

Legislative Council Panel on Transport
Subcommittee on Matters Relating to Railways

Application for Additional Funding for
Advance Railway Works of the Shatin to Central Link

Purpose

This paper aims to seek Members' support for an increase in the approved project estimate (APE) for **63TR** by \$847.7 million, from the original \$6,254.9 million to \$7,102.6 million (in money-of-the-day (MOD) prices).

Background

2. The Shatin to Central Link (SCL), with a total length of 17 kilometres, consists of the following two sections –

- (a) Tai Wai to Hung Hom Section: this is an extension of the Ma On Shan Line from Tai Wai via Southeast Kowloon to Hung Hom where it will join the West Rail Line; and
- (b) Hung Hom to Admiralty Section: this is an extension of the East Rail Line from Hung Hom across the Victoria Harbour to Wan Chai North and Admiralty.

The whole rail line will have ten stations. Apart from bringing improvements to the existing Tai Wai Station, the SCL project will involve construction of new stations or expansion of existing stations at Hin Keng, Diamond Hill, Kai Tak, To Kwa Wan, Ma Tau Wai, Ho Man Tin, Hung Hom, the Hong Kong Convention and Exhibition Centre (the Exhibition) and Admiralty. A plan showing the alignment of the SCL is at **Annex 1**.

3. The SCL is a territory-wide strategic railway project. It will link up with a number of existing rail lines, forming two strategic railway corridors, namely the “East West Corridor” and the “North South Corridor”.

- (a) The “East West Corridor” connects Tai Wai Station of the Ma On Shan

Line with Hung Hom Station of the West Rail Line. It allows passengers to travel directly from Wu Kai Sha Station to East Kowloon, Hung Hom, West New Territories and Tuen Mun without interchanging, providing a more direct and convenient railway service for passengers commuting between East New Territories and West New Territories.

- (b) The “North South Corridor” extends the existing East Rail Line from Hung Hom Station across the Victoria Harbour to Admiralty Station, allowing passengers from Lo Wu (using the East Rail Line) and Huanggang (using the Lok Ma Chau Spur Line) to reach the heart of Hong Kong Island directly.

The alignments of the “East West Corridor” and the “North South Corridor” are shown at **Annex 2**.

4. Of the ten stations along the SCL, six will be interchange stations linking to a number of existing and future rail lines. This will bring about further enhancements to the railway service in Hong Kong. The six interchange stations are –

- (a) Tai Wai Station – interchange station for the “East West Corridor” and the “North South Corridor”;
- (b) Diamond Hill Station – interchange station for the Kwun Tong Line and the SCL;
- (c) Ho Man Tin Station – interchange station for the Kwun Tong Line Extension (KTE) and the SCL;
- (d) Hung Hom Station – interchange station for the “East West Corridor” and the “North South Corridor”;
- (e) Exhibition Station – interchange station for the SCL and the proposed North Island Line; and
- (f) Admiralty Station – interchange station for the SCL, the Tsuen Wan Line, the Island Line and the South Island Line (East) (SIL(E)).

5. Upon completion, the SCL will help expand the coverage of the railway network in Hong Kong to serve a vast number of passengers. It will –

- (a) significantly reduce the journey time of passengers commuting between East Kowloon, East New Territories and Hong Kong Island;

- (b) provide railway services for various districts currently not provided with railway network connection, such as Hin Keng, Kai Tak, To Kwa Wan and Ma Tau Wai; and increase the capacity of the railway section between Shatin and Kowloon and that across the Harbour to help divert the flow of railway passengers, thus relieving the burden on the existing rail lines in urban Kowloon and on Hong Kong Island;
- (c) reduce the reliance on road-based public transport in existing developed areas, and alleviate the traffic congestion and environmental nuisance in the existing road networks, including the demand for Hung Hom Cross Harbour Tunnel;
- (d) become an important component of the Kai Tak Development by providing public transport services to the proposed new commercial and residential developments as well as other government facilities in the area; and
- (e) stimulate the rejuvenation of To Kwa Wan and Kowloon City.

6. On 11 March 2008, the Executive Council decided to adopt the “service concession” approach to implement the SCL project and we reported to this Subcommittee on 27 March 2008. Under the “service concession” approach, the Government will fund the construction of the SCL and its associated infrastructure under the public works programme, and ultimately own the railway.

SCL Project

7. The construction of the SCL consists of two protection works, two advance works and two main works items, of which the funding applications were submitted to and approved by the Legislative Council at various stages of implementation –

	Description	APE (\$million) (in MOD prices)	Date of approval of funding application by the Finance Committee (FC) of the LegCo	Commencement date of the works	Actual / anticipated completion date
(1)	<u>Protection works</u> 59TR Protection Works in Wan Chai Development Phase II 58TR Protection Works at Causeway Bay Typhoon Shelter (CBTS)	695 153 542	 Jul 2010 Jun 2011	 Aug 2010 Sep 2011	 Dec 2012 Jun 2014
(2)	<u>Advance works</u> 63TR Construction of Railway Works – Advance Works (application for additional funding under this paper)	7,703 6,255	 Feb 2011	 May 2011	 2017

	Description	APE (\$million) (in MOD prices)	Date of approval of funding application by the Finance Committee (FC) of the LegCo	Commencement date of the works	Actual / anticipated completion date
	64TR Construction of Non-railway Works – Advance Works	1,448	Feb 2011	Jul 2011	2017
(3)	<u>Main works</u>	71,416			
	61TR Construction of Railway Main Works	65,433	May 2012	Jul 2012	2021
	62TR Construction of Non-railway Main Works	5,983	May 2012	Jul 2012	2021
	Total APE	79,814			

