Hong Kong Housing Authority

Agreement No. CB20120293 Planning and Engineering Study for the Public Housing Site and Yuen Long Industrial Estate Extension at Wang Chau

Final Technical Report No.3A (TR-3A) Preferred Option and Technical Assessment - Traffic and Transport Impact assessment

REP-020-01

Final | April 2014

IMPORTANT – CONFIDENTIALITY

This project and study shall be kept confidential and any information contained in and/or related to the project/study shall not be disclosed to any person not involved in the project/study.

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1 INTRODUCTION

1.1 Project Background

1.1.1.1 As stated in the Chief Executive's 2011-12 Policy Address, the Administration is committed to expanding the land resources and increasing housing land supply. To meet this policy objective, the Planning Department (PlanD) has carried out a comprehensive review of the areas zoned "Green Belt" (GB) on the Outline Zoning Plans (OZPs) focusing on sites which are no longer green or spoiled. A number of "GB" and "Open Storage" (OS) sites in Wang Chau, Yuen Long were identified as having potential for public housing (PH) development.

1.1.1.2 Subsequently, the Innovation and Technology Commission (ITC) and the Hong Kong Science and Technology Parks Corporation (HKSTP) advised of the need to expand the Yuen Long Industrial Estate (YLIE), in addition to the existing three Industrial Estates (IEs) at Tai Po, Tseung Kwan O and Yuen Long. It was requested to use a portion of the Wang Chau potential housing site for this purpose.

1.1.1.3 After due consideration, an agreement was reached between the Housing Department (HD) and ITC to share the site, tentatively with the northerly portion to be allocated for the YLIE extension (YLIEE), while the remaining south portion would be developed for public housing use. It was further agreed that no Potential Hazardous Installations (PHIs) would be located at the YLIEE so as to minimize the potential adverse impact on the neighbouring PHD.

1.1.1.4 **Figure 1.1.1** shows the location of the Project site. The PH and YLIEE sites at Wang Chau are zoned GB and OS on the Ping Shan OZP No. S/YL-PS/14. It is currently occupied by open storage, vehicle parks, farmland, fallow land, grassland, rural residential dwellings and temporary structures.

1.1.1.5 Ove Arup & Partners Hong Kong Limited (Arup) was commissioned by Hong Kong Housing Authority (HKHA) under entrustments from the Government of the Hong Kong Special Administrative Region (HKSAR) & Hong Kong Science and Technology Parks Corporation (HKSTP) to conduct the Planning and Engineering Study for Public Housing Site and YLIEE at Wang Chau (the Study), which will examine the feasibility on developing public housing and YLIEE at Wang Chau by conducting planning, engineering and environmental assessments to formulate proposal for the PH site and YLIEE, and the implementation strategies and programme for the proposed development.

1.2 Objectives of the Report

1.2.1.1 The Technical Report (TR-3) – Preferred Option and Technical Assessments is to undertake the technical assessments (including

traffic and transport assessments, drainage and sewerage impact assessment, water supply and utilities impact assessments, geotechnical assessments, foundation assessment, natural terrain hazard study, environmental impact assessment, financial assessment, air ventilation assessment and land requirement study) to confirm the feasibility of the preferred development option and ascertain the implications that may arise.

1.2.1.2 This report TR-3a forms part of the TR-3 and is to conduct a transport and traffic impact assessment to ascertain the effects of the proposed development on the traffic infrastructure and transport provision in and adjacent to the Study Area, including the proposed future road connection to/from surrounding road network for the proposed public housing development, YLIEE and associated facilities, and recommend necessary enhancement and improvements to the local traffic system.

1.2.1.3 According to Clause 5.3(c) (iv) of the Brief, this report should comprise the following:

- review and access the available traffic data/information before using them for forecasting future traffic and pedestrian flow and pattern;
- conduct traffic counts and surveys and collect any other data for validating the transport models proposed to be used by the Consultants to the base year. The Consultant shall demonstrate to the satisfaction of the DR that the traffic flow and pattern produced by the models for the base year before the models are used to forecast traffic flow for the design years;
- forecast traffic and pedestrian flow and pattern generated and attracted by the public housing development proposals within the area of influence. The detailed methodology for traffic and pedestrian flow and pattern forecasts shall be agreed by Transport Department and DR beforehand;
- examine the adequacy/inadequacy of the capacity of the existing and planned road and pedestrian networks and major interchanges/junctions within the Site, the Study Area and the areas in the vicinity and recommend additional transport infrastructure, if any, to handle the additional traffic generated as a result of the implementation of public housing and YLIEE proposals;
- assess the likely traffic impact due to the public housing development and YLIEE proposals and associated facilities on the road network capacity, traffic and pedestrian circulation, car parking, loading and unloading facilities and lay-bys, and develop traffic improvement schemes, where appropriate, to mitigate any traffic impact;
- assess the impact of the proposal of public housing development and YLIEE and the associated facilities on traffic and pedestrian circulation during construction period and recommend measures to alleviate the impact;

- carry out schematic design of the proposed improvement schemes and measures on plans and sections in enough details to illustrate their feasibility with respect to the topography and surrounding developments/structures etc. and for proceeding with statutory procedures of rezoning and EIAO, where applicable; and
- review the public transport demand arising from the public housing developments, YLIEE and associated facilities proposals and recommend the required public transport services and the associated public transport facilities, all to be conducted in close liaison with transport operations divisions of Transport Department.

1.3 Structure of this Report

1.3.1.1 The structure of this Technical Report is as follows:

Section 1 Introduces the project background, objectives and the main tasks of the Study, as well as the purpose of this report.

Section 2 Presents the planning parameters of the preferred developments options for detailed technical assessment.

Section 3 Presents the technical approach of transport and traffic assessment.

Section 4 Presents the proposed traffic management measure to the external road network.

Section 5 Presents the proposed public transport facilities.

Section 6 Presents the proposed pedestrian and cycle track connection.

Section 7 Presents the findings on traffic impact assessment.

Section 8 Presents the findings on pedestrian impact assessment.

Section 9 Presents the findings on construction traffic impact assessment.

Section 10 Summary & Conclusion.

1.4 Nomenclature and Abbreviations

1.4.1.1 The following **Table 1.1** lists out the meaning of abbreviation for expressions adopted in this report:

Table 1.1.1 Abbreviations

Abbreviations	Term
ATC	Annual Traffic Census
AOI	Area of Influence
AT	Au Tau
BDTM	Base District Traffic Model
CLP	China Light and Power Hong Kong Limited

Abbreviations	Term
DD	District Distributor
DSD	Drainage Services Department
EPD	Environmental Protection Department
FSD	Fire Service Department
FWPSR	Fresh Water Primary Service Reservoirs
FWSR	Fresh Water Service Reservoirs
GB	Green Belt
GFA	Gross Floor Area
GLA	Gross Land Area
G/IC	Government/ Institution/ Community
HDLD	Highways Department Lighting Division
HGC	Hutchinson Global Communications Ltd
HKBN	Hong Kong Broadband Network Ltd
HKCG	The Hong Kong and China Gas Company Limited
HKCTV	Hong Kong Cable Television Ltd
HKPSG	Hong Kong Planning Standards and Guidelines
IL	Invert Level
ISWB	Integrated Social Welfare Building
LATM	Local Area Traffic Model
LD	Local Distributor
LOS	Local Open Space
MDD	Mean Daily Demand
NTM	Ngau Tam Mei
NWT	New World Telecommunications Ltd
OS	Open Storage
OZP	Outline Zoning Plan
PCU	Passenger Car Unit
PCCW	Hong Kong Telecommunications Ltd
PD	Primary Distributor
PDZ	Planning Data Zone
PE	Polyethylene
PH	Public Housing Site (This Project)
PR	Plot Ratio
PTI	Public Transport Interchange
TPDM	Transport Planning and Design Manual
TPEDM	Territorial Population and Employment Data Matrix
TPS	Tenants Purchase Scheme
TM	Transport Model
TR-2	Technical Report No. 2
TR-3	Technical Report No. 3
TTFN	Towngas Telecommunications Fixed Network Ltd
TWL	Top Water Level
UT	Urban Trunk
VE	Village Environs
WC	Wang Chau
WSD	Water Supplies Department
WT&T	Wharf T&T
WTW	Water Treatment Works
YLIE	Yuen Long Industrial Estate
YLIEE	Yuen Long Industrial Estate Extension (This Project)

2 PROJECT DESCRIPTION

2.1 Site Location

2.1.1.1 The Project site is bounded by the existing YLIE, Fuk Hi Street and Fuk Hing Garden and Sai Tau Wai to the east, Long Ping Road and Long Ping Estate to the south, Kai Shan to the west, as well as Shing Uk Tsuen, Tai Tseng Wai and Ng Uk Tsuen to the north as indicated in **Figure 1.1.1**.

2.2 Existing Conditions

2.2.1.1 According to the approved Ping Shan OZP No. S/YL-PS/14, the PH and YLIEE sites are currently zoned as "Green Belt" (GB) and "Open Storage" (OS) (**Figure 2.1.1**). It is occupied by OS, vehicle parks, farmland, fallow land, grassland, rural residential dwellings and temporary structures.

2.2.1.2 The surrounding areas of the Project site are characterized by a mixture of various land use zonings as well as different existing major land uses. These include high-rise residential development, villages and low-rise residential developments, natural landscapes, burial grounds and graves, industrial uses, major roads and railway tracks.

2.2.1.3 The Project site is irregular in shape. In terms of topography, it is generally flat on its northern and central portions and has a slightly hilly terrain on the south strip. The major land uses within the Project site include open storage/workshops, residential dwellings, agricultural and vegetated land, nullah with footpaths and watercourses.

2.3 The Preferred Option

2.3.1.1 During the process of option generation, a number of key elements which play determining roles in the formulation of initial development options have been identified. The key elements that have been paid with due respect include the burial ground at Kai Shan, Village Environs (VE) of Wing Ning Tsuen (D.D. 122), VE of Fung Chi Tsuen and Shui Tin Tsuen (D.D 120 & 122) and the Umah International Primary School. A preferred development option for PH site and YLIEE site has been formulated in the TR-2 Option Generation, Evaluation and Preliminary Assessments.

2.3.1.2 Since the approval of TR-2, discussions with various government departments have been carried out; and subsequently the Project site boundary, site layout and development parameters of the preferred option have been slightly refined and optimised to address different concerns of particular departments. This TR-3 is carried out based on the refined preferred option which is illustrated in **Figure 2.1.2**.

2.3.1.3 The revised Project site boundary, land use budget, site layout, urban design element and development scheme with parameters are briefly described in the following sections.

2.4 The Project Site Boundary

2.4.1.1 As recommended in TR-2, the Project site of the original preferred option is about 33.31 ha in size, with about 18.69 ha for the PH site and about 14.62 ha for the YLIEE site.

2.4.1.2 Taking into account the existing burial urns at Kai Shan, impacts to private land lots, woodland cutting, woodland compensation provision, existing boundaries of adjacent VE, interfacing with existing land use zonings and further optimisation of land use between PH and YLIEE sites, some minor refinements have been proposed.

2.4.1.3 The refined development site boundary is shown in **Figure 2.1.2**. With the refinement, the total area of the Project site is about 33.46 ha, with about 18.81 ha for PH site and about 14.65 ha for YLIEE site.

2.5 Land Use Budget

2.5.1.1 Subsequent to the refinement of the Project site boundary, with an aim to keep up with the development intensity and land use mix in the preferred option as generated under the guiding principles and relevant regulations, minor adjustments have also been made onto the land use budget.

2.5.1.2 **Table 2.5.1** below summarizes the land use budget for the refined site boundary.

Table 2.5.1 Proposed land use budget for the refined site boundary

Land Use	Land use budget
PH Site	
Residential	About 14.49 ha
School	About 1.94 ha (3 school sites)
G/IC (Integrated Social Welfare Building)	About 0.47 ha
Public Transport Interchange	About 0.41 ha
Roads, amenity greening and slope	About 1.49 ha
Total site area	**About 18.81 ha**
YLIEE Site	
Industrial	About 11.66 ha
Local Open Space (On-site preserved woodland area)	About 0.27 ha
Roads	About 1.81 ha
Slope	About 0.31 ha
Woodland compensation area & on-site ecological compensation area	About 0.41 ha
Parking Spaces	About 0.19 ha
Total site area	**About 14.65 ha**

2.6 Proposed Development of the PH Site

2.6.1 Guiding Planning Design Principles for the Public Housing Site

2.6.1.1 There are three major planning & urban design guiding principles followed in the design of the preferred option. These include:

i. Establishing view corridors to Kai Shan - This is achieved by aligning the northern road toward the foothills of the mountain, by strategically placing the schools to provide visual and spatial relief around the taller residential structures, and by utilizing the 50-metre buffer area as a non-developable zone separating the public housing site from the proposed industrial estate extension site.

ii. Placing public functions closer to the existing road networks - Commercial activities and the public transport interchange (PTI) have been placed along Fuk Hi Street and Long Ping Road in order to serve the greater community.

iii. Creating a tapering building height profile. The buildings taper down from 41 to 31 storeys. The tapering occurs at 5-storey intervals, in order to minimize the effect of the flat-head development.

2.6.2 Land Use Proposals

2.6.2.1 With the proposed refinement of the PH site boundary, types of land use remain unchanged. These include residential with local open space and parking spaces, retail, schools, integrated social welfare building (ISWB), PTI, roads, amenity greening and slope.

2.6.2.2 The PH site can be roughly divided into three portions. The southwestern portion of the PH site consists of the area around residential blocks 1 to 10 (Phase 1), the middle portion consists of the area around residential blocks 11 to 17 (Phase 2), and the northern portion consists of the area around buildings 18 to 24 (Phase 3). The middle and northern portions are bisected by the proposed northern access road.

2.6.2.3 **The Southwestern Portion**: The southwestern portion occupies an area of about 5.5ha. It consists of 10 residential buildings, two underground parking structures, a 2-storey commercial area, a social welfare building, i.e. ISWB, one school, and complementary recreational functions. All residential buildings in this portion will be of either 31 or 36 storeys. Single-aspect buildings have been utilized in all of the residential buildings, except Block 3, in order to minimize any potential conflicts from traffic noise issues. A two-storey retail facility has been placed strategically along Long Ping Road to allow street-front retail as well as serve the residents within the proposed new residential housing estate. An indicative pedestrian walkway

from Long Ping Estate would land at the same level as the podium level. The ISWB at the southwestern tip of this portion will provide a minimum net operating floor area of approximately 6000 m^2 for various social welfare facilities. A site of a primary school is reserved and proposed with a maximum building height of 8 storeys. Areas for two children playgrounds, two badminton courts, and one basketball court have also been reserved to serve the future residents. An existing shrine exists adjacent to the ISWB. Minimal disturbance has been taken into consideration with site formation in order to preserve this shrine.

2.6.2.4 **The Middle Portion**: It has an area of about 5.8ha. It consists of 7 residential buildings, a commercial area, one underground parking area, and other complementary recreational functions as well as a new road. The residential buildings in this portion taper from tallest (41 storeys) to the west to lowest (31 storeys) to the east. A pedestrian corridor with retail facilities on both sides is proposed. This design will minimize the adverse interface conflict between pedestrians and vehicles. In terms of complementary recreational functions, areas for four children playgrounds, three badminton courts, and two basketball courts have been served. An existing well currently situated between the proposed Blocks 12 and 13 is proposed to be preserved and beautified to give the area more character.

