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## 1. INTRODUCTION

### 1.1. Background

- 1.1.1. The 2017 Policy Address announced that the Government would commence a feasibility study on Route 11 (section between Yuen Long and North Lantau) (hereafter referred to as “Route 11”). It is the Government’s target to commission Route 11 not later than 2036 in order to meet the traffic demand arising from the anticipated population growth of multiple large-scale developments proposed in the Northwest New Territories (NWNT), enhance the road network connecting to the Airport and cope with the long-term development of Lantau.
- 1.1.2. As the Government is planning further developments at the upstream of YLH, including the San Tin/ Lok Ma Chau Node and New Territories North Strategic Growth Area. It is more appropriate to review the traffic demand and the need for road improvement of YLH east of TYSTI holistically under the “Strategic Studies on Railways and Major Roads beyond 2030” based on the latest planning data and the final development strategy under the Planning Department’s “Hong Kong 2030+: Towards a Planning Vision and Strategy Transcending 2030” planning study. The TIA for the Project will also review the traffic forecasts and the need for the improvement of YLH east of TYSTI at various stages of the Project.
- 1.1.3. In Year 2022, Highways Department (HyD) has commissioned AECOM Asia Company Limited to carry out Agreement No. CE 17/2022 (HY) and undertake an Environmental Impact Assessment (EIA) for Widening of Yuen Long Highway (section between Lam Tei and Tong Yan San Tsuen).
- 1.1.4. The Project is a Designated Project (DP) under the Environmental Impact Assessment Ordinance (EIAO). A Project Profile (No. PP-647/2022) was submitted to the Environmental Protection Department (EPD) on 6 June 2022 under Environmental Impact Assessment Ordinance (EIAO) and the EIA Study Brief (No. ESB-356/2022) for the Project was issued on 14 July 2022 under the EIAO.
- 1.1.5. The purpose of the EIA Study is to provide information on the nature and extent of environmental impact arising from the construction and operation of the Project and associated works which will take place concurrently. The information will contribute to decisions on:
  - the overall acceptability of any adverse environmental consequences which are likely to arise as a result of the Project;
  - the conditions and requirements for the detailed design, construction, and operation of the Project to mitigate against adverse environmental consequences wherever practicable; and
  - the acceptability of residual impact after the proposed mitigation measures are implemented.

## **1.2. Designated Projects under EIAO**

1.2.1. The Project covers the following DP elements of Schedule 2, Part I under the EIAO (Cap. 499).

Part I, Item A.1 of Schedule 2 of the EIAO – A carriageway for motor vehicles that is an expressway, trunk road, primary distributor road or district distributor road.

- the road widening of road section of Yuen Long Highway which is an expressway; and
- the road widening of a slip road connected from Hung Tin Road (district distributor) southbound to Yuen Long Highway eastbound.

## **1.3. Purpose of the Executive Summary**

1.3.1. This Executive Summary (ES) summarizes the findings, recommendations, and conclusions of the EIA Report for this Project. The ES contains the following information:

- Section 2 presents the purpose and the nature of the Project, consideration of alternative options and construction methods for the Project;
- Section 3 presents the key findings of the environmental impact assessment;
- Section 4 describes the proposed environmental monitoring and audit for the Project; and
- Section 5 presents the conclusions.

## 2. PROJECT DESCRIPTION

### 2.1. Purposes and Objectives of the Project

- 2.1.1. HKSAR Government targets to commission Route 11 (section between Yuen Long and North Lantau) (hereinafter referred to as “Route 11”) not later than 2033 in order to meet the traffic demand arising from the anticipated population growth of multiple large-scale developments proposed in the Northwest New Territories (NWNT).
- 2.1.2. With the commissioning of Route 11, the traffic flows at Yuen Long Highway (YLH) between Lam Tei Quarry (LTQ) and Tong Yan San Tsuen Interchange (TYSTI) are anticipated to exceed the traffic capacities during peak hours.
- 2.1.3. The objective of the Project is to improve the carrying capacity of the section of YLH between LTQ and TYSTI from a dual three-lane to a dual four-lane carriageway so as to complement the commissioning of Route 11 and support future developments in the NWNT.

### 2.2. Proposed Project Design

- 2.2.1. The widening of two sections of YLH, i.e. Lam Tei - Tin Shui Wai West Interchange and Tin Shui Wai West Interchange - Tong Yan San Tsuen Interchange sections, from existing dual-three lane to dual-four lane will increase the road capacity. Overall, the traffic performance will be improved with the widening. Meanwhile, the section of YLH at Tin Shui Wai West Interchange will operate with sufficient capacity in all cases. Therefore, TSWWI section would be maintained 3 lanes. The location plan of the project was shown in **Figure 2.1** and the overall Project includes:

- Widening of an approximately 1000-metre-long at-grade road section (with 20m long x 8m wide bridge deck at Shui Fu Road) of YLH between Lam Tei Quarry Interchange (LTQI) and Tin Shui Wai West Interchange (TSWWI) (the road levels at about +24 to +37 mPD) from existing dual-three lane to dual-four lane (additional 7.3m width carriageway) at eastbound and one side of the existing YLH supported by slope works, and existing central divider will be adjusted toward south between LTQI and future Ping Shan South Housing Development (PSS), and toward north between PSS and TSWWI (see **Figure 2.2a – 2.2c**);
- Widening of an approximately 600-metre-long at-grade road section of YLH between Tin Shui Wai West Interchange and Tong Yan San Tsuen Interchange (the road levels at about +14 to +19 mPD) from existing dual-three lane to dual-four lane (additional 7.3m width carriageway) at westbound and one side of the YLH support by retaining structures, and existing central divider will be adjusted toward south between TSWWI and TYSYI (see **Figure 2.2d – 2.2e**);
- Widening of an approximately 300-metre-long at-grade slip road connecting Hung Tin Road (southbound) to Yuen Long Highway (eastbound) (the road levels at about +13 to +14 mPD) from existing one lane to two lanes (additional 3.65m width carriageway) support by retaining structures (see **Figure 2.2d**);
- Associated works including civil, geotechnical, slope, road drainage, waterworks, utilities, public lighting, landscaping works, sign gantries modification, noise barrier

upgrading/re-provisioning works due to the widening of Yuen Long Highway, traffic control and surveillance system, re-provisioning of facilities affected by the proposed road works and environmental mitigation measures; and

- The interfacing works with other projects including.
  - Proposed waterworks along YLH eastbound (between Tan Kwai Tsuen Road and Hung Tin Road) under Agreement No. CE 71/2020 (CE) - Hung Shui Kiu / Ha Tsuen New Development Area
  - Proposed roadworks along YLH westbound (between TYSYI and TSWWI) under Agreement Nos. CE 58/2019(CE) & CE 16/2022(CE) for Yuen Long South Development
  - Proposed roadworks at TSWWI and at slip road connecting Hung Tin Road (northbound) under Agreement No. CE 16/2022(CE) for Yuen Long South Development
  - Proposed roadworks along YLH eastbound (between Tai To Tsuen Road and TSWWI) under Agreement No. CE 16/2022(CE) for Yuen Long South Development

### **2.3. Scenarios "With" and "Without" the Project**

#### **Without Project Scenario**

- 2.3.1. Without the Project in place, the traffic loading on YLH is expected to increase continuously with the commissioning of Route 11 and the future development in Northwest New Territories (NWNT) and aggravate the congestion level during the peak hours. The higher traffic flow and longer traffic queues will result in higher vehicular traffic emissions as the traffic speed decreases during traffic congestion, leading to a greater degree of air quality and noise impacts to the area. The road traffic congestion could not be relieved, and the associated air and noise pollution could not be alleviated within the area without the Project.

With Project Scenario

2.3.2. With the widening of two sections of YLH, between i.e. Lam Tei - Tin Shui Wai West Interchange and Tin Shui Wai West Interchange - Tong Yan San Tsuen, the road capacity of YLH would be increased. The anticipated traffic demand arising from the commissioning of Route 11 and the population growth of multiple large-scale developments proposed in the Northwest New Territories (NWNT) including Public Housing Developments at Long Bin, Yuen Long South Development, Tan Kwai Tsuen Public Housing Developments, LTQ Developments and Hung Shu Kiu / Ha Tsuen New Development Area, etc., could be relieved.