8. On 2 July 2010 and 24 June 2011, the Finance Committee of the Legislative Council approved the funding applications for “59TR – Shatin to Central Link – construction of railway works – protection works in Wan Chai Development Phase II” (Note: LegCo Paper No. PWSC(2010-11)11) and “58TR – Shatin to Central Link – construction of railway works – protection works” (Note: LegCo Paper No. PWSC(2011-12)12) respectively with a total of about \$700 million (in MOD prices). For the details of the above two items of protection works, please refer to paragraphs 11 and 12 below. The above works were entrusted to the Civil Engineering Development Department and the Highways Department (HyD) under the Wan Chai Development Phase II project and the Central-Wan Chai Bypass (CWB) project respectively. The above works have been completed.

9. On 18 February 2011, the Finance Committee of the Legislative Council approved the funding applications for “63TR – Shatin to Central Link – construction of railway works – advance works” (Note: LegCo Paper No. PWSC(2010-11)34) and “64TR – Shatin to Central Link – construction of non-railway works – advance works” (Note: LegCo Paper No. PWSC(2010-11)35) with a total of about \$7,700 million (in MOD prices). For the details of the above two items of advance works, please refer to paragraphs 13 and 14 below. Thereafter, the Government and the MTR Corporation Limited (MTRCL) entered into an agreement for entrusting to the latter the implementation of the advance works of SCL at the expanded Admiralty Station and Homantin Station while implementing SIL(E) and KTE respectively. The advance works commenced in May 2011.

10. Subsequently, on 11 May 2012, the Finance Committee of the Legislative Council approved the funding applications for “61TR – Shatin to Central Link – construction of railway works – remaining works” (Note: LegCo Paper No. PWSC(2012-13)1) and “62TR – Shatin to Central Link – construction of non-railway works – remaining works” (Note: LegCo Paper No. PWSC(2012-13)2) with a total of about \$71,400 million (in MOD prices). For the details of the above two items of main works, please refer to paragraph 15 below. Thereafter, the Government and MTRCL entered into an agreement for entrusting construction, testing and commissioning of the main works of SCL to the latter. MTRCL has been entrusted to provide management and monitoring services to the SCL project. The main works commenced in July 2012. According to the agreement for the main works of SCL, the original target commissioning date for the “Tai Wai to Hung Hom Section” is December 2018 and the original target commissioning date for the “Hung Hom to Admiralty Section” is December 2020.

Project Scope and Progress

11. **59TR** involves the protection works of the SCL at Convention Avenue in Wan Chai. The works comprise the construction of two rows of diaphragm walls with an underground top slab alongside Convention Avenue. This is to facilitate the laying of the cross-harbour fresh water mains and cooling water mains above the top slab under the Wan Chai Development Phase II project, and

the carrying out of the railway tunnelling works underneath the top slab under the SCL main works, thereby ensuring a better interface between the two projects. The protection works have been completed. It is expected that the final cost will be within the APE of this item.

12. **58TR** involves the protection works of the SCL at the CBTS. The works comprise the construction of a concrete tunnel box at the location where the SCL and the CWB projects overlap when the construction of the CWB is underway, so as to facilitate the railway tunnelling works carried out under the SCL main works; the construction and removal of the temporary seawall and temporary reclamation; the dredging in an area of about one hectare at the southeast corner of the CBTS to provide a temporary anchorage area; and the construction of a temporary jetty for the Royal Hong Kong Yacht Club and subsequent reinstatement of the jetty after completion of the protection works. These works are conducted to ensure a better interface between the SCL and the CWB projects. The protection works have been completed. It is expected that the final cost will be within the APE of this item.

13. **63TR** (i.e. the item in relation to this funding application) involves the advance railway works of the SCL. The works comprise the expansion of Admiralty Station to accommodate the SCL railway facilities (including an overrun tunnel of approximately 200 metres long) and the provision of ventilation facilities for the station, as well as the construction of the portion of Ho Man Tin Station for the SCL. The expanded portion of Admiralty Station will be connected with the existing Admiralty Station to form an integrated station. Works for certain parts of Admiralty Station for the SCL and the SIL(E) facilities should be constructed concurrently, so as to reduce the overall size of the station, reduce construction costs and time required, and minimise disruption to the public during construction. As such, the portion of Admiralty Station for the SCL has to be constructed in advance of other SCL main works in order to tie in with the schedule of the SIL(E) which has to start earlier in May 2011 for construction together. The advance works for the SCL at Admiralty Station have been substantially completed and the remaining works mainly involve the construction of a supplementary emergency entrance for the rail line. Separately, Ho Man Tin Station is a newly constructed integrated station serving both the SCL and KTE, providing convenient interchange for passengers between these two rail lines. Ho Man Tin Station is designed as an integrated one to reduce the overall size of the station, reduce construction costs and time

required, and minimise disruption to the public during construction. Similar to the expanded Admiralty Station, Ho Man Tin Station has to be constructed in advance of other SCL main works to tie in with the schedule of the KTE which has to start earlier in May 2011 for construction together. The advance works for the SCL at Ho Man Tin Station have been completed. This funding application involves increasing the APE for **63TR**.

