

**Annex E**  
**Revised Traffic Study**  
**(Revised Text, Figures and Appendix A)**

Hong Kong Resort Company  
 Limited  
**Traffic Study for Proposed  
 Developments in Area N1 North,  
 Area 10b, Discovery Bay**  
 Traffic Impact Assessment

TIA

Rev 1 | 29 April 2016

This report takes into account the particular  
 instructions and requirements of our client.  
 It is not intended for and should not be relied  
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 is undertaken to any third party.

Job number 236078

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# 1 INTRODUCTION

## 1.1 Background

- 1.1.1 The Discovery Bay development is a self-contained sub-urban residential development comprising mainly low-density private housing, situated in the eastern part of Lantau Island covering a total land area of about 650 hectares. There are currently around 8,300 nos. of residential flat with total population around 15,000.
- 1.1.2 Discovery Bay falls within the ambit of the Discovery Bay Outline Zoning Plan (DB OZP) which was first approved on 21 March 2003. The current approved OZP limits the population to 25,000 (i.e. 10,000 nos. of residential flat), which is reflected in the latest Master Plan MP7.
- 1.1.3 There are plans to optimize the residential potential of Discovery Bay, while maintaining the low density and resort like living environment. Under the current planning proposal, a total of 1,125 nos. of flat would be developed in Area 10b, in additional to the current approved OZP. The developments are targeted for completion in Year 2023 for population intake in the same year.
- 1.1.4 Ove Arup and Partners (HK) Ltd was commissioned by Hong Kong Resort Co Ltd, to review and evaluate the traffic impact induced by the proposed additional residential developments in Area 10b of Discovery Bay, including ferry and road-based transport, to support the application to modify the DB OZP for better optimization of the potential of Discovery Bay. The possible developments in Area 6f of Discovery Bay for residential use have also been taken into account for the assessments under this study.
- 1.1.5 Comments from Transport Department were received on 25 April 2016. This submission has addressed and incorporated the comments from Transport Department, in particular, the latest planning assumptions for Siu Ho Wan Depot Residential Development and Siu Ho Wan Reclamation and Landside Development have been adopted in the future year traffic assessment.

## 1.2 Scope of Study

- 1.2.1 The scope of this study is highlighted and summarised below:
- Conduct vehicle count surveys at critical links and junctions to appreciate current traffic conditions in the study area;
  - Validate transport models with reference to the updated vehicle count surveys as base year, i.e. Year 2015;
  - Update the inventory regarding traffic circulation patterns, traffic conditions and constraints of the existing, as well as the future committed road network and developments in the vicinity of the subject developments based on the latest information available;

- Review and assess the available traffic data/information;
- Develop reference scenario, i.e. should there be no change on the existing land use;
- Assess the likely traffic and transport impact due to the proposed developments on existing ferry service, and the road network capacity within and outside Discovery Bay;
- Develop traffic and transport improvement schemes, where appropriate, to mitigate any traffic and transport impact; and
- Assess the existing and future ferry service demand, to ensure the ferry service is able to cope with the additional demand induced by the proposed developments.

## 1.3 Structure of Report

- 1.3.1 After this introductory chapter, this report is divided into the following chapters:
- Chapter 2 – presents the details of the traffic count survey and the performance of critical junctions and road links for the base year, i.e. Year 2015;
  - Chapter 3 – presents the parameters of the proposed developments in Discovery Bay;
  - Chapter 4 – presents the traffic generation from the proposed developments, performance of critical junctions, road links and ferry service with the proposed developments in place; and
  - Chapter 5 – summarises and concludes the findings of the study.

## 2 EXISTING TRAFFIC CONDITIONS

### 2.1 Road Network in Discovery Bay

#### External Connection

- 2.1.1 Under the existing comprehensive traffic control management for Discovery Bay, only authorized vehicles are allowed to access Discovery Bay via Discovery Bay Tunnel such as emergency vehicles, servicing buses and goods vehicles.
- 2.1.2 The Discovery Bay Tunnel is a toll tunnel under single two-lane configuration that links Discovery Bay Road at Yi Pak in the east with Cheung Tung Road at Siu Ho Wan adjacent to North Lantau Highway in the west.
- 2.1.3 The Tunnel was built for the Discovery Bay residential development on the north-eastern coast of Lantau Island, Hong Kong, which open 24 hours every day to vehicles specified by the Commissioner for Transport. The toll charge ranges from HK\$50.00 to HK\$250.00, depending on the type of vehicle, and is chargeable one-way eastbound only (i.e. from North Lantau to Discovery Bay).
- 2.1.4 Toll levels of the Tunnel for different vehicle types are summarised in Table 2.1 below.

Table 2.1 Toll Levels of Discovery Bay Tunnel

Category	Vehicle Type	Toll Payable (HK Dollars)
1	Government vehicles, ambulances or vehicles used by officers of the Fire Services Department, the Hong Kong Police Force, the Customs and Excise Department or the Correctional Services Department	50
2	Private light buses other than category 1 above	50
3	Public and private buses other than category 1 above	50
4	Light goods vehicles and special purpose vehicles other than category 1 above and of a permitted gross vehicle weight not exceeding 5.5 tonnes	120
5	Medium goods vehicles and special purpose vehicles other than category 1 above and of a permitted gross vehicle weight exceeding 5.5 tonnes but not exceeding 24 tonnes	160
6	Heavy goods vehicles and special purpose vehicles other than category 1 above and of a permitted gross vehicle weight exceeding 24 tonnes	250
7	Vehicles other than categories 1 to 6 above	250

- 2.1.5 Besides the above vehicle types, Urban Taxis, Lantau Taxis and coaches with prior bookings are allowed to access designated areas in Yi Pak (Discovery Bay North) via Discovery Bay Tunnel, since 26 October 2014.

- 2.1.6 The local road connects with the tunnel link is Cheung Tung Road, which is a 7.3 metre wide two-lane single carriageway. It runs in an east-west alignment parallel to the North Lantau Expressway. The carriageway is a key corridor to provide access for the residential bus services of Discovery Bay.

#### Internal Connection

- 2.1.7 Discovery Bay Road is the major internal road within Discovery Bay, spanning from Discovery Bay Tunnel in the north to the Marina in the south. The road is under single two-lane configuration, serving as the spine for both internal and external connections, with access roads branch for various residential developments in Discovery Bay as well as the bus terminus at Discovery Bay Plaza for access to the Ferry Pier. Marina Drive connects Discovery Bay Road and the marina.
- 2.1.8 The existing road network in Discovery Bay is shown in Figure 2.1.

### 2.2 Traffic Count Survey

- 2.2.1 In order to appreciate the existing traffic conditions, comprehensive traffic counts were conducted during the periods of 0700-1000 and 1600-2000 hours on a typical weekday (Thursday), and 1300-1800 hours on a typical weekend (Saturday) in February and June 2015. Traffic flow at critical road links including Discovery Bay Road, Discovery Valley Road, Siena Avenue, Discovery Bay Tunnel, Cheung Tung Road, North Lantau Highway, Lantau Link, and key junctions in Discovery Bay, Tung Chung and Sunny Bay areas as shown in Table 2.2 below were surveyed.
- 2.2.2 The Area of Influence, location of the key junctions and critical road links are also shown in Figure 2.2.

Table 2.2 Surveved Key Junctions

Junction	Type
J1 Discovery Bay Tunnel / Discovery Bay Road	Roundabout
J2 Discovery Bay Road / Discovery Valley Road	Priority
J3 Discovery Bay Road / Plaza Lane	Priority
J4 Discovery Bay Road / Marina Drive	Priority
J5 Discovery Bay Road / Headland Drive	Priority
J6 Shun Tung Road / Tat Tung Road (West)	Signal
J7 Shun Tung Road / Tat Tung Road (East)	Signal
J8 Tat Tung Road / Fu Tung Street	Priority
J9 Sunny Bay Road / Cheung Tung Road	Priority
J10 Cheung Tung Road / Discovery Bay Tunnel	Priority
J11 Siena Avenue North Roundabout	Roundabout
J12 Discovery Bay Road / Vista Avenue	Priority
J13A Tung Chung Waterfront Road / Slip Road to North Lantau Highway	Signal
J13B Tung Chung Waterfront Road / Slip Road from North Lantau Highway	Signal
J14 Chek Lap Kok South Road Roundabout	Roundabout
J15 Shun Tung Road / Yu Tung Road	Signal
J16 Tung Chung East Interchange	Roundabout
J17 Tat Tung Road / Mei Tung Street	Signal
J18 Tat Tung Road / Hing Tung Street	Signal

2.2.3 The observed weekday AM and PM peak were found to be 0800-0900 and 1700-1800 hours respectively. While for weekend, the peak hour was found to be 1400-1500 hours, but the flows during weekend are in general lower than that during both weekday AM and PM peak. Therefore, weekday AM and PM peak were considered as critical scenarios for assessment.

## 2.3 Existing Traffic Performance

2.3.1 The observed traffic flow during the AM and PM peak hours at the critical road links (refer to Figures 2.3 and 2.4), and the corresponding performance in terms of volume-to-capacity (v/c) ratio are shown in Table 2.3 below.

Table 2.3 Year 2015 Observed Traffic Flow for Critical Links during Peak Hours

Critical Road Links	Direction	Observed Flow (VEH/Hour)		Observed Flow (PCU/Hour)		Carriageway Capacity (PCU/hour)	Volume-to-Capacity (V/C) Ratio	
		AM Peak	PM Peak	AM Peak	PM Peak		AM Peak	PM Peak
Lantau Link	E/B	2,790	3,295	3,570	4,480	6,100	0.59	0.73
	W/B	3,595	2,665	4,495	3,575	6,100	0.74	0.59
North Lantau Highway	E/B	2,450	2,740	3,090	3,840	6,100	0.51	0.63
	W/B	2,725	2,480	3,540	3,300	6,100	0.58	0.54
Cheung Tung Road Western Section	E/B	105	70	160	105	1,040	0.16	0.10
	W/B	95	75	160	110	1,040	0.15	0.10
Cheung Tung Road Eastern Section	E/B	110	80	165	165	1,040	0.16	0.16
	W/B	105	120	175	120	1,040	0.17	0.11
Discovery Bay Tunnel	E/B	75	40	120	70	1,280	0.10	0.05
	W/B	60	75	105	125	1,280	0.08	0.10
Discovery Bay Road (North of Discovery Valley Road)*	N/B	95	115	150	190	1,040	0.15	0.18
	S/B	95	110	155	175	1,040	0.15	0.17
Discovery Bay Road (South of Discovery Valley Road)*	N/B	105	135	180	225	1,040	0.17	0.21
	S/B	110	125	190	215	1,040	0.18	0.20
Discovery Valley Road*	E/B	20	35	35	55	1,040	0.03	0.05
	W/B	20	30	30	50	1,040	0.03	0.05
Siena Avenue*	E/B	45	30	75	45	1,040	0.07	0.05
	W/B	40	30	55	45	1,040	0.05	0.04

\* Included Golf Cart at Discovery Bay internal roads with PCU factor of 1.

2.3.2 Junction capacity analyses based on the Transport Planning and Design Manual (TPDM) have been carried out at the key junctions. Results of the capacity assessment are summarised in Table 2.4 below.

