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2 Project Description

2.1 History and Background

2.1.1.1 Route 11 (i.e. the Project) has a similar mainline layout of the Public Works Programme Item No 519TH "Route 10 – North Lantau to Yuen Long Highway (YLH)" (Ex-Route 10). The feasibility study as well as the investigation and preliminary design of Ex-Route 10 were completed in 1998 and 2002 respectively. Detailed design for Ex-Route 10 commenced in 2000 but had not been completed in view of the proposed implementation of the Tuen Mun – Chek Lap Kok Link (TM-CLKL) and Tuen Mun Western Bypass (now is replaced by the proposed Tuen Mun Bypass (TMB)), with Route 10 as a future option after review of the traffic and transport infrastructure in the Northwest New Territories (NWNT) and Lantau in 2002. As the above studies were carried out some 20 years ago, much information had become outdated, and the technical feasibility of the Project needs to be assessed again.

2.1.1.2 Highways Department (HyD) commissioned a Feasibility Study (FS) of the Project in May 2018 in order to take account of the latest planning and development parameters. The FS has established the technical feasibility of the Project, examined and evaluated possible alignment options and determined the Preferred Alignment for the Project.

2.1.1.3 Subsequently, HyD commissioned an Investigation consultancy of the Project in September 2021, to examine and review the Preferred Alignment for the Project, formulate a Recommended Alignment for the Project, and work out the preliminary design details of the Recommended Alignment of the Project and the associated works. The scope of the consultancy also includes the preparation of the Environmental Impact Assessment (EIA) for the Project under the Environmental Impact Assessment Ordinance (EIAO).

2.2 Objective and Need of the Project

2.2.1 Objective of the Project

2.2.1.1 The objective of the Project is to enhance the connectivity between NWNT and North Lantau to accommodate the future traffic demands generated by the future developments in both regions and also the increasing cross boundary activities. The Project will be a strategic highway to support the proposed developments in the NWNT.

2.2.2 Need of the Project

2.2.2.1 According to the traffic impact assessment, in the absence of the Project, Tuen Mun Road (Siu Lam Section and Sham Tseng Section), Tai Lam Tunnel, Ting Kau Bridge, and Lantau Link will be over capacity during morning peak hours in 2036.

2.2.2.2 The Project will offer an alternative route connecting the NWNT and the urban areas. It is anticipated that traffic conditions of Tuen Mun Road (Siu Lam Section and Sham Tseng Section), Tai Lam Tunnel, Ting Kau Bridge and Lantau Link during morning peak hours in 2036 will be significantly improved after

commissioning of the Project and the associated major roads, resulting reduced travel time between NWNT and urban areas.

2.2.2.3 In addition, the Project will provide an alternative commuting route with the proposed Tsing Yi-Lantau Link (TYLL). This will enhance the resilience of the NWNT traffic network to traffic incidents and emergencies on major roads. By having multiple access points and connections to major roads in NWNT, the Project and TYLL can serve as a dependable route for diverting traffic towards urban areas during such situations. Furthermore, the Project and TYLL will serve as a strategic route linking NWNT and the urban areas to Lantau, enhancing the resilience to the road network connecting to the airport.

2.3 Consideration of "With" and "Without" Project Scenarios

2.3.1 Consideration of "Without" Project Scenario

2.3.1.1 Without the implementation of the Project, much of the traffic from various new and existing developments in NWNT commuting to Tsuen Wan, West Kowloon and Hong Kong Island, etc. would need to use the existing Tuen Mun Road, or Tai Lam Tunnel with Ting Kau Bridge. According to the traffic impact assessment, Tuen Mun Road, Tai Lam Tunnel, and Ting Kau Bridge, would not have sufficient capacity to handle the future traffic demand. Hence, it is anticipated that these major roads would experience serious congestion during peak hours, which would lead to higher vehicular traffic emissions as the traffic speed decreases during traffic congestion. Moreover, as it was anticipated that the traffic volume during non-peak hours would increase, potential impacts on air quality and noise to the neighbouring sensitive receivers would also be more significant.

2.3.2 Consideration of "With" Project Scenario

2.3.2.1 With the implementation of the Project, the traffic from various new and existing developments in NWNT commuting to Tsuen Wan, West Kowloon and Hong Kong Island, etc. could use the Route 11 as an alternative route to reach Tsing Lung Tau and North Lantau swiftly instead of relying on Tuen Mun Road or Tai Lam Tunnel with Ting Kau Bridge. From there, the traffic can take suitable routes to reach Tsuen Wan, West Kowloon and Hong Kong Island as needed. As a result, traffic conditions on Tuen Mun Road, Tai Lam Tunnel, Ting Kau Bridge and Lantau Link would be relieved, and the associated environmental impacts along this main traffic corridor would also be improved. In addition, the Project has proactively avoided any aboveground works within Tai Lam Country Park to minimize environmental impacts.

2.3.2.2 By adopting underground tunnel form for all sections within Tai Lam Country Park, no habitat within Tai Lam Country Park will be lost or fragmented and no direct impact will be exerted on flora and fauna within Tai Lam Country Park, including those of conservation importance. Indirect impacts due to the construction activities are also mitigated by proper planning of construction works and other mitigation measures.

2.4 Environmental Benefits of the Project

2.4.1.1 As mentioned above, the existing major roads such as Tuen Mun Road, Tai Lam Tunnel, Ting Kau Bridge and Lantau Link would experience congestion during peak hours. Implementing the Project would relieve the traffic conditions on these major roads, resulting in improvement on air quality and traffic noise performance along these existing major roads.

2.5 Design Changes to the Project

2.5.1.1 Since the issue of EIA Study Brief (No. ESB-352/2022), the Project Proponent has been optimising the alignment and design of the Project proactively to avoid and minimise environmental impacts where practicable. A summary of the key project design changes is given in the sections below. Assessments to these changes have been included under this EIA Study.

2.5.2 Provision of Temporary Explosive Magazine Sites

2.5.2.1 The critical path of the construction programme for the Project is largely governed by the tunnelling works for Lam Tei Tunnel, So Kwun Wat Link Road, and Tai Lam Chung Tunnel. This would require the provision temporary explosive magazine sites to provide sufficient storage capacity for explosives to suit the cycle time of the blasting works.

2.5.2.2 According to the current design, a total of 3 temporary magazine sites are required, including 1) underground at Lam Tei Quarry; 2) aboveground at Siu Lam; and 3) aboveground at Pillar Point. These magazine sites are proposed to be shared with Tuen Mun Bypass (TMB) due to their overlapping construction programme periods envisaged at the time of preparing this EIA Report. The magazines will be decommissioned after construction of the Project and TMB. The locations of temporary magazine sites are shown in **Figure 2.5**.

2.5.3 Provision of Temporary Barging Point Facilities

2.5.3.1 To reduce the number of construction trucks using the road network for delivery of construction materials, several barging points are required for loading / unloading construction materials and removing excavated materials to fill banks by marine access. In total, 1 barging point will be established at the proposed reclamation area at Tsing Lung Tau; and another 2 barging points are proposed at North Lantau, namely To Kau Wan and San Po Tsui. See **Figure 2.5** for the locations of the proposed temporary barging points.

2.5.3.2 The barging points at Tsing Lung Tau site and To Kau Wan site are proposed to transport the excavated materials to the fill banks by barges. These barging points also serve as loading / unloading points for construction materials such as precast tunnel segments, pre-cast viaduct segments, construction plants, fill materials and other bulk deliveries for construction activities.

2.5.3.3 The works area near San Po Tsui has no land access. It is thus proposed for construction material storage and these materials will be transported by barges. The barging point is required to facilitate loading and unloading of the construction materials.

2.6 Consideration of Alignment Options

2.6.1 General

2.6.1.1 Several alternatives/options have been considered in the feasibility study, investigation and selection of the scheme of the Project to be taken forward for environmental assessment and preliminary design. This section of the report provides the details of the alignment options considered and the constraints and considerations assessed in adopting the recommended scheme.

2.6.1.2 As part of the selection process, various construction methodologies have also been reviewed in order to determine the most effective means and environmentally friendly construction method(s). The review has considered environmental benefits, engineering feasibilities, site conditions and programme aspects, etc.

2.6.1.3 The sections below present the consideration of the alternatives/options of the Project's key elements and construction methodologies.

2.6.2 Overview

2.6.2.1 In principle, tunnel alignment is adopted as far as possible and practicable to avoid environmental sensitive areas, particularly the Tai Lam Country Park and the underground bat roosts there. On the other hand, some areas are considered not viable to adopt tunnel alignment from engineering and traffic safety points of view, which are elaborated below:

- Interchanges are required at interim locations along the 12km long of the Route 11 at particular locations such as Tsing Lung Tau and So Kwun Wat, for the sake of connectivity of the Project, which in turn allows for better utilisation of this new route to relieve the traffic of the existing highways and to enhance overall resilience of the highway network. A combination of open roads and tunnels, need to be adopted to facilitate the multiple movements and connections of slip roads at the interchanges. Also, traffic merging inside tunnels is considered as high risk from traffic safety point of view.

- The seabed of Ha Pang Fairway is at about -40mPD, while the connections at Tsing Lung Tau and North Lantau are at about +70mPD to match with existing Tuen Mun Road and Lantau Link. The level difference is over 100m, which renders excessive road gradient or requires a long approach ramp to accommodate the large level difference if tunnel is adopted across the fairway. It is not favourable for highway design and traffic operation point of view (see Option D under Tai Lam Chung, Tsing Lung Tau and North Lantau Section under **Section 2.6.5** and **Figure 2.1d** in regard to this issue).

2.6.2.2 On the above basis, other alignment options comprising sections of tunnels, viaducts, at-grade roads and suspension bridge have been considered for the Project. In consideration of the alignment options, the whole Project is sub-divided for 3 sections:

- Northern Section (Tuen Mun to So Kwun Wat);
- Central Section (So Kwun Wat to Tai Lam Chung); and
- Southern Section (Tai Lam Chung to North Lantau).

2.6.2.3 The alignment options for the 3 sections of the Project are shown in **Figure 2.1a** and discussed in the sections below. These include the preferred alignment option as recommended in the initial feasibility study, and further options as developed and considered in the investigation study stage of the Project.

2.6.3 Northern Section (Tuen Mun to So Kwun Wat)

General

2.6.3.1 The Northern Section of the Project is running between Lam Tei and So Kwun Wat. Major elements in this section include the Lam Tei Quarry Interchange (LTQI) and Lam Tei Tunnel (LTT).

2.6.3.2 LTQI is at the northern end of the Project. Route 11, together with TMB, is required to connect with the existing Yuen Long Highway and Kong Sham Western Highway, at the existing viaduct stub ends formally reserved for the Ex-Route 10. LTT will run between Lam Tei and So Kwun Wat, where is an extensive hill area with a height of over 300m, hence a land tunnel through the hill will be required.

2.6.3.3 There are 3 alignment options considered for this section of the Project, namely Option FS(LT), Option LT1, and Option LT2 (see **Figure 2.1b**).

Alignment Option FS(LT)

2.6.3.4 Under this option, the alignment will traverse the Lam Tei Quarry beyond the north portal of LTT after emerging from the hill area. The tunnel portal will be located outside the Tai Lam Country Park. There is no provision for connection with the interfacing TMB, as the TMB project was not yet in place at the time of formulation of Option FS(LT) at the previous feasibility study stage. The LTT alignment has not catered for the proposed underground quarry either, as again the underground quarry project at Lam Tei was not yet proposed at the time of formulation of Option FS(LT).