2.3.3. A summary of the environmental benefits and disbenefits with and without the Project is provided in **Table 2.1**.

**Table 2.1 Summary of Environmental Benefits and Disbenefits With and Without the Project**

Scenarios	Environmental Benefits	Environmental Disbenefits
With Project	<ul style="list-style-type: none"> <li>• improving traffic performance which leading to less traffic congestion and lower vehicular traffic emissions</li> <li>• establishing noise mitigation measures</li> </ul>	<ul style="list-style-type: none"> <li>• C&amp;D materials will be generated</li> <li>• The air quality and noise impact imposed on the existing Air Sensitive Receivers/ Noise Sensitive Receivers during construction stage.</li> <li>• Although there is a vehicular emission reduction owing to less traffic congestion for "with project", it is possible that there is a potential to have higher air quality impacts on the ASRs which are located closer to the widened road of the project.</li> </ul>
Without Project	<ul style="list-style-type: none"> <li>• No construction and demolition wastes generated</li> <li>• No construction-related environmental impacts to the area</li> <li>• No additional land requirement avoiding potential disturbance to the nearby environment</li> </ul>	<ul style="list-style-type: none"> <li>• Road traffic congestion could not be relieved, and the associated air and noise pollution to the existing Air Sensitive Receivers/ Noise Sensitive Receivers will get worse</li> <li>• Miss an opportunity to relieve environmental impacts to existing and planned Air Sensitive Receivers/ Noise Sensitive Receivers</li> </ul>

## 2.4. Consideration of Different Widening Options

2.4.1. Due to the site constraints along both sides of Yuen Long Highway between Lam Tei (LT) to Tong Yan San Tsuen (TYST), the widening options were quite limited. Should the widening to the south, it would induce additional rock cut slope at adjacent area to the Tan Kwai Tsuen Public Housing Development, natural terrain hazard and road layouts developed by Yuen Long South Development Stages 2A at Tong Yan San Tsuen Interchange and Stage 2B at Tin Shui Wai West Interchange (TSWWI). In addition, a number of trunk utilities were running along both sides of YLH including twin 1400mm dia. fresh water mains, 1000mm dia. salt water main, 750 mm dia. HP gas pipeline and etc. Different widening schemes are summarized in **Table 2.2**.

**Table 2.2 Evaluation of Different Widening Schemes**

General Description	Scheme 1	Scheme 2	Scheme 3 (Recommended)
- Section of YLH between LT and TSWWI	Widening from dual 3-lane to dual 4-lane toward west	Widening from dual 3-lane to dual 4-lane toward west	Widening from dual 3-lane to dual 4-lane toward west
- Section of YLH at TSWWI	No widening works	Widening from dual 3-lane to dual 4-lane toward west with extensive bridgeworks	No widening works
- Section of YLH between TSWWI and TYSY	Widening from dual 3-lane to dual 4-lane both south and north	Widening from dual 3-lane to dual 4-lane toward north	Widening from dual 3-lane to dual 4-lane toward south
Land Matters	More land lots required. More slope works required.  Encroachment to existing Hop Hing Building located at north of YLH near TYSY	More land lots required. More extensive slope works required.  Encroachment to existing Hop Hing Building located at north of YLH near TYSY	Less land lots required. Less slope works required.
Utility Diversion	More impact to existing utility	Extensive impact to existing utility	Less impact to existing utility

<b>General Description</b>	<b>Scheme 1</b>	<b>Scheme 2</b>	<b>Scheme 3 (Recommended)</b>
Interface with planned projects	Encroachment to other planned projects is avoided	Extensive bridgeworks is anticipated at TSWWI where there is planned improvement works of TSWWI under Yuen Long South Development  Large-scale temporary traffic arrangement at TSWWI would be required and induce traffic congestion	Encroachment to other planned projects is avoided
Engineering & Constructability	Less efficiency due to more slope works involved	Less efficiency due to more slope works and extensive bridgeworks involved	More efficiency with less slope works involved
Road safety	Design complies with road safety	Design complies with road safety	Design complies with road safety
Construction Programme	Longer construction period.	Longer construction period.	Shorter construction period.
Public disruption	Longer duration of public disruption due to longer construction period	Longer duration of public disruption due to longer construction period	Shorter duration of public disruption due to shorter construction period
Cost Implication	Higher construction cost	Higher construction cost	Lower construction cost
Air Quality Impact	More potential air quality impact during construction stage due to more slope works	More potential air quality impact during construction stage due to more slope works	Less air quality impact during construction as less slope works and shorter duration of construction
Noise Impact	More potential construction noise impact due to longer construction period and more slope works	More potential construction noise impact due to longer construction period and extensive slope works	Less construction noise impact as less slope works and shorter duration of construction
Water Quality Impact	No natural stream would be affected	No natural stream would be affected	No natural stream would be affected
Waste Management	More C&D material generated from slope works and utility diversion	More C&D material generated from extensive slope works and utility diversion	C&D material could be minimized as less excavation works

<b>General Description</b>	<b>Scheme 1</b>	<b>Scheme 2</b>	<b>Scheme 3 (Recommended)</b>
Ecological Impact	More habitat (such as Agricultural Land at Fui Sha Wai near north of TSWWI) loss as a result of more land required.  Longer construction period may cause more disturbance impact.	More habitat (such as Agricultural Land at Fui Sha Wai near north of TSWWI) loss as a result of more land required.  Longer construction period may cause more disturbance impact.	Less habitat loss as a result of less land requirement.  Shorter construction period may cause less disturbance impact.
Landscape and Visual Impact	Less tree preserved due to more land requirement	Less tree preserved due to more land requirement	More tree preserved due to less land requirement
Cultural Heritage Impact	No cultural heritage would be affected	No cultural heritage would be affected	No cultural heritage would be affected

- 2.4.2. Due considerations have been given in road widening scheme to overcome environmental constraints encountered.

Avoidance of encroachment to existing Hop Hing Building located at north of YLH near TYSY

- 2.4.3. The works under the project have avoided any works encroached within Hop Hing Building land lot. Hence, the project area will not encroach into the location of chemical waste producer.

Minimisation of air quality impact during construction stage

- 2.4.4. Excavation works and slope works would cause dusty during the construction stage. In order to minimise the air quality impact to the neighborhood, the extent of ground excavation and scale of slope works have been minimised throughout the scheme selection. Less excavation and slope works would be required. Besides, dust suppression measures would be undertaken at the construction site.

Minimisation of noise impact during construction stage

- 2.4.5. In order to minimise the noise impact to the neighborhood, the shorter duration of construction period should be achieved. Less ground excavation and scale of slope works would be required under the road widening scheme. Mitigation measures including good site practices adoption of quieter construction method /equipment, use of Quality Powered Mechanical Equipment (QPME) would be implemented at the construction site.

### Minimisation of C&D Material

- 2.4.6. As an environmental initiative, the construction works at both sides to YLH would be avoided. After considering the site constraints and the anticipated environmental impact due to the construction works, the recommended scheme of widening of YLH would avoid the need of extensive slope works and minimized utility diversion. Hence, waste generation would be minimised and off-site disposal would also be reduced.
- 2.4.7. Based on the above considerations, the widening between LT and TSWWI would be taken place toward west of YLH, while the widening between TSWWI and TYSY would be taken place toward south of YLH. The latest road widening scheme is shown in **Figure 2.2**.

