or planting proposals. We will examine the impacts on trees during the construction stage, the need for tree preservation and tree planting proposals.

28. We estimate that the Proposed Project and the associated site investigation works will create about 260 jobs (90 for labourers and 170 for professional or technical staff)⁶ providing a total employment of 3 950 man-months.

⁶ The jobs for labourers to be created will mainly be responsible for carrying out site investigation works and the jobs for professional/technical staff to be created will mainly be responsible for carrying out the Proposed Works Project and supervising the associated site investigation works.



元朗公路擴闊工程
(藍地石礦場至唐人新村交匯處段)
WIDENING OF YUEN LONG HIGHWAY
(SECTION BETWEEN LAM TEI QUARRY AND
TONG YAN SAN TSUEN INTERCHANGE)

附註 NOTES:
只供示意用途
FOR INDICATIVE PURPOSE ONLY

圖則名稱 drawing title
十一號幹線 (元朗至北大嶼山段)、青衣至大嶼山連接路、屯門繞道以及元朗公路擴闊工程 (藍地石礦場至唐人新村交匯處段) 的初步走線平面圖
LAYOUT PLAN FOR PRELIMINARY ALIGNMENT OF ROUTE 11 (SECTION BETWEEN YUEN LONG AND NORTH LANTAU), TSING YI - LANTAU LINK, TUEN MUN BYPASS AND WIDENING OF YUEN LONG HIGHWAY (SECTION BETWEEN LAM TEI QUARRY AND TONG YAN SAN TSUEN INTERCHANGE)

圖則編號 drawing no. HMW6870TH-SK0088	比例 scale 1:85000
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891TH(Part) – Tsing Yi – Lantau Link – Investigation and Detailed Design

Breakdown of the estimates for consultants' fees and fees related to supervision of site investigation works (in September 2022 prices)

		Estimated man- months	Average MPS* salary point	Multiplier (Note 2)	Estimated fees (\$ million)	
(a) Consultants' fees ^(Note 1)						
(i) a review of the findings of relevant studies and examination of alignment and design options	Professional	38	38	2.0	6.7	
	Technical	63	14	2.0	3.9	
				Sub-total	10.6	#
(ii) assessments of the impacts on environment, traffic, marine, heritage, land and other related aspects	Professional	180	38	2.0	31.7	
	Technical	306	14	2.0	19.0	
				Sub-total	50.7	#
(iii) preliminary design of two long-span bridges, "Tsing Yi Connection", "North Lantau Interchange" and other works	Professional	264	38	2.0	46.5	
	Technical	456	14	2.0	28.3	
				Sub-total	74.8	#
(iv) detailed design of two long-span bridges, "Tsing Yi Connection", "North Lantau Interchange" and other works	Professional	675	38	2.0	118.8	
	Technical	975	14	2.0	60.4	
				Sub-total	179.2	#
(v) preparation of tender documents and tender assessment for TYLL works	Professional	96	38	2.0	16.9	
	Technical	192	14	2.0	11.9	
				Sub-total	28.8	#

		Estimated man- months	Average MPS* salary point	Multiplier (Note 2)	Estimated fees (\$ million)
(b) Fees related to supervision of site investigation works (Note 3)	Professional	50	38	1.6	7.0
	Technical	113	14	1.6	5.6
				Sub-total	<u>12.6</u> #
				Total	<u><u>356.7</u></u> #

* MPS = Master Pay Scale

Notes

1. The actual man-months and fees will only be known after selection of the consultants.
2. A multiplier of 2.0 is applied to the average MPS salary point to estimate the full staff costs of consultants' staff. A multiplier of 1.6 is applied to the average MPS salary point in the case of resident site staff supplied by the consultants. (As at today, MPS salary point 38 = \$88,015 per month and MPS salary point 14 = \$30,990 per month.)
3. The actual man-months and costs will only be known after completion of the site investigation works.

Remarks

The figures in this Annex are shown in constant prices to correlate with the MPS salary point of the same year. The figures marked with # are shown in money-of-the-day prices in paragraph 13.