2.6.3.5 At LTQI, LTT will connect with the existing Yuen Long Highway and Kong Sham Western Highway via slip roads and elevated viaducts, making use of the reserved existing stub ends. The LTQI layout under this option will encroach upon a certain extent of Fuk Hang Tsuen and the Permitted Burial Ground No. BURG22.

Alignment Option LT1

2.6.3.6 Under this option, the northern portal of LTT will emerge at a location more eastward as compared to Option FS(LT), hence the alignment will also be shifted eastward in general. With this eastward shifted alignment, this option would encroach upon a slightly smaller extent of Fuk Hang Tsuen. Provision for connection with the interfacing TMB will also be catered for the LTQI.

2.6.3.7 However, with this shifted alignment, the northern portal of LTT will inevitably be located inside Tai Lam Country Park. Also, the alignment will be in conflict with the proposed underground quarry at Lam Tei. It will also bisect the Lam Tei Quarry hence will impose constraint to its future land use planning. The LTQI layout under this option will encroach upon a larger extent of the Permitted Burial Ground No. BURG22. Also, its northern tunnel portal will encroach into the Tai Lam Country Park.

Alignment Option LT2 (Recommended Option)

2.6.3.8 Under this option, the northern portal of LTT will emerge at a location more westward as compared to Option FS(LT), towards the western edge of the existing Lam Tei Quarry. Hence, it will pose the least impact and constraint to the Lam Tei Quarry and its future land use planning, when comparing to option FS(LT) and LT1. In addition, the westward shifted tunnel alignment will also avoid the cavern under proposed underground quarry at Lam Tei, and will encroach upon the Permitted Burial Ground No. BURG22 at the least extent among the 3 alignment options. Also, there will be no aboveground works within Tai Lam Country Park.

2.6.3.9 For LTQI, similar to Option LT1, a more compact layout has been developed to achieve a reduced footprint, hence will encroach upon a relatively smaller extent of Fuk Hang Tsuen as compared to Option FS(LT). Provision for connection with the interfacing TMB will also be catered for the LTQI.

Summary of Alignment Options Considered

2.6.3.10 A summary of the above options for Northern Section is given below with the recommended option identified for ease of reference.

Table 2.1 Summary of alignment option considered (Northern Section)

Alignment Option	Pros	Cons	Recommended Option (Y/N)
Option FS(LT)	• Northern tunnel portal located outside Tai Lam Country Park	• Not compatible with other interfacing projects • Larger encroachment on Fuk Hang Tsuen • Larger encroachment on Permitted Burial Ground No. BURG22	N
Option LT1	• More compact layout developed for LTQI to achieve a reduced footprint • Compatible with Tuen Mun Bypass • Less encroachment on Fuk Hang Tsuen	• Northern tunnel portal located inside Tai Lam Country Park • Bisecting existing Lam Tei Quarry thus imposing constraints to its future land use planning, and in conflict with proposed underground quarry • Larger encroachment on Permitted Burial Ground No. BURG22	N
Option LT2	• Northern tunnel portal located outside and further away from Tai Lam Country Park • More compact layout developed for LTQI to achieve a reduced footprint • Less encroachment on Fuk Hang Tsuen	-	Y

Alignment Option	Pros	Cons	Recommended Option (Y/N)
	• Less encroachment on Permitted Burial Ground No. BURG22 • More compatible with other interfacing projects		

2.6.4 Central Section (So Kwun Wat to Tai Lam Chung)

General

2.6.4.1 The Central Section of the Project is running between So Kwun Wat and Tai Lam Chung. Major elements in this section include the So Kwun Wat Link Road (SKWLR) and So Kwun Wat Interchange (SKWI).

2.6.4.2 SKWLR will serve to connect the mainline of the Project with Tuen Mun Road. A connection with the local area of So Kwun Wat will also be provided. The SKWLR and the mainline of the Project will be connected at SKWI, which comprises slip roads and elevated viaducts to allow for SKWLR to access with LTT on the north as well as with Tai Lam Chung Tunnel (TLCT) on the south.

2.6.4.3 In view of the terrain and topography, a part of the mainline of the Project at this section will be in the form of an open highway, between the southern portal of LTT and the northern portal of TLCT, along the corridor will avoid encroaching to the Tai Lam Chung Reservoir, as well as various residential and institutional premises in the area.

2.6.4.4 There are 5 alignment options considered for the Central Section, mainly regarding the SKWLR and SKWI arrangements, namely Option FS(SL), Option SL1, Option SL2, Option SL3 and Option SL4 (see **Figure 2.1c**), with a view to connecting to Tuen Mun Road at So Kwun Wat or Siu Lam area.

Option FS(SL)

2.6.4.5 Under this option, SKWLR will be in the form of a combination of viaducts and tunnels. It will connect with the mainline of the Project with 2 pairs of slip road viaducts, i.e. 1 pair towards the north and 1 pair towards the south, at the SKWI. Beyond the SKWI, it will encompass a short section of viaduct right adjacent to the So Kwun Wat San Tsuen and crossing over the So Kwun Wat (east part) Site of Archaeological Interest (SAI), Fung Shui Woods, and the Permitted Burial Ground No. BURG19. It will then turn into a tunnel underneath Tai Lam Country Park, with the eastern portal located at the northwest of So Kwun Wat San Tsuen and the northeast of So Kwun Wat Tsuen, and the western portal at the northeast of Harrow International School. It will then connect with Tuen Mun Road with 1 pair of slip roads near Harrow International School Hong Kong.

2.6.4.6 There are some key issues or demerits for this option:

- The eastern tunnel portal of the SKWLR including the associated earthwork will encroach upon Tai Lam Country Park;
- The eastern tunnel portal of the SKWLR including the associated earthwork will pose direct impact to MacLehose Trail;

- The alignment of the viaduct connecting SKWLR will be located right next to So Kwun Wat Tsuen and So Kwun Wat San Tsuen, hence will pose major environmental nuisances to the villages; and
- The alignment of the viaduct connecting SKWLR will pose direct impact to the Fung Shui Woods, So Kwun Wat (east part) SAI and the Permitted Burial Ground No. BURG19.

Alignment Option SL1 (Recommended Option)

2.6.4.7 Under this option, SKWLR will be in the form of a tunnel predominantly. It will connect with the mainline of the Project with 1 pair of slip road viaducts towards the south together with the provision of a loop road viaduct to allow for movements with the north, at the SKWI. Beyond the SKWI, it will then immediately turn into a tunnel underneath Tai Lam Country Park, with the eastern portal located near Pak Shek Hang. The western portal will be at a location similar to that of Option FS(SL), at the northeast of Harrow International School Hong Kong. It will then connect with Tuen Mun Road with 1 pair of slip roads near Harrow International School Hong Kong, similar to Option FS(SL).

2.6.4.8 The tunnel length of this option is longer than that in the Option FS(SL), leading to longer travel time. However, there are key merits that most of the constraints and direct impacts can be avoided / minimised under this option, including aboveground works within Tai Lam Country Park, MacLehose Trail, Fung Shui Woods, So Kwun Wat Tsuen and So Kwun Wat San Tsuen So Kwun Wat (east part) SAI and the Permitted Burial Ground No. BURG19. The local connection to So Kwun Wat Road will be unavoidably close to Avignon at the existing roundabout. However, compared with the following Options SL2, SL3 and SL4, indirect impact to other residential premises including Le Pont, Siu Sau Village, Grandview Terrace, OMA by the Sea, Siu Lam San Tsuen, Peak Castle, Palatial Coast, So Kwun Wat Tsuen, So Kwun Wat San Tsuen and planned development at Tuen Mun East is avoided/reduced.

Alignment Option SL2

2.6.4.9 Under this option, SKWLR will be in the form of viaduct and at-grade road. It will connect with the mainline of the Project with 2 pairs of slip road viaducts, i.e. 1 pair towards the north and 1 pair towards the south, at the SKWI. Beyond the SKWI, SKLWR will take viaduct and at-grade road forms routing through the corridor in between the south of So Kwun Wat San Tsuen, So Kwun Wat Tsuen, Le Pont and Siu Sau Village, and the north of Grandview Terrace. It will then connect with Tuen Mun Road with 1 pair of slip roads near OMA by the Sea and Siu Lam San Tsuen.

2.6.4.10 The key merits of this option are that the aboveground works will avoid direct encroachment upon Tai Lam Country Park, MacLehose Trail, Fung Shui Woods and SAIs. However, it will be close to various residential premises such as Le Pont, Siu Sau Village, Grandview Terrace, OMA by the Sea and Siu Lam San Tsuen, and it will affect the planning development areas at Tuen Mun East along the route. Thus, it is anticipated to pose considerable environmental impacts to them.

Alignment Option SL3

2.6.4.11 Under this option, SKWLR will be in the form of viaduct and at-grade road. It will connect with the mainline of the Project with 2 pairs of slip road viaducts, i.e. 1 pair towards the north and 1 pair towards the south, at the SKWI. Beyond the SKWI, SKLWR will take viaduct and at-grade road forms routing through the corridor in between Peak Castle and Palatial Coast. It will then connect with Tuen Mun Road near Siu Lam San Tsuen.

2.6.4.12 The key merits of this option are that the aboveground works will avoid direct encroachment upon Tai Lam Country Park, MacLehose Trail, Fung Shui Woods and SAIs. However, it will impact on some planned residential uses at Tuen Mun East along the route. It will also be close to various residential premises such as Peak Castle, Palatial Coast and Siu Lam San Tsuen, thus is anticipated to pose considerable environmental impacts to them.

Alignment Option SL4

2.6.4.13 Under this option, SKWLR will be in the form of a viaduct. It will connect with the mainline of the Project with 2 pairs of slip road viaducts, i.e. 1 pair towards the north and 1 pair towards the south, at the SKWI. Beyond the SKWI, SKLWR will take a viaduct form routing through the corridor in between the south of Tai Lam Country Park and the north of So Kwun Wat Tsuen and So Kwun Wat San Tsuen. It will then connect with Tuen Mun Road with 1 pair of slip roads near Harrow International School.

2.6.4.14 This option will align outside Tai Lam Country Park and MacLehose Trail thus with no direct impact to them. However, it will be right next to So Kwun Wat Tsuen and So Kwun Wat San Tsuen, hence will pose major environmental impacts to the residents. The alignment of the SKWLR viaduct will also pose direct impact to the Fung Shui Woods, So Kwun Wat (east part) SAI and the Permitted Burial Ground No. BURG20. In addition, as the viaduct will run along the slopes to the north of So Kwun Wat Tsuen, thus may have construction difficulty as well.

Summary of Alignment Options Considered

2.6.4.15 A summary of the above options for Central Section is given below with the recommended option identified for ease of reference.