2.6.2.5 **The Northern Portion**: This portion occupies an area of about 7.5ha. It consists of 7 residential buildings, a commercial area, a semi-covered PTI, a non-buildable area, one underground parking area, two schools and complementary recreational functions. The residential buildings taper from tallest to the west (41 storeys) to lowest to the east (31 storeys). This tapering is of similar nature as to the buildings tapering in the middle portion. The commercial area in this portion is placed in the vicinity of the PTI, and creates a gateway to the pedestrian street found in the middle portion with the intention that it would serve both the PH site as well as the YLIEE site. In order to minimize the adverse interface conflicts generated between the YLIEE and the PH sites, a 50-metre buffer has been created between these two distinct zones. The buffer area would comprise of open space, a football pitch, badminton courts, and two playgrounds. Due to the shape of the 50-metre buffer area, this area is also most suitable for an underground parking area. Two schools have been placed strategically at the end of the proposed road, in order to further expand the frame of vision toward Kai Shan, as well as to provide a visual buffer from the high-density developments of the middle and northern portions. Apart from the recreational functions found along the 50-metre buffer, areas for two additional children playgrounds and two basketball courts have been reserved.

2.6.3 Development Schemes with Parameters

2.6.3.1 In the refined development scheme, the PH site has a site area of 18.81 ha. While the total site area is 18.81 ha, the total residential site

area is of a total of 14. 49ha which excludes 30-degree cut slope areas, local roads, and non residential structures, like the PTI, the ISWB, and the three school sites, based on the abovementioned land use proposals. Taking the opportunities to further optimize housing supply in response to the territorial need for housing by visiting various factors with a plot ratio (PR) of 6.0 (i.e. 5.86 domestic and 0.14 non-domestic) and maximum building height of 41 storeys, a total of a domestic GFA of 848,750 m^2 and retail GFA of 19,760 m^2. will be accommodated (**Table 2.6.1**). The proposed development option could then provide a total of 16,975 flats to cater for around 52,113 populations (**Table 2.6.2**). The breakdown of the GFA of each portion is as follows:

Table 2.6.1 Domestic and Retail GFA of the Three Portions

	Domestic GFA (m^2)	Retail GFA (m^2)
Southwestern Portion	213,750	6,784
Middle Portion	324,000	8,589
Northern Portion	311,000	4,383
Total	**848,750**	**19,756**

Remarks: It is assumed that the social welfare facilities, PTI, underground parking areas, schools and recreational functions are not accountable for GFA.

Table 2.6.2 The Estimation and Number of Flats of the Three Portions

	Area of Residential Site (ha)	Number of Flats^	Population*
Southwestern Portion	3.83	4,275	13,124
Middle Portion	5.00	6,480	19,894
Northern Portion	5.68	6,220	19,095
Total	14.49#	16,975	52,113

An adjustment of 0.02ha has been applied and subtracted from the total site area to avoid overprovision of domestic GFA.
^ It is also assumed that 50% of the flats will be for PRH and 50% will be for HOS.
* It is assumed that the person per flat is 3.07.

2.6.3.2 A summary of the key planning parameters for the PH development is given in **Table 2.6.3** below.

Table 2.6.3 Summary of Key Planning Parameters for PH development

Development Parameters	Units
Residential Site Area	14.49 ha
Domestic Plot Ratio	5.86
Domestic GFA	848,750 m^2
Estimates No. of Flats	16,975
Estimated Population	52,113
Non-domestic Plot Ratio	0.14
Non-domestic GFA	19,760 m^2
Maximum Building Height (in storeys) (Ground floor included)	31 / 36 / 41
Maximum Building Height (in metres)	87.1m / 100.85m / 114.6m
Maximum Number of Residential Storeys	30 / 35 / 40
Assumed No. of Units Per Storey	11 - 29 units
No. of Towers	24

2.7 Proposed Development of the YLIEE Site

2.7.1 Guiding Planning & Design Principles for the YLIEE Site

2.7.1.1 There are four planning & design principles that should be considered:

i. Optimising the development potential by partitioning the individual site with an optimal plot size between 0.65 and 0.75 ha as advised by HKSTPC.

ii. Minimising disturbance to existing woodland and providing an on-site woodland compensation area to minimise the need for off-site woodland compensation.

iii. Providing sufficient local open space for the enjoyment of local employees.

iv. Providing a pedestrian connection from the existing YLIE to the proposed YLIEE site.

2.7.2 Land Use Proposal

2.7.2.1 With the proposed refinement of the YLIEE site boundary, the major types of land use remain unchanged and a large portion of the area still contributes to industrial uses. While chances have been taken to further bring forward capitalization on existing natural resources within the YLIEE site, it is proposed to allow more on-site woodland compensation and ecological conservation area. In summary, other land uses include local open space, car parking space, road and slope area.

2.7.2.2 The YLIEE site has an area of 14.65ha. It consists of 16 individual plots, connected by a local road that terminates at a roundabout. Adequate Local Open Space (LOS) and parking areas have also been provided within the site. The LOS is currently occupied by woodland which will be preserved on-site. One on-site ecological compensation area has been proposed to the west of development plot VIII, and a woodland compensation area to the west of development plot VII has also been proposed.

2.7.3 Development Schemes with Parameters

2.7.3.1 In the refined preferred option, the total area for YLIEE site is 14.65 ha with 11.66 ha reserved for industrial use. A PR ratio of 2.5 and a maximum building height of 8 storeys for the industrial lots are proposed to remain unchanged. Chances were also taken to optimize industrial GFA provision and as a result, a maximum GFA of 291,545 m^2 will be provided to accommodate about 3,887 workers. A summary of the key planning parameters for the YLIEE development is given in **Table 2.7.1** below.

Table 2.7.1 Summary of key planning parameters for YLIEE development

Development Parameters	Units
Industrial Site Area	11.66 ha
Plot Ratio	2.5
Maximum GFA	291,545 m^2
Estimated No. of Worker*	About 3,887
Maximum Building Height (in storeys)	8 storeys
Maximum Building Height (in metres)	32m

* It is assumed that a worker density is 75 workers/ m^2.

2.7.3.2 In terms of the distribution of industrial lots, a summary is given in **Table 2.7.2** below.

Table 2.7.2 Summary of industrial lot sizes

Industrial lot size	Number of lots
1.10 ha -1.19 ha	1
1.00 ha - 1.09 ha	0
0.90 ha - 0.99 ha	0
0.80 ha - 0.89 ha	2
0.70 ha - 0.79 ha	4
0.60 ha - 0.69 ha	8
0.50 ha - 0.59 ha	1
Total number of lots	16

2.8 Tentative Implementation Programme

2.8.1.1 The PH site would be implemented in three phases and the YLIEE site would be developed in a single phase. The following summarises the tentative commissioning dates for both the PH and the YLIEE sites:

a) Year 2022: Granting of YLIEE's land starting from 2022 which will take about 4 years to complete

b) Year 2024: Population intake of PH Site Phase 1

c) Year 2026: Population intake of PH Site Phases 2 & 3

3 TECHNICAL APPROACH OF TRANSPORT AND TRAFFIC ASSESSMENT

3.1 Area of Influence

3.1.1.1 For the purpose of the traffic, air and noise impact assessments, a catchment area of 500 metres along the boundary is defined and shown in **Figure 3.1.1**. The coverage of the transport model is also presented in the figure.

3.2 Planning Assumptions for Model Input

3.2.1.1 The 2009-based TPEDM is released by PlanD in August 2011. It serves as the major input assumptions for the transport model which translates the demographic data into traffic and transport demand. The TPEDM covers base year 2009 and design years 2011, 2016, 2021, 2026 and 2031.

3.2.1.2 The TPEDM presents the population and employment assumptions by 405 PDZs. The proposed development is covered by 4 PDZ zones and the corresponding population and employment data are summarised in **Tables 3.2.1** and **3.2.2** below.

Table 3.2.1 Population and Employment Data of CTS Zones in the Study Area (2009 to 2031)

CTS Zone No.	Year					
	2009	2011	2016	2021	2026	2031
Design Population						
178	10,140	10,320	11,336	14,229	21,966	21,526
180	14,100	14,173	21,108	21,655	22,763	21,775
315	28,532	28,485	27,761	28,773	30,694	29,775
317	4,834	5,393	10,422	11,283	12,062	11,736
Total	**57,606**	**58,372**	**70,627**	**75,940**	**87,484**	**84,812**
Employment						
178	13,660	13,552	15,840	16,374	17,256	16,911
180	3,365	2,505	4,254	4,230	4,184	4,100
315	16,066	15,829	15,679	15,069	14,831	14,628
317	2,231	2,374	2,245	2,273	2,220	2,213
Total	**35,322**	**34,260**	**38,018**	**37,946**	**38,491**	**37,852**

Table 3.2.2 Percentage Change of Population and Employment Data of PDZ Zones in the Study Area (2009 to 2031)

CTS Zone No.	Year				
	2011/2009	2016/2011	2021/2016	2026/2021	2031/2026
Design Population					
178	0.88%	1.90%	4.65%	9.07%	-0.40%
180	0.26%	8.29%	0.51%	1.00%	-0.88%
315	-0.08%	-0.51%	0.72%	1.30%	-0.61%
317	5.63%	14.08%	1.60%	1.34%	-0.55%
Total	**0.66%**	**3.89%**	**1.46%**	**2.87%**	**-0.62%**

CTS Zone No.	Year				
	2011/2009	2016/2011	2021/2016	2026/2021	2031/2026
Employment					
178	-0.16%	3.17%	0.67%	1.05%	-0.40%
180	-5.73%	11.17%	-0.11%	-0.22%	-0.40%
315	-0.30%	-0.19%	-0.79%	-0.32%	-0.28%
317	1.25%	-1.11%	0.25%	-0.47%	-0.06%
Total	**-0.61%**	**2.10%**	**-0.04%**	**0.29%**	**-0.33%**

3.3 Concurrent Projects

3.3.1.1 **Table 3.3.1** below outlines the concurrent projects in the vicinity of the AOI.

Table 3.3.1 Summary on concurrent projects

Development	Development Type	Development Parameters		Intake Year
		Flats/Rooms	GFA	
Nam Sang Wai Lut Chau	Domestic	3,096	306,851	Not yet announced; Assumed 50% in 2021 and 100% in 2031
	Non-domestic	-	13,000	
West Rail Long Ping Station North Development	Domestic	832	-	2018[1]
West Rail Long Ping Station South Development	Domestic	720	-	2019[2]
Tin Shui Wai Area 115	Domestic	1,000	-	Not yet announced; Assumed 50% in 2021 and 100% in 2031
	Non-domestic	-	2,500	
	Hotel	200	-	
Ex-Yuen Long Estate (Private)	Domestic	960	-	Not yet announced; Assumed 100% in 2031
Ex-Yuen Long Estate (Housing Authority)	Domestic	440	-	Not yet announced; Assumed 100% in 2031
North East New Territories New Development Area	Mixed Use	With Reference to latest available TPEDM		
Lok Ma Chau Loop Development Area	Mixed Use	With Reference to latest available TPEDM		
Yuen Long South Development Area	Mixed Use	With Reference to latest available TPEDM		
Hung Shui Kiu Development Area	Mixed Use	With Reference to latest available TPEDM		
Kam Tin South Development Area	Mixed Use	With Reference to latest available TPEDM		

Note:
1. Reference was made on according to MTR's website: http://www.mtr.com.hk/eng/properties/westrail_lpn.html
2. Reference was made on according to MTR's website: http://www.mtr.com.hk/eng/properties/westrail_lps.html

3.4 2-Tier Transport Modelling

3.4.1.1 A two-tier modelling approach was proposed. The upper tier involved the use of Arup's in-house CTS-compatible TM which produced traffic forecasts on a strategic basis. The cordoned matrices from the TM would then be input into the lower tier LATM which would be used to predict the future year traffic flow on a more local perspective. The modelling approach is illustrated in **Figure 3.4.1** and also elaborated in the following sections.

Upper Tier Model

3.4.1.2 Arup's in-house CTS-compatible TM was applied as the upper tier model. The planning assumption as discussed in **Sections 3.2** & **3.3** had been incorporated into the TM. Adopting this TM would ensure compatibility with current government studies and would allow factors affecting global travel behaviour such as economic growth to be taken into account. The TM was capable of producing trip matrices for the base and future years based on demographic and socio-economic data such as population, employment and income etc., through which this traditional four-stage TM reflected trip generation/attraction, modal split, trip distribution, and trip assignment throughout the territory. The TM also offered the advantage of being capable of reflecting the traffic impacts especially the mode choice caused by changes of fundamental assumptions such as the demographic, socio-economic and infrastructures. It was hence recommended to adopt this model as the basis, and updated using the latest available planning data, land use data, planned and committed new infrastructures and local developments in the AOI for this study.

3.4.1.3 In order to ensure the traffic patterns predicted by the model could reasonably replicate the current traffic condition and hence provided confidence in forecasting the future year traffic, the output from the base year TM was compared against observed traffic flows as published in the Annual Traffic Census for both the AM and PM peak hours. Year 2009 was selected as the Base Year of the TM model.

Lower Tier Model

3.4.1.4 Matrices cordoned from the TM were input into the LATM. Despite the LATM only performs traffic assignment, it offered the benefit of giving more detailed accounting of queuing, junction control and delays, making it more suitable for the evaluation of localized traffic impacts.

3.4.1.5 The development of the LATM would follow the same approach as TD's latest 2008-based BDTM. The compatibility between the 2 tiers was ensured by the control of the external trip ends, which were essentially the link flows of San Tin Highway, Kam Tin Road, Kam Sheung Road, Tai Lam Tunnel, Yuen Long Highway – Lam Tei and Castle Peak Road – Lam Tei, obtained from the TM. In other words, the LATM would consistent with the TM in terms of the socio-economic, transport infrastructure, road network, planning data and all

relevant transport policy assumptions. The link flows and junction turning counts on a more local level would be produced by the LATM assignments for subsequent impact assessments.

3.4.1.6 Validation was also carried out for the LATM and additional focus was given to the comparison of observed and modelled flows at both strategic and local road links. Supplementary traffic survey had been conducted to provide traffic flows and turning counts which were not available in the Annual Traffic Census.

3.4.1.7 As survey counts represented the Year 2012 observed traffic flows, it was proposed to adopt Year 2012 as the LATM base year, and the LATM was validated to Year 2012 conditions. Trip matrices cordoned from the validated TM for the LATM model validation was projected from Year 2009 to 2012 by making reference to the published growth factors of various road links in AOI according to the Annual Traffic Census 2009 and 2012.

3.5 Traffic Projection Beyond Design Year 2031

3.5.1.1 The LATM has been developed for the area of North West New Territories, where the study area has been included.

3.5.1.2 The TM could be developed to the standard design years 2021, 2026 and 2031 where planning data is available. While the LATM requires trip matrices cordoned from the TM, the LATM could be directly developed from the corresponding TM years.