14. **64TR** involves the advance non-railway works for the SCL. The works comprise the reprovisioning of the International Mail Centre in Hung Hom, as well as the reprovisioning of Harcourt Garden and Hong Kong Park. The works must get started before the commencement of the main works, so as to vacate the sites for the works of the SCL and the SIL(E). The new mail centre was completed and handed to Hongkong Post for operation in 2014. As for the reprovisioning of Harcourt Garden and Hong Kong Park, the works are still underway to tie in with the expansion works of Admiralty Station. It is expected that the reprovisioned facilities will be reopened in the end of 2017 and the final cost of the works will be within the APE of this item.

15. **61TR** and **62TR** respectively involve the main railway works and main non-railway works of the SCL. Most of the contracts have been awarded. As at 30 September 2016, the overall progress of the works was 63%. In the Progress Update (Paper No. CB(1)1722/13-14(03)) submitted to this Subcommittee for discussion at its meeting on 4 July 2014, it stated that the archaeological works, archaeological discoveries and conservation options for the archaeological features at To Kwa Wan Station had caused a delay of about 11 months to the Tai Wai to Hung Hom Section of the SCL. The HyD would therefore co-ordinate and oversee the construction of the SCL so that the MTRCL would try to recover some of the delay to the Tai Wai to Hung Hom Section, with a view to commissioning the Tai Wai to Hung Hom Section in 2019 as far as possible. Also, as mentioned in the Progress Update (Paper No. CB(4)954/14-15(03)) submitted to this Subcommittee for discussion at its meeting on 19 May 2015, being affected by the handover of works sites for the Wan Chai Development project and to allow flexibility for the development of the convention centre atop Exhibition Station, the commissioning date of the Hung Hom to Admiralty Section of the SCL would be deferred to 2021. As regards the construction cost, it was stated in the Progress Update (Paper No. CB(1)260/14-15(03)) submitted to this Subcommittee for discussion at its meeting on 24 November 2014 that the MTRCL would conduct a detailed cost

review for the main works of SCL project in phases, including the additional costs caused by the archaeological works. MTRCL pointed out in November 2016 that the SCL project was complicated and only 40% of the Hung Hom to Admiralty Section had been completed, adding that the remaining 60% of the Section would still be affected by a number of factors. To provide a more accurate estimate for the cost of the main works, it is necessary to wait until the second half of 2017 in order to have a more practical assessment. Since the contingencies for the main works of the SCL will not be sufficient to meet the additional costs of the main works, upon receiving the final assessment on the additional costs from the MTRCL and completing the scrutiny of such assessment, we will seek additional funding from the LegCo in the 2017/18 legislative session for the continuation of the main works.

Monitoring Mechanism of the Government

16. The MTRCL, entrusted with the construction works of the SCL, has to be responsible for the overall management of the SCL project. The Government maintains a mechanism to closely monitor the work of the MTRCL, which includes a Project Supervision Committee (PSC) led by the Director of Highways (DHY). The PSC holds monthly meetings to review the progress of the project and monitor the procurement activities, post-tender cost control and resolution of contractual claims. The MTRCL has to submit monthly progress reports to the HyD to report the latest progress and financial position of the SCL project.

17. Moreover, an officer at Assistant Director level of the HyD holds monthly Project Coordination Meetings with the General Managers and Project Managers of the MTRCL to monitor different aspects of the implementation of the SCL project, including the timely completion of land-related matters, the handling of issues in relation to the design, construction and environmental fronts that may have potential impact on the progress and programme of the SCL project, as well as the handling of interfacing issues with other projects.

18. Meanwhile, two officers at Chief Engineer level hold monthly Project Progress Meetings with the site supervision staff of the MTRCL on major civil and E&M works. In case of delays, the MTRCL would report delay recovery measures at such meetings.

19. The HyD has also employed a monitoring and verification (M&V) consultant to assist in the monitoring work and undertake regular audits. The M&V consultant will review the works progress and advise the HyD of any potential risk of delay. It will also offer comment to HyD on the appropriateness of MTRCL's proposed delay recovery measures.

20. The DHy meets with the Secretary for Transport and Housing (STH) on a monthly basis and submits reports to report the progress of the project. Where necessary, he also reports to the STH any significant issue relating to the implementation of the project.

Financial Arrangement for the Construction of Advance Railway Works of the SCL (63TR)

21. The advance railway works of the SCL include the expansion of the existing Admiralty Station and the construction of Ho Man Tin Station to accommodate the railway facilities of the SCL. Upon expansion, Admiralty Station will become an integrated station serving passengers of the SCL and the SIL(E) concurrently. Hence, except that the construction cost (about \$300 million) of the overrun tunnel of the SCL, which would be fully absorbed by the SCL project, the construction cost of the expansion works of Admiralty Station will be apportioned between the SCL and the SIL(E) projects at a ratio of 70:30 in accordance with the estimated patronage at peak hours at the station. According to the cost estimate in 2011, the SCL project has to share about \$2,700 million for the costs of building works, building services works and E&M works for the SCL at Admiralty Station. Besides, the SCL project has to share about \$350 million for the cost of the ventilation facilities for the SCL at Admiralty Station. Hence, the SCL will have to share an overall cost of about \$3,350 million for the advance works at Admiralty Station. The MTRCL advised the HyD in August 2015 that the completed cost estimate review of the expansion works of Admiralty Station for the SIL(E) indicated an upward adjustment of the relevant cost of expansion works of Admiralty Station to be shared by the SCL. According to the apportionment ratio of 70:30 above, the cost shared by the SCL has to be adjusted upward from about \$3,350 million to about \$4,650 million with an increase of about \$1,300 million. According to latest cost estimate and the information provided by the MTRCL, the HyD has carried out rigorous examination with the assistance of its M&V consultant and considered that the cost to be shared by the SCL for the expansion of Admiralty

Station is about \$4,330 million, representing an increase of around \$980 million as compared with the original estimate of \$3,350 million. The increase in cost is mainly attributable to the unfavourable ground conditions, modification of the design to suit the actual site conditions, and additional funding required for price adjustments.