Table 2.2 Summary of alignment option considered (Central Section)

Alignment Option	Pros	Cons	Recommended Option (Y/N)
Option FS(SL)	• Avoiding encroachment upon existing premises and planned developments	• Eastern tunnel portal of SKWLR encroaching upon Tai Lam Country Park, and posing direct impact to MacLehose Trail • Alignment of viaduct connecting SKWLR located right next to So Kwun Wat Tsuen and So Kwun Wat San Tsuen, leading to more significant environmental nuisances to the villages	N

Alignment Option	Pros	Cons	Recommended Option (Y/N)
		• Encroachment upon Fung Shui Woods, So Kwun Wat (east part) SAI, and Permitted Burial Ground No. BURG19	
Option SL1	• Avoiding encroachment upon existing premises and planned developments at Tuen Mun East • Avoiding encroachment upon Tai Lam Country Park, MacLehose Trail, So Kwun Wat (east part) SAI and Permitted Burial Grounds from aboveground works • Minimize impact to Fung Shui Woods	• Length of tunnel is longer than Option FS(SL)	Y
Option SL2	• Avoiding encroachment upon existing premises and planned developments along the route • Avoiding encroachment upon Tai Lam Country Park, MacLehose Trail, Fung Shui Woods, So Kwun Wat (east part) SAI and Permitted Burial Grounds from aboveground works	• Close to various residential premises, imposing considerable environmental impacts • Encroachment in planning development areas	N
Option SL3	• Avoiding encroachment upon existing premises along the route • Avoiding encroachment upon the Tai Lam Country Park, MacLehose Trail, Fung Shui Woods, So Kwun Wat (east part) SAI and the Permitted Burial Ground from aboveground works	• Close to various residential premises, imposing considerable environmental impacts • Encroachment in some planned residential uses along the route	N
Option SL4	• Avoid encroachment upon Tai Lam Country Park and MacLehose Trail from aboveground works	• Encroachment in Fung Shui Woods, So Kwun Wat (east part) SAI and Permitted Burial Ground No. BURG20 • Viaduct right next to So Kwun Wat Tsuen and So Kwun Wat San Tsuen, imposing considerable environmental impacts	N

Alignment Option	Pros	Cons	Recommended Option (Y/N)
		• Alignment running along the slopes, thus may have construction difficulty	

2.6.5 Southern Section (Tai Lam Chung to North Lantau)

General

2.6.5.1 The Southern Section of the Project is running between Tai Lam Chung and North Lantau through Tsing Lung Tau. Major elements in this section include the land section between Tai Lam Chung and Tuen Mun Road and the marine section crossing Ha Pang Fairway, together with an interchange to connect with Tuen Mun Road, and North Lantau Interchange which is at the southern end of the Project. The North Lantau Interchange is required to connect with the existing North Lantau Highway and Lantau Link, as well as the proposed TYLL, HKIW-NEL Link, and Road P1.

2.6.5.2 There are 8 alignment options considered for this section of the Project, namely Option FS, Option A1, Option A2, Option B1, Option B2, Option C1, Option C2 and Option D (see **Figure 2.1d**).

Alignment Option FS

2.6.5.3 Under this option, the alignment will connect Tai Lam Chung and Tsing Lung Tau via Tai Lam Chung Tunnel (TLCT), which will comprise two sections, i.e. one to the west of Tai Lam Chung River and one to the east of Tai Lam Chung River, interlinked with a short section of viaduct crossing the river. The east section of TLCT will pass underneath Tai Lam Country Park, and its tunnel portals will be located outside Tai Lam Country Park.

2.6.5.4 Towards south, it will cross Ha Pang Fairway to connect with North Lantau at Ng Kwu Leng via Tsing Lung Bridge (TLB), which will be in the form of a suspension bridge. This location is selected as it requires the shortest marine crossing. The landing points of TLB will be located on reclamations off the coast on both Tsing Lung Tau and North Lantau sides, so as to minimise the span length of TLB under the constraints of Airport Height Restriction (AHR) (which is the AHR before the implementation of Three-Runway System at the time of formulation of Option FS at the previous feasibility study stage) for the tower heights.

2.6.5.5 The mainline of the Project will connect with Tuen Mun Road at Tsing Lung Tau via the Tsing Lung Tau Interchange (TLTI), with 2 pairs of slip roads, i.e. 1 pair connecting TLCT with Tuen Mun Road on the east and 1 pair connecting TLB with Tuen Mun Road on the west. Realignment of a section of Tuen Mun Road is needed, to provide space for the connection of these slip roads with Tuen Mun Road.

2.6.5.6 On North Lantau side, at the NLI, the mainline of the Project will connect with the existing North Lantau Highway and Lantau Link as well as the proposed Road P1, while the projects of TYLL and HKIW-NEL Link were not yet in place at the time of the formulation of Option FS thus the associated connection arrangements were not yet in place either.

2.6.5.7 The alignment under this option will offer a direct traffic routing between Tai Lam Chung and North Lantau. Also, TLCT in tunnel form will minimise potential environmental impacts, such as air, noise and visual impacts, to the residential premises at Tai Lam Chung area, such as Tai Lam Chung Tsuen and Wong Uk Tsuen. However, the option will run underneath the Tai Lam Chung (TLC) Catchwater Tunnel No. 6 at Tai Lam Chung and require reclamation for the towers of TLB on both sides. In addition, it will require extensive slope cutting at Ng Kwu Leng as the alignment will run along the spur and crest of the hill there. The southern portal of the TLCT and its associated earthwork will likely encroach upon Tai Lam Country Park. At NLI, the connection from TLB to Kap Shui Mun Bridge will require realignment of Kap Shui Mun Bridge lower deck entry, while the connection road from Kap Shui Mun Bridge to TLB will have some conflict with the existing MTR substation.

Alignment Option A1 (Recommended Option)

2.6.5.8 Under this option, the alignment will connect Tai Lam Chung and North Lantau via TLCT and TLB, together with the provision of TLTI and NLI, similar to Option FS. Nonetheless, some key improvements of Option A1 are listed below:

- The southern portal of the TLCT is shifted southward as compared to Option FS, hence avoiding direct encroachment upon Tai Lam Country Park at this area;
- The location of the southern tower of TLB on North Lantau side is shifted southward, to be located on land, hence removing the need for reclamation on North Lantau side totally;
- The slope cutting at Ng Kwu Leng has been optimised with due consideration of road gradient between Tsing Lung Bridge crossing Ha Pang Fairway and connection at Lantau Link;
- The landing point at North Lantau for TLB alignment is shifted to the west slightly, which can facilitate the connection from TLB to Kap Shui Mun Bridge without affecting the Kap Shui Mun Bridge lower deck entry, at NLI. Also, the diverging point for the connection from Kap Shui Mun Bridge to TLB is shifted west or downstream as compared to Option FS, as such both the upper and lower deck traffic from Kap Shui Mun Bridge can enter the connection without modification to Kap Shui Mun Bridge abutment structure;
- At NLI, the layout for the connection road from Kap Shui Mun Bridge to TLB is refined to avoid conflicting with the existing MTR substation. The layout is also refined to include connections with the proposed TYLL and HKIW-NEL Link;
- At TLTI, an additional slip road from Tuen Mun Road westbound to TLB southbound will be provided, so that in case of incidents of Tsing Ma Bridge and TYLL, traffic heading from urban areas via Tsing Yi to Lantau can re-route to go via Ting Kau Bridge and Tuen Mun Road, then to TLB southbound to the North Lantau Highway at NLI, hence enhancing the resilience of road network to Lantau; and

- Although the option will run underneath the TLC Catchwater Tunnel No.6, vertical separation distance has been maximized from 6m to approximately 20m to minimise disturbance impacts on the bats inhabiting in the catchwater tunnels during the tunnelling works.

Alignment Option A2

2.6.5.9 This option is similar to Option A1 but adopts whole tunnel passing under Tai Lam Chung River.

2.6.5.10 This option will have a larger separation from the bat inhabiting TLC Catchwater Tunnel No. 6. However, the gradient of this option (from TLB approximate at +76mPD down to TLC River approximate at -40mPD) would be too steep for trunk road and unfavourable from the traffic operation viewpoint.

Alignment Option B1

2.6.5.11 Under this option, the alignment will connect Tai Lam Chung and Tsing Lung Tau via an elevated viaduct round the hill area and along Tuen Mun Road hillside, instead of a tunnel through the hill as adopted in Option FS, Option A1 and Option A2. Towards south, it will cross Ha Pang Fairway to connect with North Lantau at Ng Kwu Leng via TLB, with an alignment similar to that of Option A1.

2.6.5.12 For the connection with Tuen Mun Road, the interchange will be provided near Tai Lam Chung area, which will comprise 2 pairs of slip roads, i.e. 1 pair connecting with Tuen Mun Road on the east and 1 pair connecting with Tuen Mun Road on the west, allowing for movements similar to those in Option FS. For NLI, it will be similar to Option A1.

2.6.5.13 The key merit of this option is that the relatively complicated design and construction interface among TLB anchorage, Tuen Mun Road realignment and TLCT as in Option FS, Option A1 and Option A2 can be eliminated, which is considered beneficial from engineering and construction programme points of view. The merits for TLB alignment and NLI layout for Option A1, i.e. those mentioned under bullet points 2 to 5 under **Section 2.6.5.8** above also apply for this option. This option can also avoid running underneath the bat inhabiting TLC Catchwater Tunnel No. 6.

2.6.5.14 However, there are key demerits for this option. Substantial slope cutting is required along the north of Tuen Mun Road to allow for the construction for the connection of the slip roads. The substantial slope cutting would pose significant natural terrain hazard risks and hence safety concern on the widened Tuen Mun Road. Lane closure will be required during the relevant construction, which will have major impact to the traffic condition along Tuen Mun Road which is already busy. In addition, the alignment for this option is longer and less direct between Tai Lam Chung and Tsing Lung Tau as compared to Option FS, Option A1 and Option A2, leading to longer travel times thus less traffic efficiency. The long viaduct will also bring about more environmental nuisances, such as air, noise and visual impacts, to the residential premises at Tai Lam Chung area, such as Tai Lam Chung Tsuen and Wong Uk.

Alignment Option B2

2.6.5.15 This option is similar to Option B1 which aligns round the hill area of Tai Lam Chung. This option adopts elevated viaduct from Siu Lam to Tsing Lung Tau alongside Tuen Mun Road.

2.6.5.16 The merits of this option are similar to Option B1 and also it is aligned further away from the bat inhabiting TLC Catchwater Tunnel No. 6.

2.6.5.17 The demerits of this option are similar to Option B1 as well (e.g. safety concern during substantial slope cutting along Tuen Mun Road) Additionally it will encroach important infrastructures including the new Siu Lam Integrated Rehabilitation Services Complex premises at Hong Fai Road which is undesirable. It will also encroach on VTC Student Development Education Centre, Hong Kong Maritime Service Training Institute and run close to Siu Lam Psychiatric Centre and Palatial Coast, which shows the considerable land impact. It will also impose cumulative environmental implications (e.g. air quality and road traffic noise) with existing Tuen Mun Road.

Alignment Option C1

2.6.5.18 This option is similar to Option A1 from Tsing Lung Tau to North Lantau with at grade roads, viaduct at North Lantau and suspension bridge across Ha Pang Fairway, but aligns the road southward between Options A1/A2 and Options B1/B2 at section between Siu Lam and Tsing Lung Tau in form of tunnel beneath Tai Lam Country Park to avoid interface with the bat inhabiting TLC Catchwater Tunnel No. 6 and viaduct across Tai Lam Chung Tsuen and Tai Lam Chung River.

2.6.5.19 The key demerit of this option is that its viaduct section will encroach upon the Tai Lam Chung Tsuen, the permitted burial ground no. BURGD16 and potential development at the open area between Tai Lam Chung Tsuen and BURGD16.

Alignment Option C2

2.6.5.20 This option is similar to Option A1 from Tsing Lung Tau to North Lantau, but aligns the road northward between Siu Lam and Tsing Lung Tau in form of tunnel beneath Tai Lam Country Park, CSD's Tai Lam Correctional Institute and Tai Lam Chung River to avoid interface with the bat inhabiting TLC Catchwater Tunnel No. 6.