3.5.1.3 For year beyond 2031, as planning data is not available in 2009-based TPEDM, a modest annual growth, assumed half of the growth rate between 2026 and 2031 of the transport model, will be adopted. Consequently, the half traffic growth rate will be applied to the design year 2031 of the traffic model to produce the traffic forecast data of the required assessment years beyond 2031.

3.5.1.4 By reviewing the planning data growth from 2021 to 2026, and from 2026 to 2031, of the 2009-based TPEDM, as shown in **Table 3.5.1**, it is observed that the annual growth rate of the planning data in Yuen Long from 2026 to 2031 is in general far less than the annual growth rate from 2021 to 2026.

Table 3.5.1 Growth of Planning Data in 2009-based TPEDM

District	2021	2026	2031	2026/2021 growth p.a.	2031/2026 growth p.a
Usual Residents					
Yuen Long	173,767	188,656	190,976	1.7%	0.2%
Design Population					
Yuen Long	183,561	199,774	202,902	1.7%	0.3%

3.5.1.5 It is therefore assumed that the planning data growth from 2031 to 2036 will follow a conservative growth trend, i.e., about 50% of the annual growth rate from 2026 to 2031. An annual growth half of the growth rate of 2026-2031 is considered appropriate and will therefore be applied to design year 2031 for the projection to year between 2031 and 2036.

3.5.1.6 For year 2036 and onwards, similar method of projecting the traffic data from design year 2031 will be adopted. While the projected growth rate is derived in a 5-year horizon, it is assumed that the growth rate from years 2031 to 2036 should be half of that from years 2026 to 2031. The growth rate from year 2036 to 2041 should adopt further half of the growth rate from year 2031 to 2036.

3.5.1.7 The traffic growth factor for the years 2031 to 2036, and for the years 2036 to 2041, was derived from the transport model and is summarised in **Table 3.5.2**.

Table 3.5.2 Assumed Traffic Growth beyond Design Year 2031

Road-based Daily Traffic of the model coverage (pcus)		Growth Rate per annum		
2026	2031	2026-2031	2031-2036	2036-2041
164,766	170,614	0.70%	0.35%	0.18%

3.6 Planning Assumptions for Project Site

Design Year and Assessment Scenarios

3.6.1.1 The planning parameters and assumptions for the PH and YLIEE developments formed the key basis for the forecast of the vehicular and pedestrian traffic generated by the development itself in various assessment years. It is noted that the PH developments would be divided into two stages i.e. Phase 1 – Southern PH Site (north of Long Ping Road) and Phase 2 & 3 – Northern PH Site (west of Fuk Hi Street). YLIEE, on the other hand, was assumed to be completed in one phase with full commission in Year 2022. Considering the implementation programme of the developments, traffic impact due to the developments in year 2024, 2026 and 2031 will be assessed. **Table 3.6.1** below shows the assumed development phases and the corresponding implementation years.

Table 3.6.1 Summary on Planning Parameters and Assumptions

Development Type	Parameters
Design Year 2024 – Phase 1	
Public Housing Site – PRH	4,275 x 50% = 2,138 flats
Public Housing Site – HOS	4,275 x 50% = 2,138 flats
Public Housing Site – Retail	6,784 sqm GFA
YLIEE	146,500 sqm GLA
Design Year 2026 – Phase 2 and Phase 3 (Including Phase 1)	
Public Housing Site – PRH	2,138 + (6,480 + 6,220) x 50% = 8,488 flats
Public Housing Site – HOS	2,138 + (6,480 + 6,220) x 50% = 8,488 flats
Public Housing Site – Retail	19,756 sqm GFA
YLIEE	146,500 sqm GLA

Development Type	Parameters
Design Year 2031 – 5 years after full population intake	
Public Housing Site – PRH	2,138 + (6,480 + 6,220) x 50% = 8,488 flats
Public Housing Site – HOS	2,138 + (6,480 + 6,220) x 50% = 8,488 flats
Public Housing Site – Retail	19,756 sqm GFA
YLIEE	146,500 sqm GLA

Note:
1. The implementation arrangement of the proposed PH developments is yet to be confirmed at this stage of the Study, It is therefore assumed that 50% of the flats would be Public Rental Housing (PRH) while the remaining 50% would be Home Owner Scheme (HOS)
2. It is assumed that the industry nature of proposed YLIEE would be similar to the existing YLIE
3. GFA denotes Gross Floor Area
4. GLA denotes Gross Land Area
5. Number of flats is capped at 17,000 with HOS/PRH ratio of 50:50 for assessment purpose

Adopted Trip Rates for PH Development

3.6.1.2 To estimate the traffic generation of the proposed PH development, reference was made to traffic generation survey conducted at the existing similar developments in Yuen Long and Sha Tin areas where experience similar environment as the proposed PH.

3.6.1.3 The surveys were undertaken during the periods 07:30 – 09:30 and 17:30 – 19:30 hours on a normal weekday. Surveyors were deployed to conduct classified traffic count surveys on the vehicular trips entering to and leaving from the selected developments. The observed peak traffic generation rates are tabulated in **Table 3.6.2**. The surveyed trips were compared against the trip rates stated in TPDM as shown in **Table 3.6.3**. As such, appropriate trip could be adopted for the proposed PH development.

Table 3.6.2 Summary on Survey Trip Rates of Similar Development

Survey Location	Development Type	Unit	AM Peak		PM Peak	
			Generation Rate	Attraction Rate	Generation Rate	Attraction Rate
Yiu On Estate (Sha Tin)	PRH with TPS	pcu/hr/flat	0.0259	0.0157	0.0146	0.0179
Long Ping Estate (Yuen Long)	PRH with TPS	pcu/hr/flat	0.0246	0.0219	0.0120	0.0181
Kam Ying Court (Sha Tin)	HOS	pcu/hr/flat	0.0354	0.0186	0.0164	0.0245

Note:
1. TPS denotes Tenants Purchase Scheme

Table 3.6.3 Summary on Trips Rates Stated in TPDM

Development Type	Upper / Mean / Lower	Unit	AM Peak		PM Peak	
			Generation Rate	Attraction Rate	Generation Rate	Attraction Rate
PRH (Average Flat Size 40 sqm)	Upper	pcu/hr/flat	0.0539	0.0439	0.0278	0.0339
	Mean	pcu/hr/flat	0.0432	0.0326	0.0237	0.0301
	Lower	pcu/hr/flat	0.0325	0.0213	0.0196	0.0263
HOS (Average Flat Size 50 sqm)	Upper	pcu/hr/flat	0.0761	0.0573	0.035	0.0451
	Mean	pcu/hr/flat	0.0622	0.0426	0.0297	0.0401
	Lower	pcu/hr/flat	0.0483	0.0279	0.0244	0.0351

3.6.1.4 Having compared the surveyed trip rates and the trip rates stated in TPDM, it is generally observed that the surveyed trips rates were lower for both generation and attraction for both AM and PM peaks. It

is therefore recommended to adopt the lower values as underlined in **Table 3.6.3** for the PH developments for assessment.

Adopted Trip Rates for YLIEE Development

3.6.1.5 Similarly, trip generation survey was also conducted to review the traffic generation of the existing YLIE. The surveys were undertaken during the periods 07:30 – 09:30 and 17:30 – 19:30 hours on a normal weekday. Surveyors were deployed to conduct screenline surveys on the road links to the existing YLIE. In addition to the traffic count survey, questionnaire survey with the existing tenants of YLIE was also carried out to obtain the detailed travel characteristics of YLIE. **Table 3.6.4** and **Table 3.6.5** summarise the findings from the trip generation and questionnaire surveys.

Table 3.6.4 Summary on Trip Rate Obtained from Screenline Survey

	Unit	AM Peak		PM Peak	
		Generation Rate	Attraction Rate	Generation Rate	Attraction Rate
Trip rates obtained from screeline surveys	pcu/hr/GLA	0.0544	0.0585	0.0616	0.0311

Table 3.6.5 Summary on Trip Rates Obtained from Questionnaire Survey

Industry Type	Unit	AM Peak		PM Peak	
		Generation Rate	Attraction Rate	Generation Rate	Attraction Rate
Building Materials	pcu/hr/GLA	0.1252	0.0980	0.0871	0.0871
Dyeing and Finishing	pcu/hr/GLA	0.0097	0.0019	0.0000	0.0077
Food & Beverages	pcu/hr/GLA	0.0494	0.0494	0.0412	0.0247
Green Technology	pcu/hr/GLA	0.0281	0.0230	0.0204	0.0256
Machinery & Parts	pcu/hr/GLA	0.0957	0.0783	0.0609	0.0783
Metal Parts and Products	pcu/hr/GLA	0.0341	0.0244	0.0000	0.0097
Other Manufacturing	pcu/hr/GLA	0.0461	0.0261	0.0301	0.0341
Pharmaceutical	pcu/hr/GLA	0.0487	0.0469	0.0252	0.0270
Plastic Resins and Plastic Products	pcu/hr/GLA	0.0333	0.0222	0.0311	0.0267
Printing and Publishing	pcu/hr/GLA	0.0995	0.0972	0.0648	0.0648
Service & Support	pcu/hr/GLA	0.1337	0.1213	0.0622	0.0622
Average		0.0553	0.0474	0.0347	0.0341

3.6.1.6 Base on the findings from the above surveys, it is generally observed that the trips rates obtained from screeline survey were very similar to the ones obtained from the questionnaire survey. It is therefore recommended to adopt the trip rates obtained from the screenline survey as underlined in **Table 3.6.4** for the YLIEE development's assessment.

Design Year Traffic Generation for the Study Area

3.6.1.7 Based on the development parameters given **Table 3.6.1** and the adopted trip rates as shown in **Tables 3.6.3** and **3.6.4**, the total trips generated by the proposed development are computed and shown in **Table 3.6.6**.

Table 3.6.6 Traffic Generation for the Study Area

Development Type	Unit	AM Peak		PM Peak	
		Generation Rate	Attraction Rate	Generation Rate	Attraction Rate
Design Year 2024 – Phase 1					
Public Housing Site – PRH	pcu/hr	70	46	42	57
Public Housing Site – HOS	pcu/hr	104	60	53	76
Public Housing Site – Retail	pcu/hr	18	19	24	28
YLIEE	pcu/hr	81	87	91	47
Total in 2024		273	212	210	208
Design Year 2026 – Phase 2 and Phase 3 (Including Phase 1)					
Public Housing Site – PRH	pcu/hr	203	133	122	164
Public Housing Site – HOS	pcu/hr	301	174	152	219
Public Housing Site – Retail	pcu/hr	36	38	48	55
YLIEE	pcu/hr	81	87	91	47
Total in 2026		621	432	413	485
Design Year 2031 – 5 years after full population intake					
Public Housing Site – PRH	pcu/hr	203	133	122	164
Public Housing Site – HOS	pcu/hr	301	174	152	219
Public Housing Site – Retail	pcu/hr	36	38	48	55
YLIEE	pcu/hr	81	87	91	47
Total in 2031		621	432	413	485

3.7 Conversion of Traffic Model Output to Input of Environmental Study

Conversion from Passenger Car Unit to Vehicle

3.7.1.1 The BDTM models provided forecasts in PCU. The PCU factors were used to relate all vehicle types to passenger cars in terms of size and impact on road traffic. Large or slow-moving vehicles have larger PCU factors as they cause greater impact than smaller, faster vehicles. It will require to be converted into number of vehicles for the air and noise impact assessment.

3.7.1.2 PCU factors for each vehicle type as shown in **Table 3.7.1** below are applied to convert the traffic flows in PCUs extracted from the BDTM models. These conversion factors were derived when developing the BDTM models based on traffic count survey data collected for the BDTM studies.

Table 3.7.1 PCU Values by Vehicle Type

Vehicle Type	PCU Factor
Private Car (PC)	1
Motor Cycle	0.4
Taxi	1
Private Light Bus (PrLB)	1.5
Public Light Bus (PLB)	1.5
Light Goods Vehicle (LGV)	1.4
Medium & Heavy Goods Vehicle (MGV & HGV)	2.25
Non-franchised Bus (NFB)	2
Franchised Bus Single Deck (FBSD)	2
Franchised Bus Double Deck (FBDD)	2.5

3.7.1.3 These PCU factors were defined in the matrix building stage, where traffic survey data was collected based on the number of vehicles. Subsequently, converted from number of vehicles to PCU for environmental modelling purpose.

Weekday Daily Profile

Weekday daily profile has been derived from ATC based on the latest available data. There are a total of 580 ATC stations within the AOI, of which 32 stations are 'Type A', 23 stations are 'Type B' and 525 stations are 'Type C'. The daily profiles comprise various station types and road types.

Station type

- Type A station collects 24-hour traffic data weekly;
- Type B station collects 24-hour traffic data once a year; and
- Type C station collects 24-hour traffic data once every few years.

Road type

- Urban Trunk (UT);
- Primary Distributor (PD);
- District Distributor (DD); and
- Local Distributor (LD) and Minor Road.

3.7.1.4 Therefore, station type A provides the most reliable traffic data. These daily profiles were put together and outliners were identified and removed, the daily profile for different road types and directions are consolidated and averaged as shown in **Diagrams 3.7.1** to **3.7.4**. These daily profile represents the typical daily trends by road types and are applied to the traffic forecasts for the Environmental study.