### **2.5. Consideration of Alternative Construction Methods and Sequences of Works**

- 2.5.1. It is anticipated that the existing cut slopes and fill slopes along the eastbound carriageway of YLH (between Shui Fu Road and Tai To Tsuen Road) will be modified to accommodate the additional traffic lanes for the road widening works for both bounds.
- 2.5.2. For the existing pedestrian subways (NS224A and NS184A), the reinforced box structures will be extended to match adjacent new retaining walls.
- 2.5.3. For the existing bridges spanning over existing Shui Fu Road, addition bridge will be formed for the road widening to span over the site constraints, the new bridge will be supported by bored piles or pre-bored H-piles as foundation. For the pre-bored H-piles or bored piles traditional piling methods will be used. The piers would be RC structure and the bridge deck may be cast-insitu or precast segmental bridges subject to the site constraints. Lifting cranes will be deployed for the bridge constructions.
- 2.5.4. Owing to proximity of the existing private lands to the YLH, extensive set back of the existing slopes towards the private land areas are not recommended in order to minimize the need of land resumption. Instead, new retaining structures will be proposed at the crest of existing fill slope or at the toe of existing cut slopes to support the widened YLH, and the remaining profile of the slopes will remain generally the same.
- 2.5.5. For the enhanced noise barriers or new noise barriers, prefabricated steel frame would be used in order not to frequently blocking the existing or sensitive Yuen Long Highway with large scale temporary traffic arrangements (TTA) on expressway.
- 2.5.6. The widening works are to be carried by conventional methods to minimize impact and endure road safety to the existing traffic as concerned by the relevant authorities. The widening would start with construction of new carriageway for extra eastbound traffic lanes. Upon interim operation of the new eastbound traffic lanes, the existing eastbound traffic lanes would be diverted to the newly completed carriageway, allowing working spaces for re-alignment of central median, such that the existing three-lane traffic in each direction of Yuen Long Highway could be maintained throughout the construction period. The general construction sequence is as follows:
1. Form fill/cut slopes or retaining structures along the northern side of YLH eastbound as site formation for utilities diversion of the affected trunk utilities;

2. Laying the new trunk utilities or water mains by the contractor or utilities undertakers and then connection to the unaffected section of the trunk utilities;
3. Carrying out foundation works, either base slabs for retaining structures/box structures for subways or piling for the bridge structures;
4. Construct piers or upper part of retaining structures
5. Erecting bridge deck by precast segment or cast-situ;
6. Backfilling retaining structures or embankments and then drainage works and parapet works; shifting the both bounds of YLS to north after replacing central median by temporary barriers with using TTA;
7. After shifting the YLH to north, removing the existing noise barriers and foundation of new noise barriers at YLH westbound would be carried out while the new noise barriers at eastbound will also be erected; afterward noise barrier panels would be erected;
8. Site formation for road and road pavement would be done for new carriageway;
9. Finally sign faces for sign gantry will be updated and replaced for the new dual 4-lane system and TCSS if necessary.

2.5.7. The proposed reinforced concrete (RC) superstructures would be cast-situ with either standard wooden formwork or steel formwork. Having considered the conventional and typical form of the superstructures, it is recommended to adopt steel formwork which is a more reusable and durable formwork system as far as practicable. Comparison of the merits and demerits of these two formwork systems is shown in **Table 2.3** below.

**Table 2.3 Comparison of Different Formwork Systems**

Construction Methods	Wooden Formwork	Steel Formwork
<b>Merits</b>	Wood is readily available and relatively inexpensive  Wood formwork is lightweight, easy to handle	Steel is a strong and durable material and recyclable  Steel formwork is highly durable and can withstand harsh weather conditions, moisture, and repeated use  Steel is stronger than wood and provides excellent structural stability
<b>Demerits</b>	Wooden formwork is susceptible to damage from moisture, weather conditions, and repeated use.  Less recyclable material compared to steel	Steel is more expensive than wood.  Steel formwork is heavier. Mechanical equipment used for handling is required.

Construction Methods	Wooden Formwork	Steel Formwork
	Wood may deform or warp over time and additional supports and bracing are often required for concrete pouring	

2.5.8. The proposed bridge deck at Shui Fu Road under the project can be constructed by erecting precast segment or cast-situ method. Having considered the scale and site condition of the proposed bridge deck, it is recommended to adopt precast segment method which is a more effective and environmentally friendly approach. Comparison of the merits and demerits of these two construction methods is shown in **Table 2.4** below.

**Table 2.4 Comparison of Different Construction Methods for bridge deck at Shui Fu Road**

Construction Methods	Precast Segment	Cast-situ
<b>Merits</b>	<p>Minimise concrete mixing truck travelling in site area, thus minimise potential air and noise impact</p> <p>Shorten construction time, minimising on-site potential environmental impacts and cumulative environmental impacts with concurrent projects.</p> <p>Carry out precasting works in fabrication yard away from the site</p> <p>Better control of quality and workmanship for works in fabrication yard.</p>	<p>Conventional construction method and require relatively less special skilled labour when comparing with other construction methods.</p> <p>Durable and less maintenance cost.</p>
<b>Demerits</b>	<p>Require another trade of skilled workers and additional construction equipment for erecting precast segments.</p>	<p>Longer construction time to carry out bridge deck construction, i.e. span by span.</p> <p>Required concrete mixing truck and concrete pump truck travelling in site area, thus induce potential air and noise impact.</p> <p>Require substantial temporary steel platform / falsework for construction of the bridge</p>

Construction Methods	Precast Segment	Cast-situ
		deck section over existing live traffic.  Use of timber formwork, thus more C&D waste/ materials will be generated.

2.5.9. There are existing utilities, such as twin 1400mm dia. fresh water mains, 1000mm dia. salt water main, 750mm dia. gas pipeline, running along side of YLH. After considering the site constraints and the anticipated environmental impact, the recommended scheme of widening of YLH would avoid the need of utility diversion between TSWWI and TYSYI.

2.5.10. The remaining utilities diversion works at the eastern portion (northern side of YLH eastbound section between Ping Shan South and TSWWI) would involve conventional trench excavation method. Excavated surfaces would be well compacted and the subsequent permanent work or surface protection should be carried out immediately after the final surfaces are formed to prevent erosion caused by rainstorms. Appropriate drainage like intercepting channels should be provided where necessary. Excavated materials arising from excavation works should be reused on-site as backfilling materials, as far as practicable, to minimise C&D materials.

## 2.6. Construction Programme

2.6.1. The Project construction works are originally anticipated to commence in 2028 with completion of the Project not later than 2036. However, in order to match with adjacent updated development programme and updated Route 11 programme, the project construction works has been updated for full commissioning on or before 2033. Advance utilities diversion works at the eastern portion will be commenced in 2026 and full commissioning of the Project will be in 2032. The construction sequence of the project is to widen in stages with three-lane traffic in each direction of Yuen Long Highway maintained throughout the construction period.

2.6.2. Key construction works period is listed in **Table 2.5**.

**Table 2.5 Key Construction Works of the project**

Description	Tentative Construction Period	Potential environmental impact	Mitigation measures
Utilities Diversion works at the eastern portion	Q3 2026 – Q4 2028	potential dusty work  water quality impact due to construction site drainage	Mitigation measures for air quality and water quality impact were proposed in Section 3 and 5 respectively

Description	Tentative Construction Period	Potential environmental impact	Mitigation measures
Site Formation at YLH eastbound	Q1 2029 – Q1 2030	potential dusty work construction noise impact water quality impact due to construction site drainage	Mitigation measures for air quality, noise and water quality impact were proposed in Section 3, 4 and 5 respectively
Road Widening at YLH eastbound	Q1 2030 – Q2 2031	construction noise impact water quality impact due to construction site drainage	Mitigation measures for noise and water quality impact were proposed in Section 4 and 5 respectively
Site Formation at YLH westbound	Q1 2030 – Q3 2030	potential dusty work construction noise impact water quality impact due to construction site drainage	Mitigation measures for air quality, noise and water quality impact were proposed in Section 3, 4 and 5 respectively
Road Widening at YLH westbound	Q2 2031 – Q4 2031	construction noise impact water quality impact due to construction site drainage	Mitigation measures for noise and water quality impact were proposed in Section 4 and 5 respectively
Noise Barrier Construction and associated works	Q1 2023 – Q4 2032	construction noise impact	Mitigation measures for noise impact was proposed in Section 4

## 2.7. Concurrent Projects

2.7.1. With a view to assess the cumulative impacts to the Project, a list of concurrent projects is identified based on the available information at the time of submission of this EIA. It should be noted that the implementation of individual projects would be subject to further development and subsequent actions of the respective project proponents.

2.7.2. **Table 2.6** and **Figure 2.3** summarise the concurrent projects that would contribute to the cumulative environmental impacts during construction and/or operational phase. In addition, the construction of the project should be coordinated with the implementation for concurrent projects to minimise impacts and where possible reduce the period of disturbance.