Table 2.4 Year 2015 Existing Junction Performance

Junction	Type	Performance *	
		AM	PM
J1 Discovery Bay Tunnel / Discovery Bay Road	Roundabout	0.07	0.06
J2 Discovery Bay Road / Discovery Valley Road	Priority	0.06	0.09
J3 Discovery Bay Road / Plaza Lane	Priority	0.35	0.36
J4 Discovery Bay Road / Marina Drive	Priority	0.10	0.08
J5 Discovery Bay Road / Headland Drive	Priority	0.02	0.05
J6 Shun Tung Road / Tat Tung Road (West)	Signal	42%	35%
J7 Shun Tung Road / Tat Tung Road (East)	Signal	>50%	>50%
J8 Tat Tung Road / Fu Tung Street	Priority	0.31	0.37
J9 Sunny Bay Road / Cheung Tung Road	Priority	0.05	0.05
J10 Cheung Tung Road / Discovery Bay Tunnel	Priority	0.17	0.20
J11 Siena Avenue North Roundabout	Roundabout	0.06	0.04
J12 Discovery Bay Road / Vista Avenue	Priority	0.05	0.03
J13A Tung Chung Waterfront Road / Slip Road to North Lantau Highway	Signal	>50%	>50%
J13B Tung Chung Waterfront Road / Slip Road from North Lantau Highway	Signal	>50%	>50%
J14 Chek Lap Kok South Road Roundabout	Roundabout	0.49	0.44
J15 Shun Tung Road / Yu Tung Road	Signal	>50%	>50%
J16 Tung Chung East Interchange	Roundabout	0.15	0.16
J17 Tat Tung Road / Mei Tung Street	Signal	>50%	>50%
J18 Tat Tung Road / Hing Tung Street	Signal	>50%	>50%

\* Figures shown represent "Design Flow/Capacity" (DFC) ratio for roundabout and priority junctions, and "Reserve Capacity" for signal junctions

2.3.3 As shown in Tables 2.3 and 2.4, all critical road links and key junctions are currently operating with significant spare capacity during both AM and PM peak hour.

## 2.4 Transport Services to/from Discovery Bay

2.4.1 The two main transport modes for accessing Discovery Bay are ferry and residential bus. Since 26 October 2014, designated areas in Discovery Bay (North) are also accessible by Urban and Lantau Taxis.

2.4.2 The main ferry route operates from Discovery Bay to Central. There are also local ferry/kaito ferry routes operating from Discovery Bay to Mui Wo, Peng Chau and Trappist Monastery

2.4.3 There are two types of bus services in Discovery Bay: one serves various residential developments within Discovery Bay for connection to the ferry pier or commercial centre at Discovery Bay (North); the other serves as external connection from Discovery Bay (from pier or DB North) to Tung Chung, Sunny Bay and Hong Kong International Airport, via Discovery Bay Tunnel.

2.4.4 Table 2.5 summarises the ferry and bus services for Discovery Bay.

Table 2.5 Ferry and Bus Services for Discovery Bay

No	Origin	Destination
<b>Ferry</b>		
-	Discovery Bay Ferry Pier	Central Pier No. 3
-	Discovery Bay (Nim Shue Wan)	Mui Wo <sup>(1)</sup>
-	Discovery Bay (Nim Shue Wan)	Peng Chau / Trappist Monastery <sup>(2)</sup>
<b>Internal Bus</b>		
1	Headland Drive/ Parkland Drive	Discovery Bay Ferry Pier
2	Hillgrove Village/ Midvale Village	Discovery Bay Ferry Pier
3	Hillgrove Village/ Parkvale Village	Discovery Bay Ferry Pier
4 <sup>(3)</sup>	Siena Two	Discovery Bay Ferry Pier
C4	Discovery Bay Ferry Pier	DB North Comm Centre (Circular)
5	La Vista / La Serene	Discovery Bay Ferry Pier
6	Seabee Lane	Discovery Bay Ferry Pier
7	Capeland Drive	Discovery Bay Ferry Pier
8	Caperidge Drive	Discovery Bay Ferry Pier
9 <sup>(3)</sup>	DB North Comm Centre / Siena One	Discovery Bay Ferry Pier
C9	Discovery Bay Ferry Pier	DB North Comm Centre (Circular)
9A	Chianti	Discovery Bay Ferry Pier
9S	Peninsula Village (Capevale Drive)	DB North Comm Centre
<b>External Bus</b>		
DB01R	Discovery Bay Ferry Pier	Tung Chung
DB02A	DB North Comm Centre	Airport
DB02R	Discovery Bay Ferry Pier	Airport
DB03P	DB North Comm Centre	Sunny Bay
DB03R	Discovery Bay Ferry Pier	Sunny Bay

<sup>(1)</sup> Operate on Saturdays, Sundays and Public Holidays. One departure per day per direction on Mondays to Fridays (School Days only) via Peng Chau

<sup>(2)</sup> Kaito ferry service

<sup>(3)</sup> AM peak period on Monday to Friday only

### 3 PROPOSED DEVELOPMENTS IN DISCOVERY BAY

#### 3.1 Development Parameters

- 3.1.1 The additional development is located in Area 10b along existing Marine Drive. It consists of 1,125 nos. of flat. Location plan of the developments is presented in Figure 3.1.
- 3.1.2 The other possible development in Area 6f of Discovery Bay for residential use is located west of existing Discovery Bay Phase 3 Parkvale Village. It which consists of 476 nos. of flat. The location of this residential development in Area 6f is also shown in Figure 3.1.

### 4 FUTURE TRAFFIC CONDITIONS

#### 4.1 Trip Generation for Residential Developments

##### Pedestrian Trip Generation

- 4.1.1 The likely volume of traffic generated by the additional residential developments is based on the current trip generation and attraction by the existing residential developments in Discovery Bay, assuming future additional residential developments would have similar characteristics of the existing residential developments.
- 4.1.2 Pedestrian count surveys were also conducted during weekday AM and PM peak period, at the footpaths immediately outside the typical residential developments in Discovery Bay, counting the number of pedestrians leaving and entering the residential buildings during the peak period. The survey locations are shown in Table 4.1 below.

Table 4.1 Pedestrian Survey Location

Survey Location	Coverage	Total No. of Flats
Footpath at Capevale Drive	Phase 4 Peninsula Village – Jovial Court, Haven Court and Verdant Court	408 nos.
Footpath at Costa Avenue	Phase 8 La Costa – Onda Court and Costa Court	230 nos.

- 4.1.3 The surveyed pedestrian flow and corresponding trip generation / attraction rates at the existing residential developments are then estimated. For comparison, reference has also been made to the overall pedestrian trips approaching / leaving Discovery Bay by external residential bus, ferry or taxi during the same peak period. These trip rates are tabulated in Table 4.2 below.

Table 4.2 Peak Hour Pedestrian Trips and Trip Generation Rate

	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
Pedestrian Count at Capevale Drive (persons/hr)	133	40	62	104
Trip Rate at Capevale Drive (persons/hr/flat)	0.326	0.098	0.152	0.255
Pedestrian Count at Costa Avenue (persons/hr)	67	25	38	57
Trip Rate at Costa Avenue (persons/hr/flat)	0.291	0.109	0.165	0.248
Total Pedestrian Trips Approaching / Leaving Discovery Bay by Bus, Ferry or Taxi (persons/hr) <sup>(1)</sup>	2,011	788	723	1,650
Trip Rate for Overall Discovery Bay (persons/hr/flat) <sup>(2)</sup>	0.242	0.095	0.087	0.198
Adopted Trip Rate for Additional Residential Development (persons/hr/flat)	0.316	0.109	0.165	0.255

<sup>(1)</sup> Reference to the peak hour Octopus count and ticket gate count provided by the operator for bus and ferry services respectively (refer to Appendix A). Surveys were also conducted at the taxi stand at Discovery Bay North to record the number of taxi passengers boarding/alighting during the peak hour

<sup>(2)</sup> Overall number of flats for existing residential developments is 8,326 nos.



4.1.4 As shown in Table 4.2, the surveyed pedestrian trip rates at the residential developments at Capevale Drive and Costa Avenue were in general higher than the overall trip rate for the entire Discovery Bay. For conservative approach, the higher trip rate is adopted for estimation of pedestrian generation for the proposed additional residential development, as shown in Table 4.3 below. This adopted trip rate is considered conservative, since it has also included some Discovery Bay internal trips.

**Table 4.3 Pedestrian Trip Generation for Additional Residential Developments in Area 10b (Unit: ped/hr)**

Residential Development	No. of Flats	No. of Flats for Assessment <sup>(1)</sup>	AM Peak		PM Peak	
			Generation	Attraction	Generation	Attraction
10b	1,125	1,350	440	147	223	344
Estimated Pedestrian Trips to use External Bus Service (persons/hr)			220	73	112	172
Estimated Pedestrian Trips to use Ferry Service to Central (persons/hr)			220	73	112	172

<sup>(1)</sup> Includes a +20% variation in total number of flats adopted for assessment to allow for flexibility in detailed design

4.1.5 Assuming that the modal split for additional residential developments would be similar to the existing travel pattern, the pedestrian trips generated are mainly travel to urban areas by ferry, or external residential bus to MTR Station at Sunny Bay or Tung Chung. With reference to the boarding/alighting surveys and the information on the ferry ticket gate / bus Octopus count from the operator, the modal split for ferry and bus modes is approximately 50% and 50% respectively. According to the latest survey, only around 1% of the total external trips are by taxi.

4.1.6 Also, it is anticipated that during AM and PM peak hour, trip generation from the additional residential developments are mainly work-related trips to urban areas, hence the estimated patronage for the two ferry services to Mui Wo and Peng Chau/Trappist Monastery would be minimal only.

4.1.7 For pedestrian trips generated who would travel by ferry to urban areas, it is assumed that they would take internal residential bus directly from the proposed residential development to the bus DB Plaza, then change to ferry at the pier. While for those travelling to Sunny Bay/Tung Chung, it is assumed that they would also take the internal residential bus to DB Plaza or DB North, then change transfer to external bus towards Sunny Bay/Tung Chung etc.

4.1.8 Walk trips to/from ferry pier and cycle trips are excluded, as a conservative approach for assessment of internal bus generation (i.e. assume all pedestrian trip generation would travel by internal bus).

4.1.9 In addition, the walk trips and cycle trips would only induce minimized impact to existing footpath and cycle track. Since according to the latest surveys, including both interview survey and site observation survey conducted at the building block entrance at Phase 3 Parkvale Village and Phase 4 Peninsula Village, the observed split for walking and cycling to/from ferry pier is around 10% and <0.5% respectively, as shown in Table 4.4 and 4.5 below.