Diagram 3.7.1: Weekday Daily Profile for Primary Distributor

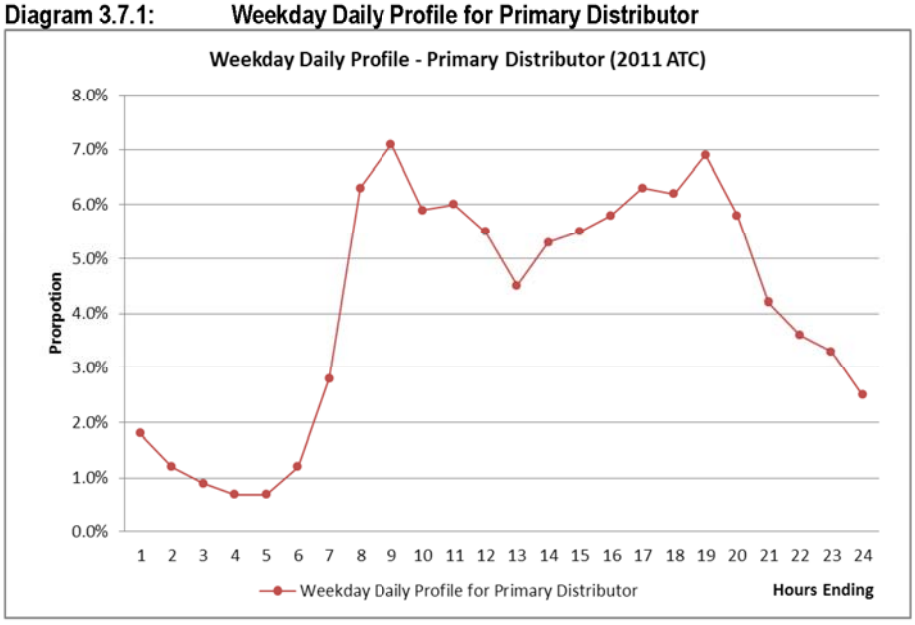


Diagram 3.7.2: Weekday Daily Profile for District Distributor

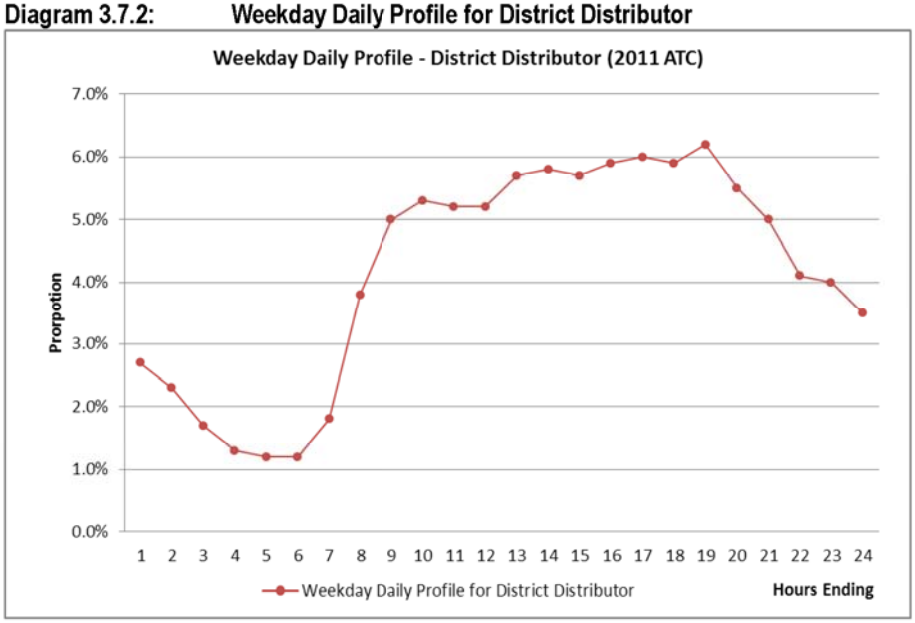


Diagram 3.7.3: Weekday Daily Profile for Local Distributor

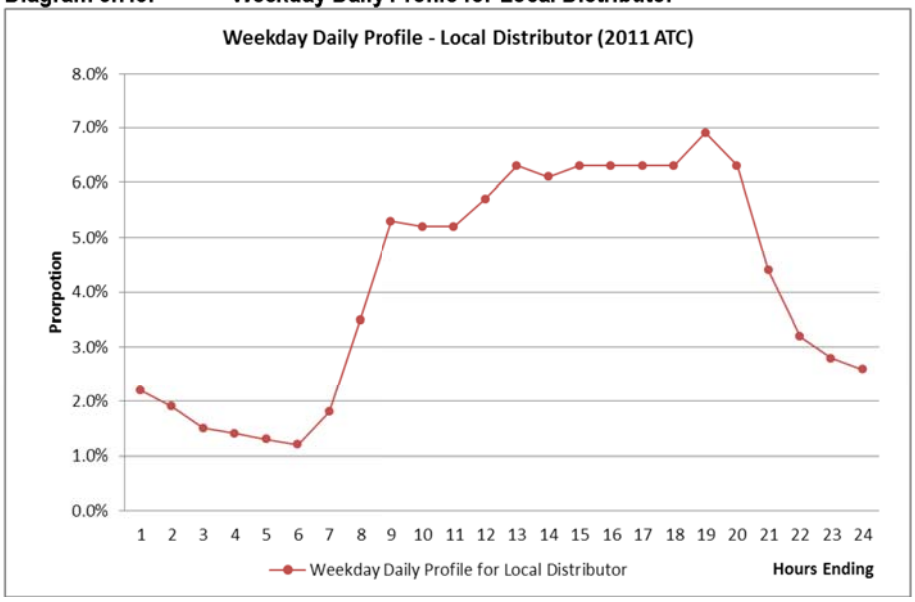
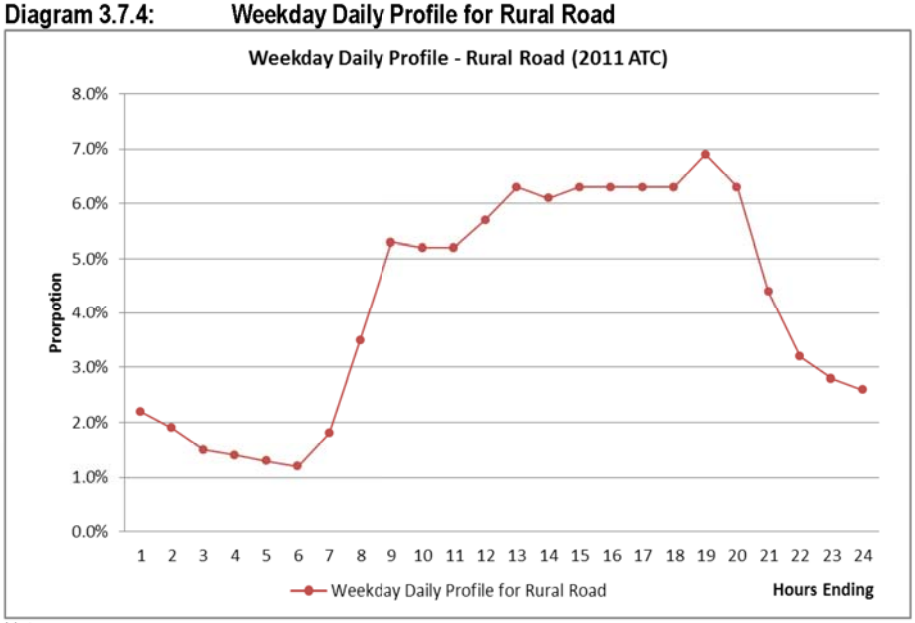


Diagram 3.7.4: Weekday Daily Profile for Rural Road



Note:

1. Due to the lack of ATC stations of Rural Road in the vicinity of the Study Area. It was assumed that Rural Road would share the same weekday daily profile as Local Distributor.

Vehicle Classification

3.7.1.5 Vehicle classifications, with reference to the 10 ATC vehicle classes, for different road sections were derived from the traffic survey which includes Motor Cycle, Private Car, Taxi, Private Light Bus, Public Light Bus, Goods Vehicle (Light and Medium & Heavy), Non-Franchised bus and Franchised Bus (Single Decker and Double Decker).

3.7.1.6 The vehicle type for the input of the Emfac-HK model in the air and noise impact assessment is in 16 classes. Further conversion from the above 10 ATC vehicle classes to 16 Emfac-HK vehicle classes is therefore required. The vehicle composition breakdown is derived based on the latest available Year 2010 HK vehicle population dataset which is available on EPD's website (http://www.epd.gov.hk/epd/english/environmentinhk/air/guide_ref/emfac.html).

3.7.1.7 Based on the definition, the 10 ATC vehicle classes are re-grouped into 16 vehicle types defined in Emfac-HK as in **Table 3.7.1**.

Table 3.7.1 Conversion of ATC to Emfac-HK Vehicle Classes

Vehicle class in ATC	Vehicle class in EMFAC-HK
PC	PC+LGV-petrol PC+LGV<2.5t-diesel
MC	Motorcycle -petrol
Taxi	Taxi- petrol/LPG (*assume no diesel taxi in future)
PrLB	PrLB<3.5t-petrol/LPG PrLB<3.5t-diesel PrLB>3.5t-petrol/LPG PrLB>3.5t-diesel
PLB	PLB (LPG) PLB (Diesel)

Vehicle class in ATC	Vehicle class in EMFAC-HK
LGV	PC+LGV-petrol PC+LGV<2.5t-diesel LGV2.5-3.5t-diesel LGV>3.5t-5.5t diesel
MGV & HGV	HGV<15t-diesel HGV>15t-diesel
NFB	NFB<6.4t-diesel NFB 6.4-15t-diesel NFB >15t-diesel
FBSD	FBSD - diesel
FBDD	FBDD - diesel

3.7.1.8 Based on the latest available Year 2010 HK vehicle population, the proposed vehicle composition percentage used for splitting the vehicle classes into 16 types is calculated in **Table 3.7.2** below:

Table 3.7.2 Vehicle composition percentage for splitting the 10 vehicle classes into 16 types

EMFAC veh class	Fuel Type	MC	Car	Taxi [1]	PrLB[2]	PLB	LGV	M&HGV [3]	NFB	FBSD	FBDD
PC	Petrol	0.00%	99.54%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.46%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	LPG	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Taxi	Petrol	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	LPG	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
LGV3	Petrol	0.00%	0.00%	0.00%	0.00%	0.00%	0.23%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	0.00%	0.00%	1.39%	0.00%	0.00%	0.00%	0.00%
	LPG	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
LGV4	Petrol	0.00%	0.00%	0.00%	0.00%	0.00%	1.74%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	0.00%	0.00%	60.00%	0.00%	0.00%	0.00%	0.00%
	LPG	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
LGV6	Petrol	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	0.00%	0.00%	36.64%	0.00%	0.00%	0.00%	0.00%
	LPG	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
HGV7	Petrol	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	26.08%	0.00%	0.00%	0.00%
	LPG	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
HGV8	Petrol	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	73.92%	0.00%	0.00%	0.00%
	LPG	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
PLB	Petrol	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	0.00%	35.56%	0.00%	0.00%	0.00%	0.00%	0.00%
	LPG	0.00%	0.00%	0.00%	0.00%	64.44%	0.00%	0.00%	0.00%	0.00%	0.00%
PV4	Petrol	0.00%	0.00%	0.00%	45.34%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	9.35%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	LPG	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

EMFAC veh class	Fuel Type	MC	Car	Taxi [1]	PrLB[2]	PLB	LGV	M&HGV [3]	NFB	FBSD	FBDD
PV5	Petrol	0.00%	0.00%	0.00%	0.27%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	29.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	LPG	0.00%	0.00%	0.00%	15.81%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NFB6	Petrol	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	40.88%	0.00%	0.00%
	LPG	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NFB7	Petrol	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	29.31%	0.00%	0.00%
	LPG	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NFB8	Petrol	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	29.81%	0.00%	0.00%
	LPG	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FBSD	Petrol	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
	LPG	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FBDD	Petrol	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
	LPG	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MC	Petrol	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Diesel	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	LPG	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Note:

2. Diesel taxi will be phased out. All taxis are LPG type in future assessment year
3. There are only 4 LPG PV4. It has been grouped to petrol type, i.e. same as for the base year vehicle population currently built in the Emfac v2.1 version.
4. MGV could either be HGV7 or HGV8. There is no information from Year 2010 HK vehicle population on the MGV (>24t) breakdown into <15t and >15t, but only the ratio of HGV7 and HGV8. The % are derived by grouping MGV and HGV and then split using the ratio of the HGV7 and HGV8 from Year 2010 HK vehicle population.
5. The percentage shown are rounded number so they may not add up to 100% for each column

Vehicular Traffic Data for Environmental Study

3.7.1.9 The vehicular traffic data adopted for the environmental impact assessments is tabulated in **Appendix A**. The figures are in vehicles/hour. The location of road ID is presented in **Figure 3.7.1** to **Figure 3.7.4**.

4 PROPOSED TRAFFIC MANAGEMENT MEASURES TO THE EXTERNAL ROAD NETWORK

4.1 Overall Vehicular Access Strategy

4.1.1.1 By studying the existing road network in the vicinity of the Study Area, and the need to maintain the accessibility of the development, three main road access (one cater for the southern PH site, one cater for the northern PH site while the remaining one cater for YLIEE) have been proposed to complement the layout of the Study Area. The key objective of the vehicular access strategy are established with due consideration to cater for the new demands from the developments, as well as improvements to the adjoining areas, specifically:

- To foster a more sustainable transport system which is highly responsive to the opportunities of the future highway and transport infrastructure and to the traffic constrains of local road network.

4.1.1.2 The overall layout of the external connectivity of the Study Area is shown in **Figure 4.1.1**. Details of the road access are discussed in the following sections.

4.2 Proposed Access Road for the Southern Public Housing Site

4.2.1.1 In order to provide direct and convenient access to the southern PH site, it is proposed to modify the existing junction of Long Ping Road and Fung Chi Road such that a new access road could be provided to serve the southern PH site as shown in **Figure 4.2.1**.

4.2.1.2 The proposed access road would extend northwards from the junction and continue towards the west near the existing West Rail track. The proposed access road is in single-2-lane configuration. The typical cross section of the proposed access road is shown in **Figure 4.2.2**. Based on traffic forecast results, the critical peak hour 2-way traffic flow in year 2031 is about 360 pcu/hr. Considering the design capacity of 1,800 pcu/hr for a single-2 lane access road, the V/C is about 0.20. Therefore, it is anticipated that the proposed access road in its single-2 lane configuration would be adequate to cater the traffic demand from the southern PH site, G/IC facility and as well as the school sites.

4.2.1.3 Due to the physical constraints of the southern PH site, the proposed access road would rise from the existing level at around +5.9mPD on Long Ping Road then levels at +15.0mPD near block 2 with a combination of gradient ranging between 6% to 8%.

4.2.1.4 In terms of the accessibility to blocks 6 – 10, a primary access has been proposed on the access road to provide access to the car parking

and loading/unloading area of blocks 6 – 10. A right turn pocket has also been proposed to minimise the interruption on prevailing traffic. A secondary access has been proposed on Long Ping Road opposite Kam Ping House of Long Ping Estate, which intended to provide emergency access only.

4.2.1.5 Run in/outs have been considered for blocks 4 – 5, blocks 1 – 3 as well as the G/IC facility. However, the arrangement of the run-in/outs is yet to be determined at this stage of the study and is subject to the implementation of these developments.

4.2.1.6 As for school 3, a pick-up/drop-off area (as shown in **Figure 4.2.1**) has been proposed. As the access is located in the vicinity of the bend of the access road, the boundary of the proposed school 3 has been setback such that a minimum sight distance of 50.0m could be achieved.

4.3 Proposed Access Road for the Northern Public Housing Site

4.3.1.1 The northern PH site is anticipated to have the greatest traffic demand out of the entire Study area. In order to minimise the impact on the local road network of Yuen Long Town, a traffic management scheme has been proposed to direct traffic from using the local roads within Yuen Long Town as far as possible.

4.3.1.2 The existing Fuk Hi Street is proposed to be widened from single-2-lane carriageway to a dual carriageway with 2 northbound traffic lanes and 3 southbound traffic lanes to cater for the anticipated traffic demand. The access road to the northern PH site and Fuk Hi Street together will form a signalised junction to provide access to the proposed and existing developments as shown in **Figure 4.3.1**.

4.3.1.3 In order to direct traffic away from the local roads, the traffic leaving from the northern PH site would be directed to use Fuk Hi Street and Long Ping Road such that the direct impact on the junctions along Long Yip Street could be reduced. The above traffic management measure to minimise traffic using those local roads in Yuen Long Town Centre is shown in **Figure 4.3.2**.