**Table 2.6 Concurrent Projects**

Item	Agreement no. and Project Title	Description	Tentative Implementation	Potential Cumulative Impacts	
				Construction phase	Operation phase
1	CE 42/2016 (CE) Environmentally-Friendly Transport Services in Hung Shui Kiu New Development Area and Adjacent Areas - Feasibility Study	A new Green transit system in Hung Shui Kiu/Ha Tsuen New Development Area	Phase 1: Year 2027 – 2030/31 Phase 2: Year 2032 – 2036 Phase 3: Year 2034 – 2038	Cumulative construction dust impact was evaluated in Section 3 Cumulative construction noise impact was evaluated in Section 4	Cumulative operation noise impact arisen from the concurrent project was considered in this study
2	CE 13/2021 (HY) Route 11 (Section between Yuen Long and Lantau)	A new highway linking Lam Tei and Lantau	No later than Year 2033	Cumulative construction dust impact was evaluated in Section 3	Cumulative operation noise and air impact arisen from the concurrent project was considered in this study
3	CE 75/2017(CE) Site Formation and Infrastructure Works for Public Housing Developments at Long Bin, Yuen Long	A public housing development to meet housing needs	Year 2020 - 2026	Not anticipated in view of no overlapping construction period	Not anticipated in view of the nature of the concurrent project.
4	CE 92/2017(CE) Site Formation and Infrastructure Works for Public Housing Development near Tan Kwai Tsuen, Yuen Long	A public housing development to meet housing needs	Year 2022 - 2027	Not anticipated in view of no overlapping construction period	Not anticipated in view of the nature of the concurrent project.
5	CE 32/2017(CE), CE 58/2019(CE) & CE 16/2022(CE) Yuen Long South Development	A new development area to meet housing needs	2022 – 2038	Cumulative construction dust impact was evaluated in Section 3 Cumulative construction noise impact was evaluated in Section 4	Not anticipated in view of the nature of the concurrent project.

Item	Agreement no. and Project Title	Description	Tentative Implementation	Potential Cumulative Impacts	
				Construction phase	Operation phase
6	CE 71/2020(CE) Hung Shui Kiu / Ha Tsuen New Development Area	A new development area to meet housing needs	2020 – 2038	Cumulative construction dust impact was evaluated in Section 3 Cumulative construction noise impact was evaluated in Section 4	Not anticipated in view of the nature of the concurrent project.
7	CE 36/2018(CE) Preliminary Technical Review on Potential Sites in Yuen Long Areas 13 and 14 for Housing Development	A public housing development to meet housing needs	Year 2025 - 2032	Cumulative construction dust impact was evaluated in Section 3	Not anticipated in view of the nature of the concurrent project.

2.7.3. Environmental assessments included the existing, committed and planned Sensitive Receiver(s) which earmarked on the relevant Outline Zoning Plans, Development Permission Area Plans, Outline Development Plans, Layout Plans and other relevant published land use plans, including plans and drawings published by the Lands Department and any land use and development applications approved by the Town Planning Board, in the vicinity of the Project.

2.7.4. Owing to close proximity to various planned (such as Ping Shan South and Tan Kwai Tsuen) in the vicinity of this Project, considerations especially in minimization of air quality and noise impact to the planned public housing developments have been taken into account in this assessment. As agreed with the Housing Department, at-receiver mitigation measures (i.e. installation of acoustic windows) would be provided at the proposed public housing development at Ping Shan South and Tan Kwai Tsuen.

## 2.8. Public Consultation

2.8.1. A public inspection of the project profile was conducted from 7 to 20 Jun 2022 and public comments were received. The key comments received are summarised in **Table 2.7**.

**Table 2.7 Key comments received during public inspection of the project profile**

Key Issue	Public Comment	Action / Response
Air Quality and Health Index	There were concerns about many concurrent development projects interfacing with the project. A comprehensive cumulative air pollution impact	The cumulative air quality impact during operation phase which takes into account the concurrent projects in the vicinity has also been included.

<b>Key Issue</b>	<b>Public Comment</b>	<b>Action / Response</b>
	assessment was then recommended during the EIA	Continuous monitoring of dust will be conducted during construction phase.
Traffic and Transport Impact	There were concerns about traffic jam issue during construction phase. Worst air pollution might be introduced by the traffic jam at the construction phase.	Construction Traffic Impact Assessment has been conducted for the project. No adverse impact to the traffic is anticipated.
Waste Management	<p>There were concerns about the waste management among construction and demolition (C&amp;D) materials, chemical wastes, refuse etc. Also, illegally leaving waste should be monitor and penalized.</p> <p>Also, there were concerns about locations of stockpiling. Caution to watercourses and riparian zones should be taken.</p>	<p>The waste management implication has been assessed in the EIA, Chapter 6. Trip-ticket system would be adopted to monitor the disposal of C&amp;D materials at public filling facilities and landfills and to control fly-tipping.</p> <p>Stockpiling area should be provided with covers and water spraying system to prevent materials from wind-blown or being washed away. Proper construction site drainage should be provided.</p>
Bird Collision	There were concerns about bird collision to noise barriers/enclosures and screen hoardings	It is anticipated that the number of birds passing through is low due to the highly disturbed nature as recorded in the assessment. Bird friendly design would be provided to further reduce the bird collision.
Site Boundary	There was concern about the extend of the environmental impact assessment, i.e. the "project limit" mentioned in drawing no. HMW2003-SK1029.	The assessment area for the EIA study, as specified in the EIA Study Brief, has been followed.

2.8.2. The Project has been presented in Ping Shan Heung Rural Committee, Yuen Long District Council Meeting and Tuen Mun District Council Meeting on 29 August 2023, 4 September 2023 and 11 September 2023 respectively. The road widening project was supported by relevant District Council and Rural Committee. Besides, no major environmental concern was received from the public.

## 2.9. Reference Environmental Permits

2.9.1. It is noted that the section of YLH between Lam Tei and Tong Yan San Tsuen under this Project is already covered under 2 existing Environmental Permits (EPs). The details of these 2 EPs are summarized in **Table 2.8**.

**Table 2.8 Relevant EPs**

EP no.	EP Title	Location
EP-163/2003/H	Deep Bay Link and Widening of Yuen Long Highway between Lam Tei and Shap Pat Heung (Lam Tei to Tan Kwai Tsuen Section)	Yuen Long Highway (section between Lam Tei and Tan Kwai Tsuen)
EP-141/2002/A	Widening of Yuen Long Highway between Lam Tei and Shap Pat Heung Interchange	Yuen Long Highway (section between Lam Tei and Shap Pat Heung)

2.9.2. A new EP covering the section of YLH between Lam Tei and Tong Yan San Tsuen assessed under this EIA study will be applied under this Project. In this connection, applications for Variation of the 2 existing EPs will be submitted to surrender the overlapping section of YLH. As a result, there will not be a section of YLH covered by 2 EPs.

### 3. KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

#### 3.1. Air Quality Impact

- 3.1.1. Potential air quality impact associated with the construction and operation phases of the Project have been assessed in accordance with the criteria and guidelines as stated in the requirements given in Section 3.4.4 and Appendices B and B-1 of the EIA Study Brief, as well as Annexes 4 and 12 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM). The assessment area for air quality impact assessment was within 500m from the boundary of the Project Site.
- 3.1.2. Potential air quality impact during construction phase would be limited to fugitive dust emissions generated work activities such as site clearance, excavation, piling, and handling of construction materials. The key air pollutants of concern arising from the construction of the Project include Respirable Suspended Particulates (RSP) and Fine Suspended Particulates (FSP). Considering the extent of the works will be limited at any one time, no adverse air quality impact arising from the construction activities of the Project was anticipated with the implementation of mitigation measures specified in the Air Pollution Control (Construction Dust) Regulation together with the recommended dust suppression measures, and good construction site practices, including establishment and use of vehicle wheel and body washing facilities at exit points of the works site, keeping all exposed areas wet or covering by impervious sheets at all times, and spraying all dusty materials with water/ dust suppression chemical immediately prior to any loading, unloading or transfer operation, connecting construction plant and equipment to mains electricity supply and avoid use of diesel generators and diesel-powered equipment, refraining from the use of exempted non-road mobile machinery, providing site hoarding of at least 4 m for air sensitive receivers (ASRs) located in close proximity to works areas, and continuous RSP and FSP monitoring to ensure the relevant legal requirements and standards are complied with during construction phase of the Project.
- 3.1.3. During operation of the Project, vehicular emissions from the widened Yuen Long Highway have the potential to cause air quality impact to the nearby ASRs. The key air pollutants of concern due to operation of the Project were from vehicular emissions, including Nitrogen Dioxide (NO<sub>2</sub>), RSP, and FSP. A quantitative assessment was conducted taking into account vehicular emissions from the widened Yuen Long Highway of the Project and the existing road networks within the 500m Study Area, other adjacent emission sources (including portal emissions, industrial emissions, and emissions associated with bus and minibus termini, heavy goods vehicle, and coach parking sites) within the 500m Study Area, as well as the background air quality. The prediction indicated the cumulative NO<sub>2</sub>, RSP, and FSP impacts at all identified ASRs would comply with the prevailing Air Quality Objectives (AQOs). Adverse air quality impact arising from the operation of the Project is thus not anticipated.

