

For discussion
On 16 December 2022

Legislative Council Panel on Transport

876TH – Improvement of Lion Rock Tunnel Design and Site Investigation

PURPOSE

This paper seeks Members' view on the funding proposal to upgrade part of **876TH** "Improvement of Lion Rock Tunnel" to Category A for carrying out the first stage design and site investigation of the proposed works at an estimated cost of \$250.1 million in money-of-the-day (MOD) prices.

PROJECT SCOPE AND NATURE

2. The proposed scope of "Improvement of Lion Rock Tunnel" ("the LRTI Project") at present comprises –

- (a) construction of a three-lane tunnel tube of about 1.4 kilometres (km) long between the two existing tunnel tubes of Lion Rock Tunnel ("LRT"), 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) re-provisioning of ventilation buildings, administration building, trunk water mains within the existing southbound and northbound 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.

3. A plan showing the layout and section of the LRTI Project and photomontages of proposed noise enclosure are at **Enclosure**.

4. The advance study of the LRTI Project has been substantially completed. Based on the findings of the advance study, we have formulated the scheme of the LRTI Project, defined the project scope as set out in paragraph 2 above and commenced the relevant consultations and statutory procedures. We now need to take forward the first stage design and site investigation works of the LRTI Project (“Proposed Project”), the scope of which includes –

- (a) site investigation works and associated works supervision;
- (b) carrying out the first stage design works¹ for the 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.

5. Subject to funding approval from the Finance Committee of the Legislative Council (“the Finance Committee”), we plan to start the Proposed Project as early as possible and expected to complete the work in about 18 months.

JUSTIFICATION

Addressing Tunnel Aging and Traffic Problem

6. LRT is a major 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 inspection, repair and maintenance work of the tunnel is normally carried out during closure of one of the tunnel tubes in the small hours, and have to be completed within a few hours.

7. With the abovementioned inspection, repair and maintenance work, the tunnel now continues to provide reliable and safe services. Since the southbound and northbound tubes have been put in use for over 50 years and 40 years respectively, signs of deterioration and aging have become apparent on the structural elements including ceiling slab and carriageway. 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.

8. LRT currently provides for dual two-lane traffic. 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

¹ The overall arrangement for the design work is set out in paragraph 13 below.

abovementioned road sections, and traffic in other areas may also be affected. 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.

9. 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 3600 passenger car units per hour (pcu/hr)² to 5400 pcu/hr, which is expected to improve the existing traffic congestion and cope with the traffic demand arising from future development, and enhance the connectivity between the New Territories and urban areas.

Scheme for the LRTI Project

10. 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 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 use while the new tunnel tube will be converted into a northbound tunnel for Sha Tin bound traffic. By then, both the southbound and northbound tunnel tubes of LRT will provide for three-lane traffic.

11. As for the existing northbound tunnel tube, it is proposed at this stage to convert it for emergency backup use³ after completion of the LRTI Project. In the event of a traffic accident or other incident requiring closure of one of the operating tunnel tube, the backup tunnel tube will be swiftly opened for traffic to divert traffic flow and avoid paralysing connecting roads and regional traffic. In addition, as there are fresh water trunk mains in the tunnel tube, the backup tunnel tube also serves as access for maintenance and repair work of the water mains.

12. The very confined site environment will impose much constraint on the

² Passenger car unit per hour (pcu/hr) is a unit for measuring traffic flow in 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.

³ The proposal of opening up the existing northbound tunnel tube for use by cyclists and pedestrians will not only affect the prompt opening of the northbound tunnel for emergency vehicular use if needed, but will also require consideration of a number of factors (including constraints of ancillary facilities, relevant fire safety requirements, etc.). We will thoroughly explore the feasibility of the proposal and actively engage relevant stakeholders under the Proposed Project.

construction works. At the same time, the existing facilities (including ventilation buildings, administration building, etc.) will need to be relocated and reprovisioned to free up space for works areas while maintaining tunnel operation. After completion of the new tunnel, it is also necessary to re-direct traffic amongst tunnel tubes a few times to tie in with the tunnel enlargement works. Each traffic re-direction would require reprovisioning of electrical and mechanical systems and fire services installations which are essential to tunnel operations well as testing of the systems under various scenarios (e.g. when there was 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 testing will take time to complete. In addition, due to the heavy traffic at LRT and its connecting roads, some works such as 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 located 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 needs to be carried out with great caution, and thus a longer construction period would be required.