22. Ho Man Tin Station is another integrated station serving passengers of the SCL and the KTE. The construction cost of Ho Man Tin Station is therefore also apportioned between the SCL and the KTE projects at a ratio of about 74:26 in accordance with the estimated patronage at peak hours at the station. According to the cost estimate in 2011, the SCL project has to share about \$2,900 million for the advance works of Ho Man Tin Station, in order to meet the costs of building works, building services works and E&M works for the SCL at Ho Man Tin Station. According to the information provided by the MTRCL to the HyD in August 2015, the construction cost of Ho Man Tin Station to be shared by the SCL was still within the estimate. The HyD has examined the latest cost estimate with the assistance of its M&V consultant and considered that although the construction costs of individual items for Ho Man Tin Station have exceeded the relevant estimates under the APE, those additional costs can be met using the relevant contingencies and the overall cost is still within the estimate. The cost to be shared by the SCL for the construction of Ho Man Tin Station is about \$2,770 million, representing a decrease of about \$130 million as compared with the original estimate of \$2,900 million.

23. Taking the latest cost estimates of Admiralty Station and Ho Man Tin Station as a whole, the APE for **63TR** should be increased by \$847.7 million, i.e. from \$6,254.9 million to \$7,102.6 million. The HyD and its M&V consultant have reviewed the estimated construction cost of the advance railway works of the SCL and verified the latest trend of construction prices. It is considered that the current estimated construction cost is reasonable. Since the contingencies for the advance railway works of the SCL under 63TR are not sufficient to meet the additional costs incurred, we have to seek additional funding from the LegCo in order to meet the payment of the additional costs for the advance railway works.

Justifications for Additional Funding

24. In our previous quarterly reports to the Committee since August 2015,

MTRCL estimated that the construction cost of the advance railway works of SCL would exceed the budget. As mentioned in paragraph 23 above, we consider it necessary to increase the APE for **63TR** by \$847.7 million (in MOD prices) to cover the expenses arising from the following –

- (i) unfavourable ground conditions;
- (ii) modification of the construction schemes to suit the actual site conditions; and
- (iii) increase in provision for price adjustments.

Details of the increase in APE are set out in paragraphs 25 to 46 below.

(I) Unfavourable Ground Conditions

Excavation Works for the Expansion of Admiralty Station

25. The expansion works at Admiralty Station involves the construction of a structure with a depth of six-storey underground at Harcourt Garden, which is to the east of the existing station. The works were conducted using the cut-and-cover method, followed by the structural works for the station. Since there are many high-rise buildings in the vicinity of Admiralty Station and the underground is full of foundations and utilities, the works were constrained. During construction, we had to take into account the impacts on the existing station, the tunnels of the Island Line and the Tsuen Wan Line currently in use, as well as the foundations of the buildings in the vicinity. Given that works safety is of prime importance, the works encountered great challenges. The mechanical drill-and-break method was adopted for the rock excavation works. The efficiency of excavation is directly related to the spacing of the natural joints of rocks. If the natural joints are densely spaced, the drilling machines can break the rock more easily for subsequent removal and the excavation works will be more efficient. The MTRCL followed the Geoguide compiled by the Geotechnical Engineering Office to carry out the ground investigation and the number of drill holes fulfilled the recommendations of the guide. However, during the excavation for the expanded Admiralty Station, it was found that the actual nature of the rocks was different from the geological information obtained by ground investigations during the design stage. The average spacing between the natural joints of the rocks was twice as the estimated spacing (i.e. the actual

spacing was around one metre, which is more than the originally estimated spacing of around half metre). This made the digging and excavation more difficult, thus impairing the efficiency of the works to a great extent and slowing down the works progress.

26. To expedite the excavation progress under the unfavourable ground conditions, the construction team adopted mitigation measures as follows –

- (a) the works were conducted round the clock on weekdays and some public holidays. As a result, (i) more acoustic covers were required to comply with the requirements stipulated in the Construction Noise Permits, (ii) the logistics support for the works site had to be rearranged, and (iii) the construction conditions and plans had to be modified;
- (b) the excavation of the station adopted a top-down approach. In general, when the appropriate depth was reached, the concrete floor slab which would form part of the station structure would be constructed. The concrete floor slabs could also serve as temporary supports for the vertical excavated surface of the rocks. However, to ensure that the subsequent excavation procedures would not be affected by the extra time required for constructing concrete floor slabs and causing further delay in the main excavation works of the station, the contractor gave up using concrete floor slabs for support purpose. Instead, the less time-consuming way of erecting temporary steel frames was adopted to serve the support purpose, with a view to expediting the excavation progress;
- (c) given the normal railway services could not be affected, limited blasting was carried out in midnight when the Island Line stopped services, so as to crack the rock to facilitate the breaking of the rock by the drill breaker such that the mechanical drill-and-break excavation could be expedited; and
- (d) the number of excavation machines increased from 24 to 55. Also, the contractor used larger excavation machines for the drill-and-break works. Such large machines are more capable in digging and can reduce the time needed for excavation.