876TH – Improvement of Lion Rock Tunnel

PROJECT SCOPE AND NATURE

We propose to upgrade part of **876TH** (i.e. **893TH**) (Proposed Project) to Category A which scope comprises –

- (a) site investigation works and associated works supervision;
- (b) carrying out the first stage design work¹ for the Improvement of Lion Rock Tunnel project (LRTI Project) based on the proposed works scheme and the results of the abovementioned site investigation works; and
- (c) preparation of tender documents and assessment of tenders for the LRTI Project.

2. Upon obtaining funding approval from the Finance Committee (FC), we will commence the Proposed Project for target completion in about 18 months. In order to meet the tight schedule, we have invited tenders for the consultancy contract of the first stage design of the Proposed Project in parallel so as to commence the Proposed Project as early as possible. We will update the estimated project cost and cash flow of the project with reference to the returned tender prices before the FC. The contract will only be awarded after obtaining of FC's funding approval. In the tendering stage for the consultancy of the first stage design, we have invited tenderers to propose shorter programme and measures to expedite design work with a view to further shortening the time required for the first stage design and site investigations.

JUSTIFICATION

Addressing Tunnel Aging and Traffic Problem

3. Lion Rock Tunnel (LRT) is a major road link between Kowloon and Sha Tin with heavy traffic in the morning and evening hours on weekdays. In order to minimise the impact on traffic, the regular routine inspections, repair and maintenance works of the tunnel are normally carried out during closure of one of the tunnel tubes in the small hours and have to be completed within a few hours.

/4.

¹ The overall arrangement for the design work is set out in paragraph 10 below.

4. With the abovementioned inspection, repair and maintenance works, the tunnel now continues to provide safe and reliable service. Since the southbound and northbound tunnel tubes have been in use for over 50 years and 40 years respectively, signs of deterioration and aging have become apparent in the structural elements including ceiling slabs and carriageways. In order to improve the overall tunnel environment and enhance the safety level of the tunnel, it is necessary to carry out a more comprehensive rehabilitation for the tunnel.

5. LRT currently provides for dual two-lane traffic. The traffic at the tunnel and its connecting roads (i.e. LRT Road at the Sha Tin and Kowloon portals) is saturated in the morning and evening hours on weekdays. In the event of traffic accidents or vehicle breakdowns, serious congestion may occur at the abovementioned road sections, and may even affect traffic in other areas. Therefore, we consider it is necessary to take the opportunity of the tunnel rehabilitation to enhance the capacity of the tunnel and its connecting roads, so as to relieve traffic congestion during peak hours and enhance the resilience of this important trunk road to cope with traffic accidents.

6. After completion of the LRTI Project, LRT and its connecting roads will provide for three-lane traffic. The capacity of each tunnel tube will be increased from the existing 3 600 passenger car units per hour (pcu/hr)² to 5 400 pcu/hr, which is expected to improve the existing traffic congestion and cope with the traffic demand arising from future development, enhance the connectivity between the New Territories and urban areas and improve the traffic condition between Sha Tin and Kowloon. A plan showing the layout and a section illustration of the LRTI Project and photomontages of the proposed noise enclosures are at **Annex 1 to Enclosure 2**.

Scheme for the LRTI Project

7. In order to maintain the normal tunnel operation during the works period, the tunnel improvement works have to be carried out in stages. More specifically, a new tunnel tube would first need to be constructed between the two operating road tunnels. Upon its completion, the new tunnel tube will temporarily replace the existing southbound tunnel tube for the Kowloon-bound traffic. The existing southbound tunnel tube will then be closed for expansion to provide three-lane traffic while the northbound tunnel tube will remain in operation. After completion of the expansion works of the existing southbound tunnel tube, it will be re-opened for southbound traffic while the new tunnel tube will be converted into a northbound tunnel for the Sha Tin-bound traffic. By then, both the northbound and southbound tunnel tubes of LRT will provide for three-lane traffic.

/8.

² Passenger car unit per hour is a unit for measuring traffic flow in an equivalent number of private cars as design basis. For example, a passenger car unit value of 1.0 is assigned to private cars and taxis. Heavy vehicles such as goods vehicles or buses which usually travel at a lower speed are assigned with higher passenger car unit value.