**Table 4.4 Pedestrian Survey at Phase 3 Parkvale Village**

	AM Peak	PM Peak
<i>Total surveyed pedestrians leaving residential building block to ferry pier</i>	59	22
• By bus/golf cart	52 (88%)	19 (86%)
• By walk	7 (12%)	3 (14%)
• By Bicycle	0 (0%)	0 (0%)
	AM Peak	PM Peak
<i>Total surveyed pedestrians approaching residential building block from ferry pier</i>	16	62
• By bus/golf cart	15 (94%)	57 (92%)
• By walk	1 (6%)	5 (8%)
• By Bicycle	0 (0%)	0 (0%)

**Table 4.5 Pedestrian Survey at Phase 4 Peninsula Village**

	AM Peak	PM Peak
<i>Total surveyed pedestrians leaving residential building block to ferry pier</i>	105	43
• By bus/golf cart	91 (87%)	40 (93%)
• By walk	13 (12%)	3 (7%)
• By Bicycle	1 (1%)	0 (0%)
	AM Peak	PM Peak
<i>Total surveyed pedestrians approaching residential building block from ferry pier</i>	23	83
• By bus/golf cart	21 (91%)	76 (92%)
• By walk	2 (9%)	6 (7%)
• By Bicycle	0 (0%)	1 (1%)

4.1.10 The additional two-way walk trips generated/attracted for Area 10b would only be less than 30 ped/hr during AM and PM peak hour. While the clear width of the narrowest part of the footpath is 2.5m, assuming 0.5m lateral clearance on both sides of the footpath and LOS C performance (i.e. flow rate = 32.8 ped/min/m), the capacity of footpath would be  $32.8 \times (2.5 - 0.5 - 0.5) \times 60 = 2,952$  ped/hr.

4.1.11 With the existing footpath available capacity at the narrowest section of around 2,950 ped/hr (i.e. around 100 times the pedestrian trip generated). Majority of the residents would travel by shuttle bus immediate outside the residential developments. Hence, impact on existing pedestrian and cycle track network would only be minimal.

#### Vehicular Trip Generation – Bus

4.1.12 Based on the above assumptions, the estimated pedestrian trips as shown in Table 4.3 are converted to vehicular (bus) trip generation.

4.1.13 As a conservative approach, it is assumed that the bus trip generation due to additional residential developments would have occupancy of not more than 70% (i.e. each bus would carry not more than 56 passengers including standing passengers), hence generating a higher number of bus trips compared with the case of assuming 100% occupancy (i.e. each bus would carry 80 passengers including standing passengers).

4.1.14 The vehicular (bus) trip generation for internal trips between the additional developments and DB Plaza bus terminus is tabulated in Table 4.6 below.

**Table 4.6 Calculated Internal Bus Trip Generation for Additional Residential Developments in Area 10b (Unit: pcu/hr)**

Residential Development	No. of Flats	No. of Flats for Assessment <sup>(1)</sup>	AM Peak		PM Peak	
			Generation	Attraction	Generation	Attraction
Area 10b	1,125	1,350	440 / 56 = 8 veh = 20 pcu	147 / 56 = 3 veh = 8 pcu	223 / 56 = 4 veh = 10 pcu	344 / 56 = 7 veh = 18 pcu

<sup>(1)</sup> Includes a +20% variation in total number of flats adopted for assessment to allow for flexibility in detailed design

4.1.15 For assessment purpose on providing bus service to the residential development, the critical bound traffic during peak hour would be adopted for both generation and attraction. In the morning peak, the critical bound is generation while in the evening peak the attraction would be more critical. Also, for conservative approach, it is assumed these buses from the additional residential developments would operate with headway of around 8 minutes, similar to the existing internal bus services. The adopted vehicular (bus) trip generation for internal trips is shown in Table 4.7 below.

**Table 4.7 Adopted Internal Bus Trip Generation for Additional Residential Developments in Area 10b (Unit: pcu/hr)**

Residential Development	No. of Flats	No. of Flats for Assessment <sup>(1)</sup>	AM Peak		PM Peak	
			Generation	Attraction	Generation	Attraction
Area 10b	1,125	1,350	20	20	20	20

<sup>(1)</sup> Includes a +20% variation in total number of flats adopted for assessment to allow for flexibility in detailed design

4.1.16 Similarly, the vehicular (bus) trips for external services are estimated, assuming that these buses would operate in addition to the existing services to Sunny Bay, Tung Chung and Airport. The calculated bus trip generation is shown in Table 4.8.

**Table 4.8 Calculated Additional External Bus Trip Generation for Additional Residential Developments in Area 10b**

	% Split <sup>(1)</sup>	AM Peak		PM Peak	
		Generation	Attraction	Generation	Attraction
Estimated Pedestrian Trips to use External Bus Service (persons/hr)	-	220	73	112	172
Estimated Pedestrian Trips for Tung Chung (persons/hr)	25%	55	18	28	43
Estimated Pedestrian Trips for Airport (persons/hr)	5%	11	4	6	9
Estimated Pedestrian Trips for Sunny Bay (persons/hr)	70%	154	51	78	120
Calculated External Bus Trip for Tung Chung (pcu/hr)	-	55 / 56 = 1 veh = 2.5 pcu	18 / 56 = 1 veh = 2.5 pcu	28 / 56 = 1 veh = 2.5 pcu	43 / 56 = 1 veh = 2.5 pcu
Calculated External Bus Trip for Airport (pcu/hr)	-	11 / 56 = 1 veh = 2.5 pcu	4 / 56 = 1 veh = 2.5 pcu	6 / 56 = 1 veh = 2.5 pcu	9 / 56 = 1 veh = 2.5 pcu
Calculated External Bus Trip for Sunny Bay (pcu/hr)	-	154 / 56 = 3 veh = 7.5 pcu	51 / 56 = 1 veh = 2.5 pcu	78 / 56 = 2 veh = 5.0 pcu	120 / 56 = 3 veh = 7.5 pcu
<b>Total Additional Calculated External Bus Trip for Discovery Bay</b>	-	<b>13 pcu</b>	<b>8 pcu</b>	<b>10 pcu</b>	<b>13 pcu</b>

<sup>(1)</sup> Reference to the peak hour Octopus count provided by the operator for the three existing bus routes to Tung Chung, Airport and Sunny Bay

4.1.17 Critical bound traffic during peak hour would be adopted for both generation and attraction, similar to the approach for internal bus trip generation. Hence, the adopted bus trip generation is shown in Table 4.9.

**Table 4.9 Adopted Additional External Bus Trip Generation for Additional Residential Developments in Area 10b**

	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
Adopted External Bus Trip for Tung Chung (pcu/hr)	2.5	2.5	2.5	2.5
Adopted External Bus Trip for Airport (pcu/hr)	2.5	2.5	2.5	2.5
Adopted External Bus Trip for Sunny Bay (pcu/hr)	7.5	7.5	7.5	7.5
<b>Total Additional Adopted External Bus Trip for Discovery Bay</b>	<b>13</b>	<b>13</b>	<b>13</b>	<b>13</b>

**Vehicular Trip Generation – Taxi**

4.1.18 With reference to the traffic study conducted in March 2014, for peak hour taxi generation under the no toll scenario, it is estimated that the existing residential developments in Discovery Bay would generate / attract 79 taxis one-way during the peak hour.

4.1.19 While under the survey conducted after introduction of taxi services, the surveyed peak hour taxi generation is 30 taxis one-way, including those serving the residential developments, hotel and other facilities in Yi Pak. Hence, the existing amount of taxi trip generation is lower than the estimation under previous traffic study. For conservative approach, the taxi trip generation by new additional developments will make reference to the estimation under previous traffic study.

4.1.20 Using the taxi trip generation under previous traffic study, the one-way additional taxi trip generation would be 79 taxis ÷ 8,326 existing flats × 1,350 additional flats (with 20% buffer) = 13 taxis.

**Vehicular Trip Generation – Summary**

4.1.21 Table 4.10 below summarised the adopted trip generation for the proposed additional residential developments in Area 10b of Discovery Bay.

**Table 4.10 Adopted Trip Generation for Additional Residential Developments in Area 10b (Unit: pcu/hr)**

	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
Internal Bus Trip	20	20	20	20
External Bus Trip	13	13	13	13
External Taxi Trip	13	13	13	13
<b>Total</b>	<b>46</b>	<b>46</b>	<b>46</b>	<b>46</b>

4.1.22 Similarly, the trip generation for the possible trip generation for developments in Area 6f of Discovery Bay for residential use is also estimated, and would be included in the "Reference Scenario" of future year traffic assessment (refer to Section 4.3). Table 4.11 below summarised the adopted trip generation for the possible residential developments in Area 6f of Discovery Bay.

**Table 4.11 Adopted Trip Generation for Additional Residential Developments in Area 6f (Unit: pcu/hr)**

	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
Internal Bus Trip	20	20	20	20
External Bus Trip	10	10	8	8
External Taxi Trip	5	5	5	5
<b>Total</b>	<b>35</b>	<b>35</b>	<b>33</b>	<b>33</b>

**Occupancy for Ferry Service**

4.1.23 Assessment on the existing ferry service has also been conducted, to appreciate the impact of the additional residential developments to the existing ferry service.

4.1.24 As mentioned above, the pedestrian trip generation from additional residential developments are mainly work-related trips to urban areas. Hence it is assumed that all pedestrian trips generated would use the ferry service to/from Central during the AM and PM peak hour. Nonetheless, the existing occupancy of the two ferry services to Mui Wo and Peng Chau/Trappist Monastery is also shown for reference purpose.

4.1.25 As shown in Table 4.12 below, the critical AM peak occupancy for ferry services from Discovery Bay to Central would increase from 64% to 93%, with taken into account the subject proposed additional residential development in Area 10b and also the possible residential developments in Area 6f. Hence, the existing ferry service would still operate within capacity with the additional residential developments in place.

**Table 4.12 Occupancy of Ferry Service**

	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
<b>Discovery Bay – Mui Wo <sup>(1)</sup></b>				
Existing Peak Hour Ferry Ridership to/from Mui Wo (persons/hr) <sup>(2)</sup>	n/a	122	94	n/a
Capacity of Ferry Service Operated (persons/hr)	n/a	161	161	n/a
Existing Occupancy of Ferry Service to/from Mui Wo	n/a	76%	58%	n/a

	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
<b>Discovery Bay – Peng Chau/Trappist Monastery</b>				
Existing Peak Hour Ferry Ridership to/from Peng Chau/Trappist Monastery (persons/hr) <sup>(2)</sup>	30	237	119	11
Capacity of Ferry Service Operated (persons/hr)	364	364	182	182
Existing Occupancy of Ferry Service to/from Peng Chau/Trappist Monastery	8%	65%	65%	6%
<b>Discovery Bay – Central</b>				
Existing Peak Hour Ferry Ridership to/from Central (persons/hr) <sup>(3)</sup>	1,277	177	249	926
Capacity of Ferry Service Operated (persons/hr)	1,980	1,485	990	1,485
Existing Occupancy of Ferry Service	64%	12%	25%	62%
Estimated Ferry Patronage to Represent 10,000 Flats under Approved OZP with Adjustment Factor of 1.2 (refer to Section 4.3) (persons/hr)	1,532	212	299	1,111
Estimated Pedestrian Trips Generated from Possible Residential Developments in Area 6f (persons/hr)	93	31	47	73
Estimated Pedestrian Trips Generated from Additional Residential Developments in Area 10b (persons/hr)	220	73	112	172
Total Ridership with Additional Residential Developments (persons/hr)	1,845	317	458	1,356
Estimated Occupancy of Ferry Service	93%	21%	46%	91%

<sup>(1)</sup> Single trip from Mui Wo to Discovery Bay in AM peak; single trip from Discovery Bay to Mui Wo in PM peak

<sup>(2)</sup> Reference to patronage count survey conducted on a typical weekday in Jan 2015

<sup>(3)</sup> Reference to the peak hour ticket gate count provided by the operator

## 4.2 Future Year Major Highway and Land Use Assumption

4.2.1 The additional developments in Discovery Bay are targeted for completion in Year 2023. Year 2026 and 2031 are used as the assessment years for the purpose of this study.