27. The deployment of more machinery and manpower due to the above unfavourable ground conditions for the expansion of Admiralty Station has contributed to a cost increase of \$614.1 million.

Excavation Works for the Shaft of the Ventilation Building of the Expanded Admiralty Station

28. Although the MTRCL followed the Geoguide compiled by the Geotechnical Engineering Office to carry out the ground investigation and the number of drill holes fulfilled the recommendations of the guide, during the excavation works for the ventilation shaft, it was found that the actual bedrock surface was different from the geological information obtained by ground investigations during the design stage.

29. As the bedrock surface encountered was shallower than expected, more rock excavation was needed in order to reach the depth required for the shaft at these areas with shallower bedrock. As rock excavation takes more time than that of soil excavation, the speed of excavation has been affected. To reduce delays in works, the works team has implemented mitigation measures, including deploying more machinery and manpower.

30. The above measures adopted in the excavation works for the shaft of the Ventilation Building have contributed to a cost increase of \$51.3 million.

Construction Works of SCL Overrun Tunnel at the Expanded Admiralty Station

31. One of the advance railway works of SCL under the expansion works of the Admiralty Station is to construct a 200m long overrun tunnel for the SCL. As the overrun tunnel of SCL is very close to the tunnel of SIL(E), the SCL overrun tunnel has to be constructed in advance of other SCL main works in order to tie in with the construction schedule of SIL(E), such that the blasting works of SCL overrun tunnel could avoid causing risks to the SIL(E) under operation in future and encounter less restrictions on construction time window.

32. In the expansion works of Admiralty Station, one end of the SCL overrun tunnel is connected to the Ventilation Building. Since there was disruption to the progress of works of the Ventilation Building mentioned in paragraphs 28 and 29 above, the excavation works of the overrun tunnel had to

be deferred. Eventually, the rock excavation works for the SCL overrun tunnel and the tunnel excavation works for the SIL(E) which runs underneath the SCL had to be carried out concurrently. As the distance between the tunnels of the two projects is less than 10 metres, simultaneous blasting could affect the stability of the rocks around the tunnels. For safety consideration, it was necessary to stagger the blasting and excavation works of the two tunnels in close proximity. This affected the blasting cycle and the progress of excavation, resulting in an increase in the construction time and resources required.

33. The increase in the construction time and resources required for the construction of the SCL overrun tunnel mentioned above has contributed to a cost increase of \$136.7 million.

Construction Works of Ho Man Tin Station

34. Ho Man Tin Station is designed to found on solid rock mass. When the excavation for the station was carried out, it was found that the rock mass at the bottom was not as solid as expected. Therefore, it is necessary to have deeper excavation and thicker concrete base to support the station structure. When blasting of the cavern of the station was carried out, more faults than the expectation at the design stage were found. As a result, more excavations are needed in order to remove loose rocks. Also, thicker tunnel wall structure is needed to fill up the overbreak.

35. The above measures adopted in the construction of Ho Man Tin Station have contributed to a cost increase of \$47.4 million.

36. The unfavourable ground conditions mentioned in paragraphs 25 to 35 above have contributed to a cost increase of \$849.5 million.

(II) Modification of the Construction Schemes to Suit the Actual Site Conditions

Expanded Admiralty Station

37. When building the major structure of the expanded Admiralty Station, the existing rocks which supporting the main tunnel structure of the Island Line had to be excavated. Since the Island Line under operation is vital to the

transport on Hong Kong Island, coupled with the complicated work procedures for underpinning works, and the need to ensure that railway operations would not be affected during the underpinning works, a number of technical reviews on the detailed design of the underpinning works have been carried out after awarding the contract. Having considered the views put forth by experts, the Buildings Department and the Geotechnical Engineering Office, the MTRCL has carried out additional stabilisation works and temporary propping works, and a more advanced propping scheme has been adopted. In doing so, the movements of the Island Line tunnel can be more effectively monitored and controlled during the underpinning works. The revised scheme for underpinning works could allow the MTRCL to monitor the movements of the tunnel of the Island Line and make use of more advanced supporting system to effectively compensate the movements arising from the underpinning works. This could further reduce the risks to the railway operation and the passengers when the works are being carried out. Therefore, the cost for the underpinning works of the Island Line tunnel is higher than that of the original plan. Also, the implementation time for the underpinning works has to be extended.

38. The above modification of construction schemes involves a cost increase of \$225.1 million.

Ho Man Tin Station

39. Ho Man Tin Station is situated at the vacant land lot of ex-Valley Road Estate. In view of the sloping ground of the land lot, the MTRCL adopted the conventional open blasting method for excavation at rock hill at the design stage. After commencing the construction works, the contractor had to apply the blasting permit from the authority. In view of the proximity of the blasting sites to major trunk roads and residential buildings, during the early stages of construction, the contractor, the MTRCL and relevant government departments had to use longer time to assess, design and re-examine the protective measures to be used during blasting. Eventually, the MTRCL adopted the suggestions from the relevant Government departments and decided to provide additional protective measures on top of the conventional open blasting in order to obtain a blasting permit. After using the above protective measures for the blasting works, the excavation rate was slower than expected. In order to expedite the progress, the MTRCL adopted the canopy type protective design, which was about the using of large steel mesh to cover the entire blasting site, in order to

proceed with the remaining excavation works. Although the progress of excavation works was improved after adopting the canopy type protective design, the overall excavation works of the Ho Man Tin Station had been delayed and affected the programme of the subsequent structural, E&M, track laying and building services installation works.