8. As for the existing northbound tunnel tube, it is proposed at this stage to convert it for emergency backup use after completion of the LRTI Project. In the event of a traffic accident or other incident requiring the closure of one of the operating tunnel tube, the backup tunnel tube will be swiftly opened to divert traffic flow, thus avoiding paralysing the traffic in the connecting roads and local areas. In addition, as there are fresh water trunk mains in the tunnel tube, the backup tunnel tube also serves as access for carrying out maintenance and repair works for the water mains. As regards suggestions on converting the existing northbound tunnel to other uses, consideration of a number of factors (including constraints of ancillary facilities, relevant fire safety requirements, etc.) is required. We will further explore the feasibility of such suggestions under the Proposed Project and engage relevant stakeholders in the process.

9. The very confined site environment will impose much constraint on the construction works. Also, the existing facilities (including ventilation buildings, administration building, etc.) will need to be relocated and reprovisioned to free up space for working areas while maintaining tunnel operation. After completion of the new tunnel, it is also necessary to redirect traffic amongst tunnel tubes several times to tie in with the tunnel enlargement works. Each traffic redirection will require re-commissioning of the electrical and mechanical systems and fire services installations which are essential to tunnel operations as well as testing of the systems under various scenarios (e.g. traffic accident or outbreak of fire of various scale) to ascertain the reliability of the systems and ensure their expected performance. These reprovisioning works and testings will take time. In addition, due to the heavy traffic at LRT and its connecting roads, some works such as the installation of noise barriers/noise enclosures can only be carried out under temporary road closure during non-peak hours. The LRTI Project also requires reprovisioning of existing fresh water trunk mains running inside the tunnel tubes. These fresh water trunk mains supply fresh water to areas such as Central Kowloon and Hong Kong Island Central to Hong Kong Island East. It is expected that such reprovisioning works will involve extensive changes to the fresh water supply zones and have to be carried out in stages to ensure a stable fresh water supply. All in all, the project is complex and very challenging, and the construction works need to be carried out with great caution, and thus require a longer construction period.

10. Since the project involves a wide range of disciplines (including tunnel construction, redirection of the existing heavy traffic at LRT, geotechnical design, etc.), the works are very complicated with a very high level of construction technical requirements. Therefore, we plan to engage the contractor in the design of the main works, so that the design would be complementary with the construction technology of the contractor to facilitate smooth implementation of the project. Hence, we plan to first engage consultants for the first stage design work and site investigation works. The scope of the first stage design work comprises devising works plans for the advance works including site formation, transportation and assembly of tunnel boring machines, diversion of underground

public utilities (including fresh water trunk mains), and formulating requirements for the construction of the new tunnel, enlargement of the existing tunnel and widening of the connecting roads (such as the size of the tunnel tube and road structures, the foundation works required, etc.). The contractor will participate in the design of the main works in the next stage (including formulation of the detailed scheme of the construction works, traffic diversion arrangements, etc.), and will base on the first stage design and their technical expertise, devise the most cost-effective and appropriate detailed scheme of construction works so as to expedite project implementation. We will apply for funding approval from the Legislative Council (LegCo) to carry out the design of the main works in the next stage and its construction upon substantial completion of the site investigation and the first stage design.

11. It is currently estimated that the new tunnel tube will be commissioned four years after the commencement of works, and the tunnel will be able to cater for dual three-lane traffic another four years after the new tunnel tube is commissioned. We will continue to study various measures to synchronise the various works of the LRTI Project as far as practicable, and explore the application of innovative designs to expedite the project.

FINANCIAL IMPLICATIONS

12. We estimate the cost of the Proposed Project to be \$250.1 million in MOD prices, broken down as follows –

	\$ million (in MOD prices)
(a) Consultants' fees	119.8
(i) first stage design work ³	107.0
(ii) preparation of tender documents and assessment of tenders	12.8
(b) Fees related to supervision of site investigation works	5.3
(c) Site investigation ⁴	102.3

/(d)

³ The scope and nature of first stage design is set out in paragraph 10 above.

⁴ Site investigation covers the site investigation works to be carried out on slopes, retaining walls and natural terrains alongside the main roads, as well as horizontal drilling along the alignment of the new tunnel tube for verification of the geological profile.