4.3.1.4 The access road leading to the northern PH site will be designed varying from 2 to 4 traffic lanes to allow traffic to pass whilst there are kerbside activities occupying the nearside lane and the laybys. Based on traffic forecast results, the critical peak hour 2-way traffic flow in year 2031 is about 880 pcu/hr. Considering the design capacity of 1,800 pcu/hr for a single-2 lane access road, the V/C is about 0.49. It is anticipated that the proposed access road would be adequate to serve the northern PH site and as well as the school sites. Run in/outs have been considered for blocks 11 – 17, blocks 18 – 24 as well as the school sites. However, the arrangement of the run-in/outs is yet to be determined at this stage of the study and is subject to the implementation of these developments. The typical cross

sections for Fuk Hi Street and access road for the northern public housing site are shown in **Figure 4.3.3**.

4.3.1.5 Nonetheless, a pick-up/drop-off area (as shown in **Figure 4.3.1**) has been reserved for schoo1 1 and 2.

4.4 Proposed Access Road for YLIEE

4.4.1.1 Similar to the existing roads in YLIE, a single-2-lane carriageway has been proposed to serve the future developments in YLIEE. With reference to TPDM, this single-2-lane carriageway is assumed to be a secondary industrial access road with a minimum width of 10.3m as shown in **Figure 4.4.2**. A turnaround facility has been proposed at the end of the access road.

4.4.1.2 The proposed access road would connect to the existing Fuk Hi Street in the form of priority junction as shown in **Figure 4.4.1**. Swept path analyses had been conducted to ensure that the priority junction would be able to allow the turning of 16.8m long vehicles.

5 PROVISION OF TRANSPORT FACILITIES

5.1 Existing Public Transport Services

5.1.1.1 Two bus termini can be found within the Study Area. They are located at Wang Lee Street and Long Ping Estate respectively. At present Long Ping bus terminus provides service for 8 franchised bus routes, and 3 of which terminate at the terminus. A summary of public transport services in the two bus termini as well as those serving the Study Area are shown in **Figure 5.1.1** and **Table 5.1.1**.

Table 5.1.1 Public Transport Services in the Study Area

Route No	Origin / Destination	
Franchised Bus (FB)		
68A	Long Ping Estate Bus Terminus	Tsing Yi Railway Station Bus Terminus
76K	Long Ping Estate Bus Terminus	Wah Ming Bus Terminus
263M	Fu Tai Estate Bus Terminus	Tsing Yi Railway Station Bus Terminus
264M	Tin Yan Estate Bus Terminus	Tsing Yi Railway Station Bus Terminus
268B	Long Ping Railway Station	Hung Hom Ferry Concourse Bus Terminus
268C	Long Ping Railway Station	Kwun Tong Ferry Bus Terminus
269D	Tin Fu	Lek Yuen Bus Terminus
276	Tin Tsz Bus Terminus	Sheung Shui Bus Terminus
276P	Tin Tsz Bus Terminus	Sheung Shui Bus Terminus
B1	Tin Shui Wai Railway Station	Lok Ma Chau Spur Line
E34	Tin Shui Wai Town Centre Bus Terminus	Airport (Ground Transportation Centre) Terminus
K66	Long Ping Estate Bus Terminus	Tai Tong Bus Terminus
K68	Yuen Long Industrial Estate Bus Terminus	Yuen Long Park
K73	Tin Heng Estate Public Transport Interchange	Yuen Long Plaza
K74	Tin Shui Bus Terminus	Yuen Long (East) Public Transport Interchange
N269	Tin Tsz Bus Terminus	Mei Foo Bus Terminus
N30	Yuen Long (East) Bus Terminus	Tung Chung Railway
Green Minibus (GMB)		
74	Yuen Long (Fook Hong Street) Minibus Terminus	Shing Uk Tsuen
74A	Yuen Long (Fook Hong Street) Minibus Terminus	Tung Tau Wai
77	Tin Shui Wai Town Centre Public Transport Interchange	Lok Ma Chau (San Tin) Public Transport Interchange
77A	Grandeur Terrace Terminus	Pok Oi Hospital Terminus
79S	Tin Chung Court Bus Terminus	Lok Ma Chau Control Point

5.2 Public Transport Interchange

5.2.1.1 In support of the transport strategy to promote the use of public transport facilities, a public transport interchange (PTI) is proposed at to the west of Fuk Hi Street between the northern PH site and YLIEE. The key objectives of the transport strategy are established with due consideration to cater for the new demands from the developments, as well as improvements to the adjoining areas, specifically:

- To encourage the use of public transport; and
- To establish a pedestrian friendly road network.

Public Transport Demand

5.2.1.2 Based on Arup's in-house CTS-compatible transport model, it is estimated that the modal share of rail-based and road-based public transport in Wang Chau were about 58% and 24% respectively as shown in **Table 5.2.1**. The higher modal share of rail-based public transport in Wang Chau as compared to the model share of entire Yuen Long District can be attributed by its proximity to the Long Ping MTR station.

5.2.1.3 The reliance of short-shuttle trips for rail passenger from the Study site to Long Ping Station has also been reviewed. Considering most of the housing blocks are within the rail catchment area, it is therefore assumed that majority of the rail-based public transport trips (75%) were walk trips, while the remaining would use GMB as the feeder services.

Table 5.2.1 Modal Share of Yuen Long and Wang Chau

Area	Private Mode	Public Transport	
		Rail	Road-based
Yuen Long	21%	48%	31%
Wang Chau	18%	58%	24%

5.2.1.4 The demand on public transport, both short-shuttle trips to Long Ping Station and external bus services, by person trips generated and attracted by the Study site was estimated by making reference to the Arup's in-house pedestrian trip surveys conducted for similar developments. The surveyed pedestrian trip generation rates were applied to the proposed number of flats to derive the trips. These trip rates and the estimated pedestrian trips are tabulated in **Table 5.2.2** and **Table 5.2.3**.

Table 5.2.2 Pedestrian Generation Rates

Development Type	Unit	AM Peak		PM Peak	
		Generation Rate	Attraction Rate	Generation Rate	Attraction Rate
PRH	Pedestrians /hr/flat	0.464	0.201	0.194	0.440
HOS	Pedestrians /hr/flat	0.494	0.081	0.158	0.298

Table 5.2.3 Estimated Demand on Public Transport

Parameter	Unit	AM Peak		PM Peak	
		Generation	Attraction	Generation	Attraction
Estimated Trips for 8,488 PRH Flats	persons/ hr	3,942	1,708	1,648	3,736
Estimated Trips for 8,488 HOS Flats	persons/ hr	4,190	689	1,339	2,528
Total		8,132	2,397	2,987	6,264

5.2.1.5 As shown in **Table 5.2.3**, of the total of 8,100 persons per hour critical peak hour one-way demand on public transport, there are some 2,000 and 1,200 persons per hour demand on road-based public transport and short-shuttle trips using GMB feeder services.

Preliminary Layout and Service Capacity of the proposed PTI

5.2.1.6 The estimated size of the PTI is 4,100m^2. The preliminary layout of the proposed PTI is shown in **Figure 5.2.1**. It would accommodate 2 bus bays (one single width and one double width), 1 GMB bay and 1 taxi bay. **Table 5.2.4** summarizes the provision of public transport facilities of the proposed PTI.

Table 5.2.4 Summary on public transport provision at the proposed PTI

Facility Type	Provision
Bus Bay – Single Width[1]	40m
Bus Bay – Double Width[1,2]	40m
Green Minibus (GMB) – Double Width[3]	40m
Taxi[4]	45m

Note:
1. With reference to TPDM, the width of the single width bus bay is 3.5m and the length is 40.0m which allows 1 boarding/alighting space and 2 spaces for stacking. If only one route is assigned to this bay, there will be 2 stacking spaces for the bus route. However, these spaces are not sued by buses of other routes even if the spaces are not occupied;
2. With reference to TPDM, the width of the double width bus bay is 7.3m and the length is 40.0m which allows 1 boarding/alighting space and 2 spaces for stacking for a terminating bus route, or alternatively provides 2 boarding/alighting spaces for en-route buses;
3. With reference to TPDM, public light bus bays should be 3.0m wide between kerbs with a minimum length of 30 metres for 4 PLBs. At least one double-width bay should be provided to facilitate bypassing. A passenger platform with shelter and queue railing should have a minimum width of 2.5m and minimum 2.0m wide without shelter; and
4. With reference to TPDM, taxi stands should be 3.0m in width from the kerb with a minimum length for 3 taxis. The length of taxi stand should accommodate some stacking requirements of off-peak hours when turn over is low.

5.2.1.7 A preliminary estimate of the road-based public transport requirements to meet the demand described above is shown in **Table 5.2.5**. 3 bus routes and 2 - 3 GMB routes are initially recommended. Therefore, the service capacity of the proposed PTI (3,100 and 1,400 persons per hour for franchised bus and GMB) would adequately cater for the road-based public transport demand (2,000 persons per hour) and feeder to rail-based public transport demand using GMB services (1,200 persons per hour) from the developments within the Study area.

5.2.1.8 It is noted that the final operation plan of the public transport would be subject to other operational considerations, and would be refined by the respective operators. The rerouting of existing public transport services along Long Ping Road to the Study site could also supplement these proposed public transport services.

Table 5.2.5 Estimates on Service Capacity

	Franchised Bus	GMB
Number of routes provided	3	2 – 3
Proposed AM peak headway (minutes)	7	2
Capacity	135	16
Occupancy rate in AM peak	0.9	1.0
Estimated service capacity in AM peak (persons per hour)	3,100	1,400

5.3 Parking and Servicing Facilities Provisions of the Proposed Developments

5.3.1.1 Private car, light goods vans and motorcycle parking spaces and loading/unloading bays will be provided inside the proposed developments.

5.3.1.2 The proposed parking and servicing requirements for the PH developments would make reference to the parking standards provided by Housing Authority while the parking standard for the YLIEE will follow the standards stipulated in Hong Kong Planning Standards and Guidelines (HKPSG). **Tables 5.3.1** and **5.3.2** summarise the requirements for the PH developments and YLIEE respectively.

Table 5.3.1 Summary on the requirements for PH site

Facilities	Standard
PRH - Domestic	
Private Car	Lower – 1 per 36 flats Higher – 1 per 33 flats
Motorcycle	1 per 80 flats
Light Goods Vans	Lower – 1 per 400 flats Higher – 1 per 300 flats
Loading/Unloading Bay	1 per block
Accessible Car Parking	Subject to the total no. of car parking space in lot: 1-50 = 1 51-150 = 2 151-250 = 3 251-350 = 4 351-450 = 5 Above 450 = 6
PRH – Non-Domestic (Retail/Commercial)	
Private Car	Lower – 1 per 300 sqm GFA Higher – 1 per 200 sqm GFA
Loading/Unloading Bay	Lower – 1 per 1200 sqm GFA Higher – 1 per 800 sqm GFA
Accessible Car Parking	Subject to the total no. of car parking space in lot: 1-50 = 1 51-150 = 2 151-250 = 3 251-350 = 4 351-450 = 5 Above 450 = 6

Facilities	Standard
HOS - Domestic	
Private Car	Lower – 1 per 19 flats Higher – 1 per 13 flats
Motorcycle	1 per 110 flats
Bicycle	1 per 7.5 flats
Loading/Unloading Bay	1 per block
Visitor Car Parking	Lower – 2 per block Higher – 3 per block
Accessible Car Parking	Subject to the total no. of car parking space in lot: 1-50 = 1 51-150 = 2 151-250 = 3 251-350 = 4 351-450 = 5 Above 450 = 6
HOS – Non-Domestic (Retail/Commercial)	
Private Car	1 per 200 sqm GFA
Loading/Unloading Bay	Lower – 1 per 1200 sqm GFA Higher – 1 per 800 sqm GFA
Accessible Car Parking	Subject to the total no. of car parking space in lot: 1-50 = 1 51-150 = 2 151-250 = 3 251-350 = 4 351-450 = 5 Above 450 = 6

Table 5.3.2 Summary on the requirements for YLIEE

Facilities	Standard
YLIEE	
Private Car & Lorry	1 per 900 sqm GFA; or 1 per 450 sqm site area, whichever is the greater *50% shall be private car and light goods vans and 50% shall be for parking and loading/unloading of lorries
Container Vehicle	1 per site
Accessible Car Parking	Subject to the total no. of car parking space in lot: 1-50 = 1 51-150 = 2 151-250 = 3 251-350 = 4 351-450 = 5 Above 450 = 6

5.3.1.3 With reference to the development parameters and assumptions shown in **Table 3.6.1** and the parking and loading/unloading facilities requirements as shown in **Tables 5.3.1** and **5.3.2**. The recommended

car parking and loading/unloading facilities for the PH site and YLIEE are summarised in **Tables 5.3.3** and **5.3.4**. In view of the transport strategy and the close proximity to West Rail Long Ping Station as discussed in **Sections 5.1** and **5.2**, it is proposed to adopt the low-end provision.

Table 5.3.3 Summary on the recommended provision of the PH site

Facilities	Standard	Recommended Provision
PRH – Domestic[1]		
Private Car	Lower – 1 per 36 flats	237
Motorcycle	1 per 80 flats	107
Light Goods Vans	Lower – 1 per 400 flats	22
Loading/Unloading Bay	1 per block[3]	12
Accessible Car Parking	Subject to the total no. of car parking space in lot: 151 - 250 = 3	3
PRH – Non-Domestic[2]		
Private Car	Lower – 1 per 300 sqm GFA	33
Loading/Unloading Bay	Lower – 1 per 1200 sqm GFA	9
Accessible Car Parking	Subject to the total no. of car parking space in lot: 1 - 50 = 1	1
HOS – Domestic[1]		
Private Car	Lower – 1 per 19 flats	448
Motorcycle	1 per 110 flats	78
Bicycle	1 per 7.5 flats	1,134
Loading/Unloading Bay	1 per block[3]	12
Visitor Car Parking	Lower – 2 per block	24
Accessible Car Parking	Subject to the total no. of car parking space in lot: 351 - 450 = 5	5
HOS – Non-Domestic[2]		
Private Car	1 per 200 sqm GFA	50
Loading/Unloading Bay	Lower – 1 per 1200 sqm GFA	9
Accessible Car Parking	Subject to the total no. of car parking space in lot: 1 - 50 = 1	1

Note:
1. Estimates based on the 50%:50% split of PRH and HOS. of the total no. of 17,000 flats
2. Estimates based on the 50%:50% split of PRH and HOS. of the total no. of 19,756 sqm GFA,; and
3. Estimates based on the 50%:50% split of PRH and HOS. of the total no. of 24 blocks.

Table 5.3.4 Summary on the recommended provision of the YLIEE

Facilities	Standard	Recommended Provision
Private Car & Lorry	1 per 900 sqm GFA	Private Car = 162 Lorry = 162
Container Vehicle	1 per site	16
Accessible Car Parking	Subject to the total no. of car parking space in lot: 151 - 250 = 3	3

Note:
1. No. of site refers to **Section 2.3**; and
2. Based on the plot ratio of 2.5 for the YLIEE, the GFA is assumed to be 291,545 sqm GFA. Based on the requirement stipulated in HKPSG, the 1 per 900 sqm GFA standard would be applied.

5.4 Review of Cycling Facilities

5.4.1.1 The proposed PH site would be served by the existing cycle track on Long Ping Road, Fuk Hi Street and Fung Chi Road (as shown in **Figure 5.1.1**). According to on-site observation, it was generally observed that the demand on existing cycling facilities was minimal. Furthermore, the proposed PH site would be well connected to the existing and proposed public transport facilities. Therefore, it is envisaged that the current cycling facilities would be adequate to cater for the future demand.