40. E&M works of railway projects in general can only commence after the completion of the related major station structures. As the construction of the major structure of Ho Man Tin Station lagged behind, resulting in delays in the follow-on E&M works, it was necessary to increase the number of work fronts and man hours in order to catch up with the scheduled progress. As a result, there was also a corresponding increase in manpower and machinery resources.

41. The above modification of construction schemes of Ho Man Tin Station has contributed to a cost increase of \$175.3 million.

42. Owing to the factors mentioned in paragraphs 37 to 41 above, we estimate that the modification in design has contributed to a cost increase of \$400.4 million.

Increase in Provision for Price Adjustments

43. When preparing the project estimate in 2011, we reserved \$737 million as the provision for price adjustments based on the price adjustment factors and the cash flow model available at the time. Since the above factors have led to an increase in the project cost, coupled with changes in the work procedures and the project programme, the actual cash flow is different from the original plan. Hence, we need to increase the provision for price adjustments. According to the latest project estimate, cash flow as well as the latest price adjustment factors compiled by the Government in September 2016, the provision for price adjustments should be increased by \$558.5 million, i.e. from \$737 million to \$1,295.5 million. Details of the latest cash flow and estimation of price adjustments for the project are at **Annex 3**.

Items Involving Savings

Adjustment of the On-cost Payable to the MTRCL

44. In the funding application for the advance works of SCL in 2011, \$710.5 million was temporarily reserved in 63TR for paying MTRCL's Project Management Cost¹. Subsequently, after the Independent Consultant appointed by HyD has come up with a concrete estimate for the construction cost and project management cost based on the detailed design of the SCL, the Government lowered the estimate of the Project Management Cost to \$498.5 million. The decrease is about \$212 million.

Savings on Works Items

45. As the tender price for building services works and E&M works is lower than that as set out in APE, the net saving is \$277.1 million. The difference is mainly attributed to the tender price awarded being lower than the amount allowed in APE for this project.

Review of the Contingencies

46. Some of the contingencies under the original APE (i.e. \$501.6 million) have been committed to cater for the additional costs arising from the above reasons. As the major advance works have been substantially completed, after review, \$471.6 million of the contingency provision could be used to offset part of the additional cost. The remaining contingency provision of \$30 million would be served as a reserve for settling additional payments in case some of the claims from contractors are established.

Summary of Financial Position

47. All in all, a breakdown of the proposed increase of \$847.7 million is as follows –

¹ The Project Management Cost is payable to the MTRCL for undertaking technical studies, design, construction supervision and contract management during the design and construction stages.

Factors	Proposed increased amount/savings (in MOD prices) (\$ million)	Percentage of the total increased amount/savings (%)
Increase due to –		
(a) unfavourable ground conditions	849.5	47.0
(i) <i>excavation works for the expanded Admiralty Station</i>	614.1	34.0
(ii) <i>excavation works for the shaft of the Ventilation Building of Admiralty Station</i>	51.3	2.8
(iii) <i>construction of SCL overrun tunnel at the expanded Admiralty Station</i>	136.7	7.6
(iv) <i>construction works for Ho Man Tin Station</i>	47.4	2.6
(b) modification of the construction schemes to suit the actual site conditions	400.4	22.1
(i) <i>expanded Admiralty Station</i>	225.1	12.4
(ii) <i>Ho Man Tin Station</i>	175.3	9.7
(c) additional funding for price adjustments	558.5	30.9

(d) total increase	1,808.4	100.0
(d) = (a)+(b)+(c)		
Some expenses are offset due to —		
(e) adjustment of the on-cost payable to the MTRCL	(212.0)	22.1
(f) savings from other works items	(277.1)	28.8
(g) reduction of the contingencies	(471.6)	49.1
(h) total savings	(960.7)	100.0
(h) = (e) + (f) + (g)		
(i) proposed increase	847.7	
(i) = (d) - (j)		

A comparison of the cost breakdowns of the original APE and the revised project estimate is at **Annex 4**.

Financial Implications

48. Subject to funding approval, we will revise the phased expenditure as follows –

Financial Year	\$ million (in MOD prices)
Up to 31 March 2016	5,303.0
2016-2017	932.7
2017-2018	699.7
2018-2019	167.2
Total	7,102.6

49. The proposed increase in the APE of the project will not give rise to any additional recurrent expenditure.

Next Step

50. We plan to consult the Members at the meeting of the Public Works Subcommittee to be held in the first quarter of 2017 and then seek the funding approval from the Finance Committee.