	\$ million (in MOD prices)
(d) Contingencies	22.7
	<hr/>
Total	250.1
	<hr/>

13. Due to the complexity of the LRTI Project and the multi-disciplinary nature of the works (including tunnel construction, redirection of the existing heavy traffic at LRT, geotechnical design, etc.), we plan to engage consultants to proceed with the first stage design work, and supervise the related site investigation works. The basis of the estimate of the consultants' fees and fees associated with the supervision of site investigation works is set out in **Annex 2 to Enclosure 2**.

14. Subject to funding approval, we plan to phase the expenditure as follows –

Year	\$ million (in MOD prices)
2023 – 24	25.0
2024 – 25	150.0
2025 – 26	75.1
	<hr/>
	250.1
	<hr/>

15. We have derived the MOD estimates on the basis of the Government's latest set of assumptions on the trend rate of change in the prices of public sector building and construction output from 2023 to 2026. Subject to funding approval, we will engage consultants to undertake the consultancy services for the first stage design on a lump sum basis. As for the site investigation works, it will be tendered under a standard re-measurement contract because the quantities of works involved may vary depending on actual ground conditions. The Proposed Project will be delivered under New Engineering Contract⁵. The contracts will provide for price adjustments.

/16.

⁵ NEC is a suite of contracts developed by the Institution of Civil Engineers, United Kingdom. It is a contract form that emphasises cooperation, mutual trust and collaborative risk management between contracting parties.

16. The Proposed Project will not give rise to any recurrent expenditure.

PUBLIC CONSULTATION

17. We have commenced the public consultation on the proposed scheme of the LRTI Project in mid-2022, including consultation with the Kowloon City District Council (DC), Wong Tai Sin DC and Sha Tin DC on 16, 21 June and 30 August 2022 respectively. The abovementioned DCs supported the early implementation of the LRTI Project. In addition, we have consulted the Sha Tin Rural Committee, relevant Area Committees and residents in the vicinity, and obtained their general support. We will continue to closely liaise with relevant parties on the progress of the LRTI Project.

18. We gazetted the scheme and plans for the LRTI Project under the Roads (Works, Use and Compensation) Ordinance (Cap. 370) on 14 and 21 October 2022. During the statutory period, 16 objections, mainly related to nuisance caused by the works to nearby residential areas and the environment, were received. We will handle the public opinions received in accordance with the statutory procedures.

19. We consulted the LegCo Panel on Transport about the Proposed Project on 16 December 2022. Members generally supported the project.

ENVIRONMENTAL IMPLICATIONS

20. The LRTI Project is a designated project under Schedule 2 of the Environment Impact Assessment (EIA) Ordinance (Cap. 499). The Highways Department (HyD) has conducted the EIA on the LRTI Project in accordance with the requirements of EIA Ordinance and the EIA Study Brief. The relevant EIA Report has examined the details of the LRTI Project and assessed the potential impact, such as noise and ecological aspects, on sensitive receivers within the assessment area (such as nearby housing estates), having regard to the characteristics of the surrounding environment. The Environmental Protection Department approved the EIA Report on 15 November 2022 and issued the Environmental Permit for the construction and operation of the LRTI Project on 12 December 2022. During the construction period to come, we will also implement the mitigation measures and environmental monitoring and audit programme as recommended in the EIA Report with a view to minimising the impact on the nearby environment during the construction period.

21. As regards the Proposed Project, the site investigation works will be carried out within the Lion Rock Country Park. If it is later confirmed that the relevant site investigation works is a designated project under the EIA Ordinance, we will follow the statutory procedures as required under the EIA Ordinance to assess the environmental impacts of the works and formulate corresponding mitigation measures to control the short term impact on the environment before carrying out such works. Related cost has been included in the cost estimate of the Proposed Project.

22. The Proposed Project will only generate a minimal amount of construction waste. We will require the consultants to fully consider measures to minimise the generation of construction waste and to reuse/recycle construction waste as much as possible in the future implementation of the construction works.

HERITAGE IMPLICATIONS

23. The Proposed Project will not affect any heritage site, i.e. all declared monuments, proposed monuments, graded historic sites/buildings or structures, sites of archaeological interest, all new proposed graded heritage sites/historic buildings or structures, and government heritage sites identified by the Antiquities and Monuments Office.