4.2.2 Year 2026 and 2031 traffic forecast for the major strategic road links (eg. North Lantau Highway) and critical junctions in Tung Chung are prepared with reference to our in-house strategic transport model,

which has incorporated with the latest highway infrastructure and planning assumptions.

4.2.3 With reference to the latest highway infrastructure assumptions, relevant key future highway infrastructures for this study are summarised in Table 4.13 below.

**Table 4.13 Highway Infrastructure Assumptions**

Year 2026 (In addition to existing Road Network)	Configuration
Southern Connection of Tuen Mun-Chek Lap Kok Link	Dual 2
Hong Kong – Zhuhai – Macao Bridge Hong Kong Link Road	Dual 3
Hong Kong – Zhuhai – Macao Bridge	Dual 3
Northern Connection of Tuen Mun-Chek Lap Kok Link	Dual 2
Lantau Road P1 between Tung Chung and Sunny Bay	Dual 2

4.2.4 A brief summary of the key land-use assumptions are also listed below:

- Tung Chung New Town (progressive population intake);
- SkyCity developments located in the North Commercial District of Airport Island (which includes SkyPlaza), plus some additional development in the East Commercial District (from now to 2020);
- Asia World-Expo (AWE) future expansion (from now to 2025);
- Siu Ho Wan MTR Depot Transportation Hub (2026);
- Siu Ho Wan Depot Residential Development (full intake by 2031);
- Siu Ho Wan Reclamation and Landside Development (full intake by 2031);
- Boundary Control Facility Topside Development (2026);
- Airport Third Runway (2026);
- Tung Chung New Town Extension (by 2031)

## 4.3 Assessment Scenarios

4.3.1 To evaluate the associated traffic impact likely to be induced by the additional developments in Discovery Bay, two scenarios were analysed and compared. The first scenario (i.e. "Reference Scenario") assumed that the number of residential units in Discovery Bay would be grown to 10,000 flats from existing 8,326 flats under the current approved OZP. An adjustment factor of 1.2 ( $=10,000 \div 8,326$ ) would be applied to the Year 2015 surveyed traffic flow within Discovery Bay to represent the traffic with 10,000 flats.

4.3.2 Reference has also been made to the previous approved TIA report for transport arrangements in Yi Pak in Year 2010 and the taxi flow sensitivity study under no toll scenario in March 2014. Traffic generation for the proposed commercial, community and hotel

developments in Yi Pak, including taxi, goods vehicles, and public coach etc. has been included in the "Reference Scenario". Although taxi service has already been introduced and surveyed in the Year 2015 flow, the surveyed taxi flow is lower than that estimated in the previous study. For conservative approach, the trip generation presented in previous study will be adopted in this study.

- 4.3.3 For the taxi generation for residential developments in Discovery Bay, and it has been adjusted using the factor of 1.2 mentioned above, to represent the flow under full 10,000 flats within Discovery Bay.
- 4.3.4 Traffic forecast of background traffic at critical strategic road links and junctions outside Discovery Bay under the "Reference Scenario", reference is made to our in-house strategic transport model, which has incorporated with the latest highway infrastructure and planning assumptions.
- 4.3.5 In addition, trip generation and attraction of the possible residential developments in Area 6f has also been included under the "Reference Scenario".
- 4.3.6 For the second scenario (i.e. "Design Scenario"), traffic generated by the additional residential developments in Area 10b of Discover Bay as presented in the previous section would be included on top of the traffic flow under Reference Scenario.
- 4.3.7 In summary, the assessed scenarios are listed below:
- Year 2026/2031 "Reference Scenario"
    - = Year 2026/2031 in-house traffic model with latest highway and planning assumptions
    - + Surveyed Year 2015 Discovery Bay Traffic Flow with Adjustment Factor of 1.2 (*for full development under approved OZP*)
    - + Traffic Generation and Attraction (*including taxi*) for Yi Pak Developments
    - + Taxi Generation and Attraction with Adjustment Factor of 1.2 (*for full development under approved OZP*)
    - + Trips Generation and Attraction for Possible Residential Developments in Area 6f in Discovery Bay
  - Year 2026/2031 "Design Scenario"
    - = Traffic Flow under "Reference Scenario"
    - + Trips Generation and Attraction for Additional Residential Developments in Area 10b in Discovery Bay

## 4.4 Future Traffic Performance

- 4.4.1 The projected Year 2026 traffic flows of internal and external road networks for the "Reference Scenario" and "Design Scenario" are shown in Figures 4.1 to 4.4 accordingly, while the same set of traffic flows for Year 2031 are shown in Figures 4.5 to 4.8 respectively.
- 4.4.2 Link capacity assessment for Year 2026 and 2031 are shown in Tables 4.14 to 4.17 below, while junction capacity assessment for the key junctions for Year 2026 and 2031 are summarised in Tables 4.18 and 4.19 below. The observed traffic flow condition in 2015 are shown together in the tables as reference.
- 4.4.3 All critical road links and key junctions are expected to operate with v/c ratio below 1.2 (except Lantau Link W/B during AM Peak of Year 2031 Reference and Design Scenarios) and within practicable capacity during both AM and PM peak hour in Year 2026 and 2031, with the additional residential developments in place. As shown in Tables 4.16 and 4.17, Lantau Link W/B would be operating with v/c ratio of 1.26 during AM Peak in Year 2031 Reference and 1.27 in Year 2031 Design Scenario, indicating that the impact of traffic generation from the additional residential units on the said assessed road link is negligible.

**Table 4.14 Year 2026 Projected Traffic Flow for Critical Links during Peak Hours – Reference Scenario (Unit: PCU/Hour)**

Critical Road Links	Direction	Carriageway Capacity (PCU/hour)	Year 2015 Observed Flow (PCU/Hour)		Year 2026 Reference Scenario (PCU/Hour)		Year 2026 Volume-to-Capacity (V/C) Ratio	
			AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Lantau Link	E/B	6,100	3,570	4,480	4,950	5,250	0.81	0.86
	W/B	6,100	4,495	3,575	5,390	5,175	0.88	0.85
North Lantau Highway	E/B	6,100	3,090	3,840	3,165	3,450	0.52	0.57
	W/B	6,100	3,540	3,300	3,755	3,545	0.62	0.58
Cheung Tung Road Western Section	E/B	1,040	160	105	250	220	0.24	0.21
	W/B	1,040	160	110	230	190	0.22	0.18
Cheung Tung Road Eastern Section	E/B	1,040	165	165	330	375	0.32	0.36
	W/B	1,040	175	120	345	290	0.33	0.28
Discovery Bay Tunnel	E/B	1,280	120	70	410	345	0.32	0.27
	W/B	1,280	105	125	390	410	0.30	0.32
Discovery Bay Road (North of Discovery Valley Road)	N/B	1,040	150	190	195	235	0.19	0.23
	S/B	1,040	155	175	200	220	0.19	0.21
Discovery Bay Road (South of Discovery Valley Road)	N/B	1,040	180	225	245	295	0.24	0.28
	S/B	1,040	190	215	255	285	0.25	0.27
Discovery Valley Road	E/B	1,040	35	55	60	85	0.06	0.08
	W/B	1,040	30	50	60	80	0.06	0.08
Siena Avenue	E/B	1,040	75	45	345	310	0.33	0.30
	W/B	1,040	55	45	320	310	0.31	0.30

**Table 4.15 Year 2026 Projected Traffic Flow for Critical Links during Peak Hours – Design Scenario (Unit: PCU/Hour)**

Critical Road Links	Direction	Carriageway Capacity (PCU/hour)	Year 2015 Observed Flow (PCU/Hour)		Year 2026 Design Scenario (PCU/Hour)		Year 2026 Volume-to-Capacity (V/C) Ratio	
			AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Lantau Link	E/B	6,100	3,570	4,480	4,960	5,265	0.81	0.86
	W/B	6,100	4,495	3,575	5,400	5,185	0.89	0.85
North Lantau Highway	E/B	6,100	3,090	3,840	3,180	3,465	0.52	0.57
	W/B	6,100	3,540	3,300	3,765	3,560	0.62	0.58
Cheung Tung Road Western Section	E/B	1,040	160	105	255	230	0.25	0.22
	W/B	1,040	160	110	235	195	0.23	0.19
Cheung Tung Road Eastern Section	E/B	1,040	165	165	335	385	0.32	0.37
	W/B	1,040	175	120	360	305	0.34	0.29
Discovery Bay Tunnel	E/B	1,280	120	70	435	370	0.34	0.29
	W/B	1,280	105	125	415	435	0.32	0.34
Discovery Bay Road (North of Discovery Valley Road)	N/B	1,040	150	190	205	250	0.20	0.24
	S/B	1,040	155	175	210	230	0.20	0.22
Discovery Bay Road (South of Discovery Valley Road)	N/B	1,040	180	225	260	310	0.25	0.30
	S/B	1,040	190	215	270	295	0.26	0.28
Discovery Valley Road	E/B	1,040	35	55	60	85	0.06	0.08
	W/B	1,040	30	50	60	80	0.06	0.08
Siena Avenue	E/B	1,040	75	45	360	325	0.34	0.31
	W/B	1,040	55	45	335	325	0.32	0.31

**Table 4.16 Year 2031 Projected Traffic Flow for Critical Links during Peak Hours – Reference Scenario (Unit: PCU/Hour)**

Critical Road Links	Direction	Carriageway Capacity (PCU/hour)	Year 2015 Observed Flow (PCU/Hour)		Year 2031 Reference Scenario (PCU/Hour)		Year 2031 Volume-to-Capacity (V/C) Ratio	
			AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Lantau Link	E/B	6,100	3,570	4,480	6,865	7,445	1.13	1.22
	W/B	6,100	4,495	3,575	7,710	7,505	1.26	1.23
North Lantau Highway	E/B	6,100	3,090	3,840	4,300	5,270	0.70	0.86
	W/B	6,100	3,540	3,300	5,305	5,005	0.87	0.82
Cheung Tung Road Western Section	E/B	1,040	160	105	265	240	0.26	0.23
	W/B	1,040	160	110	230	190	0.22	0.18
Cheung Tung Road Eastern Section	E/B	1,040	165	165	345	400	0.33	0.38
	W/B	1,040	175	120	340	290	0.33	0.28
Discovery Bay Tunnel	E/B	1,280	120	70	410	345	0.32	0.27
	W/B	1,280	105	125	390	410	0.30	0.32
Discovery Bay Road (North of Discovery Valley Road)	N/B	1,040	150	190	195	235	0.19	0.23
	S/B	1,040	155	175	200	220	0.19	0.21
Discovery Bay Road (South of Discovery Valley Road)	N/B	1,040	180	225	245	295	0.24	0.28
	S/B	1,040	190	215	255	285	0.25	0.27
Discovery Valley Road	E/B	1,040	35	55	60	85	0.06	0.08
	W/B	1,040	30	50	60	80	0.06	0.08
Siena Avenue	E/B	1,040	75	45	345	310	0.33	0.30
	W/B	1,040	55	45	320	310	0.31	0.30