2.6.5.21 The key demerit of this option is that it will encroach upon the CSD's Tai Lam Correctional Institution and cross WSD's water tunnel No. 4 with approximate 10m clearance. The gradient of this option (from TLC River approximate at -40mPD up to So Kwun Wat-Siu Lam Open Road Section approximate at +54mPD) would be too steep for trunk road and unfavourable from the traffic operation viewpoint.

Alignment Option D

2.6.5.22 Under this option, the alignment will take the form of an elevated viaduct at Tai Lam Chung area similar to Option B1, and will cross the Ha Pang Fairway via a sub-sea tunnel between Tai Lam Kok and Sunny Bay, in the form of either immersed tube tunnel (IMT) or by tunnel boring machine (TBM). Substantial reclamation is required on both sides at Tai Lam Kok and Sunny Bay for tunnel daylighting.

2.6.5.23 For the connection with Tuen Mun Road, the interchange will be provided near Tai Lam Kok area beyond the daylighting of the tunnel, which will comprise 2 pairs of

slip roads, i.e. 1 pair connecting the viaduct section at Tai Lam Chung area with Tuen Mun Road on the east and 1 pair connecting the sub-sea tunnel beyond daylighting with Tuen Mun Road on the west, allowing for movements similar to those in Option FS. This connection is most distant from Tai Lam Country Park compared with other options.

2.6.5.24 On North Lantau side, beyond the daylighting of the tunnel, the mainline of the Project will connect with the existing North Lantau Highway and Lantau Link, as well as the proposed TYLL, HKIW-NEL Link and Road P1.

2.6.5.25 The key merit of this option is that there will be no constraint to marine navigation during the operation stage. However, there are key demerits for this option:

- Substantial reclamations will be required on both sides of the sub-sea tunnel for daylighting;
- IMT construction will seriously affect marine navigation during construction;
- Steep road gradient will be required for the sub-sea tunnel and difficult connection design for the interchanges at the two ends of the tunnel, due to the large level differences between the very deep level required for the sub-sea tunnel and the high levels of adjacent connecting roads;
- Sub-sea tunnel construction will generate a considerable amount of dredged materials;
- Potential water quality impact will occur for IMT construction; and
- The tunnel daylighting and reclamation on North Lantau side will pose a major impact to the planning of future Sunny Bay Development.

Summary of Alignment Options Considered

2.6.5.26 A summary of the above options for Southern Section is given below with the recommended option identified for ease of reference.

Table 2.3 Summary of alignment option considered (Southern Section)

Alignment Option	Pros	Cons	Recommended Option (Y/N)
Option FS	• Direct traffic routing between Tai Lam Chung and North Lantau • Sections of roads at Tai Lam Chung in form of tunnel, minimising potential environmental impacts to residential premises at Tai Lam Chung area	• Reclamation at both Tsing Lung Tau and North Lantau sides required for towers of Tsing Lung Bridge • Southern portal and its associated earthwork of Tai Lam Chung Tunnel likely encroach upon Tai Lam Country Park • Realignment of Kap Shui Mun Bridge lower deck entry required for connection from Tsing Lung Bridge to Kap Shui Mun Bridge	N

Alignment Option	Pros	Cons	Recommended Option (Y/N)
		• Conflict with existing MTR substation for connection road from Kap Shui Mun Bridge to Tsing Lung Bridge • Running underneath the TLC Catchwater Tunnel No. 6 at Tai Lam Chung	
Option A1	• Direct traffic routing between Tai Lam Chung and North Lantau • Sections of roads at Tai Lam Chung in form of tunnel, minimising potential environmental impacts to residential premises at Tai Lam Chung area • Avoiding reclamation for tower of Tsing Lung Bridge at North Lantau side • Southern portal of Tai Lam Chung Tunnel shifted southward, hence avoiding encroachment to Tai Lam Country Park • Conflicts with Kap Shui Mun Bridge and MTR substation as in Option FS resolved	• Reclamation at Tsing Lung Tau side slightly increased by 0.8ha as compared to Option FS • Running underneath the TLC Catchwater Tunnel No. 6 at Tai Lam Chung	Y
Option A2	• Similar to Option A1 • Larger separation from the TLC Catchwater Tunnel No. 6 than Option A1	• Similar to Option A1 • Gradient too steep for trunk road	N
Option B1	• Eliminating complicated design and construction interface among Tsing Lung Bridge anchorage, Tuen Mun Road realignment and Tai Lam Chung Tunnel as in Option FS, Option A1 and Option A2, which is considered beneficial from engineering and construction programme points of view • Avoiding reclamation for tower of Tsing Lung Bridge at North Lantau side	• Substantial slope cutting required along north of Tuen Mun Road, natural terrain hazard risks in this area and safety concern on adjacent Tuen Mun Road anticipated to be significant • Lane closure required during construction, hence having major impact to busy traffic along Tuen Mun Road • Potential encroachment upon Tai Lam Country Park towards eastern end of connection with Tuen Mun Road	N

Alignment Option	Pros	Cons	Recommended Option (Y/N)
	• Conflicts with Kap Shui Mun Bridge and MTR substation as in Option FS resolved • Avoiding running underneath the TLC Catchwater Tunnel No. 6	• Longer and less direct route between Tai Lam Chung and Tsing Lung Tau as compared to Option FS, Option A1 and Option A2, leading to longer travel times thus less traffic efficiency • Section at Tai Lam Chung in form of viaduct, leading to potential environmental impacts to residential premises at Tai Lam Chung area	
Option B2	• Similar to Option B1	• Similar to Option B1 • Encroach upon the new Siu Lam Integrated Rehabilitation Services Complex premises, the VTC Maritime Training Institution and Siu Lam Integrated Rehabilitation Services Complex at Hong Fai Road • Close to Siu Lam Psychiatric Centre and Palatial Coast, leading to environmental impacts • Cumulative environmental impacts (e.g. air quality and road traffic noise) with Tuen Mun Road	N
Option C1	• Direct traffic routing between Tai Lam Chung and North Lantau • Sections of roads at Tai Lam Chung in form of tunnel, minimising potential environmental impacts to residential premises at Tai Lam Chung area • Avoiding reclamation for tower of Tsing Lung Bridge at North Lantau side • Southern portal of Tai Lam Chung Tunnel shifted southward, hence avoiding encroachment to Tai Lam Country Park	• Reclamation at Tsing Lung Tau side slightly increased by 0.8ha as compared to Option FS • Encroaching upon the Tai Lam Chung Tsuen, permitted burial ground BURGD16 and the potential development at open area between Tai Lam Chung Tsuen and BURGD16.	N

Alignment Option	Pros	Cons	Recommended Option (Y/N)
	• Conflicts with Kap Shui Mun Bridge and MTR substation as in Option FS resolved • Avoiding running underneath the TLC Catchwater Tunnel No. 6		
Option C2	• Direct traffic routing between Tai Lam Chung and North Lantau • Sections of roads at Tai Lam Chung in form of tunnel, minimising potential environmental impacts to residential premises at Tai Lam Chung area • Avoiding reclamation for tower of Tsing Lung Bridge at North Lantau side • Southern portal of Tai Lam Chung Tunnel shifted southward, hence avoiding encroachment to Tai Lam Country Park • Conflicts with Kap Shui Mun Bridge and MTR substation as in Option FS resolved • Avoiding running underneath the TLC Catchwater Tunnel No. 6	• Reclamation at Tsing Lung Tau side slightly increased by 0.8ha as compared to Option FS • Encroaching upon the CSD's Tai Lam Correctional Institution • Close interface with WSD's Water Tunnel No. 4 • Unfavourable highway design in terms of road gradient	N
Option D	• Subsea tunnel imposing no constraint to marine navigation during the operational stage • Avoiding encroachment upon Tai Lam Country Park • Conflicts with Kap Shui Mun Bridge and MTR substation as in Option FS resolved	• Substantial reclamations required on both sides of the sub-sea tunnel for daylighting • Unfavourable highway design in terms of road gradients and connection • Long and steep ramps required leading to longer travel times and less traffic efficiency • Considerable amount of dredged materials generated from sub-sea tunnel construction • Marine navigation seriously affected by immersed tube tunnel (IMT) construction	N

Alignment Option	Pros	Cons	Recommended Option (Y/N)
		• Potential water quality impact from IMT construction • Sections of road at Tai Lam Chung in form of viaduct, leading to potential environmental impacts to residential premises at Tai Lam Chung area • Conflict with the planning of future Sunny Bay Development	

2.7 Project Details

2.7.1 Recommended Alignment for the Project

2.7.1.1 As per discussion in **Section 2.6** above, the recommended alignment with key elements for the Project is summarised as follows. Further development and refinement on the recommended alignment (see **Section 2.7.2**). The recommended alignment with refinements for draft gazette purpose is shown in detail in **Figures 2.2a to h**. For Project Road Extent adopted in this EIA, please refer to **Section 3** to **Section 12**.

Table 2.4 Summary of Recommended Alignment for the Project

Section	Option Adopted	Descriptions of Key Elements
Northern Section (Lam Tei to So Kwun Wat)	Option LT2	• Lam Tei Quarry Interchange, which comprises slip roads and viaducts, connecting the proposed Lam Tei Tunnel and the planned TMB (under separate project) to Kong Sham Western Highway and Yuen Long Highway • Lam Tei Tunnel, which is an approximately 4.2 km long dual 3-lane carriageway tunnel, connecting the proposed Lam Tei Quarry Interchange and So Kwun Wat Interchange
Central Section (So Kwun Wat to Tai Lam Chung)	Option SL1	• So Kwun Wat Interchange, which comprises slip roads and viaducts, connecting the proposed Lam Tei Tunnel, So Kwun Wat Link Road and the Tai Lam Chung Tunnel • So Kwun Wat Link Road, which comprises an approximately 2.0 km long dual 2-lane carriageway tunnel and associated slip roads and viaducts, connecting to Tuen Mun Road and So Kwun Wat Road, and the proposed So Kwun Wat Interchange
Southern Section (Tai Lam Chung to North Lantau)	Option A1	• Tai Lam Chung Tunnel (South Section), which is an approximately 1.7 km long dual 4-lane carriageway tunnel, a viaduct crossing Tai Lam Chung River and another tunnel (i.e. Tai Lam

Section	Option Adopted	Descriptions of Key Elements
		Chung Tunnel (North Section)) to the west of Tai Lam Chung River, which is an approximately 0.4 km long dual 4-lane carriageway tunnel, connecting the proposed So Kwun Wat Interchange and Tsing Lung Tau Interchange • Tsing Lung Tau Interchange, which comprises slip roads, viaducts and tunnel, connecting the proposed Tai Lam Chung Tunnel and Tsing Lung Bridge to Tuen Mun Road • Re-alignment of an approximately 1.4 km long section of Tuen Mun Road at Tsing Lung Tau • Widening of Tai Lam Chung Road of approximately 0.4km long • Tsing Lung Bridge, which is an approximately 1.9 km long dual 4-lane carriageway suspension bridge, crossing over the Ha Pang Fairway and connecting the proposed Tsing Lung Tau Interchange and North Lantau Interchange, with reclamation of approximately 2.2 ha for construction of bridge tower at Tsing Lung Tau • North Lantau Interchange, which comprises slip roads, viaducts and tunnels, connecting Tsing Lung Bridge to North Lantau Highway, Lantau Link, the proposed TYLL (under separate project), the proposed HKIW-NEL Link (under separate project), and the proposed Road P1 (under separate project)

2.7.2 Works Areas(s) / Site(s) and Their Locations

2.7.2.1 In the context of the EIA study, works areas/sites were defined according to the nature of their uses during the construction of the Project. Works site(s) refer to the area(s) for temporary construction activities that would involve construction works on site (e.g. site formation, foundation works, excavation, and construction of viaducts and tunnels), while works area(s) refer to areas for the provision of site office and storage of materials, etc. in supporting the construction of the Project. For areas beyond works sites and works area(s) but within project boundary, there would be transient and localised activities such as temporary traffic management scheme, which would not cause any significant environmental impacts with implementation of good site practice and control measures, such as Recommended Pollution Control Clauses promulgated by EPD. The locations of works sites/areas are shown in **Figure 2.5**. These works area would be reinstated and handed over upon completion of the project in 2033 tentatively.