LAND ACQUISITION

24. The Proposed Project will not require any land acquisition.

BACKGROUND INFORMATION

25. The proposed scope of works under PWP Item **876TH** – the LRTI Project currently comprises –

- (a) construction of a three-lane tunnel tube of about 1.4 kilometres long between the two existing tunnel tubes of Lion Rock Tunnel, and enlargement of the existing southbound tunnel tube for three-lane traffic;
- (b) widening the section of LRT Road between the Sha Tin tunnel portal and Fung Shing Court for dual three-lane traffic;
- (c) widening the connecting roads at Kowloon tunnel portal for dual three-lane traffic, and widening of the southbound slip road connecting Lung Cheung Road eastbound for two-lane traffic;

/(d)

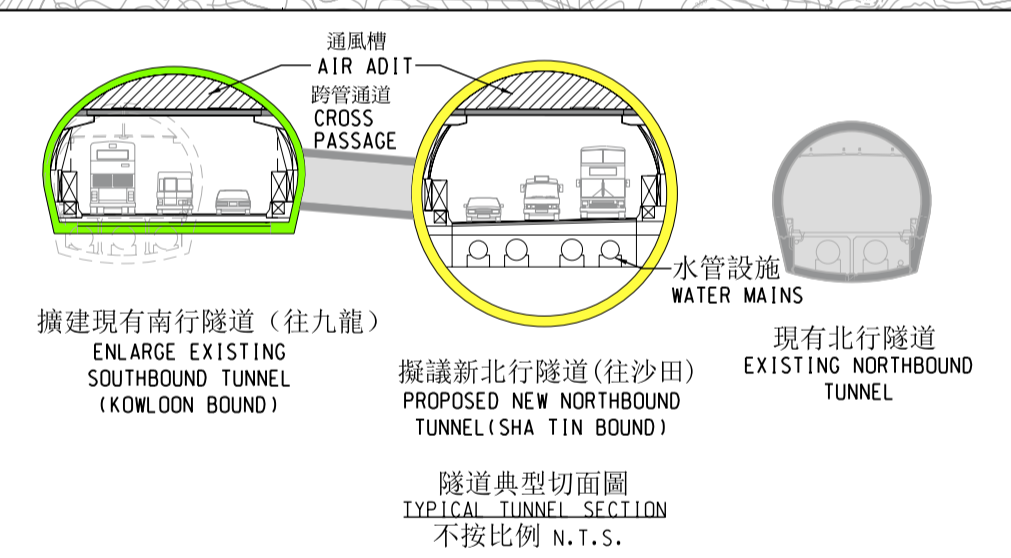
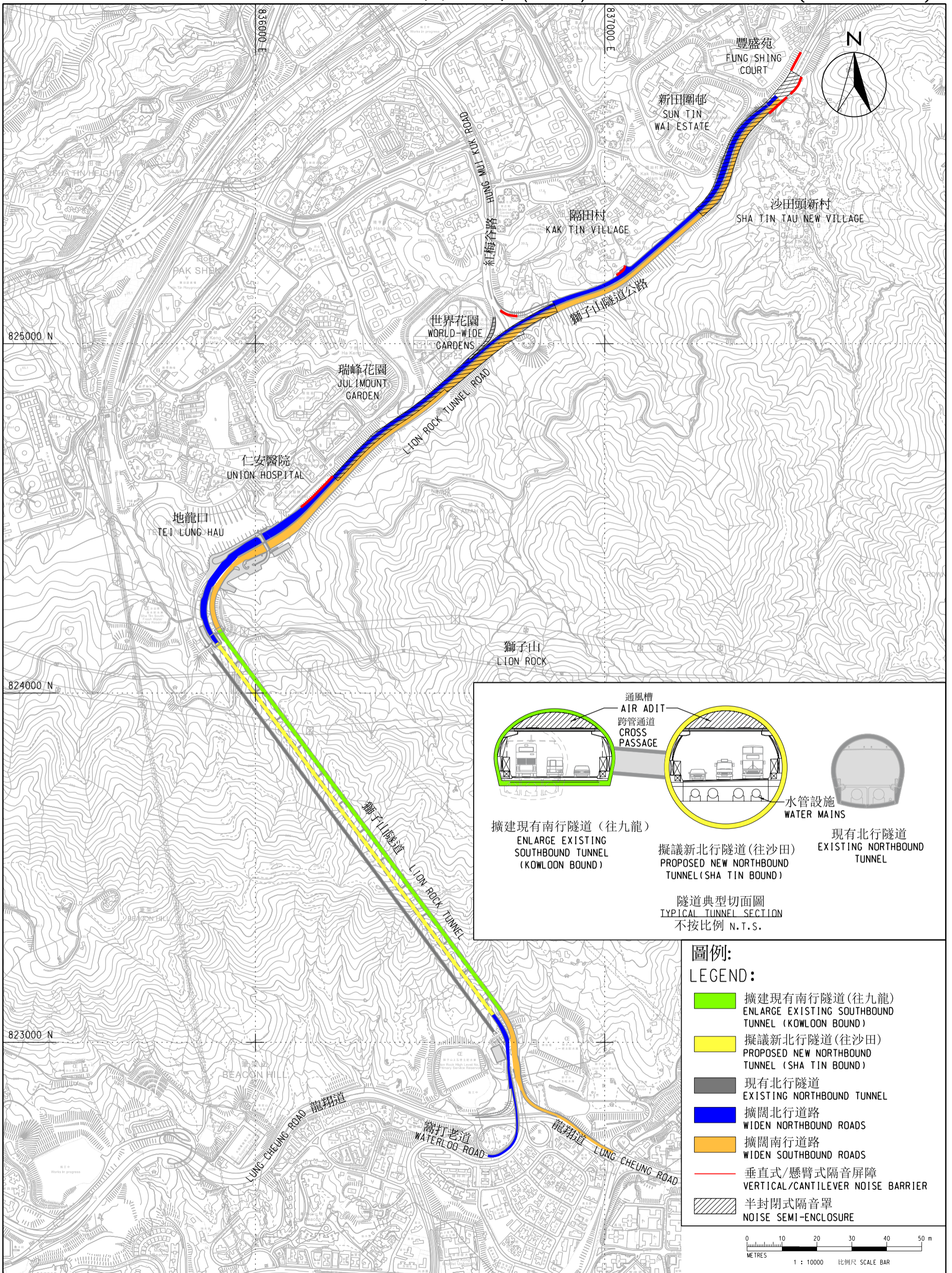
- (d) re-provisioning of ventilation buildings, administration building, trunk water mains within the existing northbound and southbound tunnel tubes as well as other facilities affected by the works; and
- (e) carrying out associated building, civil, structural, electrical and mechanical, fire services, waterworks, traffic control and surveillance system, slope, landscaping, and environmental protection and mitigation measures such as noise barriers/noise enclosures, etc.