### **3.2. Noise Impact**

- 3.2.1. Potential noise impacts associated with the construction and operation phases of the Project have been assessed in accordance with the criteria and guidelines as stated in the requirements given in Clause 3.4.5 and Appendix C of the EIA Study Brief, as well as Annexes 5 and 13 of the EIAO-TM. The study area for noise impact assessment was defined by a distance of 300 m from the site boundary of the Project.
- 3.2.2. Potential construction noise impacts would mainly be due to the use of powered mechanical equipment (PME) from road works construction. The key construction works include site clearance, excavation, slope works, piling works, earthworks, retaining works, drainage works, watermains, sign gantry works, utilities laying, laying of sub-base materials, and laying of bituminous or concrete surfacing layers. Noise mitigation measures, such as use of quality PME, movable noise barriers/ noise enclosure/ noise insulation fabric for PME, and quieter construction equipment and method are recommended. The Contractor shall prepare a Construction Noise Management Plan (CNMP), which contains quantitative construction noise impact assessment, adopted quieter construction method and equipment, noise mitigation measures, and construction noise monitoring and auditing programme, with reference to the updated and identified noise mitigation measures once available and in any case before the tender invitation if there is any change to the construction noise mitigation measures recommended in this EIA report and before the commencement of construction of this Project, to the Director of the EPD before tender invitation and before commencement of construction of the Project.
- 3.2.3. The potential road traffic noise impacts have been assessed based on Year 2048 traffic forecast, which was the maximum projected traffic level within 15 years upon operation of the Project. With the provision of the recommended noise mitigation measures, i.e., low noise road surfacing (LNRS), cantilever noise barrier, and the application of acoustic window on planned public housing development committed by Housing Department, the noise levels at NSRs would comply with the noise standards. While exceedance would still be predicted at some of the representative NSRs due to existing roads, the increase in road traffic noise level due to the Project is less than 1.0 dB(A) at all NSRs after provision of noise mitigation measures and all the predicted noise levels for Project Roads at the representative NSRs would comply with the noise criteria. Adverse noise impact arising from the operation of the Project is thus not anticipated.

### **3.3. Water Quality Impact**

- 3.3.1. Potential water quality impacts associated with the construction and operation of the Project were conducted in accordance with the requirements of Annex 6 and Annex 14 of EIAO-TM as well as the requirements set out under Clause 3.4.6 and Appendix D of the Study Brief.
- 3.3.2. Potential sources of water quality impact associated with the Project include construction site runoff, discharges from construction activities and sewage effluents from the on-site workforce. Chemical wastes would also be produced from the use of chemicals and accidental spillage of chemicals/ chemical wastes during construction. With the implementation of the recommended management and mitigation measures, including surface control measures stipulated in ProPECC PN 1/94 and regular cleansing and maintenance of the chemical toilets, no unacceptable water quality impact is expected from the land-based construction activities.

3.3.3. Potential water quality impacts associated with the operation phase were identified as surface runoff generated from the proposed roads. Such runoff typically contains elevated levels of suspended solids, grits, trace amounts of oil and grease from vehicles, which could affect the water quality of the receiving waters. A road drainage system with appropriate silt or grit traps will be provided to collect runoff from the road surface during periods of rain. With the implementation of proposed mitigation measures and management practices, no adverse water quality impact during the operation phase is anticipated.

### **3.4. Waste Management Implication**

3.4.1. The waste management implications have been assessed in accordance with the requirements of Annexes 7 and 15 of the Technical Memorandum on Environmental Impact Assessment Ordinance (EIAO-TM) as well as requirements set out under Clause 3.4.7 of the EIA Study Brief.

3.4.2. Potential waste management implications from the generation of waste during construction phase have been evaluated. Measures, including the opportunity for on-site sorting, reusing C&D materials etc., are devised in the construction methodology to minimise the surplus materials to be disposed. Recommendations have been made for implementation by the Contractor during the construction period to minimise waste generation and off-site disposal.

3.4.3. During operation phase, it is expected that there would be limited quantities of general refuse to be generated from the operation of the Project and will be properly handled by FEHD or relevant department. Small amount of chemical waste will be generated during operation and routine maintenance of the Project. No unacceptable environmental impacts are anticipated with proper waste management practices. Waste monitoring and audit programme for the operation phase of the Project would not be required.

### **3.5. Land Contamination**

3.5.1. The land contamination assessment in associated with the construction of the Project was conducted in accordance with the requirements of Annex 19 of the EIAO-TM and S3.4.8 of the Study Brief.

3.5.2. 10 potential contaminated sites are identified with encroachment of the Project. Most of the sites could not be accessed to inspect the site conditions during site walkover due to the sites were still in operation or accesses were not granted. As such, further site visits to these potentially contaminated sites are proposed once future development of these sites is confirmed and that site access is available in order to identify the need for SI for any additional hot spots as a result of the on-going land contaminating activities. Based on the latest information, site C1 to C9 are currently under work area of other contracts of CEDD. The environmental sampling of these sites will be conducted by relevant contractors Hence, only site C10 will be conducted under this Project.

- 3.5.3. Further works re-appraisal would be required after land resumption of site C10 under this Project, findings from the re-appraisal will be presented in a supplementary CAP. Upon approval of the supplementary CAP and completion of the SI works, a CAR would be prepared to present findings of the SI works. If contamination has been identified, a RAP would be prepared to recommend specific remediation measures. Upon completion of the remediation works, if any, a RR would also be prepared to demonstrate that the clean-up works are adequate. The CAR, RAP and RR would be submitted to EPD for approval prior to commencement of any construction works. Site C1 to C9 will be included in the CAP/SCAP by the relevant contractors.
- 3.5.4. With the implementation of the recommended further works for the Project, any soil / groundwater contamination would be identified and properly treated prior to the construction works. No insurmountable land contamination impacts to the Project are therefore anticipated.

### **3.6. Ecological Impact**

- 3.6.1. Potential ecological impact associated with the construction and operation phases of the Project have been assessed in accordance with the criteria and guidelines as stated in the requirements given in Section 3.4.9 and Appendix G of the EIA Study Brief No. ESB-356/2022, as well as Annexes 8 and 16 of the the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM). The assessment area for ecological impact assessment was 500m from the boundary of the Project Site.
- 3.6.2. Existing 1.8ha plantation and 1.6ha village fringe areas within the Project Site are highly fragmented and disturbed by surrounding traffic; the wildlife diversity and abundance is low. The direct impact on wildlife due to habitat loss within the Project Site, is anticipated to be negligible to low significance.
- 3.6.3. Potential ecological impact from the construction works of the Project would mainly be related to construction disturbance, in the form of noise, run-off, dust and direct disturbance from construction workers.
- 3.6.4. Ecological monitoring is not considered necessary; however, precautionary check for the potential bat roost (the planted Chinese Fan-palm) at and near the Project Site is recommended. If roosts are found, protection measures shall be implemented to avoid any possible construction impact upon the bat roost in the Chinese Fan-palm.
- 3.6.5. Adverse ecological impact arising from the operation of the Project is not anticipated as the existing assessment area is highly developed and disturbed by variety of anthropogenic activities.

### **3.7. Landscape and Visual Impact**

- 3.7.1. Potential landscape and visual impacts arising from the Project have been assessed in accordance with the requirements set out in the EIA study brief (No.: ESB-356/2022) and the EIAO Guidance Note No. 8/2010, relevant Annexes of the Technical Memorandum issued under EIAO.