2.7.2.2 Construction haul roads outside Tai Lam Country Park are required for construction vehicles to transport construction materials and personnels to works sites when there is no direct connection to public road. The alignment of construction haul road can be adjusted on-site to minimise the impact on trees during the design stage, and impact on surrounding environment by maintaining separation distances from sensitive receivers and implementing good site control

measures. Special attention will be made to construction site runoff during or after rainstorm events. Proper implementation of measures is described in **Section 5**. The construction haul road shall be reinstated upon project completion.

2.8 Further Refinements and Optimisations of the Recommended Alignment

2.8.1.1 Further to the alignment option recommended above, further development and refinement in finer aspects of the alignment have been made to achieve better engineering and environmental performance, as described in the paragraphs below.

2.8.2 Finer-level Detail – Minimizing Slope Cut with Refinement of Alignment at So Kwun Wat Area

2.8.2.1 The recommended alignment has been further refined with an aim to minimise cutting at the hill area at So Kwun Wat area. The original scheme in the recommended Option SL1 would be aligned to pass across the hill area and would require considerable cutting of the hill. In order to minimise slope cutting, the alignment has been refined to route round the hill area instead of across the hill area, together with raised road levels. With this refinement, the volume of cut in So Kwun Wat Interchange and So Kwun Wat - Siu Lam Open Road Section will be significantly reduced from an approximately 1.8 Mm^3 in the original scheme to an approximately 0.8 Mm^3 in the refined scheme (see **Figure 2.3**).

2.8.2.2 The reduced slope cutting will bring about environmental benefits of reduced impacts in terms of landscape resources and characters, and reduced number of the trees affected. This will also reduce the amount of spoil arising from the slope cutting, i.e. the amount of construction waste generated. From engineering perspective, the reduced extent of slope cutting will also bring about benefits of construction cost and construction time saving for this section of road.

2.8.3 Finer-level Detail – Minimizing Slope Cut for the Connection of So Kwun Wat Link Road with So Kwun Wat Road

2.8.3.1 In the development of the local connection of So Kwun Wat Link Road with So Kwun Wat Road, alternative options as to whether the slip road for this local connection up-ramp from So Kwun Wat Road to So Kwun Wat Link Road will cross the So Kwun Wat Link Road mainline from above or below have been considered.

2.8.3.2 For the option that the up-ramp slip road from So Kwun Wat Road to So Kwun Wat Link Road to cross below So Kwun Wat Link Road mainline, the road gradient will be about 3 to 4 % which is more beneficial for traffic operation. However, substantial slope cutting will be required for accommodating this slip road. An alternative option is to provide this up-ramp slip road to cross above So Kwun Wat Link Road mainline. In this case, the road gradient will be increased up to about 8% which is comparatively much steeper thus less preferable in terms of traffic operation. However, it will be able to save a certain amount of slope cutting, from approximately 0.24 Mm^3 in the “below-ramp” option to approximately 0.22 Mm^3 in this “above-ramp” option.

2.8.3.3 Considering the relatively short length for this slip road and the reduction of slope cutting, it is considered prudent to provide this up-ramp slip road to cross above So Kwun Wat Link Road mainline.

2.8.4 Finer-level Detail – Minimising Impact to Fung Shui Woods near So Kwun Wat Interchange

2.8.4.1 The preferred alignment identified in the feasibility stage (Option FS(SL)) will intersect with the Fung Shui Woodland, resulting in a potential impact on approximately 0.95 ha of the woodland.

2.8.4.2 After the feasibility stage, the alignment was further investigated and developed with alternative options, as discussed in **Section 2.6.4**. The recommended alignment was subsequently revised with the aim of reducing its potential impact on the Fung Shui Woodland.

2.8.4.3 Under the revised recommended alignment (Option SL1), a section of approximately 50 m long dual 4-lane mainline of the Project at So Kwun Wat area will cross about 0.25 ha of Fung Shui Woodland near So Kwun Wat area. The impact to the Fung Shui Woodland is reduced. In addition, to avoid direct impact on the Fung Shui Woodland, the Project will adopt viaduct design to overpass the woodland area. The viaduct will be designed to avoid columns within the Fung Shui Woodland, and the alignment will be designed to maximise the road gradient and headroom clearance to minimise impact on the woodland.

2.8.4.4 To further minimise impact on the Fung Shui Woodland, further mitigation measure will be adopted. The two bounds of the mainline will be designed as separate viaduct structures with a gap of 7m wide in between, so as to allow sunlight reaching the woodland. The 7m gap has been optimised for allowing sunlight to reach beneath the viaduct with minimum footprint over the Fung Shui Woodland. With the separate viaducts decks of the north-south running mainline of the Project, it is anticipated that sunlight can reach the trees underneath the decks at different times of the day for the tree health (see **Figure 2.4**).

2.8.5 Ventilation Buildings and Administration Buildings

2.8.5.1 There will be 4 nos. of tunnel sections under the Project, namely, (i) the approximately 4.2 km long dual 3-lane LTT, (ii) the approximately 2.0 km long dual 2-lane carriageway SKWLR, (iii) the approximately 0.4 km long dual 4-lane TLCT (North Section), and (iv) the approximately 1.7 km long dual 4-lane TLCT (South Section).

2.8.5.2 Considering the length and size of these tunnels, it is considered that ventilation buildings are required at both ends of LTT, SKWLR, and TLCT (South Section) for normal tunnel ventilation. Regarding the TLCT (North Section), considering its short length of approximately 0.4 km only, ventilation building is not required for normal tunnel ventilation but it is provided for smoke extraction in case of fire incident, which will be located at the western side only. All ventilation buildings will be located at the tunnel portal locations, except that at the southern end of TLCT (South Section), the ventilation building will be located off the eastern area of the tunnel portal in view of availability of space. The locations of the ventilation buildings can be referred to **Figures 2.2a to g**. The tentative heights of the proposed ventilation buildings are summarised in **Table 2.5**.

Table 2.5 Summary of Tentative Height of the Proposed Ventilation Buildings

Tunnel Section	Ventilation Buildings	Tentative Height [1]
LTT	Ventilation building at north portal	Approximately 24m
	Ventilation building at south portal	Approximately 24m

Tunnel Section	Ventilation Buildings	Tentative Height [1]
SKWLR	Ventilation building at east portal	Approximately 24m
	Ventilation building at west portal	Approximately 24m
TLCT (North Section)	Ventilation building at west portal	Approximately 24m
TLCT (South Section)	Ventilation building at north portal	Approximately 24m
	Ventilation building at south of Tuen Mun Road	Approximately 24m

Note:

[1] Roof level refers to the approximate main roof finish floor level, excluding any M&E plant, lift shaft structure, ancillary features, water tanks, etc. above the main roof.

2.8.5.3 In addition to the aforesaid ventilation buildings, administration buildings and areas will be provided to facilitate the management, operation and maintenance of the Project. 2 primary administration areas will be provided, which will be located at Lam Tei Quarry and Ng Kwu Leng of North Lantau respectively. Apart from the administration buildings, other operation and maintenance facilities such as maintenance depot, workshops and stores, maintenance and recovery vehicle fleet parking areas, etc. will be provided at the administration areas. A recovery area will be provided at Tai Lam Chung, with areas for recovery vehicle fleet parking and satellite control building.

2.9 Construction Methodologies

2.9.1 Overview

2.9.1.1 The key construction elements of the Project comprise tunnels, a cable-supported bridge of TLB, reclamation for the northern tower of TLB, viaducts, at-grade roads and buildings, see **Figure 2.6a** to **Figure 2.6f**. This section describes the planning of the construction of the Project, covering the key aspects including the envisaged methods and the sequence of works of key construction elements.

2.9.2 Construction Methodology for Tunnels

2.9.2.1 Based on the available geological information, it is suggested that tunnel excavation will generally occur in good quality granite rock masses. Common excavation methods include drill and blast, tunnel boring machine (TBM), and other mechanical methods such as drill and break. The choice of tunnel construction method is largely determined by local constraints and the proximity of sensitive receivers.

2.9.2.2 LTT, SKWLR and TLCT are located at deep level (the road levels at about +30 to 60mPD) under the Tai Lam hill area (the hilltop along the LTT and SKWLR up to +350mPD) and Tai Lam Chung hill area (the hilltop along TLCT up to +250mPD). The tunnels are generally aligned away from sensitive receivers, except that the LTT near the southern portal is located at about 115m from the western portal of the bat inhabiting TLC Catchwater Tunnel No. 8, the SKWLR near the eastern portal is located at about 20m above the TLC Water Supply Tunnel No. 1 and the TLCT (South Section) near the western portal is located at about 20m below the bat inhabiting TLC Catchwater Tunnel No. 6.

2.9.2.3 The primary method of construction for the tunnels is expected to be by drill and blast method which utilises controlled blasting to excavate medium to hard rock. 3 temporary magazine sites in Lam Tei, Pillar Point and Siu Lam are proposed to

provide sufficient storage capacity of explosives to suit the cycle time of the blasting works.

2.9.2.4 Compared with mechanical breaking by rock breaker / excavator, the drill and blast method is more effective which can significantly shorten the construction period for the tunnel excavation. The shortened construction period is not only financially beneficial but also fast-track the commissioning of the Project and shorten the duration of the associated construction impacts. For the tunnel sections near the water tunnels, detailed blasting assessment with comprehensive monitoring to control the charge rate will be carried out to ensure no adverse impact to the water tunnels as well as the bat habitat inside the water tunnels. Bat monitoring surveys (e.g. acoustics survey, emergence survey, and bat roost survey) and ground-borne vibration monitoring are proposed during the pre-blasting, blasting, post-blasting and operational phases, along with the adaptive review on the tunnelling methods and blasting / charge rate to ensure no adverse impacts to the bats and their roosting tunnels (see details in **Section 9**).

2.9.2.5 In particular for the TLCT (South Section), which is a dual 4-lane tunnel, with bifurcation on the southern section to become two tunnels of three lanes and two lanes respectively on the southbound. Cavern construction method would be adopted.

2.9.2.6 Alternative method using tunnel boring machine (TBM) has also been considered for construction of the tunnels. However, TBMs of the size required for dual 3-lane or dual 4-lane tunnels for hard rock ground condition are not currently available in the market.

2.9.3 Construction Methodology for Reclamation

2.9.3.1 For protection to the tower of TLB from ship impact, a reclamation of approx. 2.2ha at Tsing Lung Tau from the shore is required. A seawall is required as a retaining structure of the proposed reclamation and as an armouring structure to protect the reclamation shoreline from erosion against wave and current actions. Fully-dredged seawall is widely adopted in Hong Kong in the past as the preferred seawall form for reclamation projects. It involves removal of soft marine clay below the existing seabed for forming the seawall base so as to ensure the stability of the seawall and minimise the settlement of seawall. A fully-dredged trench will be required to form and be filled with sand and/or rockfill, follow by laying a seawall core and armour stones on the sloping seawall surface.