26. HyD commenced the advance study for the LRTI Project in March 2019 through the block allocation **Subhead 6100TX** “Highway works, studies and investigations for items in Category D of the Public Works Programme” at an approved estimate of \$29.0 million in MOD prices. The relevant advance study has helped define the project scope and has been substantially completed. Based on the result of the advance study, we have formulated the scheme of the LRTI Project and defined the project scope as set out in paragraph 25 above, as well as commenced the relevant consultations and statutory procedures for taking forward the LRTI Project with a view to seeking funding approval from the Legislative Council.

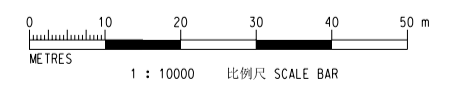
27. The Proposed Project will not involve any tree removal or planting proposals. We will examine the impacts on trees during the construction stage, the need for tree preservation and tree planting proposals.

28. We estimate that the Proposed Project will create about 80 jobs (30 for labourers and 50 for professional/technical staff)⁶ providing a total employment of 1 220 man-months.

⁶ The jobs for labourers to be created will mainly be responsible for carrying out site investigation works and the jobs for professional/technical staff to be created will mainly be responsible for carrying out the first stage design, preparation of tender documents and assessment of tenders for the LRTI Project and supervising the associated site investigation works.