- 3.7.2. Potential landscape and visual impacts of the Project would primarily arise from site clearance and removal/ disturbance to existing trees and vegetation, modification of existing road features, and introduction of the new highway structures at the Project site. These impacts will be minimized through careful design of the road alignment and extent of widening works, optimization of greening opportunities, and incorporation of sensitive/ aesthetically pleasing design of the proposed highway structures/ noise barriers.
- 3.7.3. Based on this EIA, a total of 13 nos. of Landscape Resources (LRs) and 6 nos. of Landscape Character Areas (LCAs) have been identified in 500m Assessment Area, among which LR4 Vehicular Road (~13.41ha), LR6 Roadside Vegetation (~3.45ha) and LR3 Brownfield Operation (~2.35ha) are mostly impacted by the Project. No Old and Valuable Trees will be impacted.
- 3.7.4. Based on the initial tree survey findings, approximately 1,401 nos. of trees are located within the Project Limit. A detailed tree survey is being undertaken and a compensatory tree planting proposal in terms of 1:1 ratio will be formulated and presented in the Tree Preservation and Removal Proposal at a later stage of the Study.
- 3.7.5. Four major types of Visually Sensitive Receivers (VSRs) were identified within the Visual Envelop (VE), namely Residential VSR, Leisure VSRs, Functional VSRs and Transportation VSRs.
- 3.7.6. During the construction phase and operation phase without mitigation, the most affected VSRs are R05, R06, L01 and F01 who are expected to experience **Moderately Adverse** impacts as they are located within or very close to the Project site. With the implementation of mitigation measures, R05, R06, L01, F01 and T01 will experience **Slightly Adverse** impacts during construction and operation phases after mitigation. R04 and F-R04 will experience **Slightly Adverse** impacts during construction phase and the visual impacts will be further reduced to **Insubstantial** impacts during operation phase.
- 3.7.7. Upon full implementation of all proposed mitigation measures and adequate tree compensation, the residual landscape or visual impacts from the Project are almost insubstantial to most of the affected sensitive receivers, although for some receivers, e.g. LR6 Roadside Vegetation, the residual impacts may remain Slightly Adverse during the early operation stage of the Project. Overall, the resulting Landscape and Visual Impacts from the Project is considered to be acceptable with mitigation.

### 3.8. Cultural Heritage Impact

- 3.8.1. Potential cultural heritage impacts associated with the construction and operation of the Project were conducted in accordance with the requirements of Annex 10 and Annex 19 of EIAO-TM as well as the requirements set out under Clause 3.4.11 and Appendix I of the Study Brief.

- 3.8.2. There is no declared monument, proposed monument, graded historic sites/ buildings/ structure, sites, buildings/ structures in the new list of proposed grading items and Government historic sites identified within the Project Boundary or the 300m assessment area. There will be no works encroaching upon these historical structures. Hence, direct impact is not anticipated. Indirect impacts from ground-borne vibration will also be negligible given the large separation distance to the works. No adverse impact is anticipated during construction. In addition, given that there are long separation distances from the historical structure to the Project Boundary, no adverse impact is also anticipated during the operation of the Project.
- 3.8.3. The nearest Sites of Archaeological Interest (SAIs) includes Fu Tei Ha SAI and Nai Wai Kiln SAI which are located at approximately 350 to 400m from the Project Limit respectively. No SAI is identified partly or wholly within the Project Limit and the 300m assessment area. It is anticipated that no SAI will be directly and indirectly affected by the proposed road widening works due to their considerable distance from Yuen Long Highway. Thus, no impact on SAI is expected during both construction and operation phases.
- 3.8.4. As no SAI and built heritage resources would be affected by the road widening works of the Project, no mitigation measure or conservation management plan is required for these cultural heritage resources. As a precautionary measure, AMO should be informed immediately in case of discovery of antiquities or supposed antiquities in the course of works, so that appropriate mitigation measures, if needed, can be timely formulated and implemented in agreement with AMO.

#### **4. ENVIRONMENTAL MONITORING AND AUDIT (EM&A)**

- 4.1.1. Environmental Monitoring and Audit (EM&A) requirements and regular site inspection and audits for air quality, noise, water quality, waste management, land contamination, terrestrial ecological, landscape and visual and cultural heritage have been recommended during construction phase. The EM&A requirements under construction and operation phases are specified and detailed in the EM&A Manual.

#### **5. CONCLUSION**

- 5.1.1. The findings of the EIA provided information on the nature and extent of the environmental impacts likely to arise from the construction and operation of the Project. The EIA has, where appropriate, identified mitigation measures to ensure compliance with environmental legislation and standards. The summary of the environmental impacts arising from the Project is presented in **Table 5.1**.
- 5.1.2. Overall, the EIA concluded that the Project would comply with the requirements of the EIA Study Brief and EIAO-TM with the implementation of the proposed mitigation measures during construction and operational phases of the Project. The schedule of implementation of the proposed mitigation measures has been provided in the EIA Report. An EM&A programme has also been recommended to check the effectiveness of the proposed mitigation measures.

**Table 5.1 Summary of Environmental Impacts**

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedance Predicted (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After implementation of mitigation measures)
<b>Air Quality Impact</b>					
<b>Construction impact</b>					
Representative ASRs within 500m from the boundary of the Project Site	The potential sources of air quality impact associated with the construction works include dust generated from construction sites, exhaust emissions from construction plant and equipment.	Annexes 4 and 12 of the EIAO-TM	Not Applicable	<ul style="list-style-type: none"> <li>• Appropriate dust control measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices will be incorporated into the Contract Specifications and implemented throughout the construction phase. Continuous RSP and FSP monitoring (also incorporated into the Contract Specifications) will be conducted to ensure the relevant legal requirements and standards are complied with during construction phase of the Project.</li> <li>• Close liaison between the contractors of other concurrent projects and the Project would be maintained to minimise dusty activities to be conducted concurrently as far as practicable</li> <li>• Connecting construction plant and equipment to mains electricity supply and avoid use of diesel generators and diesel-powered equipment</li> <li>• Exempted NRMMs are not allowed</li> </ul>	No adverse residual impact is anticipated.

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedance Predicted (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After implementation of mitigation measures)
				Provision of site hoarding (>4m) for ASRs located in close proximity to works areas (e.g., A5, A12, and A30)	
<b>Operation Phase</b>					
Representative ASRs (including existing and planned) within 500m from the boundary of the Project Site	Predicted cumulative air pollutant concentrations (NO <sub>2</sub> , RSP, and FSP) at ASRs with Project operation comply with the prevailing AQOs.	<ul style="list-style-type: none"> <li>Annexes 4 and 12 of the EIAO-TM</li> <li>Prevailing AQOs</li> </ul>	Not Applicable	No adverse air quality impact is anticipated during the operation phase of the Project, thus mitigation measure is deemed not necessary.	No adverse residual impact is anticipated.
<b>Noise Impact</b>					
<b>Construction Phase</b>					
Representative NSRs (including existing and planned) within 300m from the boundary of the Project Site	Potential construction noise impacts would mainly be due to the use of powered mechanical equipment (PME) from road works construction.	<ul style="list-style-type: none"> <li>Annex 5 and 13 of the EIAO-TM</li> </ul>	Not Applicable	Implementation of recommended noise mitigation measures including: <ul style="list-style-type: none"> <li>Quality PME prescribed in EPD's Quality Powered Mechanical Equipment (QPME) database.</li> <li>Temporary movable noise barriers, noise enclosure and noise insulation fabric for PME.</li> <li>The use of quieter construction equipment and construction method.</li> </ul>	No adverse residual impact is anticipated.
<b>Operation Phase</b>					
Representative NSRs (including existing and planned) within 300m from the boundary of the Project Site	<ul style="list-style-type: none"> <li>Predicted overall noise levels: 48 – 81 dB(A)</li> <li>Predicted noise levels of the Project roads: &lt;40 – 79 dB(A)</li> <li>Contribution from Project roads: 0 - 12 dB(A)</li> </ul>	<ul style="list-style-type: none"> <li>Annexes 5 and 13 of the EIAO-TM</li> <li>EIAO Guidance Note No. 10/2010</li> <li>L<sub>10</sub> (1-hour) 70 dB(A) at 1m from the façade of</li> </ul>	<ul style="list-style-type: none"> <li>Exceedance of the noise criteria by up to 11 dB(A).</li> <li>The exceedances are dominantly contributed by the existing roads at majority of representative</li> </ul>	<ul style="list-style-type: none"> <li>Application of 570m long LNRS on the slip road connecting Hung Tin Road (South Bound) and Yuen Long Highway (East Bound) (LNRS1)</li> <li>Application of HMFC on Project road of Yuen Long</li> </ul>	No adverse residual impact is anticipated.