2.9.3.2 Based on the ground investigation (GI) results, the marine deposit is approximately 3 to 4m thick locally within the reclamation area. It is not effective to adopt deep cement mixing or stone column for strengthening the seabed. In view of the limited dredging amount of about 30,000m^3, it is proposed to adopt fully-dredged method. Instead of dumping the dredged marine deposit to open sea or designated area, the dredged marine deposit will be backfilled to a mud pit formed within the reclamation area. After filling the reclamation area, surcharge with band drain will be installed for consolidation of the reclamation ground.

2.9.4 Construction Methodology for Tsing Lung Bridge

2.9.4.1 TLB would be designed as a cable suspension bridge linking between Tsing Lung Tau and Ng Kwu Leng across the Ha Pang Fairway. The key construction elements of TLB comprise the foundations, towers, anchorages, suspension cables, and the bridge deck.

2.9.4.2 The towers are generally supported by large diameter bored pile foundations. For the northern tower foundation, consideration is also given to caisson type foundation similar to the tower foundation of Tsing Ma Bridge. The advantages of caisson are that pile cap is not required, faster construction, less noise and reduced vibrations. However, the selection of caisson foundation depends on the ground conditions.

2.9.4.3 For the towers, the construction method will depend on whether it is designed to be made of steel or reinforced concrete. Selection of the construction materials for the towers is subject to various factors including construction time, cost, long-term durability and maintenance requirements. For steel tower, it will be segmental pre-fabricated off-site and erected on-site. For concrete tower, it will be cast-insitu using jump form or slip form construction method.

2.9.4.4 The anchorages for the suspension cables will be located at the landing points on both sides of the bridge. A gravity type of anchorage, which involves a large concrete mass underground, is commonly adopted and proposed for TLB. Pre-excavation to the ground is required for accommodating the anchorage. It is expected that a large amount of concrete would be required for constructing the anchorage and the towers if they are designed to be made of concrete. It is envisaged that the contractor would setup their own concrete batching plant in the works area to facilitate construction.

2.9.4.5 Upon completion of towers and anchorages, the suspension cables will be installed, followed by installation of suspenders and erection of bridge deck. The bridge deck will be made of steel, segmental pre-fabricated off-site and transported to the site by barge for lifting and installation. During the installation of the deck segments, appropriate temporary arrangements for marine navigation will be implemented.

2.9.5 Construction Methodology for Viaducts

2.9.5.1 Viaducts will be adopted for the mainline at So Kwun Wat and Tai Lam Chung River, as well as for some of the slip roads in the interchanges. Generally, precast concrete segmental viaduct construction method would be adopted as far as possible to minimise cast-in-situ on-site. Under this method, the deck will be formed from precast concrete segments which will be manufactured at the casting yard offsite and stitched together at their final positions onsite. This method will minimise the quantities of C&D materials, and also minimise the extent and duration of construction activities required on-site.

2.9.5.2 On the other hand, consideration is also given to the site constraints in terms of accessibility for delivery of the precast deck segments. Where space is limited for access, cast-insitu using formwork and falsework would be adopted an alternative option.

2.9.6 Construction Methodology for Rock Cuttings

2.9.6.1 The rock hill at the north and southwest edges of Lam Tei Quarry will be cut to form at-grade roads and tunnel portals respectively for the Project. Construction of the proposed Tsing Lung Bridge anchorages at Tsing Lung Tau and North Lantau involve excavating rock in a large quantity. Rock cutting is also required for the site formation work for proposed at-grade roads and proposed administration area at North Lantau.

2.9.6.2 It is proposed to adopt open blasting for the above rock cuttings in view of cost and time of the Project. The selected locations for open blasting are predominately in low population density areas. Additional blasting screens, blast cages and blast mats will be provided alongside a well-designed surface blast design to control the effects of flyrock.

2.9.7 Construction Methodology for Buildings

2.9.7.1 Administration buildings for the Project are proposed to be located at the administration areas at Lam Tei Quarry and Ng Kwu Leng. Ventilation buildings will typically be situated at the portal locations, except that the ventilation building at the south portal of Tai Lam Chung Tunnel (South Section) will be located slightly off the portal due to space limitation and avoidance of construction inside the country park. Underground adits will be constructed to link up the ventilation ducts from the tunnel to the ventilation system in the building.

2.9.7.2 The buildings will be typically designed as reinforced concrete structure and constructed by cast-in-situ method using formwork and falsework. Subject to the ground conditions, bored piles or raft footing foundation is envisaged.

2.9.8 Construction Methodology for Explosive Magazines

2.9.8.1 Two above ground explosive magazines are proposed at Pillar Point and Siu Lam. The magazines will follow the requirements of relevant government departments, including Mines Division of CEDD, Hong Kong Police Force, Fire Services Department and EMSD for safe operation of the explosive magazine stores. The Project will adopt brick built mounded store as it is regarded as the highest blast protection for a surface-built magazine.

2.9.8.2 An underground explosive magazine is proposed at Lam Tei Quarry. The provision of the underground magazine is similar to the above ground magazine, with addition measures for management of the underground magazine. Accidental detonation will be protected by the having the fenced storage niches out of line of sight of each other. Blast protection and blasting gate will be located at the adit entrance to dissipate any remaining blast energy. A rock cover of at least 14m is maintained except for the magazine entrance/exit. The adit and niches will be constructed by drill and blast method, with detonators and explosives delivered by Mines Division and used on the day of delivery.

2.10 Tackling Environmental Challenges

2.10.1.1 Due consideration has been given in formulating the design of the Project to overcome environmental challenges encountered. The hierarchy of “Avoidance, Minimization and Mitigation” has been adopted during the process to protect the environment as much as practicable. A summary of key actions adopted to tackle all the environmental challenges are summarized below and discussed in the following sections:

- Avoidance of aboveground works within Tai Lam Country Park and water gathering grounds;
- Avoidance of direct impacts to the butterfly overwintering ground at Siu Lang Shui;

- Avoidance of direct impacts to eastern patch of Ching Uk Tsuen Fung Shui Woodland (Fung Shui Woodland at So Kwun Wat);
- Minimization of disturbance to bat habitats;
- Avoidance of direct impacts on SAI graded buildings and potential marine archaeology;
- Avoidance of reclamation near To Kau Wan in North Lantau;
- Minimization of reclamation and dredging extents for the reclamation in Tsing Lung Tau;
- Confinement of filling works within seawall for the reclamation in Tsing Lung Tau; and
- Minimization of slope cutting.

2.10.2 Avoidance of Aboveground Works within Tai Lam Country Park and Water Gathering Grounds

2.10.2.1 As discussed in **Section 2.2.1**, the Project would need to provide connectivity between NWNT and North Lantau to meet future traffic demands. This Project alignment would inevitably go through Tai Lam Country Park, which is a Recognised Site of Conservation Importance with high ecological value, for direct access from NWNT to North Lantau. In order to conserve this ecologically important country park, the design has been cautiously refined to ensure that the Project alignment would take the form as tunnels through this country park and there are no aboveground works within this country park. By adopting this approach, it would avoid any ecological impacts on Tai Lam Country Park as much as practicable.

2.10.2.2 By adopting this approach and suitable engineering design during tunnelling, it would also avoid any adverse impacts on the water gathering ground in the vicinity of Tai Lam Chung Reservoir.

2.10.3 Avoidance of Direct Impacts to the Butterfly Overwintering Ground at Siu Lang Shui

2.10.3.1 The Project alignment would be more than 5 km from the butterfly overwintering ground at Siu Lang Shui in Tuen Mun and hence would have insignificant impacts on this butterfly habitat. However, as explained in **Section 2.5.2**, a total of 3 temporary magazine sites would be required for the storage of explosive, and one of the magazine sites is located near Pillar Point. This temporary magazine site would not encroach into the overwintering ground at Siu Lang Shui and has maintained a separation distance of about 700m.

2.10.3.2 Besides, the site for this magazine site near Pillar Point had been partially formed by other previous projects and hence the additional engineering works required to develop the existing site to a magazine site would be relatively minor. Hence, any indirect impacts on the butterfly overwintering ground during the construction of the Project would be insignificant. More discussion on the ecological impacts on the butterfly overwintering ground is given in **Section 9**.

2.10.4 Minimization of Direct Impacts to Eastern Patch of Ching Uk Tsuen Fung Shui Woodland (Fung Shui Woodland near So Kwun Wat)

2.10.4.1 The preliminary alignment scheme adopted in the previous feasibility study and presented in the Project Profile (PP-637/2022) would run across a Fung Shui Woodland near So Kwun Wat area. An ecological survey and a tree survey have been conducted as part of this EIA to establish better and more updated baseline information relating to this Fung Shui Woodland. Survey results indicate that this Fung Shui Woodland is dominated by *Ixonanthes reticulata*, which is identified as a Tree of Particular Interest and species of conservation importance.

2.10.4.2 As mentioned in **Section 2.8.4**, the alignment has been adjusted with the following improvement measures to minimise the impact to the Fung Shui Woodland:

(i) Alternative alignment is adopted to minimise the overlapping area with the Fung Shui Woodland (the overlapping area is largely reduced from 0.95 ha under the previous feasibility study alignment to 0.25 ha under the current proposed alignment);

(ii) The gradient of the alignment is maximised to 4% (desirable maximum in accordance with Transport Department's Transport Planning and Design Manual) in order to raise the alignment to increase headroom clearance as much as possible over the area that overlaps with the Fung Shui Woodland;

(iii) Elevated viaduct is adopted to span over the Fung Shui Woodland to avoid direct impact to the woodland;

(iv) The supporting columns of the viaduct will be positioned to avoid the Fung Shui Woodland; and

(v) The northbound and southbound viaduct structures above the Fung Shui Woodland is split to allow for a local separation of about 7m. As the local section above the Fung Shui Woodland is in a north-south orientation, the provision of a 7m separation would maximize the time for sunlight to penetrate through the separation and reach into the Fung Shui Woodland underneath.

2.10.4.3 More discussion on the ecological impacts on Fung Shui Woodland is given in **Section 9**.

2.10.5 Minimization of Disturbance to Bat Habitat

2.10.5.1 The LTT, SKWLR and TLCT will pass close to the Water Supplies Department (WSD) catchwater tunnels, which are the bat habitats. The two closest catchwater tunnels are TLC Catchwater Tunnel No. 6 and Catchwater Tunnel No. 8, which the Project alignment will pass directly underneath with separation of 20m and at a distance of 115m away from tunnel portal respectively.

2.10.5.2 The Project alignment has maximized the separation distances from these water tunnels, and adjusted the tunnelling methodology (e.g. review of charge weight of blasting, explore alternative construction method, etc.) for the section in close vicinity of the water tunnels with bat habitats. More discussion on the ecological impacts on the bat habitat is given in **Section 9**.

2.10.6 Avoidance of Direct Impacts to Sites of Archaeological Interest (SAIs), Graded Buildings and Potential Marine Archaeology

2.10.6.1 A baseline study has been conducted to identify all the SAIs and Graded Buildings in the vicinity of the Project alignment and the associated temporary works areas. The SAIs in the vicinity include Fu Tei Ha SAI, So Kwun Wat Perowne Barrick SAI, So Kwun Wat SAI, Siu Lam SAI and Tai Lam SAI. Most of the Project alignment and the associated temporary works areas would totally avoid these SAIs except for a short viaduct section of around 15m long which would run across the So Kwun Wat Perowne Barrick SAI. In order to avoid impacts on this SAI, the design of this viaduct section and temporary works areas has been proactively adjusted to ensure that there will be no temporary works areas within that SAI and the viaduct sections would only span over that SAI instead of running at-grade. By adopting this design adjustments, all SAIs would be totally avoided.