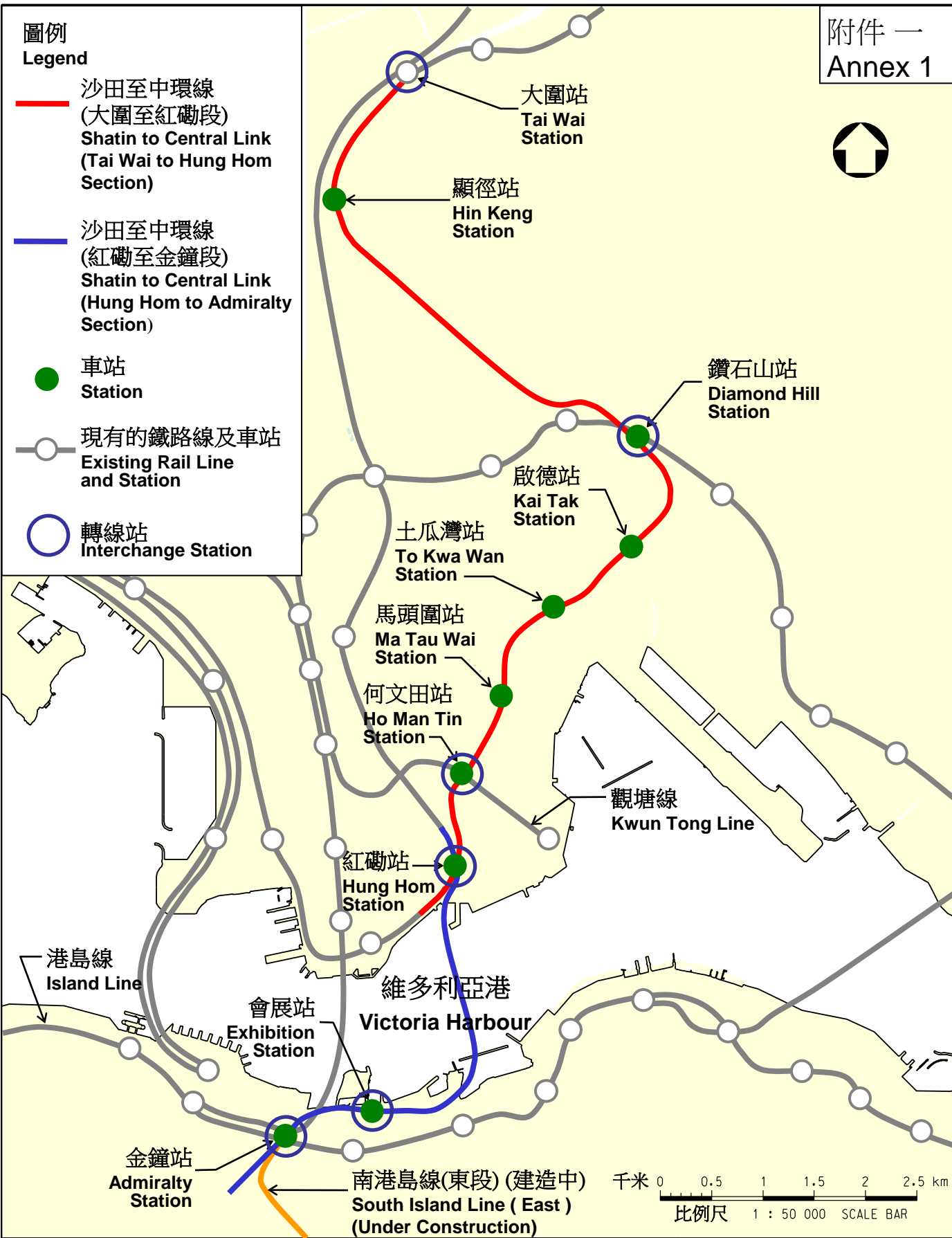
Advice Sought

51. Members are invited to support the proposal to increase the APE for 63TR by \$847.7 million, from \$6,254.9 million to \$7,102.6 million.

**Transport and Housing Bureau
Highways Department
December 2016**

圖例
Legend

- 沙田至中環線
(大圍至紅磡段)
Shatin to Central Link
(Tai Wai to Hung Hom Section)
- 沙田至中環線
(紅磡至金鐘段)
Shatin to Central Link
(Hung Hom to Admiralty Section)
- 車站
Station
- 現有的鐵路線及車站
Existing Rail Line and Station
- 轉線站
Interchange Station



圖則名稱 drawing title

沙田至中環線的走線

Alignment of the Shatin to Central Link

圖號 drawing no.

HRWSCLO03-SK0448

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鐵路拓展處 RAILWAY DEVELOPMENT OFFICE



路政署
HIGHWAYS DEPARTMENT



**63TR – Shatin to Central Link –
Construction of Railway Works – Advance Works**

Table 1 - Cash flow and provision for price adjustment in PWSC (2010-11)34

Year	Original project estimate (in September 2010 prices) (\$ million)	Original price adjustment factors (October 2010) #	Approved project estimate (in MOD prices) (\$ million)	Provision for price adjustment (\$ million)
	X	Y	Z	A = Z - X
2011 - 2012	1,015.4	1.04250	1,058.6	43.2
2012 - 2013	1,656.5	1.09463	1,813.3	156.8
2013 - 2014	1,399.9	1.14936	1,609.0	209.1
2014 - 2015	1,002.0	1.20682	1,209.2	207.2
2015 - 2016	444.1	1.27169	564.8	120.7
Total	5,517.9		6,254.9	737.0