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedance Predicted (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After implementation of mitigation measures)
		residential dwellings <ul style="list-style-type: none"> <li>• 65 dB(A) at 1m from the external façade of schools, places of public worship, courts of law, and places where unaided voice communication is required.</li> <li>• 55 dB(A) at 1m from the external façade of hospitals and clinics</li> </ul>	NSRs, while at some other representative planned NSRs, the exceedances are dominantly contributed by Project Roads.	Highway as the standard surfacing material <ul style="list-style-type: none"> <li>• Proposed total length of 150m long 3m high Vertical barrier (N1)</li> <li>• Proposed total length of 680m long, 8m high with 4m cantilever (at 45° from ground level) barrier (N3, N4)</li> <li>• Proposed total length of 300m long, 8m high with 4m cantilever (at 45° from ground level) Y-shape barrier (N2)</li> </ul>	
<b>Water Quality Impact</b>					
<b>Construction Phase</b>					
Representative Water Sensitive Receivers within 500m from the boundary of the Project Site.	Potential sources of water quality impact associated with construction works include: <ul style="list-style-type: none"> <li>• Wastewater from general construction activities;</li> <li>• Construction site-runoff</li> <li>• Sewage from construction workforce; and</li> <li>• Accidental spillage of chemicals</li> </ul>	<ul style="list-style-type: none"> <li>• Annexes 6 and 14 of the EIAO-TM</li> <li>• ETWB TC (Works) No. 5/2005</li> <li>• Water Quality Objectives for the Deep Bay and North Western Water Control Zone (WCZ)</li> <li>• Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>• Mitigation measures and good site practices in ProPECC PN 1/94 "Construction Site Drainage"</li> <li>• Provision of interim treatment facilities, such as chemical toilets, for construction workforce</li> </ul>	No adverse residual impact is anticipated.

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedance Predicted (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After implementation of mitigation measures)
		<p>Systems, Inland and Coastal Waters (TM-DSS)</p> <ul style="list-style-type: none"> <li>Practice Note for Professional Persons (ProPECC) PN1/94</li> </ul>			
<b>Operation Phase</b>					
<p>Representative Water Sensitive Receivers within 500m from the boundary of the Project Site.</p>	<p>Potential water quality impacts associated with operation phase include surface run-off from the widened roads</p>	<ul style="list-style-type: none"> <li>Annexes 6 and 14 of the EIAO-TM</li> <li>Water Quality Objectives for the Deep Bay and North Western Water Control Zone (WCZ)</li> <li>Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS)</li> <li>Practice Note for Professional Persons (ProPECC) PN5/93</li> </ul>	<p>Not applicable</p>	<ul style="list-style-type: none"> <li>Adequate design in silt trap for the new road drainage which takes into account the guidelines in ProPECC PN5/93.</li> <li>Best Storm Water Management Practices and Storm Water Pollution Control Plan to reduce non-point source pollution.</li> </ul>	<p>No adverse residual impact is anticipated</p>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedance Predicted (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After implementation of mitigation measures)
		<ul style="list-style-type: none"> <li>Environmental, Transport and Works Bureau (ETWB) Technical Circular (Works) No. 5/2005</li> </ul>			
<b>Waste Management Implications</b>					
<b>Construction Phase</b>					
C&D materials, chemical wastes and general refuse	<ul style="list-style-type: none"> <li>Around 5,950 m<sup>3</sup> of non-inert C&amp;D materials and 18,740 m<sup>3</sup> of inert C&amp;D materials will be generated from site clearance, site formation and excavation, and superstructure works.</li> <li>Small quantity of chemical wastes in the order of a few hundred liters per month.</li> <li>Around 130 kg per day of general refuse will be generated from construction works and on-site staff and workers.</li> </ul>	<ul style="list-style-type: none"> <li>Annexes 7 and 15 of the EIAO-TM</li> <li>Waste Disposal Ordinance (Cap. 354)</li> <li>Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N)</li> <li>Land (Miscellaneous Provisions) Ordinance (Cap. 28)</li> <li>Public Health and Municipal Services Ordinance – Public Cleansing and Prevention of Nuisances Regulation (Cap. 132BK)</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>Implementation of good site practices, waste reduction measures and proper storage, collection and transport of waste.</li> </ul>	No adverse residual impact is anticipated.

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedance Predicted (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After implementation of mitigation measures)
<b>Operation Phase</b>					
General waste and chemical waste	It is expected that limited quantity of general waste and chemical waste will be generated during the operation phase of the Project.	<ul style="list-style-type: none"> <li>• Annexes 7 and 15 of the EIAO-TM</li> <li>• Waste Disposal Ordinance (Cap. 354)</li> <li>• Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N)</li> <li>• Land (Miscellaneous Provisions) Ordinance (Cap. 28)</li> <li>• Public Health and Municipal Services Ordinance – Public Cleansing and Prevention of Nuisances Regulation (Cap. 132BK)</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>• Register with EPD as a chemical waste producer</li> <li>• Store, recycle, and collect chemical waste in accordance with the Waste Disposal (Chemical Waste) (General) Regulation</li> <li>• Provision of adequate number of rubbish bins for collection of roadside littering</li> <li>• Frequent clearing of bins by FEHD</li> </ul>	No adverse residual impact is anticipated
<b>Land Contamination</b>					
Onsite construction workers and future occupants	<ul style="list-style-type: none"> <li>• A total of 10 areas were identified with potential land contamination concerns within the Project Area. Only one site (i.e. C10) is covered under this project.</li> </ul>	<ul style="list-style-type: none"> <li>• Annex 19 of the EIAO-TM</li> <li>• Guidance Note for Contaminated Land Assessment and Remediation, EPD, revised in April 2023</li> <li>• Practice Guide for Investigation and Remediation of</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>• A sampling and testing programme, targeting the potential areas identified within the Project Area, had been proposed.</li> <li>• Site re-appraisal should be carried out for the whole Project Area at a later stage of the Project in order to address any new</li> </ul>	Onsite construction workers and future occupants

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedance Predicted (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After implementation of mitigation measures)
		Contaminated Land, EPD, revised in April 2023 <ul style="list-style-type: none"> <li>Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management, EPD, revised in April 2023</li> </ul>		contamination issues caused by the (i) changes in operation of the identified potentially contaminated site and (ii) changes in land use within the Project Area. <ul style="list-style-type: none"> <li>The submission of supplementary CAP(s) associated SI works and any necessary remediation should be carried out at the concerned areas and any new contaminated area identified in the site re-appraisal, prior to the commencement of construction at the potentially contaminated area(s). The further assessment and remediation works would follow EPD's prevailing guidelines.</li> <li>Any soil / groundwater contamination would be identified and properly treated prior to the construction works.</li> </ul>	
<b>Ecology</b>					
<b>Construction Phase</b>					
Habitats of ecological importance and fauna of conservation importance in the vicinity	<ul style="list-style-type: none"> <li>Habitat loss of 1.6ha plantation and 1.8ha village fringe area</li> <li>Indirect disturbance impact (e.g., dust, noise, run-off) on natural habitats and</li> </ul>	<ul style="list-style-type: none"> <li>Annexes 8 and 16 of the EIAO-TM</li> <li>EIAO Guidance Notes Nos. 6/2010, 7/2010 and 10/2010</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>Noise, dust, run-off control in relevant sections shall be implemented as far as possible, in order to avoid any indirect impact to adjacent habitats and wildlife.</li> </ul>	No adverse residual impact anticipated