5.4.1.2 In terms of cycling facility to YLIEE, according to on-site survey on existing YLIE, it was generally observed that staff shuttle services were provided by the existing industrial developments and the number of trips made by cycling was found to be negligible. Therefore, it was considered that further expansion of the cycling facilities within the proposed YLIEE would not be required.

6 TRAFFIC IMPACT ASSESSMENT

6.1 Existing Road Network

6.1.1.1 The existing major transportation linkages are shown in **Figure 6.1.1**. The main road network in the vicinity includes Yuen Long Highway, Long Tin Road and Castle Peak Road – Yuen Long Section. These roads would serve as the main external road access for the Study area. In addition, Fuk Hi Street, Long Ping Road and Wang Lok Street would serve as the connections between the PHD site and Yuen Long Town.

Yuen Long Highway

6.1.1.2 Yuen Long Highway is an expressway in a dual-3 configuration, running in the east-west direction at the south of Yuen Long Town. It connects Tsing Long Highway in the east and Tuen Mun Road in the west. It caters mainly for traffic between New Territories West and Kowloon. Pok Oi Interchange is located at the junction amongst Yuen Long Highway and Castle Peak Road – Yuen Long Section, whereby majority of the traffic to Yuen Long Town from Kowloon will utilise this interchange. Pok Oi Interchange is currently operating over its capacity. Traffic queues are generally observed on the slip roads between Yuen Long Highway and Pok Oi Interchange. Tong Yan San Tsuen Interchange is located at the junction amongst Yuen Long Highway and Long Tin Road, whereby majority of the traffic to Yuen Long Town from Tuen Mun will utilise this interchange. Tong Yan San Tsuen Interchange is currently operating well within its capacity during normal peaks hours.

Long Tin Road

6.1.1.3 Long Tin Road is a primary distributor in dual carriageway configuration with 2 traffic lanes running in northbound and 3 traffic lanes running in southbound. It spans from Tin Tze Road in the north near Tin Tsz Estate and Yuen Long Highway in the south near The Eldorado. It currently serves as a major connector road between Yuen Long Highway, Castle Peak Road – Ping Shan, Wang Tat Road, Ma Wang Road, Long Ping Road as well as Tin Tsz Road in Tin Shui Wai.

Castle Peak Road – Yuen Long Section

6.1.1.4 Castle Peak Road – Yuen Long (Yuen Long Main Road) is a district distributor in dual carriageway configuration with one traffic lane running in each direction. It is the traditional main road in Yuen Long running in the middle of the town. Over the decades, Yuen Long expanded and Castle Peak Road was evolved as a main traffic street characterised with heavy people movements and immense kerb side activities. Most of the traffic was diverted to use Long Yip Street/Ma Wang Road/Wang Tat Road and Yuen Long Highway instead leaving most of the public transport services behind. Providing the Light Rail Transit (LRT) in the middle of the carriageway further pushed the

motorized traffic away from the Castle Peak Road and thus public transport services dominate traffic on it.

Fuk Hi Street

6.1.1.5 Fuk Hi Street is a local distributor in single-2 configuration with one traffic lane running in each direction. It is the key western access to Yuen Long Industrial Estate. It connects Long Ping Road to the south, which links to Long Tin Road and eventually to Yuen Long Highway. Numerous frontal vehicular accesses can be found along Fuk Hi Street with frequent on-street loading / unloading activities.

Long Ping Road

6.1.1.6 Long Ping Road is a district distributor in dual-2 configuration. It connects Fuk Hi Street in the north at the northern end of Long Ping Estate and Long Tin Road in the south near Chun Hing San Tsuen. It currently serves as a major connecting road between YLIE, Long Ping Estate, Tin Shui Wai and Yuen Long Highway.

Wang Lok Street

6.1.1.7 Wang Lok Street is a local distributor in dual-2 configuration. It is the key vehicular access to YLIE in the east. It connects Wang Tat Road / Long Yip Street in the south near Long Ping Station of West Rail. Wang Lok Street also provides access to Tung Tau Industrial Area via Fu Yip Street. Numerous frontal vehicular accesses can be found along Wang Lok Street with frequent on-street loading / unloading activities.

Wang Tat Road / Long Yip Street

6.1.1.8 Wang Tat Road / Long Yip Street is a primary distributor in a single-3 configuration running in the eastbound direction only. It connects Shui Pin Wai Interchange in the west and Castle Peak Road – Yuen Long in the east. It serves as a key traffic corridor in Yuen Long complement to Castle Peak Road.

Yuen Long On Lok Road / Ma Wang Road

6.1.1.9 Yuen Long On Lok Road / Ma Wang Road is a primary distributor in a single-3 configuration running in the westbound direction only. It connects Shui Pin Wai Interchange in the west and Castle Peak Road – Yuen Long in the east. It also serves as a key traffic corridor connecting Yuen Long Highway and the northern part of Yuen Long. Three intersections can be found between Wang Tat Road / Long Yip Street and Yuen Long On Lok Road / Ma Wang Road which enables the access between YLIE, Tung Tau Industrial Area, Yuen Long Town as well as Yuen Long Highway.

6.2 Base Year Traffic Condition

6.2.1.1 The traffic condition of the base year 2012 at major roads are presented in Link flow (in units of pcu/hr), and Volume/Capacity (V/C) ratio in **Table 6.2.1**. The location of the road links is shown in

Figure 6.1.1. Volume to Capacity (VC) Ratio indicates the proportion of peak hour traffic flow to the capacity of a road link. A higher VC ratio of a road indicates a heavy usage of the road link in concern, inter alia. Reviewing the VC ratio of major road link in the area helps identifying the spare capacity in the existing road network. Making a better use of the road network helps minimising the additional capital investment for further development in Yuen Long.

Table 6.2.1 Traffic flow (in pcu/hr) and V/C ratio of existing major road links

Key Corridors		Road Type	Configuration	Design Capacity	2012 Peak Hour Flow (pcu/hr)		2012 Peak Hour V/C Ratio	
					AM	PM	AM	PM
L1 – Yuen Long Highway – Tin Shui Wai West Interchange & Tong Yan San Tsuen Interchange[2]	EB	EX	D3	6,100	3,510	3,230	0.58	0.53
	WB				3,290	3,410	0.54	0.56
L2 – Yuen Long Highway – Tong Yan San Tsuen Interchange & Shap Pat Heung Interchange[2]	EB	EX	D3	6,100	4,300	3,950	0.70	0.65
	WB				4,030	4,180	0.66	0.68
L3 – Long Tin Road – Castle Peak Road – Yuen Long & Yuen Long Highway	SB	PD	D3	6,100	4,100	2,260	0.67	0.37
	NB				2,660	2,900	0.44	0.48
L4 – Long Ping Road – Shui Pin Wai Interchange & Fung Chi Road	EB	DD	D2	2,850	600	660	0.21	0.23
	WB				750	800	0.26	0.28

Note:
1. A V/C ratio below 1.0 is considered acceptable. A V/C ratio above 1.0 indicates the onset of mild congestion and a V/C ratio between 1.0 and 1.2 would indicate a manageable degree of congestion. A V/C ratio above 1.2 indicates the onset of more serious congestion.
2. Calculated traffic flow with reference to Annual Traffic Census 2012.

6.2.1.2 The results indicate that all assessed road links are currently operating at satisfactory level.

6.2.1.3 The major junctions which fall within the Study Area have been identified, and their locations are shown in **Figure 6.1.1**. The traffic condition for the base year 2012 at these major junctions are presented in Reserved Capacity (RC) for signal-controlled junction and Design Flow to Capacity (DFC) ratio for priority junction in **Table 6.2.2**. The base year 2012 peak hour traffic flow are presented in **Figure 6.2.1**.

Table 6.2.2 Assessment on existing major junctions

Junction	Junction Type	2012	
		AM	PM
J1 – Fuk Hi Street / Long Ping Road	Signal	48.6%	>50%
J2 – Fuk Hi Street / Wang Lok Street	Signal	45.0%	47.2%
J3 – Long Ping Road / Fung Chi Road	Signal	>50%	>50%
J4 – Fung Chi Road / Wang Tat Road / Ma Wang Road / Ping Wui Street	Signal	38.1%	>50%
J5 – Wang Lok Street / Wang Tat Road / Long Yip Street / Yuen Long On Lok Road / Ma Wang Road	Signal	34.8%	>50%

Junction	Junction Type	2012	
		AM	PM
J6 – Po Yip Street / Long Yip Street / Yuen Long On Lok Road	Signal	41.1%	>50%
J7 – Shui Bin Wai Interchange	Signal	>50%	>50%
J8 – Long Ping Road / Long Ping Estate Ingress	Priority	0.39	0.47
J9 – Long Ping Road / Long Ping Estate Egress	Priority	0.78	0.63

Note:
1. A signal-controlled junction with a Reserved Capacity (RC) of 0% implies that it is operating at capacity while a negative RC suggests that it is over capacity.
2. For priority junctions and roundabouts, the performance indicator is the Design Flow to Capacity (DFC) ratio. A DFC ratio less than 1.0 (or in positive percentage) indicates that the junction is operating within design capacity. A DFC ratio greater than 1.0 (or in negative percentage) indicates that the junction is overloaded, resulting in traffic queues and longer delay time to the minor arm traffic.

6.2.1.4 The results indicate that all the assessed junctions are currently operating at satisfactory.

6.3 Future Year Assessment

6.3.1.1 The traffic forecast for the design year 2024, 2026 and 2031 at major roads under with and without development scenarios are presented in Link flow (in units of pcu/hr) and Volume/Capacity (V/C) ratio in **Table 6.3.1** and **Table 6.3.2** respectively.

Table 6.3.1 Traffic flow on major road links for design years 2024, 2026 and 2031 (in pcu/hr)

Key Corridors		Road Type	Design Capacity	2024 without Development		2024 with Development		2026 without Development		2026 with Development		2031 without Development		2031 with Development	
				AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
L1	EB	EX	6,100	4,760	4,480	4,620	4,470	4,800	4,910	4,880	4,950	5,480	5,790	5,550	5,820
	WB			5,180	4,240	5,190	4,280	5,460	4,450	5,510	4,530	6,350	5,360	6,090	5,450
L2	EB	EX	6,100	5,150	4,440	5,820	4,580	6,070	5,000	6,220	5,200	7,120	6,270	7,250	6,450
	WB			4,420	4,520	4,430	4,570	4,580	4,640	4,620	4,680	5,040	5,410	5,040	5,230
L3	SB	PD	6,100	3,700	3,140	4,350	3,340	4,370	3,270	4,560	3,610	5,050	4,060	5,350	4,380
	NB			2,480	3,060	2,480	3,140	2,320	2,990	2,450	3,120	2,410	3,220	2,520	3,420
L4	EB	DD	2,850	320	490	510	580	340	480	640	700	350	520	720	750
	WB			610	730	790	990	750	790	1,380	1,280	810	930	1,530	1,380

Table 6.3.2 V/C ratio of major road links for design years 2024, 2026 and 2031

Key Corridors		Road Type	Design Capacity	2024 without Development		2024 with Development		2026 without Development		2026 with Development		2031 without Development		2031 with Development	
				AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
L1	EB	EX	6,100	0.78	0.73	0.76	0.73	0.79	0.80	0.80	0.81	0.90	0.95	0.91	0.95
	WB			0.85	0.70	0.85	0.70	0.90	0.73	0.90	0.74	1.04	0.88	1.00	0.89
L2	EB	EX	6,100	0.84	0.73	0.95	0.75	1.00	0.82	1.02	0.85	1.17	1.03	1.19	1.06
	WB			0.72	0.74	0.73	0.75	0.75	0.76	0.76	0.77	0.83	0.89	0.83	0.86
L3	SB	PD	6,100	0.61	0.51	0.71	0.55	0.72	0.54	0.75	0.59	0.83	0.67	0.88	0.72
	NB			0.41	0.50	0.41	0.51	0.38	0.49	0.40	0.51	0.40	0.53	0.41	0.56
L4	EB	DD	2,850	0.11	0.17	0.18	0.20	0.12	0.17	0.22	0.25	0.12	0.18	0.25	0.26
	WB			0.21	0.26	0.28	0.35	0.26	0.28	0.48	0.45	0.28	0.33	0.54	0.48

Note:
1. A V/C ratio below 1.0 is considered acceptable. A V/C ratio above 1.0 indicates the onset of mild congestion and a V/C ratio between 1.0 and 1.2 would indicate a manageable degree of congestion. A V/C ratio above 1.2 indicates the onset of more serious congestion.

6.3.1.2 The results indicate that all assessed road links would be operating at satisfactory level except for L2 where the V/C would increase to 1.19 for the with development scenario in 2031. Having reviewed the traffic forecast, L2 would be operating with a V/C ratio of 1.17 for the without development scenario in 2031. The contribution of traffic from the proposed developments in Wang Chau is estimated to be 2% of the overall traffic on L2. Therefore, it is considered that the impact is negligible.

6.3.1.3 The traffic forecast for the design year 2024, 2026 and 2031 at major junctions under with and without development scenarios are presented in Reserved Capacity (RC) for signal-controlled junction and Design Flow to Capacity (DFC) ratio for priority junction in **Table 6.3.3**. The design years 2024, 2026 and 2031 peak hour traffic flow under with and without development scenarios are presented in **Figure 6.3.1** to **Figure 6.3.6**.

Table 6.3.3 Assessment of major junctions for design years 2024, 2026 and 2031

Key Corridors	Junction Type	2024 without Development		2024 with Development		2026 without Development		2026 with Development		2031 without Development		2031 with Development	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Southern PH Site Access Road / Long Ping Road[1]	Signal	-	-	78.2%	49.2%	-	-	21.6%	23.0%	-	-	8.0%	9.1%
Northern PH Site Access Road / Fuk Hi Street	Signal	-	-	-	-	-	-	>50%	>50%	-	-	>50%	>50%
YLIEE Access Road / Fuk Hi Street	Priority	-	-	0.15	0.17	-	-	0.15	0.17	-	-	0.15	0.17
J1	Signal	43.1%	>50%	-	-	41.8%	>50%	47.2%	>50%	39.5%	>50%	35.8%	>50%
J2	Signal	42.5%	27.0%	21.6%	24.7%	44.2%	27.3%	9.4%	2.8%	44.1%	29.9%	9.6%	4.5%
J3	Signal	>50%	>50%	-	-	>50%	>50%	-	-	49.8%	44.7%	-	-
J4	Signal	37.1%	>50%	49.3%	>50%	22.7%	>50%	26.0%	>50%	-1.5%	42.4%	9.3%	26.9%
J5	Signal	30.5%	>50%	29.0%	>50%	22.0%	>50%	13.2%	35.4%	2.3%	9.6%	8.6%	27.7%
J6	Signal	17.8%	>50%	36.2%	>50%	18.2%	>50%	21.7%	>50%	2.7%	41.1%	12.5%	>50%
J7	Signal	>50%	>50%	>50%	>50%	>50%	>50%	5.8%	35.1%	29.2%	>50%	-0.5%	22.1%
J8	Priority	0.40	0.48	0.49	0.59	0.40	0.48	0.57	0.65	0.44	0.52	0.61	0.66
J9	Priority	0.83	0.68	0.83	0.68	0.84	0.68	0.94	0.73	0.84	0.68	0.96	0.74

Note:
1. A signal-controlled junction with a Reserved Capacity (RC) of 0% implies that it is operating at capacity while a negative RC suggests that it is over capacity.
2. For priority junctions and roundabouts, the performance indicator is the Design Flow to Capacity (DFC) ratio. A DFC ratio less than 1.0 (or in positive percentage) indicates that the junction is operating within design capacity. A DFC ratio greater than 1.0 (or in negative percentage) indicates that the junction is overloaded, resulting in traffic queues and longer delay time to the minor arm traffic.
3. For the without development scenario, J3 would remain the same as existing. For the with development scenario, J3 would be modified to form the junction of Southern PH Site Access / Long Ping Road;
4. As part of the traffic management measure to sustain the phase 2 & 3 of public housing development, the junction arrangement for Junction J1 as shown in **Figure 4.3.1** must be required. Therefore, the junction analyses for the 2026 and 2031 with development scenario have taken the proposed junction layout as shown in **Figure 4.3.1** into consideration;
5. It is assumed that the proposed junction improvement works proposed by West Rail Long Ping South Development would be in place as shown in **Figure 6.4.1**.
6. It is assumed that the proposed junction improvement works proposed by Hyd would be in place as shown in **Figure 6.4.2**.