**Table 4.17 Year 2031 Projected Traffic Flow for Critical Links during Peak Hours – Design Scenario (Unit: PCU/Hour)**

Critical Road Links	Direction	Carriageway Capacity (PCU/hour)	Year 2015 Observed Flow (PCU/Hour)		Year 2031 Design Scenario (PCU/Hour)		Year 2031 Volume-to-Capacity (V/C) Ratio	
			AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Lantau Link	E/B	6,100	3,570	4,480	6,880	7,455	1.13	1.22
	W/B	6,100	4,495	3,575	7,725	7,520	1.27	1.23
North Lantau Highway	E/B	6,100	3,090	3,840	4,310	5,285	0.71	0.87
	W/B	6,100	3,540	3,300	5,320	5,020	0.87	0.82
Cheung Tung Road Western Section	E/B	1,040	160	105	275	250	0.26	0.24
	W/B	1,040	160	110	230	195	0.22	0.19
Cheung Tung Road Eastern Section	E/B	1,040	165	165	355	405	0.34	0.39
	W/B	1,040	175	120	355	305	0.34	0.30
Discovery Bay Tunnel	E/B	1,280	120	70	435	370	0.34	0.29
	W/B	1,280	105	125	415	435	0.32	0.34
Discovery Bay Road (North of Discovery Valley Road)	N/B	1,040	150	190	205	250	0.20	0.24
	S/B	1,040	155	175	210	230	0.20	0.22
Discovery Bay Road (South of Discovery Valley Road)	N/B	1,040	180	225	260	310	0.25	0.30
	S/B	1,040	190	215	270	295	0.26	0.28
Discovery Valley Road	E/B	1,040	35	55	60	85	0.06	0.08
	W/B	1,040	30	50	60	80	0.06	0.08
Siena Avenue	E/B	1,040	75	45	360	325	0.34	0.31
	W/B	1,040	55	45	335	325	0.32	0.31

Table 4.18 Year 2026 Junction Performance

Junction	Type	Year 2015 Observed Performance *		Year 2026 Reference Scenario *		Year 2026 Design Scenario *	
		AM	PM	AM	PM	AM	PM
J1 Discovery Bay Tunnel / Discovery Bay Road	Roundabout	0.07	0.06	0.20	0.18	0.21	0.19
J2 Discovery Bay Road / Discovery Valley Road	Priority	0.06	0.09	0.11	0.15	0.11	0.15
J3 Discovery Bay Road / Plaza Lane	Priority	0.35	0.36	0.49	0.49	0.55	0.55
J4 Discovery Bay Road / Marina Drive	Priority	0.10	0.08	0.12	0.09	0.14	0.12
J5 Discovery Bay Road / Headland Drive	Priority	0.02	0.05	0.02	0.07	0.03	0.07
J6 Shun Tung Road / Tat Tung Road (West)	Signal	42%	33%	17%	21%	16%	20%
J7 Shun Tung Road / Tat Tung Road (East)	Signal	>50%	>50%	>50%	>50%	>50%	>50%
J8 Tat Tung Road / Fu Tung Street	Priority	0.30	0.37	0.34	0.42	0.37	0.45
J9 Sunny Bay Road / Cheung Tung Road	Priority	0.05	0.05	0.49	0.50	0.52	0.53
J10 Cheung Tung Road / Discovery Bay Tunnel	Priority	0.17	0.20	0.70	0.72	0.75	0.77
J11 Siena Avenue North Roundabout	Roundabout	0.06	0.04	0.27	0.24	0.28	0.25
J12 Discovery Bay Road / Vista Avenue	Priority	0.05	0.03	0.06	0.04	0.06	0.04
J13A Tung Chung Waterfront Road / Slip Road to North Lantau Highway	Signal	>50%	>50%	>50%	>50%	>50%	>50%
J13B Tung Chung Waterfront Road / Slip Road from North Lantau Highway	Signal	>50%	>50%	>50%	>50%	>50%	>50%
J14 Chek Lap Kok South Road Roundabout	Roundabout	0.49	0.44	0.52	0.52	0.52	0.52
J15 Shun Tung Road / Yu Tung Road	Signal	>50%	>50%	>50%	>50%	>50%	>50%
J16 Tung Chung East Interchange	Roundabout	0.15	0.16	0.32	0.28	0.32	0.28
J17 Tat Tung Road / Mei Tung Street	Signal	>50%	>50%	>50%	>50%	>50%	>50%
J18 Tat Tung Road / Hing Tung Street	Signal	>50%	>50%	>50%	>50%	>50%	>50%

\* Figures shown represent "Design Flow/Capacity" (DFC) ratio for roundabout and priority junctions, and "Reserve Capacity" for signal junctions

Table 4.19 Year 2031 Junction Performance

Junction	Type	Year 2015 Observed Performance *		Year 2031 Reference Scenario *		Year 2031 Design Scenario *	
		AM	PM	AM	PM	AM	PM
J1 Discovery Bay Tunnel / Discovery Bay Road	Roundabout	0.07	0.06	0.20	0.18	0.21	0.19
J2 Discovery Bay Road / Discovery Valley Road	Priority	0.06	0.09	0.11	0.15	0.11	0.15
J3 Discovery Bay Road / Plaza Lane	Priority	0.35	0.36	0.49	0.49	0.55	0.55
J4 Discovery Bay Road / Marina Drive	Priority	0.10	0.08	0.12	0.09	0.14	0.12
J5 Discovery Bay Road / Headland Drive	Priority	0.02	0.05	0.02	0.07	0.03	0.07
J6 Shun Tung Road / Tat Tung Road (West)	Signal	42%	33%	17%	21%	16%	20%
J7 Shun Tung Road / Tat Tung Road (East)	Signal	>50%	>50%	>50%	>50%	>50%	>50%
J8 Tat Tung Road / Fu Tung Street	Priority	0.30	0.37	0.40	0.40	0.43	0.43
J9 Sunny Bay Road / Cheung Tung Road	Priority	0.05	0.05	0.53	0.54	0.55	0.57
J10 Cheung Tung Road / Discovery Bay Tunnel	Priority	0.17	0.20	0.70	0.73	0.75	0.78
J11 Siena Avenue North Roundabout	Roundabout	0.06	0.04	0.27	0.24	0.28	0.25
J12 Discovery Bay Road / Vista Avenue	Priority	0.05	0.03	0.06	0.04	0.06	0.04
J13A Tung Chung Waterfront Road / Slip Road to North Lantau Highway	Signal	>50%	>50%	>50%	>50%	>50%	>50%
J13B Tung Chung Waterfront Road / Slip Road from North Lantau Highway	Signal	>50%	>50%	>50%	>50%	>50%	>50%
J14 Chek Lap Kok South Road Roundabout	Roundabout	0.49	0.44	0.85	0.87	0.85	0.87
J15 Shun Tung Road / Yu Tung Road	Signal	>50%	>50%	15%	>50%	15%	>50%
J16 Tung Chung East Interchange	Roundabout	0.15	0.16	0.42	0.43	0.42	0.43
J17 Tat Tung Road / Mei Tung Street	Signal	>50%	>50%	>50%	>50%	>50%	>50%
J18 Tat Tung Road / Hing Tung Street	Signal	>50%	>50%	>50%	>50%	>50%	>50%

\* Figures shown represent "Design Flow/Capacity" (DFC) ratio for roundabout and priority junctions, and "Reserve Capacity" for signal junctions



## 5 SUMMARY AND CONCLUSION

### 5.1 Summary

- 5.1.1 There are plans to optimize the residential potential of Discovery Bay, in particular in Area 10b with a total of 1,125 nos. of flats into residential development in addition to the current approved Outline Zoning Plan.
- 5.1.2 This submission has addressed comments from Transport Department received on 25 April 2016, in particular, the latest planning assumptions for Siu Ho Wan Depot Residential Development and Siu Ho Wan Reclamation and Landside Development have been adopted in the future year traffic assessment.
- 5.1.3 Under the existing comprehensive traffic control management for Discovery Bay, only authorized vehicles are allowed to access Discovery Bay via Discovery Bay Tunnel such as emergency vehicles, servicing buses and goods vehicles. And coaches with prior registration could access Discovery Bay (North). Since 26 October 2014, designated areas in Discovery Bay (North) are also accessible by Urban and Lantau Taxis.
- 5.1.4 Comprehensive traffic counts were conducted at critical road links including Discovery Bay Road, Discovery Valley Road, Siena Avenue, Discovery Bay Tunnel, Cheung Tung Road and North Lantau Highway, Lantau Link, and key junctions in Discovery Bay, Tung Chung and Sunny Bay areas. They are all currently operating with significant spare capacity during both AM and PM peak hour.
- 5.1.5 To investigate the performance and handling capacity of the critical road links and junctions, an analysis was carried out to appraise the likely traffic impact generated by the additional developments (i.e. residential) in the Discovery Bay. Assessment on the existing ferry services has also been conducted.
- 5.1.6 Both reference scenario (full development under current approved OZP with traffic generation for Yi Pak developments) and design scenario (with traffic generation from the additional residential development) have been assessed, for Year 2026 and 2031.
- 5.1.7 All key road links and junctions would be operated below v/c ratio of 1.2 (except Lantau Link in Year 2031 Reference and Design Scenarios) and within practicable capacity during both AM and PM peak hour, with the additional residential developments in place. Lantau Link W/B would be operating with v/c ratio of 1.26 and 1.27 during AM Peak, under Year 2031 Reference and Year 2031 Design Scenario