2.10.6.2 The Project alignment and temporary works areas would avoid all Graded Buildings as well. More discussion on the cultural heritage impacts on SAIs and Graded Buildings is given in **Section 12**.

2.10.6.3 In addition, marine diver survey will be conducted to investigate the archaeological potential seabed anomalies identified for geophysical survey. The marine ground investigation works would be arranged to avoid all the anomalies by allowing sufficient setback distance (around 50m) from the anomalies, in case the archaeological values of the anomalies are not confirmed by marine diver survey and agreed with AMO.

2.10.7 Avoidance of Reclamation at To Kau Wan in North Lantau

2.10.7.1 The preferred alignment scheme recommended in the previous feasibility study and presented in the Project Profile (PP-637/2022) has included possible reclamation locations on both Tsing Lung Tau and To Kau Wan. After the issue of EIA Study Brief (ESB-352/2022), the project team has collated further engineering information and conducted further studies to optimize the Project alignment and engineering design. While the marine waters in the vicinity of Tsing Lung Tau and To Kau Wan are not important habitats for Chinese While Dolphins, it is still considered prudent to avoid and minimize the extent of reclamation for various reasons such as minimizing seabed loss.

2.10.7.2 As explained in **Section 2.6.5** (Option A1 refers), the reclamation in To Kau Wan could be totally avoided by adjustment of the alignment and setback of the tower of the suspension bridge. However, the reclamation in Tsing Lung Tau would still be inevitable due to local constraints (e.g. Tuen Mun Road, existing buildings, etc.) which prohibit further setback of the bridge tower.

2.10.8 Minimization of Reclamation and Dredging Extents for the Reclamation in Tsing Lung Tau

2.10.8.1 As explained in **Section 2.6.5** (Option A1 refers), a small reclamation in Tsing Lung Tau is still inevitable. Hence, the engineering design has taken a proactive approach to minimize the extent of dredging as far as practicable so as to minimize the associated water quality impacts and impacts on marine ecology.

2.10.8.2 In addition to considering different reclamation methods, the design of the northern anchor has also been meticulously considered. The preliminary design presented in the Project Profile stated that the reclamation area above sea level would be

approximately 2.7ha, however after scrutinising multiple aspects including engineering and environmental technicalities, the latest proposed design has reduced the reclamation extent by approximately 0.5ha (i.e. from 2.7ha to 2.2ha). This reduction has reduced the total amount of dredged sediments, hence reducing the associated water quality impacts during the construction phase. This would also mean that the extent of channel narrowing is reduced, thereby reducing the change in hydrodynamic regime for the operational phase.

2.10.9 Confinement of Filling Works Within the Seawall

2.10.9.1 Considering that reclamation works are unavoidable at Tsing Lung Tau, to minimise the potential water quality impacts caused by the reclamation works, non-dredge reclamation methods such as deep cement mixing (DCM) have been explored but were found to be ineffective due to shallow depth of marine deposit. However, upon considering all aspects including engineering feasibilities, geological conditions, and environmental impacts, etc., according to the latest GI results, dredging would be required to remove the soft marine sediments to support the construction of the seawall. Additionally, filling works will only commence upon the full completion of the perimeter seawall and will only be conducted within the seawall to prevent any fill materials and fine suspended solids from being discharged into the open sea. Nonetheless, the dredging works would inevitably generate suspended solids from the disturbed sediment. Hence, quantitative water quality modelling would be conducted to assess the impacts induced by the dredging works. The assessment results are given in **Section 5**.

2.10.10 Minimization of Slope Cutting

2.10.10.1 The alignment of the Project will need to pass through various hilly terrains along the route from North Lantau through Tsing Lung Tau, Tai Lam Chung, So Kwun Wat to Lam Tei. In the design for the Project, measures have been adopted to minimise slope cutting, with an aim to (i) minimise disruption and impacts to the landscape resources and characters, (ii) minimise the number of trees impacted, (iii) minimise potential impacts to the natural habitats and the associated ecology, and (iv) minimise the amount of excavation spoil and construction waste generated.

2.10.10.2 Along the whole route, tunnel form has been adopted at various locations where appropriate, including LTT, SKWLR, and TLCT, instead of adopting open highway which requires slope cutting, when passing through most of the hilly terrains. At some other locations, the road sections would need to be in the form of open highway instead of tunnel, as tunnel form was not suitable at those locations, for example, at a road interchange area or where the ground cover may be too shallow or inadequate to form a tunnel. At those locations, refinement in the highway design of the alignment and road profile has been made, so as to minimise the intrusion into the hill area, i.e. minimise the slope cutting required. One of these locations is the Ng Kwu Leng area, at which the landing point at North Lantau for TLB alignment has been shifted westward to avoid the spur and crest of the hill, hence minimising the extent of slope cutting required at Ng Kwu Leng. (see also **Section 2.6.5**). Another location is at the hill area at So Kwun Wat / Tai Lam Chung area, at which the alignment has been refined to route round the hill area instead of across the hill area, together with raised road levels, to reduce the slope cutting required (see also **Section 2.8.2**). A further location is at the local connection of So Kwun Wat Link Road with So Kwun Wat Road, in which the layout of interchange and the arrangement of the connecting roads have been

selected with consideration of practicably minimising the slope cutting as one of the main considerations (see also **Section 2.8.3**).

2.11 Implementation Programme

2.11.1.1 The construction phase of the Project, including reclamation works, site formation for TLB anchorages, tunnelling, roads and viaducts construction, road realignment of Tuen Mun Road, ventilation buildings and administration buildings construction, and TLB construction, will be tentatively commenced in 2026 Q1 and completed in 2033 Q4. The tentative phasing of major construction works are outlined in **Table 2.6** and **Appendix 2.1**.

2.11.1.2 Sequence of works will be further reviewed during detailed design stage and construction stage. Liaison with nearby concurrent projects (e.g. TMB, TYLL, Road P1, Underground Quarrying at Lam Tei, etc.) will be conducted to minimize potential cumulative environmental impacts.

Table 2.6 Summary of the Key Construction Works for the Project

Description	Tentative Construction Programme
Reclamation at Tsing Lung Tau	Q1 2026 to Q1 2028
Site formation for anchorages of Tsing Lung Bridge	Q1 2026 to Q1 2028
Construction of explosive magazines	Q1 2026 to Q1 2028
Construction of tunnels, viaducts and interchanges	Q1 2028 to Q4 2033
Road realignment of Tuen Mun Road	Q1 2028 to Q4 2033
Construction of Tsing Lung Bridge	Q1 2028 to Q4 2033
Construction of ventilation buildings and administration buildings	Q1 2031 to Q4 2033

2.12 Concurrent Projects

2.12.1.1 In order to assess the cumulative impacts, a review of best available information at the time of preparing this EIA report to identify a number of other concurrent projects in the vicinity that are undergoing planning, design, construction and/or operation within the construction and/or operation period of the Project has been conducted and a list of the tentative concurrent projects identified at the time of this EIA study is summarised in **Table 2.7** below, and shown in **Figure 2.7**.

2.12.1.2 Various cumulative impacts for different concurrent projects have been identified and detailed justification on consideration of various cumulative environmental impacts from individual concurrent project has been included in the corresponding technical assessment sections of this EIA report.

Table 2.7 Summary of Potential Concurrent Projects

Concurrent Project	Description	Tentative Programme			Assessment of Potential Cumulative Environmental Impact	
		Start	Complete	Reference for Programme	Construction Phase	Operation Phase
Tuen Mun Bypass	A new highway with an approximate length of 7.5km linking the Tuen Mun-Chek Lap Kok Tunnel, Tuen Mun South, Yuen Long Highway and Kong Sham Western Highway	Under Planning (1)	2033	LC Paper No. CB(4)1046/2022(01)	Cumulative impacts were evaluated in this EIA report.	Cumulative impacts were evaluated in this EIA report.
Tsing Yi-Lantau Link	Highway project connecting Tsing Yi and North Lantau	Under Planning (1)	2033	Project Profile of the Concurrent Project [PP-653/2022]	Cumulative impacts were evaluated in this EIA report.	Cumulative impacts were evaluated in this EIA report.
Hong Kong Island West - Northeast Lantau Link	Road project consists of land and subsea tunnels, land and marine viaducts, and at-grade roads	Under Planning (1)	2033	LC Paper No. CB(1)930/2022(01)	Cumulative impacts were evaluated in this EIA report.	Cumulative impacts were evaluated in this EIA report.
Road P1 (Tai Ho – Sunny Bay Section)	Road project consists of land viaducts, land tunnels, at-grade roads and reclamation.	Under Planning (1)	2030	Project Profile of the Concurrent Project [PP-615/2020]	Cumulative impacts were evaluated in this EIA report.	Cumulative impacts were evaluated in this EIA report.

Concurrent Project	Description	Tentative Programme			Assessment of Potential Cumulative Environmental Impact	
		Start	Complete	Reference for Programme	Construction Phase	Operation Phase
Widening of Yuen Long Highway (Section between Lam Tei Quarry and Tong Yan San Tsuen Interchange)	Highway improvement works to increase road capacity	Under Planning (1)	2033	LC Paper No. CB(4)1046/2022(01)	Cumulative impacts were evaluated in this EIA report.	Cumulative impacts were evaluated in this EIA report.
Widening of Castle Peak Road - Castle Peak Bay	Road improvement works to increase road capacity	Commenced	2024	HyD Project Page on Widening of Castle Peak Road - Castle Peak Bay (2)	There is no overlap of construction period. Therefore, cumulative impact during construction phase is not anticipated.	Cumulative impacts were evaluated in this EIA report.
Widening of Fuk Hang Tsuen Road (Between Castle Peak Road – Lam Tei and Fuk Hang Tsuen Lane)	Road improvement works to increase road capacity	Commenced	2025	HyD Project Page on Widening of Fuk Hang Tsuen Road (Between Castle Peak Road – Lam Tei and Fuk Hang Tsuen Lane) (3)	There is no overlap of construction period. Therefore, cumulative impact during construction phase is not anticipated.	Cumulative impacts were evaluated in this EIA report.

Concurrent Project	Description	Tentative Programme			Assessment of Potential Cumulative Environmental Impact	
		Start	Complete	Reference for Programme	Construction Phase	Operation Phase
Ground Investigation Works within Tai Lam Country Park for Route 11 (Section between Yuen Long and North Lantau) (4)	Ground investigation works within Tai Lam Country Park	Commenced	2024	Project Profile of the Concurrent Project [PP-651/2022]	There is no overlap of construction period. Therefore, cumulative impact during construction phase is not anticipated.	Cumulative impacts are not anticipated in view of the nature of the concurrent project.
Underground Quarrying at Lam Tei, Tuen Mun	Development of an underground quarry	2024/25	2025/27	Project Profile of the Concurrent Project [PP-643/2022]	Cumulative impacts were evaluated in this EIA report.	There may be potential cumulative impacts. However, details of the development (including its emission sources) are not available during the preparation of this EIA study for detailed impact assessment.
Hung Shui Kiu / Ha Tsuen New Development Area	A new town development area to meet housing and land supply needs	Commenced	2034	CEDD Project Page on Hung Shui Kiu/Ha Tsuen New Development Area – First Phase Development (Stage 1 Works) and Second Phase	Cumulative impacts were evaluated in this EIA report.	Not anticipated in view of the nature of the concurrent project.