13. Since the project involves a wide range of disciplines (including tunnel construction, redirection of the existing heavy traffic at LRT, geotechnical design, etc.), and the works are very complicated with a very high level of construction technical requirements, therefore, we will 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 will proceed with the first stage of design work and site investigation works. The first stage design will devise works plan for the advance works such as site formation, transportation and assembly of tunnel boring machine, diversion of underground public utilities (including fresh water trunk mains), and formulate relevant construction requirements for construction of new tunnels, enlargement of the existing tunnels and widening of connecting roads (such as the dimension of tunnel tube and road structures, foundation works required etc.) etc. The contractor will participate in the design of the main works at 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 speed up the project implementation. We will apply for funding from the Legislative Council to carry out the design and construction of the main works of the next stage upon substantial completion of the site investigation works and the first stage design.

14. 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 for carrying out as much works as practicable for the LRTI Project simultaneously, and explore application of innovative designs with a view to expediting project implementation.

FINANCIAL IMPLICATIONS

15. We estimate the cost of the Proposed Project, which includes the cost of the associated site investigation works, to be \$250.1 million in money-of-the-day (MOD) prices. In view of the complexity and multi-disciplinary nature (including tunnel construction, re-direction of existing heavy traffic at LRT, geotechnical design, etc.) of the Proposed Project, we plan to engage consultants to undertake the first stage design, site investigation works and relevant works supervision.

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

PUBLIC CONSULTATION

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

18. We have 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, and will handle the public opinions received in accordance with the statutory procedures.

ENVIRONMENTAL IMPLICATIONS

19. The LRTI Project is a designated project under Schedule 2 of the Environment Impact Assessment (EIA) Ordinance (Cap. 499). 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 EIA Report was approved by the Environmental Protection

Department on 15 November 2022, and HyD will apply for an Environmental Permit for the construction and operation of the LRTI Project in due course. 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 minimizing the impact to the surrounding environment during the construction period.

20. As regards the Proposed Project, the relevant 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 to the environment before carrying out such works. Related cost has been included in the cost estimate of the Proposed Project.

21. 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.

IMPLICATIONS ON TREES

22. The Proposed Project will not involve any tree removal or planting proposals, and will examine the implications of the proposed works on trees during the construction stage, the need for tree preservation and tree planting proposals.