- 圖例:**
LEGEND:
- 擴建現有南行隧道(往九龍)
ENLARGE EXISTING SOUTHBOUND TUNNEL (KOWLOON BOUND)
 - 擬議新北行隧道(往沙田)
PROPOSED NEW NORTHBOUND TUNNEL (SHA TIN BOUND)
 - 現有北行隧道
EXISTING NORTHBOUND TUNNEL
 - 擴闊北行道路
WIDEN NORTHBOUND ROADS
 - 擴闊南行道路
WIDEN SOUTHBOUND ROADS
 - 垂直式/懸臂式隔音屏障
VERTICAL/CANTILEVER NOISE BARRIER
 - 半封閉式隔音罩
NOISE SEMI-ENCLOSURE



工務計劃項目第876TH號-獅子山隧道改善工程
平面圖和典型切面圖

PWP ITEM No. 876TH - IMPROVEMENT OF LION ROCK TUNNEL
LAYOUT PLAN AND TYPICAL SECTIONS

圖則編號 plan no.	比例 scale
103	1:10000 或圖示 Or as shown

主要工程管理處
MAJOR WORKS PROJECT MANAGEMENT OFFICE

HIGHWAYS DEPARTMENT HONG KONG 路政署



近世界花園擬議隔音罩俯瞰圖
 AERIAL VIEW OF PROPOSED NOISE ENCLOSURE NEAR WORLD-WIDE GARDENS

圖則名稱 drawing title

工務計劃項目第876TH號 - 獅子山隧道改善工程 - 擬議隔音罩的電腦模擬圖(兩張圖中的第一張)
 PWP ITEM No. 876TH - IMPROVEMENT OF LION ROCK TUNNEL - PHOTOMONTAGE OF PROPOSED NOISE ENCLOSURE (SHEET 1 OF 2)

圖則編號 plan no.
 HMW6876TH-SK0017

比例 scale
 示意圖
 DIAGRAMMATIC

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HIGHWAYS
 DEPARTMENT
 HONG KONG

路政署
 香港



近豐盛苑擬議隔音罩內觀圖
 INTERNAL VIEW OF PROPOSED NOISE ENCLOSURE NEAR FUNG SHING COURT

圖則名稱 drawing title

工務計劃項目第876TH號 - 獅子山隧道改善工程 - 擬議隔音罩的電腦模擬圖(兩張圖中的第二張)

PWP ITEM No. 876TH - IMPROVEMENT OF LION ROCK TUNNEL - PHOTOMONTAGE OF PROPOSED NOISE ENCLOSURE (SHEET 2 OF 2)

圖則編號 plan no.
 HMW6876TH-SK0018

比例 scale
 示意圖
 DIAGRAMMATIC

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876TH (Part) – Improvement of Lion Rock Tunnel – First Stage Design and Site Investigation

Breakdown of the estimates for consultants’ fees and fees related to supervision of site investigation works (in September 2022 prices)

		Estimated man-months	Average MPS* salary point	Multiplier (Note 2)	Estimated fee (\$ million)
(a) Consultants’ fees					
(i) First stage design works (Note 1)	Professional	346	38	2.0	60.9
	Technical	586	14	2.0	36.3
				Sub-total	97.2 [#]
(ii) Preparation of tender documents and assessment of tenders for the LRTI Project (Note 1)	Professional	46	38	2.0	8.1
	Technical	56	14	2.0	3.5
				Sub-total	11.6 [#]
(b) Fees related to supervision of site investigation works (Note 3)	Professional	19	38	1.6	2.7
	Technical	43	14	1.6	2.1
				Sub-total	4.8 [#]
				Total	113.6

* MPS = Master Pay Scale

Notes

1. The actual man-months and fees will only be known after the consultants have been selected.
2. A multiplier of 2.0 is applied to the average MPS salary point to estimate the full staff cost. A multiplier of 1.6 is applied to the average MPS salary point to estimate the cost of resident site staff supplied by the consultants (As at now, MPS salary point 38 = \$88,015 per month and MPS salary point 14 = \$30,990 per month.).
3. The actual man-months and fees will only be known after the completion of the site investigation works.

Remarks

The cost figures in this Appendix are shown in constant prices to correlate with the MPS salary point of the same year. The figures marked with # are shown in MOD prices in paragraph 12 of Enclosure 2.