6.3.1.4 The results indicate that all assessed junctions are currently operating at satisfactory level except for J2 and J7. The corresponding junction improvement schemes are discussed in the next section.

6.4 Recommended Junction Improvements

6.4.1.1 According to the junction performance assessments for future years, Junction 2 and Junction 7 are identified with potential capacity problems. Mitigation measures have been proposed and are discussed as follows:

Junction 2 – Fuk Hi Street / Wang Lok Street

6.4.1.2 It is observed from the traffic forecast that there is an increased traffic demand from Wang Lok Street northbound left turn to Fuk Hi Street westbound. It is proposed to widen the existing Wang Lok Street northbound to provide an additional traffic lane to cater for the left turn traffic demand as shown in **Figure 6.4.3**.

Junction 7 – Shui Bin Wai Interchange

6.4.1.3 It is observed from the traffic forecast that there is an increased traffic demand from Long Ping Road westbound left turn to Long Tin Road. It is proposed to rearrange the existing traffic island such that two left turn lanes can be provided to cater for the left turn traffic demand as shown in **Figure 6.4.4**.

Capacity Assessment with Recommended Junction Improvements

6.4.1.4 By implementing the proposed junction improvement schemes, the junctions with potential capacity problems induced by the proposed developments in the Study area in the future years will be suitably alleviated. The assessment results are summarised in **Table 6.4.1**.

Table 6.4.1 Assessment of major junctions with improvement for the future years

Key Corridors	Junction Type	2026 without Improvement		2026 with Improvement		2031 without Improvement		2031 with Improvement	
		AM	PM	AM	PM	AM	PM	AM	PM
J2	Signal	9.4%	2.8%	34.6%	39.7%	9.6%	4.5%	40.8%	42.1%
J7	Signal	5.8%	35.1%	28.3%	41.6%	-0.5%	22.1%	20.3%	20.1%

Note:
1. A signal-controlled junction with a Reserved Capacity (RC) of 0% implies that it is operating at capacity while a negative RC suggests that it is over capacity.

7 PEDESTRIAN IMPACT ASSESSMENT

7.1 Existing Pedestrian Condition

Existing Pedestrian Network

7.1.1.1 **Figure 7.1.1** shows the inventory of existing pedestrian network in the vicinity of the Study area.

7.1.1.2 There are existing footpaths at both eastern (along Fuk Hi Street) and southern (along Long Ping Road) frontages of the Study area. The footpaths, particularly along the southern frontage, provide key connection between the Study area and West Rail Long Ping Station.

7.1.1.3 The existing at-grade crossing facilities along Long Ping Road, Fuk Hi Street and Long Yip Street provide pedestrian access to/from the Yuen Long Town area.

7.1.1.4 In addition, pedestrian can used the elevated walkway system through Long Ping Estate to gain direct access to West Rail Long Ping Station.

7.1.1.5 The commonly observed pedestrian path in the area are summarised as below:

- Route 1: West Rail Long Ping Station Exit B1 → Footbridge across Wang Tat Road → Wang Tat Road Northern Side Footpath → Fung Chi Road Eastern Side Footpath→ Pedestrian Crossing across Long Ping Road;
- Route 2: West Rail Long Ping Station Exit B1 → Footbridge across Wang Tat Road →Elevated Walkway Network through Long Ping Estate → Pedestrian Crossing across Long Ping Road at the Intersection with Fuk Hi Street;
- Route 3: West Rail Long Ping Station Exit A → Wang Tat Road Northern Side Footpath → At-grade Footpath Network through Long Ping Estate → Pedestrian Crossing across Long Ping Road at the Intersection with Fuk Hi Street; and
- Route 4: West Rail Long Ping Station Exit A → Wang Tat Road Northern Side Footpath →Ping Yee Road / Wang Lok Street → Pedestrian Crossing across Long Ping Road at the Intersection with Fuk Hi Street

Existing Pedestrian Condition

7.1.1.6 Pedestrian count surveys were conducted on a normal weekday at selected locations as shown in **Figure 7.1.1**. It was anticipated that the peak pedestrian flows would be critical during the commuting period. The counts were undertaken during the periods 0730-0930 and 1730-1930 hours. The morning and evening peak hours were found to be 0730-0830 and 1830-1930 hours respectively. A "Level of Service" assessment was carried our as shown in **Table 7.1.2**.

7.1.1.7 "Level of Service" (LOS) analysis of the existing pedestrian facilities was carried out based on the definitions presented in the Highways Capacity Manual 2000. This follows the approach currently being recommended by Transport Department. In general, LOS C and D are typical values and LOS A and B would provide a very good LOS. At a LOS of A, pedestrians basically move in desired paths without altering their movements in response to other pedestrians. Walking speeds are freely selected and conflicts between pedestrians are unlikely. At a LOS of B, pedestrians would continue to freely select their own walking speed, can bypass slower pedestrians, and avoid crossing conflicts with others. At a LOS of C, pedestrians are restricted in selecting walking speed and in bypassing other pedestrians. A LOS of D would represent a further deterioration of the pedestrian movements but would still provide reasonable fluid flow. At a LOS of E or lower, it was determined that mitigation measures or improvement schemes should be considered to achieve a LOS of C or better. For the purposes of this pedestrian impact assessment, a LOS of C or above would be considered acceptable while a LOS of D would be marginally acceptable. **Table 7.1.1** shows the various LOS 'quantified' in terms of pedestrian flow rates

Table 7.1.1 Level of Service (LOS) for Walkway

LOS	Flow rate (ped/min/m)	Description
A	<= 16	Pedestrians move in desired paths. Walking speeds are freely selected and conflicts between pedestrians are unlikely.
B	16 - 23	Sufficient space is provided for pedestrians to freely select walking speeds, to bypass other pedestrians and to avoid crossing conflicts with others. Pedestrians become aware of other pedestrians.
C	23 - 33	Sufficient space is available to select normal walking speeds and to bypass other pedestrians in unidirectional stream. Minor conflicts will occur in reverse direction or crossing movements.
D	33 - 49	Freedom to select individual walking speeds and bypass other pedestrians is restricted. Probability of conflicts is high in crossing or reverse-flow movements. LOS provides reasonable fluid flow, however, friction and interactions between pedestrians are likely to occur.
E	49 - 75	All pedestrians would have normal walking speeds restricted. Space is insufficient to pass over slower pedestrians. Cross and reverse movements are possible only with extreme difficulties. Design volumes approach the limit of walking capacity.
F	> 75	Walking speeds are severely restricted. Forward progress is made by shuffling. Cross and reverse movements are virtually impossible. Space is more characteristic of queued pedestrians than of moving pedestrian streams.

7.1.1.8 Based on the pedestrian count surveys, **Table 7.1.2** details the results of the LOS assessment:

Table 7.1.2 LOS Assessments on Existing Walkways

Location		Type	Clear Width (m)	Ped Flow 2-way (ped/hr)		Ped Flow Rate (ped/m/min)		LOS	
				AM	PM	AM	PM	AM	PM
F1	Fuk Hi street (north of Long Ping Road Eastern Footpath)	Footpath	3.2	579	384	5.3	3.5	A	A
F2	Fuk Hi Street (south of Long Ping Road Eastern Footpath)	Footpath	3.4	301	387	2.7	3.5	A	A
F3	Wang Lok Street (Eastern Footpath)	Footpath	3.1	1,693	1,245	15.4	11.3	A	A
F4	Long Ping Road (Northern Footpath)	Footpath	3.6	147	248	1.3	2.3	A	A
F5	Fung Chi Road (Western Footpath)	Footpath	4	181	315	1.6	2.9	A	A

Notes:
1. Please refer to **Figure 7.2.1** for the location of the assessed pedestrian facilities.
2. Clear width in metres based on on-site measurement.
3. Computed based on effective width, by assuming 0.5m lateral clearance on both sides.

7.1.1.9 As shown in **Table 7.1.2**, all existing pedestrian footpaths are operating with LOS A. This indicates that there are currently no pedestrian circulation problems. In general, the morning peak hour flows are higher than those in the evening peak.

7.2 Planning Assumptions for Project Site

Development Schedule

7.2.1.1 As discussed in **Section 3.6**, **Table 7.2.1** below recaps the assumed development phases and the corresponding implementation years.

Table 7.2.1 Summary on Planning Parameters and Assumptions

Development Type	Parameters
Design Year 2024 – Phase 1	
Public Housing Site – PRH	4,275 x 50% = 2,138 flats
Public Housing Site – HOS	4,275 x 50% = 2,138 flats
Public Housing Site – Retail	6,784 sqm GFA
YLIEE	146,500 sqm GLA
Design Year 2026 – Phase 2 and Phase 3 (Including Phase 1)	
Public Housing Site – PRH	2,138 + (6,480 + 6,220) x 50% = 8,488 flats
Public Housing Site – HOS	2,138 + (6,480 + 6,220) x 50% = 8,488 flats
Public Housing Site – Retail	19,756 sqm GFA
YLIEE	146,500 sqm GLA
Design Year 2031 – 5 years after full population intake	
Public Housing Site – PRH	2,138 + (6,480 + 6,220) x 50% = 8,488 flats
Public Housing Site – HOS	2,138 + (6,480 + 6,220) x 50% = 8,488 flats
Public Housing Site – Retail	19,756 sqm GFA
YLIEE	146,500 sqm GLA

Note:
1. The implementation arrangement of the proposed PH developments is yet to be confirmed at this stage of the Study, It is therefore assumed that 50% of the flats would be Public Rental Housing (PRH) while the remaining 50% would be Home Owner Scheme (HOS)
2. It is assumed that the industry nature of proposed YLIEE would be similar to the existing YLIE
3. GFA denotes Gross Floor Area
4. GLA denotes Gross Land Area
5. Number of flats is capped at 17,000 with HOS/PRH ratio of 50:50 for assessment purpose

Pedestrian Access Arrangement

7.2.1.2 As mentioned in **Section 7.1**, there are existing footpaths at both eastern and southern frontages of the Study area. These two frontages would form the key connection to West Rail Long Ping Station as well as Yuen Long Town.

7.3 Future Pedestrian Condition

Pedestrian Trip Generation

7.3.1.1 To estimate the pedestrian generation for the proposed developments from the Study area, reference was made to pedestrian trip rate survey conducted at the existing similar developments in Yuen Long and Sha Tin areas which experience similar environments as the Study area.

7.3.1.2 The surveys were undertaken during the periods 0730-0930 and 1730-1930 hours on a normal weekday. Surveyors were deployed to observe pedestrian trips entering to and leaving from the selected developments. The observed peak pedestrian trip rates are tabulated in **Table 7.3.1**. These rates were applied to the proposed development parameter to derive the resident trips.

7.3.1.3 For the development types of community facilities and retail facilities, since they are expected to serve mainly the Site residents and will only induce minimal pedestrian trips on the external walkway network. These development types are therefore excluded from the pedestrian trip rate survey.

Table 7.3.1 Summary on Pedestrian Trip Rates of Similar Development

Survey Location	Development Type	Unit	AM Peak		PM Peak	
			Generation Rate	Attraction Rate	Generation Rate	Attraction Rate
Long Ping Estate (Yuen Long)	PRH with TPS	ped/hr/flat	0.4644	0.2012	0.1941	0.4401
Kam Ying Court (Sha Tin)	HOS	ped/hr/flat	0.4936	0.0811	0.1578	0.2978

Note:
TPS denotes Tenants Purchase Scheme

7.3.1.4 Using the observed trip rates above, the estimated generated and attracted trips related to the developments from the Study area was calculated. A summary of the estimated pedestrian trips is shown in **Table 7.3.2**.

Table 7.3.2 Summary of Estimated Pedestrian Trips

Development	No. of Flats	Unit	AM Peak		PM Peak	
			Generation	Attraction	Generation	Attraction
PRH	8,488	ped/hr/flat	3,942	1,708	1,648	3,736
HOS	8,488	ped/hr/flat	4,190	689	1,339	2,528

7.3.1.5 It can be seen in **Table 7.3.2** that the proposed developments would generate/attract some 10,500 and 9,300 pedestrians (2-way) during the morning and evening peak hours respectively.

Pedestrian Desire Lines

7.3.1.6 Pedestrian desire lines represent linkages of key trip generation and attraction areas that may be the source and destination of pedestrians.

7.3.1.7 The main pedestrian desire line during the peak hours would be from the Study area towards the public transport facilities in the area, including West Rail Long Ping Station, the PTI within the Study area and the PTI within Long Ping Estate.

Assessment Scenarios

7.3.1.8 Considering that the completion of the proposed developments in the Study area would occur by phases, i.e. phase 1 would be completed by 2024 and phase 2 would be completed by 2026. Therefore, years 2024, 2026 and 2031 were adopted as the design years which were inline with the assessment years of the traffic impact assessment. Year 2024 would demonstrate the pedestrian conditions in the Study area after Phase 1 completion while year 2026 would demonstrate the pedestrian condition in the Study area after the full implementation. The year 2031 scenario would demonstrate the fully settled pedestrian conditions in the Study area 5 years after completion of the whole proposed developments in the Study area.

Background Pedestrian Flow Forecast

7.3.1.9 Pedestrian flows adopted in the Study were primarily based on the existing pedestrian counts undertaken. A suitable growth factor was then applied to these counts to forecast the future pedestrian flow. The growth factor was determined using the same methodology as shown in **Section 3** of this Report.

Future Pedestrian Condition

7.3.1.10 Considering the background pedestrian flows, the proposed developments related pedestrian trips as described in the preceding sections, a forecast LOS assessment for the three design years 2024, 2026 and 2031 are shown in **Tables 7.3.3** to **7.3.5**.