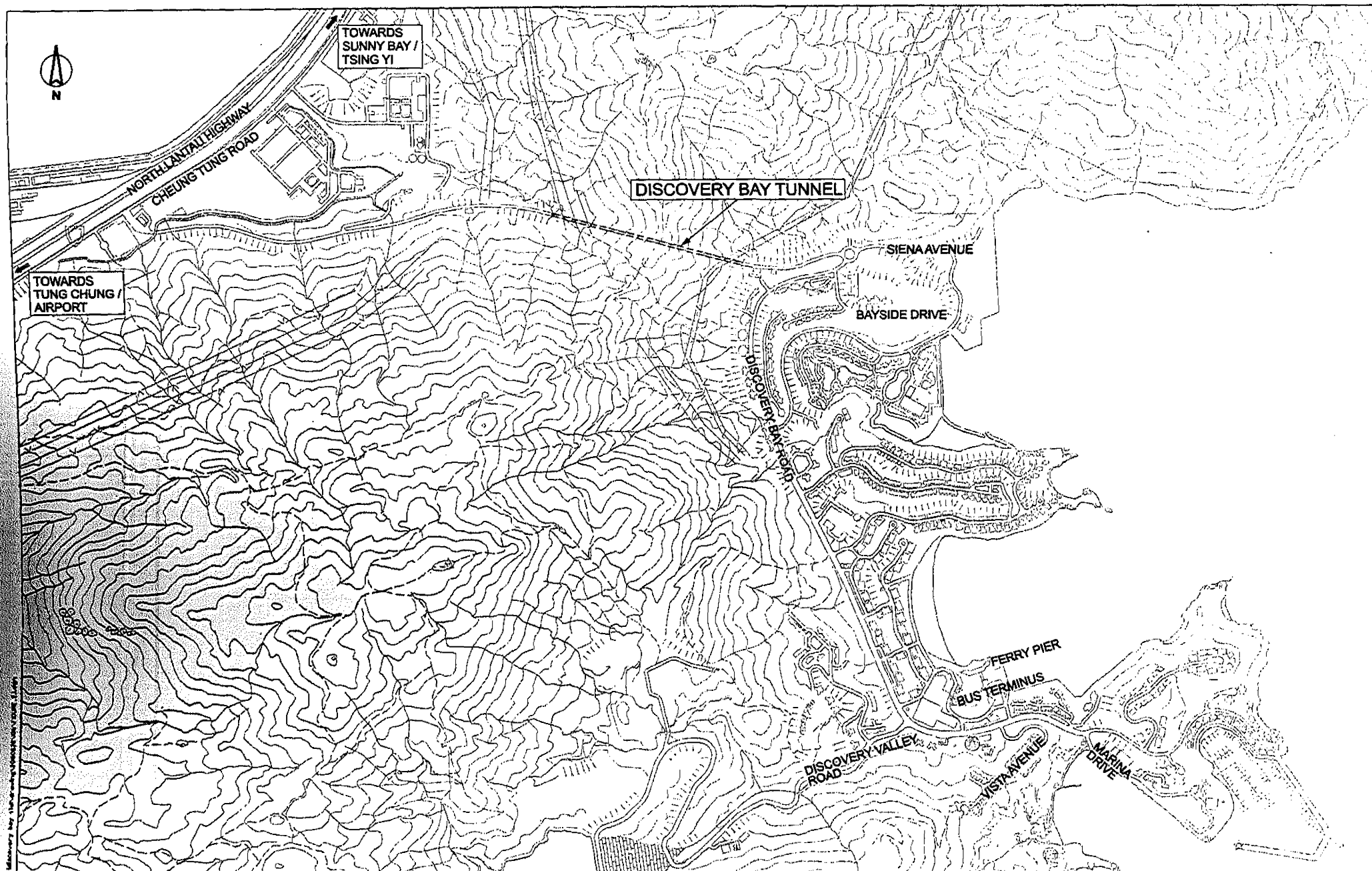
respectively, indicating that the impact of traffic generation from the additional residential units on the said assessed road link is negligible.

- 5.1.8 In addition, the existing ferry service would still operate within capacity with the additional residential developments in place.

### 5.2 Conclusion

- 5.2.1 The proposed additional residential developments in Discovery Bay (i.e. Area 10b) would not generate adverse traffic impact to the ferry services and the critical road links and junctions in Discovery Bay, Tung Chung and Sunny Bay areas. Therefore, the additional residential developments are acceptable from traffic point of view.

Figures

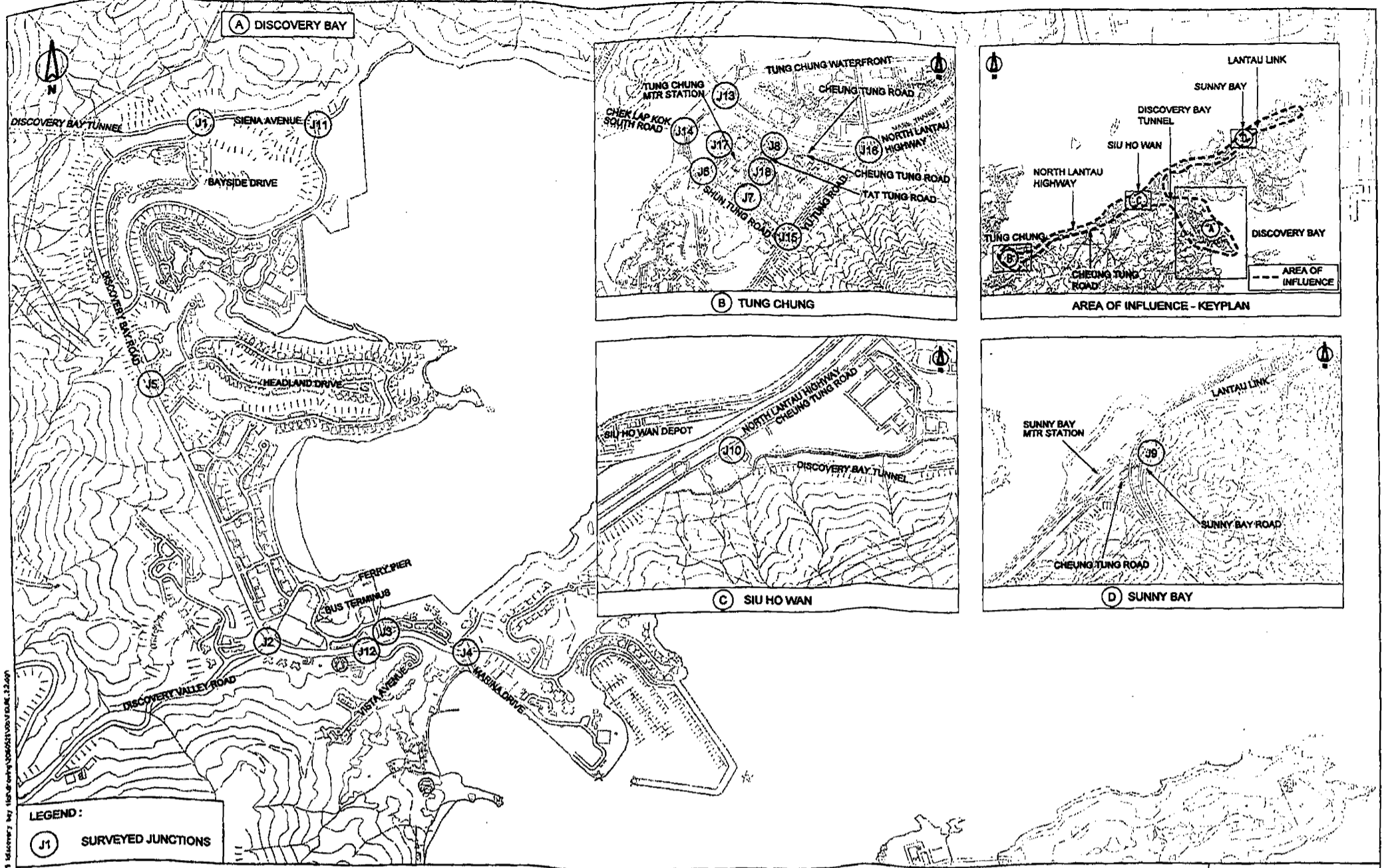


TRAFFIC STUDY FOR PROPOSED DEVELOPMENTS IN AREA N1 NORTH, AREA 10B, DISCOVERY BAY

FIGURE 2.1

NOV 15	1:11000	EXISTING ROAD NETWORK IN DISCOVERY BAY
WTL	236078	

ARUP



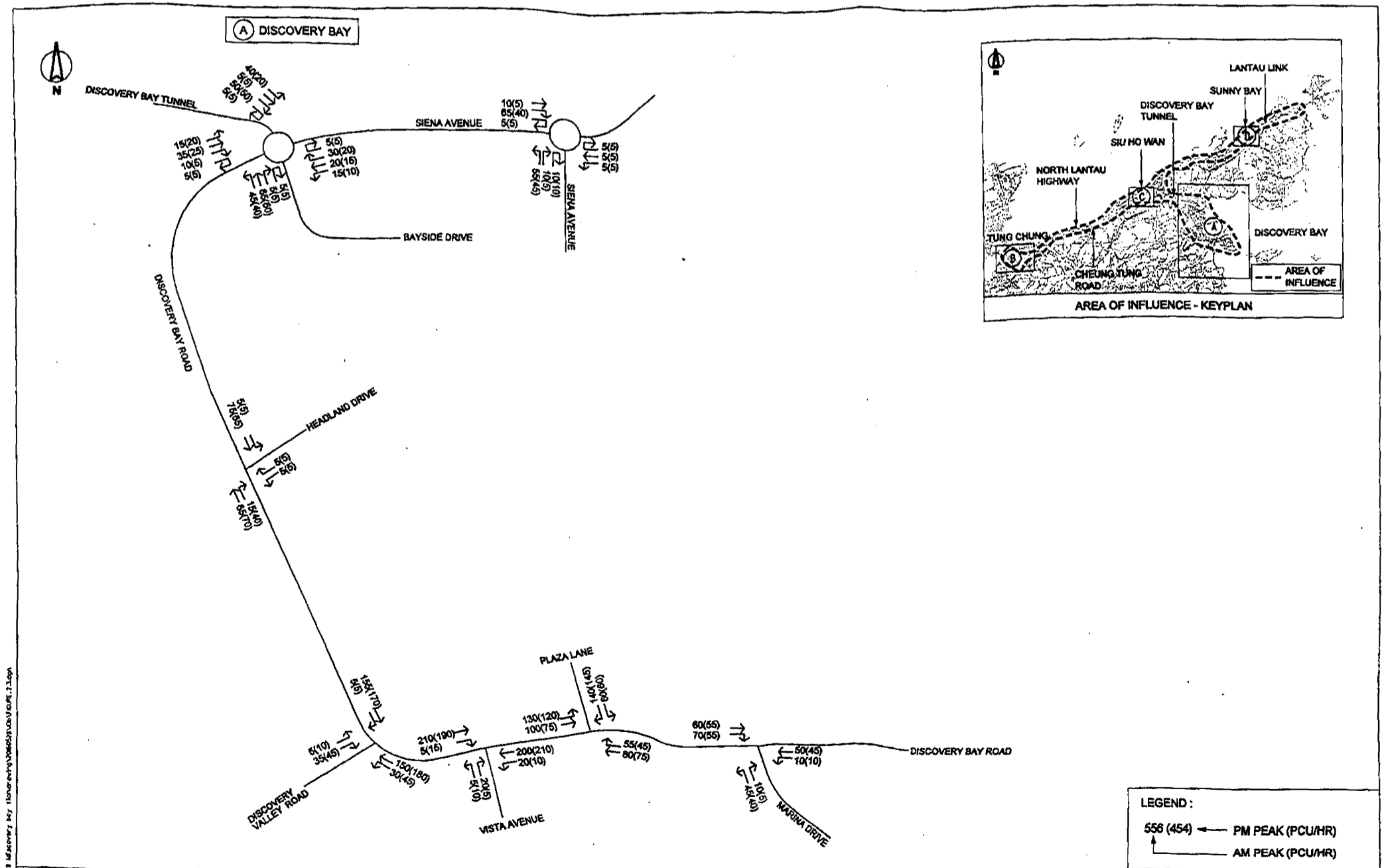
TRAFFIC STUDY FOR PROPOSED DEVELOPMENTS IN AREA N1 NORTH, AREA 10B, DISCOVERY BAY