Table 2 - Latest cash flow and provision for price adjustment of 56TR

Year	Latest Project Estimate (PE) (in September 2010 prices) (\$ million)	Latest PE (in September 2016 prices) (\$ million) ^^	Latest price adjustment factors (September 2016) ##	Latest PE (in MOD prices) (\$ million)	Latest provision for price adjustment (\$ million)	Net increase in provision for price adjustment (\$ million)
	a	b	c	d	e	f
Up to March 2016	4,530.1 [^]	5,303.0 [^]	1.00000	5,303.0	e = d - a	f = e - A
2016 - 2017	683.1	932.7 ^{^^}	1.00000	932.7		
2017 - 2018	484.6	661.7 ^{^^}	1.05750	699.7		
2018 - 2019	109.3	149.2 ^{^^}	1.12095	167.2		
Total	5,807.1	7,046.6		7,102.6	1,295.5	558.5

Notes:

Price adjustment factors adopted in October 2010 were based on the projected movement of prices for public sector building and construction output at that time, which were assumed to increase by 2.0% per annum in 2010, 5.0% from 2011 to 2014 and 5.5% from 2015 onwards.

Price adjustment factors adopted in September 2016 were based on the latest movement of prices for public sector building and construction output, which was assumed to increase by 6.0% per annum over the period from 2017 to 2019.

[^] \$4,530.1 million was the actual expenditure (excluding price adjustment) up to March 2016; whereas \$5,303.0 million was the actual expenditure (including price adjustment).

^{^^} The September 2016 prices are converted by multiplying the latest project estimate (in September 2010 prices) by 1.36537. The figure of 1.36537 represents the changes in price movement for public sector building and construction output between September 2010 and September 2016.

**63TR – Shatin to Central Link –
Construction of Railway Works – Advance Works**

**Comparison between Approved Project Estimate and
the Latest Project Estimate**

	(A) Approved Project Estimate (\$ million)	(B) Latest Project Estimate (\$ million)	(B) – (A) Difference (\$ million)
(a) SCL portion at Admiralty Station	1,873.8	2,623.8	750.0
(i) Station building works	1,351.4	2,190.6	839.2
(ii) Building services works	172.8	162.5	(10.3)
(iii) E&M works	349.6	270.7	(78.9)
(b) SCL portion of ventilation facility for Admiralty Station	231.7	283.0	51.3
(i) Building works	206.9	256.7	49.8
(ii) Building services works	24.8	26.3	1.5
(c) Overrun tunnel at Admiralty Station	199.0	335.7	136.7
(d) SCL portion at Ho Man Tin Station	2,001.3	2,036.1	34.8
(i) Station building works	1,496.3	1,695.8	199.5
(ii) Building services works	399.5	211.6	(187.9)
(iii) E&M works	105.5	128.7	23.2
(e) On-cost payable to MTRCL	710.5	498.5	(212.0)
(f) Contingencies	501.6	30.0	(471.6)
Sub-total	5,517.9 (in Sept 2010 prices)	5,807.1 (in Sept 2010 prices)	289.2
(f) Provision for price adjustment	737.0	1,295.5	558.5
Total	6,254.9 (in MOD prices)	7,102.6 (in MOD prices)	847.7

2. As regards item **1(a)(i) (station building works for SCL portion at Admiralty Station)**, the increase of \$839.2 million is mainly due to unfavourable ground conditions and changes in design to suit actual conditions.
3. As regards item **1(a)(ii) (building service works for SCL portion at Admiralty Station)**, the decrease of \$10.3 million is mainly due to the lower prices in the awarded contracts as compared to the sums allowed in the Approved Project Estimate.
4. As regards item **1(a)(iii) (E&M works for SCL portion at Admiralty Station)**, the decrease of \$78.9 million is mainly due to the lower prices in the awarded contracts as compared to the sums allowed in the Approved Project Estimate.
5. As regards item **1(b)(i) (building works for SCL portion of ventilation facility for Admiralty Station)**, the increase of \$49.8 million is mainly due to unfavourable ground conditions.
6. As regards item **1(b)(ii) (building service works for SCL portion of ventilation facilities at Admiralty Station)**, the increase of \$1.5 million is mainly due to unfavourable ground conditions.
7. As regards item **1(c) (overrun tunnel at Admiralty Station)**, the increase of \$136.7 million is mainly due to unfavourable ground conditions.
8. As regards item **1(d)(i) (station building works for SCL portion at Ho Man Tin Station)**, the increase of \$199.5 million is mainly due to unfavourable ground conditions and changes in design to suit actual conditions.
9. As regards item **1(d)(ii) (building service works for SCL portion at Ho Man Tin Station)**, the decrease of \$187.9 million is mainly due to the lower prices in the awarded contracts as compared to the sums allowed in the Approved Project Estimate.
10. As regards item **1(d)(iii) (E&M works for SCL portion at Ho Man Tin Station)**, the increase of \$23.2 million is mainly due to changes in design to suit actual conditions.
11. As regards item **1(e) (on-cost payable to MTRCL)**, the decrease of \$212.0 million is mainly due to the adjustment based on a payment schedule of the remaining on-cost payable to MTRCL established under the entrustment agreement of the main works.
12. As regards item **1(f) (contingencies)**, the decrease of \$471.6 million is mainly due to commitment to cater for the additional costs arising from the above reasons. The remaining of \$30.0 million is to cater for the potential claims from the contractors.

13. As regards item **1(g) (provision for price adjustment)**, an increase of \$558.5 million is based on the latest increase in the price adjustment factors promulgated by the Government, as well as the latest anticipated cash flow of the project. Details are given in paragraph 43 of the main paper and Annex 3.