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedance Predicted (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After implementation of mitigation measures)
	associated wildlife in the vicinity			<ul style="list-style-type: none"> <li>Precautionary check of potential bat roosts on the planted Chinese Fan-palm near the Project Site is recommended; if any roost found, protection measures shall be implemented.</li> </ul>	
<b>Operation Phase</b>					
Habitats of ecological importance and fauna of conservation importance in the vicinity	Not anticipated.	<ul style="list-style-type: none"> <li>Annexes 8 and 16 of the EIAO-TM</li> <li>EIAO Guidance Notes Nos. 6/2010, 7/2010 and 10/2010</li> </ul>	Not applicable	No mitigation measure would be required	No adverse residual impact anticipated
<b>Landscape and Visual Impact</b>					
<b>Construction Phase</b>					
Landscape Resources (LRs)	<ul style="list-style-type: none"> <li>Moderately adverse impacts to LR6 Roadside Vegetation</li> <li>Slightly adverse impacts to LR1 Village Settlement, LR3 Brownfield Operation and LR4 Vehicular Road</li> <li>Insubstantial impacts/ no discernible changes to the remaining LRs</li> </ul>	<ul style="list-style-type: none"> <li>Annexes 10 and 18 of the EIAO-TM</li> <li>EIAO-GN 8/2010</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>Careful Site Planning and Management</li> <li>Tree Preservation and Inspection of Tree Works</li> <li>Provision of Decorative Site Hoarding</li> <li>Minimisation of Light Impact</li> <li>Reinstatement of Temporarily Disturbed Areas</li> </ul>	<ul style="list-style-type: none"> <li>Moderately adverse impacts on LR6 Roadside Vegetation</li> <li>Slightly adverse impacts on LR4 Vehicular Road</li> <li>Insubstantial impacts to the remaining LRs</li> </ul>
Landscape Character Areas (LCAs)	<ul style="list-style-type: none"> <li>Moderately adverse impacts to LCA2 Yuen Long Miscellaneous Urban Fringe</li> <li>Slightly adverse impacts to LCA1 Yuen</li> </ul>	<ul style="list-style-type: none"> <li>Annexes 10 and 18 of the EIAO-TM</li> <li>EIAO-GN 8/2010</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>Careful Site Planning and Management</li> <li>Tree Preservation and Inspection of Tree Works</li> <li>Provision of Decorative Site Hoarding</li> <li>Minimisation of Light Impact</li> </ul>	<ul style="list-style-type: none"> <li>Slightly adverse impacts on LCA2 Yuen Long Miscellaneous Urban Fringe</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedance Predicted (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After implementation of mitigation measures)
	<p>Long Miscellaneous Rural Fringe</p> <ul style="list-style-type: none"> <li>• Insubstantial impacts/ no discernible changes to the remaining LCAs</li> </ul>			<ul style="list-style-type: none"> <li>• Reinstatement of Temporarily Disturbed Areas</li> </ul>	<ul style="list-style-type: none"> <li>• Insubstantial impacts to the remaining LCAs</li> </ul>
Visually Sensitive Receivers (VSRs)	<ul style="list-style-type: none"> <li>• Moderately adverse impacts to R05, R06, L01 and F01 who are located within or very close to the Project site</li> <li>• Slightly adverse impacts to R04, T01 and F-R04</li> <li>• Insubstantial impacts to the remaining VSRs</li> </ul>	<ul style="list-style-type: none"> <li>• Annexes 10 and 18 of the EIAO-TM</li> <li>• EIAO-GN 8/2010</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>• Careful Site Planning and Management</li> <li>• Tree Preservation and Inspection of Tree Works</li> <li>• Provision of Decorative Site Hoarding</li> <li>• Minimisation of Light Impact</li> <li>• Reinstatement of Temporarily Disturbed Areas</li> </ul>	<ul style="list-style-type: none"> <li>• Slightly adverse impacts to R04, R05, R06, L01, F01, T01 &amp; F-R04</li> <li>• Insubstantial impacts to the remaining VSRs</li> </ul>
<b>Operation Phase</b>					
Landscape Resources (LRs)	<ul style="list-style-type: none"> <li>• Moderately adverse impacts to LR6 Roadside Vegetation</li> <li>• Slightly adverse impacts to LR1 Village Settlement, LR3 Brownfield Operation and LR4 Vehicular Road</li> <li>• Insubstantial impacts/ no discernible changes to the remaining LR6</li> </ul>	<ul style="list-style-type: none"> <li>• Annexes 10 and 18 of the EIAO-TM</li> <li>• EIAO-GN 8/2010</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>• Landscape Planting</li> <li>• Slope Greening</li> <li>• Provision of Aesthetically Pleasing Design of Noise Barrier</li> <li>• Provision of Sensitively Designed Building Structures</li> </ul>	<ul style="list-style-type: none"> <li>• Slightly adverse impacts to LR6 Roadside Vegetation on Day 1 Operation, and insubstantial impacts in Year 10 Operation</li> <li>• Insubstantial impacts/ no discernible changes to the remaining LR6</li> </ul>
Landscape Character Areas (LCAs)	<ul style="list-style-type: none"> <li>• Slightly adverse impacts to LCA1 Yuen Long Miscellaneous Rural Fringe and LCA2 Yuen Long Miscellaneous Urban Fringe</li> </ul>	<ul style="list-style-type: none"> <li>• Annexes 10 and 18 of the EIAO-TM</li> <li>• EIAO-GN 8/2010</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>• Landscape Planting</li> <li>• Slope Greening</li> <li>• Provision of Aesthetically Pleasing Design of Noise Barrier</li> <li>• Provision of Sensitively Designed Building Structures</li> </ul>	<ul style="list-style-type: none"> <li>• Insubstantial impacts/ no discernible changes to all LCAs</li> </ul>

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedance Predicted (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After implementation of mitigation measures)
	<ul style="list-style-type: none"> <li>Insubstantial impacts/ no discernible changes to the remaining LCAs</li> </ul>				
Visually Sensitive Receivers (VSRs)	<ul style="list-style-type: none"> <li>Moderately adverse impacts to R05, R06, L01 and F01</li> <li>Slightly adverse impacts to R04, T01 &amp; F-R04</li> <li>Insubstantial impacts/ no discernible changes to the remaining VSRs</li> </ul>	<ul style="list-style-type: none"> <li>Annexes 10 and 18 of the EIAO-TM</li> <li>EIAO-GN 8/2010</li> </ul>	Not applicable	<ul style="list-style-type: none"> <li>Landscape Planting</li> <li>Slope Greening</li> <li>Provision of Aesthetically Pleasing Design of Noise Barrier</li> <li>Provision of Sensitively Designed Building Structures</li> </ul>	<ul style="list-style-type: none"> <li>Slightly adverse impacts to R05, R06, L01, F01 &amp; T01 on Day 1 Operation</li> <li>Slightly adverse impacts to R05, R06, L01, F01 &amp; T01 in Year 10 Operation</li> <li>Insubstantial impacts/ no discernible changes to the remaining VSRs in Year 10 Operation</li> </ul>
<b>Cultural Heritage Impact</b>					
<b>Construction Phase</b>					
Cultural heritage resources, Site of Archaeological Interest	<p>Direct impact would not be anticipated.</p> <p>Indirect impact from construction vibration will be negligible given the distances to the work. No adverse impact would be anticipated on both built heritages and site of archaeology interest (SAIs) during the construction phase</p>	<ul style="list-style-type: none"> <li>Antiquities and Monuments Ordinance (A&amp;MO) (Cap.53)</li> <li>Annexes 10 and 19 of the EIAO-TM</li> <li>Guidance Notes on Assessment of Impact on Sites of Cultural Heritage in Environmental Impact Assessment Studies (GN-CH)</li> <li>Guidelines for Cultural Heritage Impact</li> </ul>	Not applicable	As a precautionary measure, AMO should be informed immediately in case of discovery of antiquities or supposed antiquities in the course of works, so that appropriate mitigation measures, if needed, can be timely formulated and implemented in agreement with AMO	No adverse residual impact is anticipated.

Sensitive Receivers / Assessment Points	Impact Prediction Results (Without Mitigation)	Key Relevant Standards / Criteria	Extents of Exceedance Predicted (Without Mitigation)	Impact Avoidance Measures / Mitigation Measures	Residual Impacts (After implementation of mitigation measures)
		Assessment (GCHIA)			
<b>Operation Phase</b>					
Cultural heritage resources, Site of Archaeological Interest	No adverse impact would be anticipated on both built heritages and site of archaeology interest (SAIs) during the operational phase	<ul style="list-style-type: none"> <li>• Annexes 10 and 19 of the EIAO-TM</li> <li>• Guidance Notes on Assessment of Impact on Sites of Cultural Heritage in Environmental Impact Assessment Studies (GN-CH)</li> <li>• Guidelines for Cultural Heritage Impact Assessment (GCHIA)</li> </ul>	Not applicable	No mitigation measure would be required	No adverse residual impact is anticipated.