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

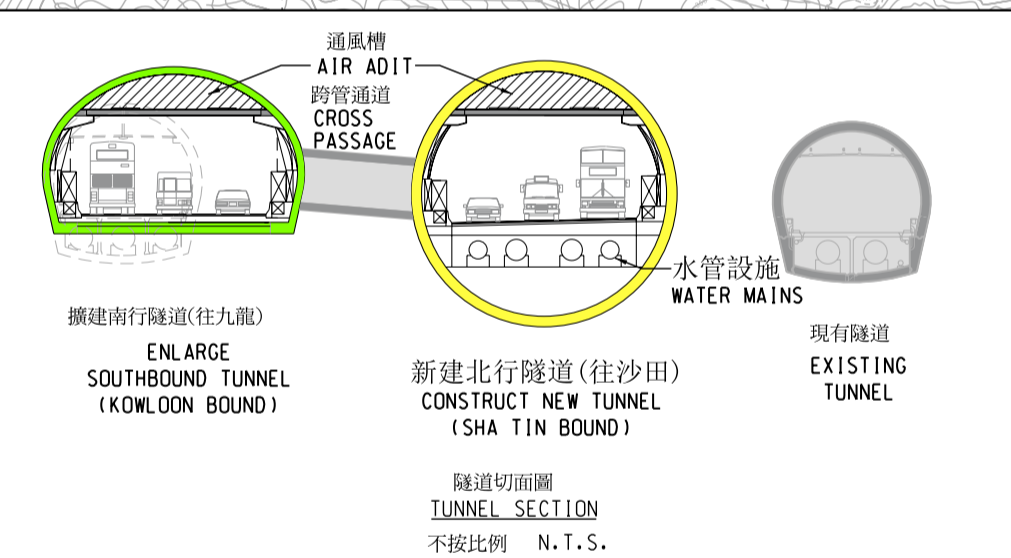
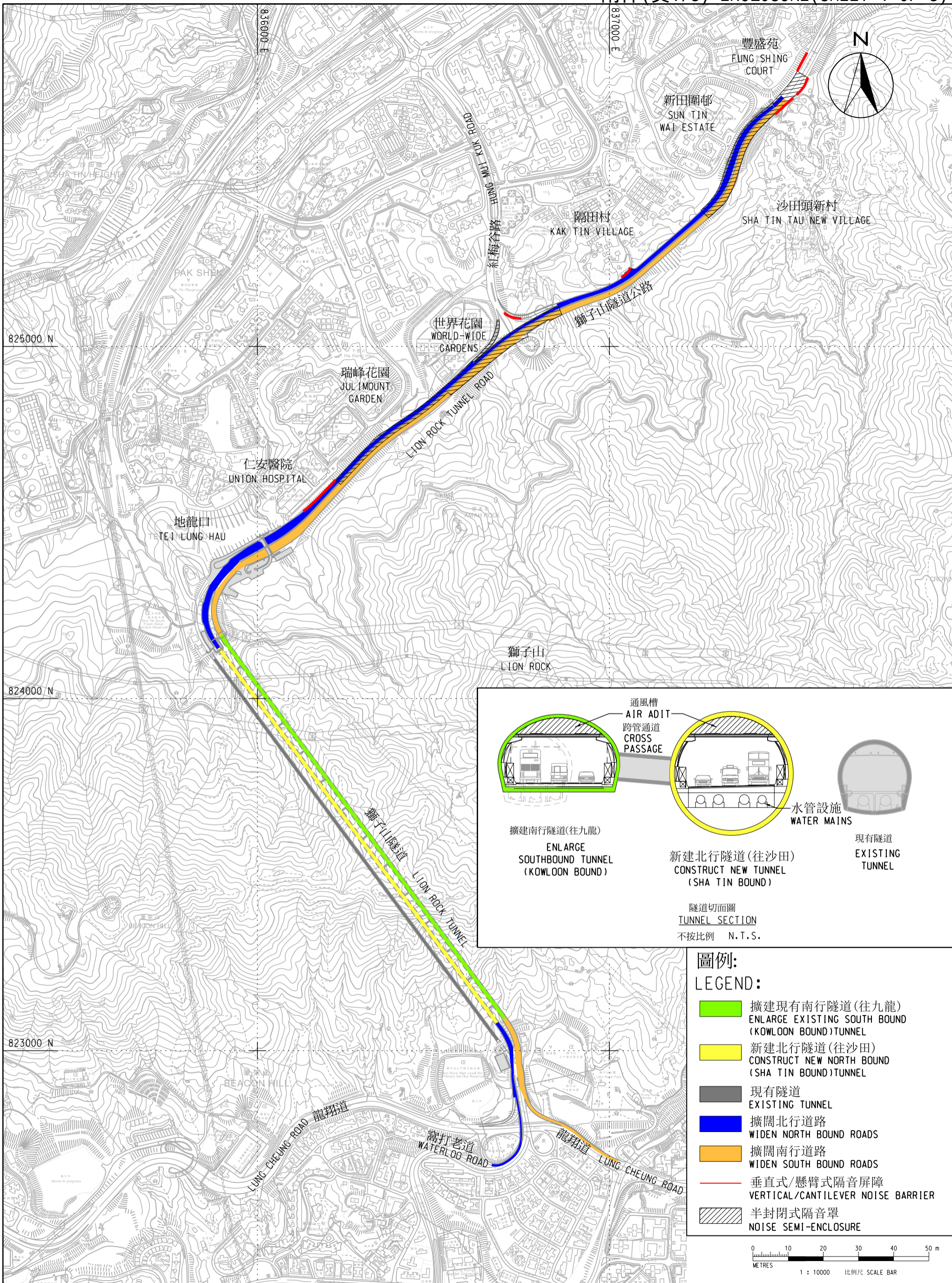
25. HyD commenced the advance study for the LRTI Project in March 2019

through an item in Category D of the Public Works Programme under the block allocation **Subhead 6100TX**. The relevant advance study has been helpful in defining the project scope and has been substantially completed.

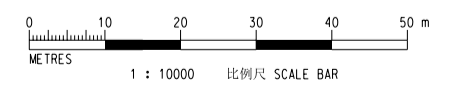
WAY FORWARD

26. After consultation with the Panel on Transport, we plan to seek the support of the Public Works Subcommittee, and apply to the Finance Committee for funding to upgrade the Proposed Project, which is part of **876TH**, to Category A.

Transport and Logistics Bureau
December 2022



- 圖例:**
LEGEND:
- 擴建現有南行隧道(往九龍)
ENLARGE EXISTING SOUTH BOUND (KOWLOON BOUND) TUNNEL
 - 新建北行隧道(往沙田)
CONSTRUCT NEW NORTH BOUND (SHA TIN BOUND) TUNNEL
 - 現有隧道
EXISTING TUNNEL
 - 擴闊北行道路
WIDEN NORTH BOUND ROADS
 - 擴闊南行道路
WIDEN SOUTH BOUND 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
平面和切面圖

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