Concurrent Project	Description	Tentative Programme			Assessment of Potential Cumulative Environmental Impact	
		Start	Complete	Reference for Programme	Construction Phase	Operation Phase
				Development (5)		
Development at Lam Tei North East	Land development for housing and economic purposes	Under Planning (1)	Under Planning (1)	Project Profile of the Concurrent Project [PP-642/2022]	There may be potential cumulative impacts. However, details of construction programme and plant inventory is not available during the preparation of this EIA study for detailed impact assessment.	There may be potential cumulative impacts. However, details of the development (including its emission sources) are not available during the preparation of this EIA study for detailed impact assessment.
Cycle Track between Tsuen Wan and Tuen Mun (Tuen Mun to So Kwun Wat Section)	Development of a new cycling track	2023	2026	Approved EIA Report of the Concurrent Project [AEIAR-239/2022]	Cumulative impacts were evaluated in this EIA report.	Not anticipated in view of the nature of the concurrent project.
Cycle Track between Tsuen Wan Bayview Garden and So Kwun Wat (6)	Development of a new cycling track	Under Planning (1) (7)	Under Planning (1) (7)	CEDD Project Page on Cycle Track between Bayview Garden and So Kwun Wat	There may be potential cumulative impacts. However, details of construction programme and plant inventory is not available during the preparation of this EIA study for detailed impact assessment.	Not anticipated in view of the nature of the concurrent project.

Concurrent Project	Description	Tentative Programme			Assessment of Potential Cumulative Environmental Impact	
		Start	Complete	Reference for Programme	Construction Phase	Operation Phase
Proposed Public Housing Developments at Ping Shan South, Yuen Long, Lam Tei North and Nai Wai, Tuen Mun	Development of public housing sites to alleviate territorial housing needs	Under Planning (1) (8)	Under Planning (1) (8)	N.A.	Even the planning status of the public housing sites is yet to be confirmed at the time of assessment (8), cumulative impacts were evaluated in this EIA report as a conservative approach.	Even the planning status of the public housing sites is yet to be confirmed at the time of assessment (8), cumulative impacts were evaluated in this EIA report respectively as a conservative approach.
Public Housing Development near Tan Kwai Tsuen, Yuen Long	Development of public housing sites to alleviate territorial housing needs	Commenced	Under Planning (1)	CEDD Project Page on Site Formation and Infrastructure Works for Public Housing Development near Tan Kwai Tsuen, Yuen Long (8)	The planning status of the public housing site is yet to be confirmed, the induced traffic has been taken into consideration for the impact assessments for air quality and road traffic noise as a conservative approach.	The planning status of the public housing site is yet to be confirmed, the induced traffic has been taken into consideration for the impact assessments for air quality and road traffic noise as a conservative approach.
Developments of Tuen Mun East and Adjacent Green Belt Cluster (5)	Land use planning for potential sites in Tuen Mun East	Under Planning (1)	Under Planning (1)	N.A.	There may be potential cumulative impacts. However, details of construction programme and plant inventory is not available during the preparation of this EIA study for detailed impact assessment.	There may be potential cumulative impacts. However, details of construction programme and plant inventory is not available during the preparation of this EIA study for detailed impact assessment.

Concurrent Project	Description	Tentative Programme			Assessment of Potential Cumulative Environmental Impact	
		Start	Complete	Reference for Programme	Construction Phase	Operation Phase
Relocation of Tuen Mun Water Treatment Works to Caverns (5)	Relocation of a water treatment works to cavern	Under Planning (1)	Under Planning (1)	N.A.	There may be potential cumulative impacts. However, details of construction programme and plant inventory is not available during the preparation of this EIA study for detailed impact assessment.	Not anticipated in view of the nature of the concurrent project.
Sunny Bay Development	Reclamation and infrastructure works	Under Planning (1)	Under Planning (1)	Project Profile of the Concurrent Project [PP-507/2014]	There may be potential cumulative impacts. However, details of construction programme and plant inventory is not available during the preparation of this EIA study for detailed impact assessment.	There may be potential cumulative impacts. However, details of the development (including its emission sources) are not available during the preparation of this EIA study for detailed impact assessment.

Notes:

(1) For concurrent project which is still under study and under planning during the preparation of this EIA study, potential cumulative impact would be further reviewed and addressed in its respective environmental study

(2) https://www.hyd.gov.hk/en/our_projects/road_projects/6853th/index.html

(3) https://www.hyd.gov.hk/en/our_projects/road_projects/6852th/index.html

(4) In view of insignificant environmental cumulative impacts due to the nature of concurrent project, its location is not shown in **Figure 2.7**. Please refer to Project Profile (PP-651/2022).

(5) https://www.cedd.gov.hk/eng/our-projects/major-projects/index-id-90.html

(6) The location of the project is yet to be confirmed at this stage. Therefore, its location is not presented in **Figure 2.7**.

(7) https://www.twtm-cycletrack.hk/en/

(8) The Lam Tei North site is currently zoned as "Green Belt" and "Residential (Group D)", while Nai Wai site is currently zoned as "Residential (Group C)" and "Residential (Group D)" under approved Lam Tei and Yick Yuen Outline Zoning Plan (OZP) No. S/TM-LTYY/12 at the time of assessment.

(9) https://www.cedd.gov.hk/eng/our-projects/major-projects/index-id-134.html

2.13 Collating and Addressing Public Views

2.13.1.1 The Project Proponent has conducted series of consultation activities to collate comments from different stakeholders. These consultation activities include but not limited to the statutory inspection period for the Project Profile and meeting with district councils, green groups, local communities, professional bodies and rural committee. Key concerns received from stakeholders are summarized in **Table 2.8** below.

Table 2.8 Summary of Key Concerns from Public Consultation and Follow Up Action Taken

Key Concerns/ Issues	Follow Up Actions Taken
General	
Support the Project which would help to relieve the existing traffic congestion in Tuen Mun Road	Noted.
Alignment, Footprint, Reclamation and Associated Facilities	
Need to avoid excessive project footprint including but not limited to road corridor, ventilation buildings, associated facilities, slope works etc	• Due considerations have been taken to optimise the at-grade project footprint as much as practicable. Hence, tunnels design has been adopted to minimise the need for at-grade work and avoid at-grade works within Tai Lam Country Park. • The open road sections of the Project have also been optimised to minimise slope cutting extent and impact to Fung Shui Woodland. • If tolling is required, electronic toll collection system would be set up without additional land requirement for toll plaza. • Footprint of the works sites have been optimized. For example, the excavated rock would be used by some existing concrete and asphalt plants and/or for reclamation such that land requirement for stockpiling would be optimized.
Need to consider aesthetic for ventilation buildings and associated facilities to blend in with the surrounding natural setting	• The design of the ventilation buildings and associated facilities have been optimised by striking a practicable balance between aesthetic, functionality, practicality, etc. **Section 11** on LVIA would provide more details on the visual impacts of the project and mitigation measures proposed.
Need to minimise the extent of reclamation and implement necessary eco-features	• The scheme presented in the Project Profile included reclamation on both Tsing Lung Tau and North Lantau. After the issue of EIA Study Brief, this EIA study (including hydrodynamic and water quality impact

Key Concerns/ Issues	Follow Up Actions Taken
	assessment) conclude to avoid the reclamation in North Lantau to minimise water quality and ecological impacts. Ecological enhancement features would be considered on artificial seawall. More description is given in **Section 5** and **Section 9**.
Need for climate resilience measures of the proposed infrastructure against extreme weather conditions	• Oversea studies on climate changes effects were reviewed (e.g. sea level rise, temperature increase and wind speed increase). The effects had been taken into account in the design of Tsing Lung Bridge.
Connection at So Kwun Wat	
Suggest including a local connection at So Kwun Wat and / or implement improvement measures as necessary	• A local connection to So Kwun Wat has been included.
Concurrent Projects and Cumulative Impacts	
Need for a clear demarcation between various Designated Projects including but not limited to Tsing Yi - Lantau Link, Road P1, etc., and their respective cumulative impacts	• Cumulative impacts from concurrent projects listed in **Table 2.7** have been addressed in corresponding technical assessment sections.
Concern on the impacts caused by the Project and its temporary works areas on Tai Lam Country Park (e.g. direct and indirect impacts on areas of conservation importance, hydrological disruption such as groundwater drawdown, etc.)	• Potential groundwater drawdown has been assessed, and mitigation measures and good practices have been addressed in **Section 5**. • Ecological impact assessment in **Section 9** has assessed both direct and indirect impacts. Where necessary, mitigation measures and good design have been incorporated.
Air Quality	
Need to comply with Air Quality Objectives (AQO) at sensitive receivers	• Air quality assessment in **Section 3** has demonstrated that AQO would be complied at all the air sensitive receivers within the assessment area.
Noise	
Compliance with noise criteria as stipulated in EIAO-TM at sensitive receivers	• Road traffic noise assessment in **Section 4** has demonstrated that respective noise criteria at all the noise sensitive receivers within the assessment area.
Illegal Dumping	
Need to properly control illegal dumping of Construction and	• All dump trucks would be installed with GPS for monitoring by the Contractor, resident site staff and Environmental Team

Key Concerns/ Issues	Follow Up Actions Taken
Demolition (C&D) materials, especially in rural countryside	to avoid illegal dumping of C&D materials. More details are given in **Section 6**.
Ecology and Fisheries	
Avoidance of at-grade works in Tai Lam Country Park	• The ecological importance of Tai Lam Country Park is noted and hence all at-grade works would totally avoid this Country Park.
Prevention of animal roadkill	• Boundary fence for at-grade road sections would be erected to avoid animal intrusion. (see **Section 9** for more discussion on ecological impact assessment).
Minimization of glare impact to habitat	• Lighting angle would be properly designed to reduce glare impact while achieving the respective safety requirement. • No light-sensitive species was found from the ecological survey in the vicinity of the road alignment (see **Section 9** for more discussion on ecological impact assessment).
Need to review and minimise any impacts on Chinese White Dolphins and implement any necessary mitigation measures, and any impacts on fisheries and implement any necessary mitigation measures	• As discussed in **Section 2.10.7**, the reclamation in North Lantau has been avoided. According to literature review on historical Chinese While Dolphins monitoring records, there are no sighting near to the small reclamation at Tsing Lung Tau. Besides, no unacceptable adverse impacts to fisheries are anticipated due to the small reclamation at Tsing Lung Tau (see **Section 9 and Section 10** for more discussion on ecological impact assessment and fisheries impact assessment respectively).
Need to consider the potential impacts on the ardeid breeding colony in Ma Wan	• Ma Wan is located at more than 500m from the Project site and hence any impacts on the ardeid breeding colony would be minor (see **Section 9** for more discussion on ecological impact assessment).
Need to consider the ecological importance of North Lantau	• Permanent loss of natural shrubland/grassland in Ng Kwu Leng and those south of North Lantau Highway has been minimized by optimizing the footprint of the Project • The Project has avoided diversion of watercourses in North Lantau

Key Concerns/ Issues	Follow Up Actions Taken
	• The Project has avoided direct impact on fauna species of conservation importance (e.g. Romer's Tree Frog) • Reclamation at To Kau Wan has been eliminated to avoid disruption on the natural coastline of North Lantau. (see **Section 9** for more discussion on ecological impact assessment).