NOV 15 N.T.S.  
WTL 236078

LOCATION OF SURVEYED KEY JUNCTIONS

FIGURE 2.2

ARUP



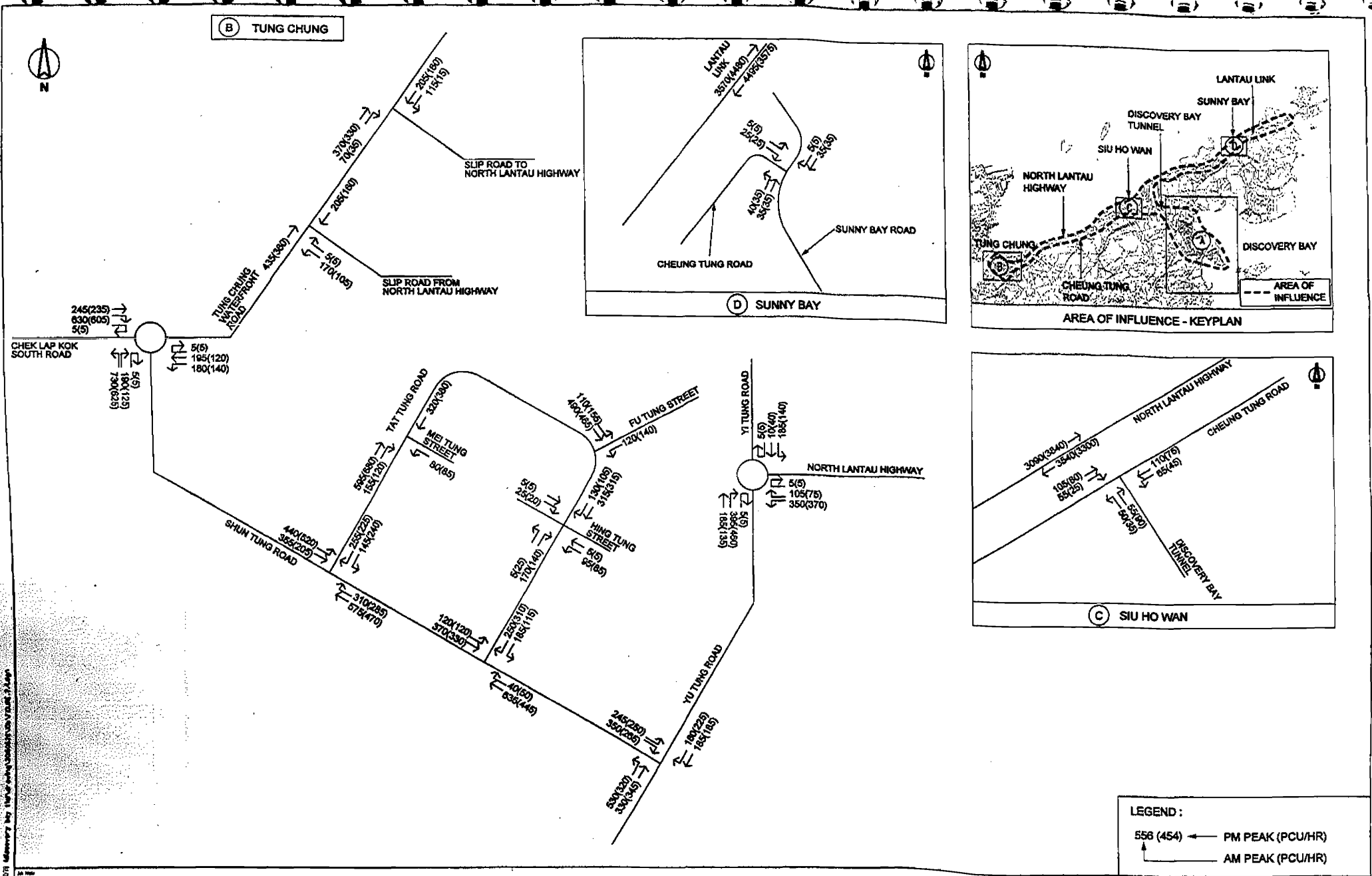
TRAFFIC STUDY FOR PROPOSED DEVELOPMENTS IN AREA N1 NORTH, AREA 10B, DISCOVERY BAY

NOV 15 N.T.S.  
WTL 236078

EXISTING YEAR 2015 OBSERVED TRAFFIC FLOWS (INTERNAL ROAD NETWORK)

FIGURE 2.3

ARUP



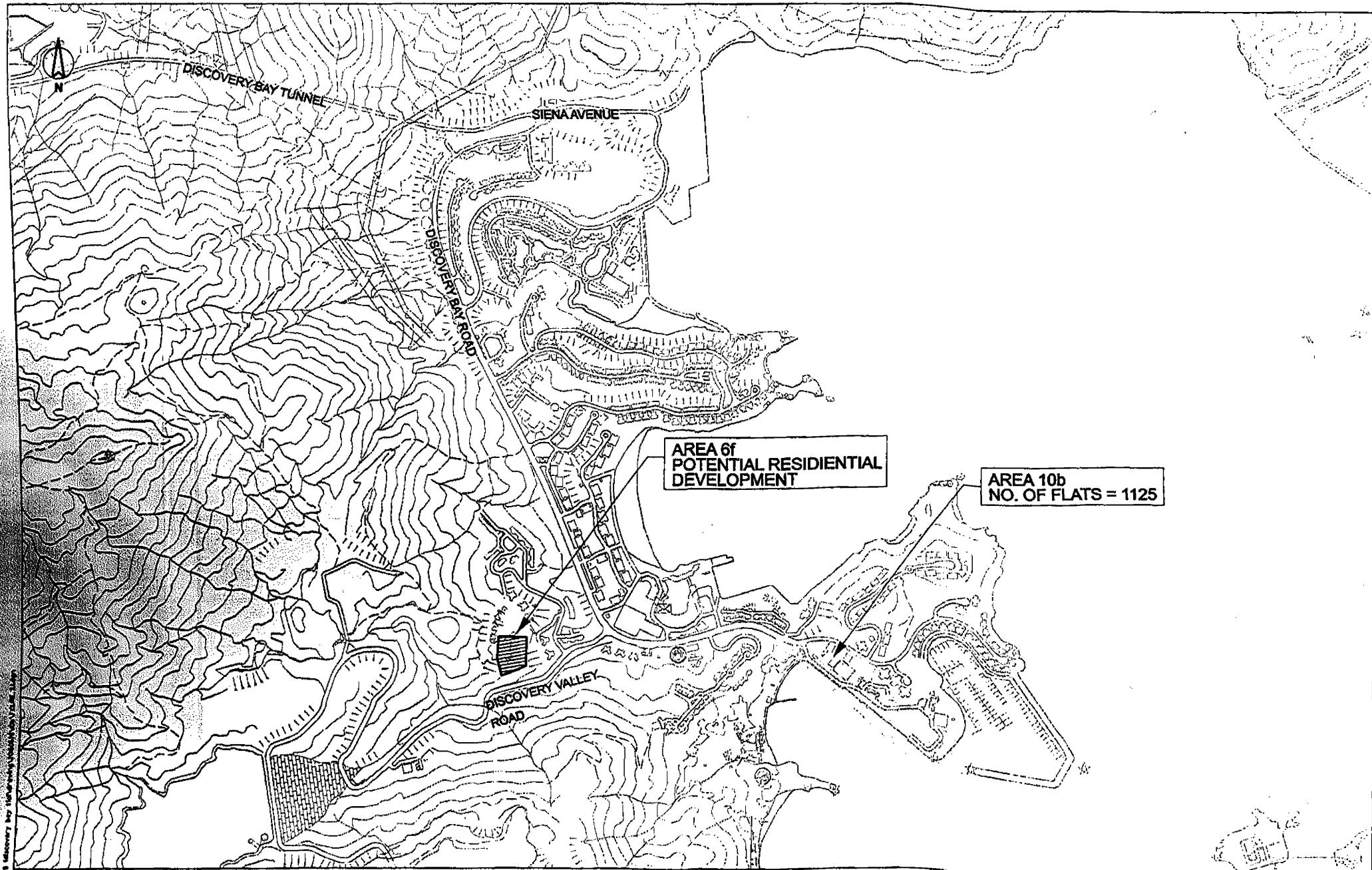
TRAFFIC STUDY FOR PROPOSED DEVELOPMENTS IN AREA N1 NORTH, AREA 10B, DISCOVERY BAY

NOV 15	N.T.S.
WTL	236078

EXISTING YEAR 2015 OBSERVED TRAFFIC FLOWS (EXTERNAL ROAD NETWORK)