Table 7.3.3 LOS Assessments on Existing Walkways in 2024

Location	Clear Width (m)	Ped Flow without Development (ped/hr)		Ped Flow with Development (ped/hr)		Ped Flow Rate without Development (ped/m/min)		Ped Flow Rate with Development (ped/m/min)		LOS without Development		LOS with Development	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
F1	3.2	592	393	1,843	1,644	4.5	3.0	14.0	12.5	A	A	A	A
F2	3.4	308	396	1,559	1,647	2.3	3.0	11.8	12.5	A	A	A	A
F3	3.1	1,731	1,273	2,982	2,524	13.1	9.6	22.6	19.1	A	A	B	B
F4	3.6	150	254	2,728	2,831	1.1	1.9	20.7	21.4	A	A	B	B
F5	4	185	322	589	726	1.4	2.4	4.5	5.5	A	A	A	A

Notes:
1. Please refer to **Figure 7.2.1** for the location of the assessed pedestrian facilities.
2. Clear width in metres based on on-site measurement.
3. Computed based on effective width, by assuming 0.5m lateral clearance on both sides.

Table 7.3.4 LOS Assessments on Existing Walkways in 2026

Location	Clear Width (m)	Ped Flow without Development (ped/hr)		Ped Flow with Development (ped/hr)		Ped Flow Rate without Development (ped/m/min)		Ped Flow Rate with Development (ped/m/min)		LOS without Development		LOS with Development	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
F1	3.2	594	394	1,845	1,645	4.5	3.0	14.0	12.5	A	A	A	A
F2	3.4	309	397	1,560	1,648	2.3	3.0	11.8	12.5	A	A	A	A
F3	3.1	1,738	1,278	2,989	2,529	13.2	9.7	22.6	19.2	A	A	B	B
F4	3.6	151	255	2,729	2,832	1.1	1.9	20.7	21.5	A	A	B	B
F5	4	186	323	590	728	1.4	2.4	4.5	5.5	A	A	A	A

Notes:
1. Please refer to **Figure 7.2.1** for the location of the assessed pedestrian facilities.
2. Clear width in metres based on on-site measurement.
3. Computed based on effective width, by assuming 0.5m lateral clearance on both sides.

Table 7.3.5 LOS Assessments on Existing Walkways in 2031

Location	Clear Width (m)	Ped Flow without Development (ped/hr)		Ped Flow with Development (ped/hr)		Ped Flow Rate without Development (ped/m/min)		Ped Flow Rate with Development (ped/m/min)		LOS without Development		LOS with Development	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
F1	3.2	600	398	1,851	1,649	4.5	3.0	14.0	12.5	A	A	A	A
F2	3.4	312	401	1,563	1,652	2.4	3.0	11.8	12.5	A	A	A	A
F3	3.1	1,755	1,291	3,006	2,542	13.3	9.8	22.8	19.3	A	A	B	B
F4	3.6	152	257	2,730	2,835	1.2	1.9	20.7	21.5	A	A	B	B
F5	4	188	327	592	731	1.4	2.5	4.5	5.5	A	A	A	A

Notes:
1. Please refer to **Figure 7.2.1** for the location of the assessed pedestrian facilities.
2. Clear width in metres based on on-site measurement.
3. Computed based on effective width, by assuming 0.5m lateral clearance on both sides.

7.3.1.11 As shown in **Tables 7.3.3** to **7.3.5**, all the future pedestrian facilities are predicted to operate with LOS B or above. It is anticipated that the impact on existing pedestrian network would be minimal.

8 CONSTRUCTION TRAFFIC IMPACT ASSESSMENT

8.1 Overview

8.1.1.1 The volume of construction traffic is based on the preliminary estimates on the excavation and construction material.

8.1.1.2 Quantities for the various construction tasks have been identified to calculate the number of trips that can be expected for the duration of the project. Estimates of the number of site employees have also been made from which employee movements have been calculated to derive the total number of trips expected from the site both throughout the day and during peak period.

8.2 Construction Programme

8.2.1.1 Considering the construction sequence and schedule, year 2019 is identified as the critical construction stage with respect to the peak construction traffic generated.

8.3 Construction Material Transport Assumptions

8.3.1.1 Assumptions to estimate the number of vehicle trips generated from the transport of construction materials on the road network have been estimated based on the nature and size of the works. Construction traffic is principally generated by spoil disposal and concrete delivery trucks.

8.3.1.2 To facilitate the assessment of the capacity of the key junctions and road links, the construction traffic generated was converted in terms of passenger car unit (PCU), using a common multiplication factor of 2.5 for both spoil and concrete lorries. The maximum number of trucks generated hourly during the peak periods was estimated based on the design assumptions as shown in **Table 8.3.1** and **Table 8.4.1**.

Table 8.3.1 Truck type and capacity assumptions

Truck Type	Transport Materials	Truck Capacity	PCU Factor
1	Spoil/Fill/Build Deliveries	5.0m^3	2.5
2	Steel	10 or 20 ton	2.5
3	Concrete	5.0m^3	2.5
4	Formwork	50m^2	2.5

8.4 Construction Material Trip Estimates

8.4.1.1 Estimates of the number of trips likely to be made from each construction activity were calculated according to the above stated assumptions. For each activity the expected timing and duration from the construction programme were used to calculate the daily and peak hour estimates of construction trips.

Table 8.4.1: Work rate assumptions

Criteria	Value
Working hours per day (i.e. 0800 – 1700 hours) (for truck movement)	8
Peak hour factor	3

8.5 Construction Material Trip Generation

8.5.1.1 To determine the total traffic movements for the site, the cumulative effect of concurrent activities has been derived and the busiest period during the entire construction period identified. The peak period of construction related traffic activity is expected to occur in 2019 when some **144** trucks per day or **45 pcu/hour** (including peak factor) will be generated and attracted in the peak hour.

8.5.1.2 A summary of trips generated and attracted by the construction listed in **Table 8.5.1**.

Table 8.5.1 Estimated construction traffic generation & attraction

Work Site	Estimate of Peak Construction Traffic (pcu/hour each way)
Wang Chau	45

8.6 Trips by Construction Workers and Staff

8.6.1.1 In addition to the journeys made by vehicles transporting construction material, trips will also be made by construction workers and staff travelling to and from the site. The site is close proximity of major public transport hub (Long Ping Estate Bus Terminus and West Rail Long Ping Station). The majority of site employees will therefore likely use existing public transport service and will not generate additional trips on the road network.

8.7 Construction Traffic Routing

8.7.1.1 As mentioned in 8.3.1.1, construction traffic is principally generated by soil disposal and concrete delivery trucks. At this stage of the Study, it is assumed that the construction traffic movements would avoid passing through the high density residential areas in Yuen Long. Therefore, the main construction traffic routing would be via Yuen Long Highway, Shui Bin Wai Interchange, Long Ping Road and Fuk Hi Street. The construction traffic routing is shown in **Figure 8.7.1**.

8.8 Construction Traffic Forecast

8.8.1.1 Peak traffic levels generated from construction site are expected to occur in year 2019; therefore year 2019 has been adopted as the assessment year for construction traffic impact assessment. The future year traffic forecasting was developed with the same methodology as discussed in **Section 3**.

8.9 Assessment Scenarios

8.9.1.1 To evaluate the associated traffic impact likely to be induced by construction worksites two scenarios have been developed and analysed. The first scenario, named "Reference Scenario", assumed that there will be no construction taking place. The second scenario, named "Design Scenario", assumed that there will be construction traffic as well as the Temporary Traffic Management Scheme (TTMS) and the associated traffic diversion in place. The traffic forecast scenarios are summarised as follows;

- Year 2019 Reference Scenario – Year 2019 background traffic forecast
- Year 2019 Design Scenario – Year 2019 reference scenario + traffic generated / attracted due to construction activities

8.10 Preliminary Construction Traffic Impact Assessment

8.10.1.1 Considering the construction traffic routing as discussed in Section 8.7, the traffic forecast for the year 2019 at major roads under reference and design scenarios are presented in Link flow (in units of pcu/hr), and Volumn/Capacity (V/C) ratio in **Table 8.10.1**. The results indicate that all assessed road links would be operating at satisfactory level.

Table 8.10.1 Traffic flow (pcu/hr) and V/C ratio of major road links at critical construction stage

Key Corridors		Road Type	Design Capacity	2019 Reference Peak hour flow		2019 Design Peak hour flow		2019 Reference V/C ratio		2019 Design V/C ratio	
				AM	PM	AM	PM	AM	PM	AM	PM
L1	EB	EX	6,100	4,031	3,751	4,054	3,774	0.66	0.61	0.66	0.62
	WB			4,078	3,756	4,101	3,779	0.67	0.62	0.67	0.62
L2	EB	EX	6,100	4,654	4,154	4,677	4,177	0.76	0.68	0.77	0.68
	WB			4,193	4,322	4,216	4,345	0.69	0.71	0.69	0.71
L3	SB	PD	6,100	3,933	2,627	3,978	2,672	0.64	0.43	0.65	0.44
	NB			2,585	2,967	2,630	3,012	0.42	0.49	0.43	0.49
L4	EB	DD	2,850	483	589	528	634	0.17	0.21	0.19	0.22
	WB			692	771	737	816	0.24	0.27	0.26	0.29

Note:
1. A V/C ratio below 1.0 is considered acceptable. A V/C ratio above 1.0 indicates the onset of mild congestion and a V/C ratio between 1.0 and 1.2 would indicate a manageable degree of congestion. A V/C ratio above 1.2 indicates the onset of more serious congestion.

8.10.1.2 Only J1, J3 and J7 will be affected by the construction traffic by considering their routing. The traffic forecast for the year 2019 at these major junctions under reference and design scenarios are presented in Reserved Capacity (RC) for signal-controlled junction in **Table 8.10.2**. The results indicate that all assessed junctions would be operating at satisfactory levels.

Table 8.10.2 Assessment of major junctions at critical construction stage

Key Corridors	Junction Type	2019 Reference		2019 Design	
		AM	PM	AM	PM
J1	Signal	40%	>50%	39%	>50%
J3	Signal	>50%	>50%	>50%	>50%
J7	Signal	>50%	>50%	>50%	>50%

Note:
1. A signal-controlled junction with a Reserved Capacity (RC) of 0% implies that it is operating at capacity while a negative RC suggests that it is over capacity.

8.10.1.3 As indicated in the Section 8.5, it is anticipated that construction traffic generated is less than 50 pcu/hr during the peak hour at the critical construction stage. The traffic forecast results at major road links and major junctions reveal that the construction traffic will not adversely affect the capacity of the existing road system and the junction capacity of the major junctions in the peak hour in the vicinity of the development site.

8.11 Preliminary Temporary Traffic Management Schemes for the Construction of Utilities

8.11.1.1 Preliminary temporary traffic management schemes (TTMS) have been prepared for the proposed utility upgrading works which would be required to support the proposed developments in the Wang Chau Area, namely:

- Sewerage upgrading works on Fung Chi Road, Fuk Hi Street section between access road to Fuk Hing Tsuen and Wang Lee Street, and the section across Long Ping Road connecting between the access road of the PH Phase 1 development and Fung Chi Road
- Drainage upgrading works on Long Ping Road section between Fung Chi Road and Fuk Hi Street, and Fuk Hi Street section between Wang Lok Street and access road to the proposed YLIEE
- Water supply upgrading works on Long Ping Road near the intersection with Fuk Hi Street

8.11.1.2 It is noted that the assessment for road links and junctions under lane closures for construction activities shall be carried out in detailed stage to take into account the prevailing traffic condition.

Sewerage Upgrading Works

8.11.1.3 The proposed sewerage upgrading works would be required on Fung Chi Road northbound. At present, Fung Chi Road is a single-2-lane carriageway which connects Long Ping Road and Wang Tat Road. According to the current construction method, it is anticipated that temporary closure of 1 traffic lane would be required to facilitate the construction works. The existing cycle track would be temporarily suspended during the course of construction. A preliminary TTMS is shown in **Figure 8.11.1**.

8.11.1.4 For the works on Fuk Hi Street section between access road to Fuk Hing Tsuen and Wang Lee Street, it is anticipated that partial lane closure of Fuk Hi Street northbound would be required. A minimum of 7.3m wide 2-way carriageway would be maintained. A typical TTMS is shown in **Figure 8.11.2**.

8.11.1.5 For the works across Long Ping Road connecting between the access road of the PH Phase 1 development and Fung Chi Road, it is anticipated that temporary closure of 1 traffic lane for each direction by stage would be required to facilitate the construction works. A preliminary TTMS is shown in **Figure 8.11.3**.

Drainage Upgrading Works

8.11.1.6 The proposed drainage upgrading works would be required on Fuk Hi Street southbound. At present, Fuk Hi Street is a dual-2-lane carriageway which connects the proposed developments and Wang Lok Street. According to the current construction method, it is anticipated that temporary closure of the southbound carriageway of Fuk HI Street (south of Long Ping Road) would be required to facilitate the construction works. It is proposed to temporarily convert the existing central median and eastern footpath into carriageway to maintain the 2 southbound traffic lanes. A preliminary TTMS is shown in **Figure 8.11.4**.

8.11.1.7 Partial lane closure on Fuk Hi Street (north of Long Ping Road) would also be required to facilitate the construction works. A preliminary TTMS is shown in **Figure 8.11.5**.

8.11.1.8 For the works on Long Ping Road, similar arrangement as Fuk Hi Street would be required. According to the current construction method, it is anticipated that temporary closure of the eastbound carriageway would be required to facilitate the construction works. It is proposed to temporarily convert the existing central median and northern footpath into carriageway to maintain the 2 eastbound traffic lanes. A preliminary TTMS is shown in **Figure 8.11.6**.

Water Supply Upgrading Works

8.11.1.9 The proposed water supply upgrading works would be required on Long Ping Road eastbound near the intersection with Fuk Hi Street. In view of minimising the overall traffic impact, the proposed upgrading works should be considered along with the drainage upgrading works. A preliminary TTMS is shown in **Figure 8.11.7**.

9 SUMMARY AND CONCLUSION

9.1 Summary

9.1.1.1 This report has provided a transport and traffic impact assessment of the proposed PH and YLIEE developments on the existing and planned transport systems. The planning parameters and assumptions have been used to form the key basis for the forecast of the traffic generated by the developments after the full commissioning of the developments. A 2-tier transport modelling approach has been adopted for traffic forecast purpose. Both strategic and local transport models have been developed to provide quantitative input for the road capacity analyses of the major road corridors and junctions. Necessary road improvements measures have been identified to mitigate the potential traffic impact due to the proposed developments in Wang Chau.

9.1.1.2 Public transport strategy has also been presented in the report, providing adequate public transport facilities for accessing the proposed developments in Wang Chau. The public transport facilities is complemented by the proposed pedestrian network which further enhance the connectivity to the major public transport hub such as West Rail Long Ping Station such that the use of public transport could be promoted.

9.1.1.3 The report also presented the provision of internal transport facilities including car parking and loading/unloading facilities for various type developments.

9.1.1.4 The traffic impact during the construction has been analysed. The impact due to the construction activities is anticipated to have manageable impact on the road network.

9.2 Conclusion

9.2.1.1 Based on the traffic and pedestrian analyses, the proposed developments in Wang Chau will have manageable traffic impact on the nearby road links, junctions and pedestrian facilities while appropriate improvement measures have been proposed as necessary. The conclusion therefore is that the proposed development is acceptable from the traffic point of view.