FIGURE 2.4

**ARUP**



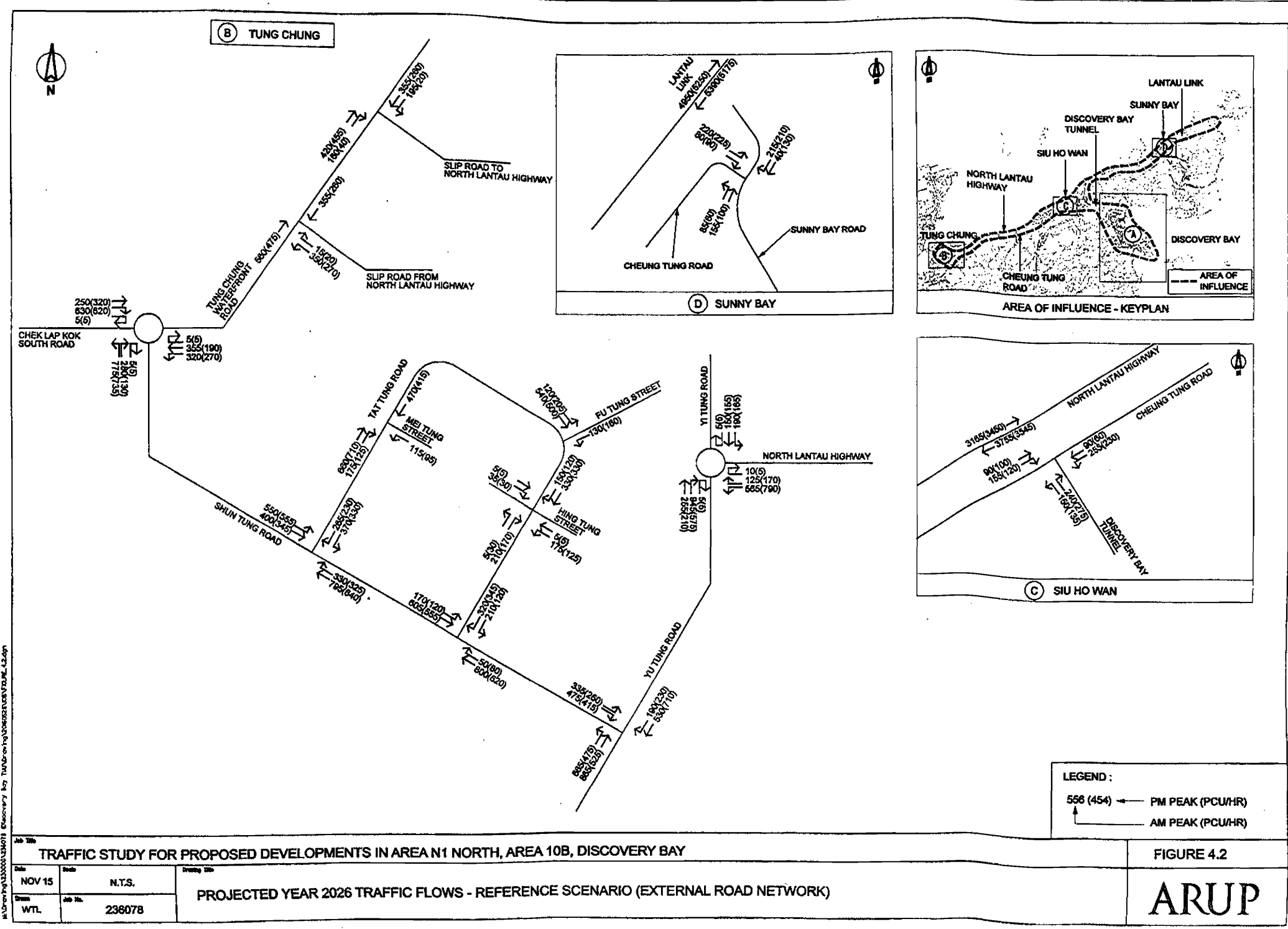
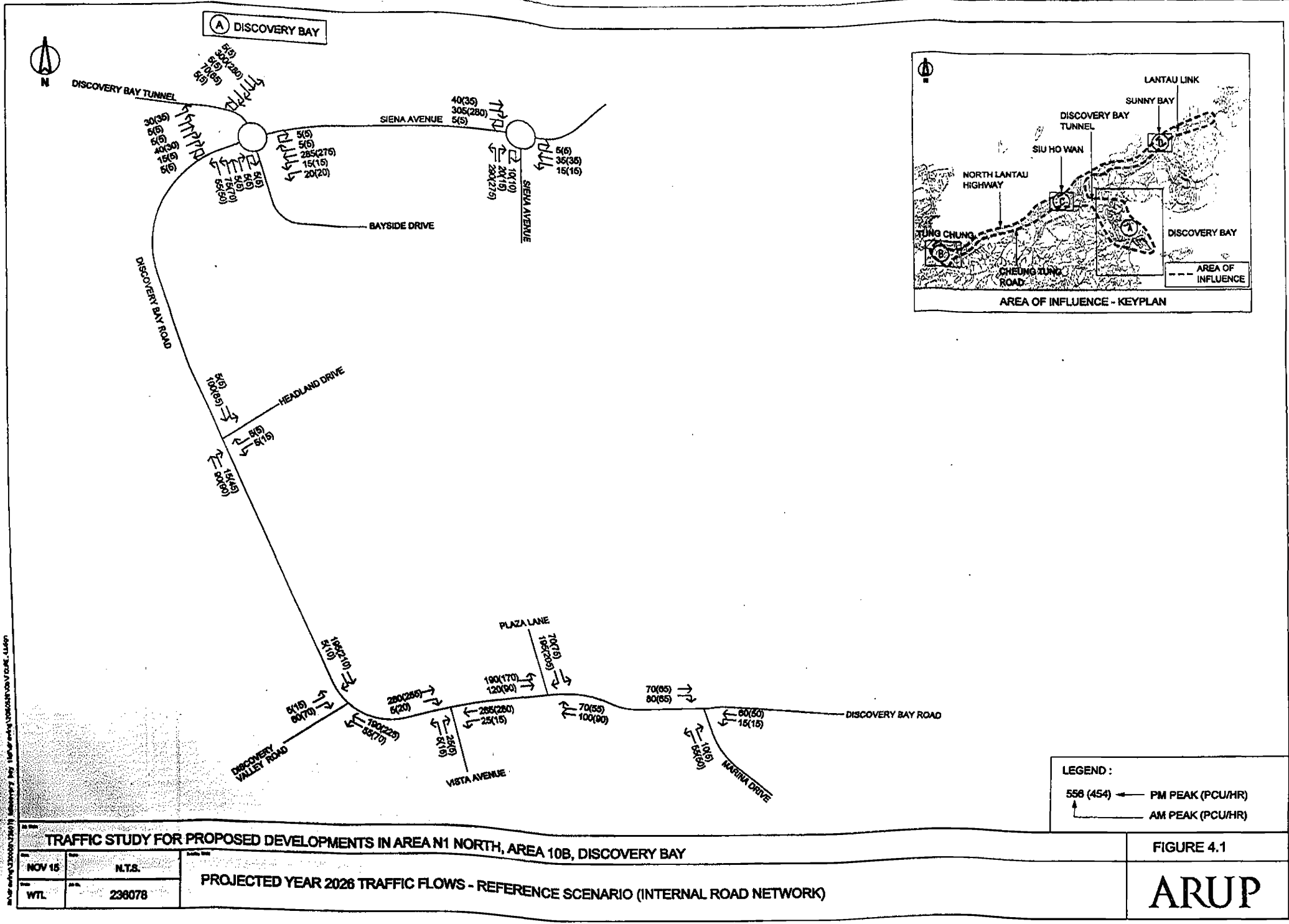
TRAFFIC STUDY FOR PROPOSED DEVELOPMENTS IN AREA N1 NORTH, AREA 10B, DISCOVERY BAY

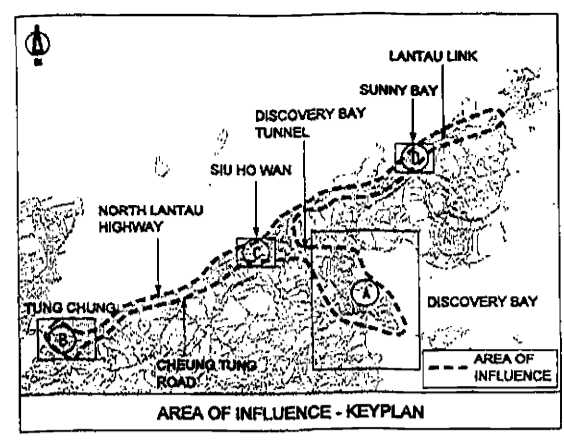
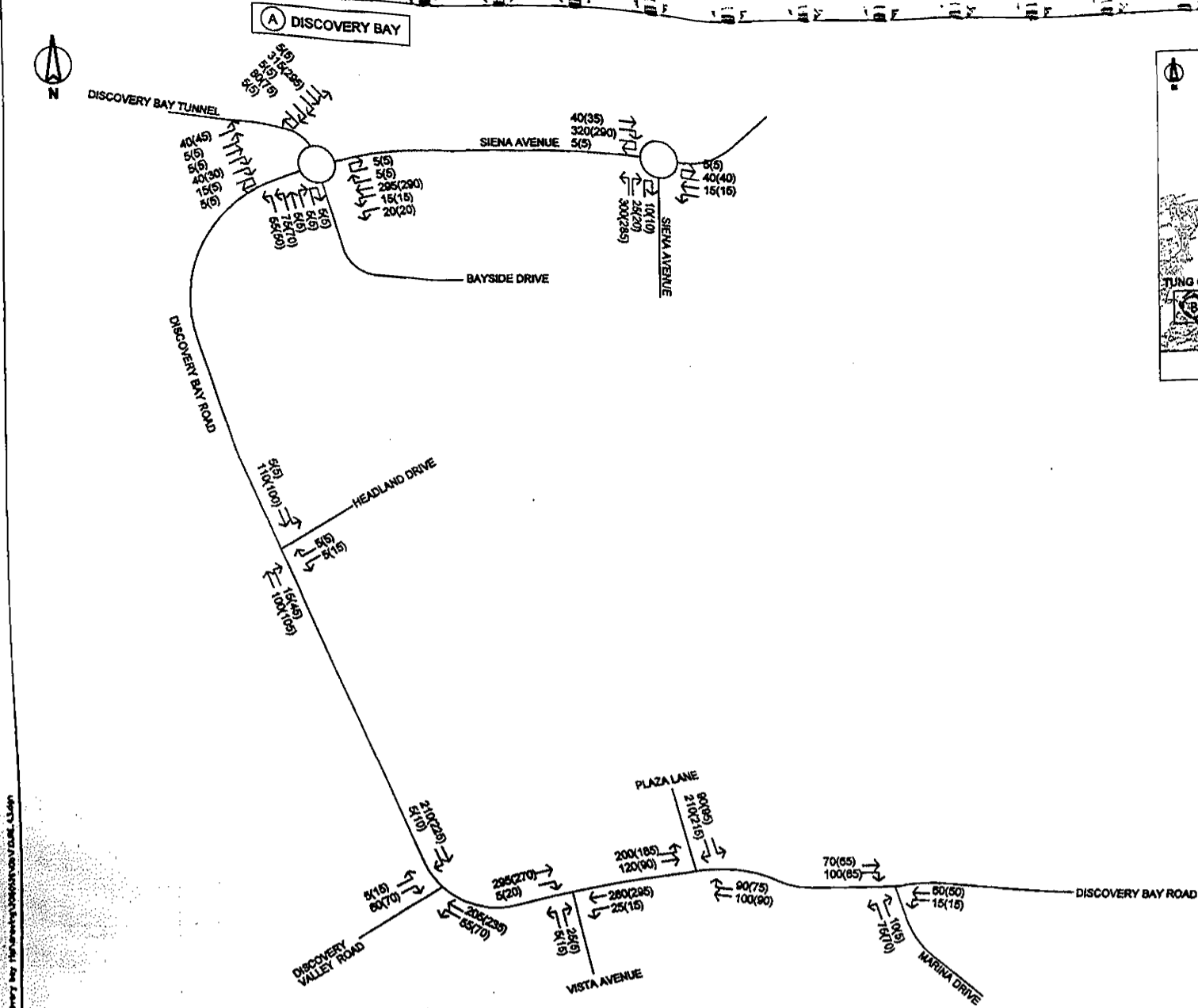
NOV 15	1:10000
WTL	236078

PROPOSED DEVELOPMENT IN DISCOVERY BAY

FIGURE 3.1

**ARUP**





LEGEND :  
 558 (454) ← PM PEAK (PCU/HR)  
 ← AM PEAK (PCU/HR)

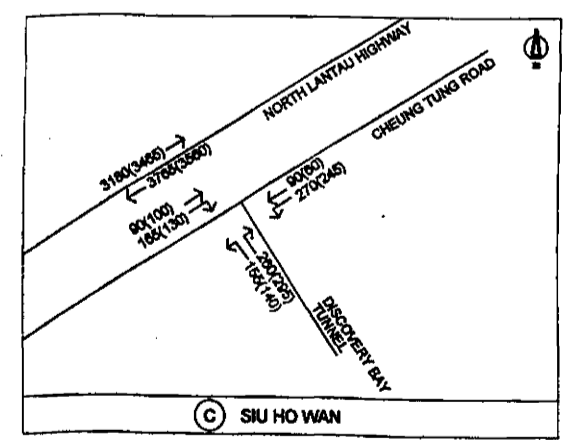
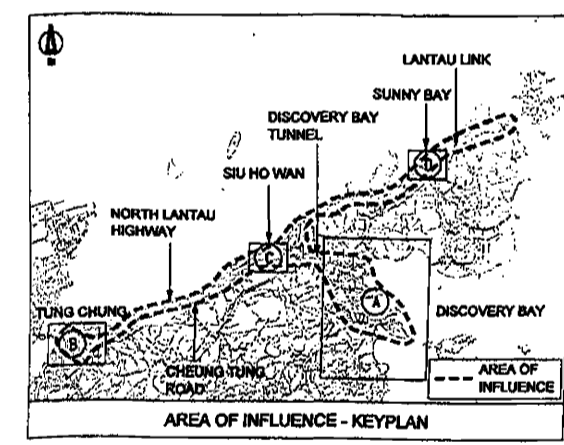
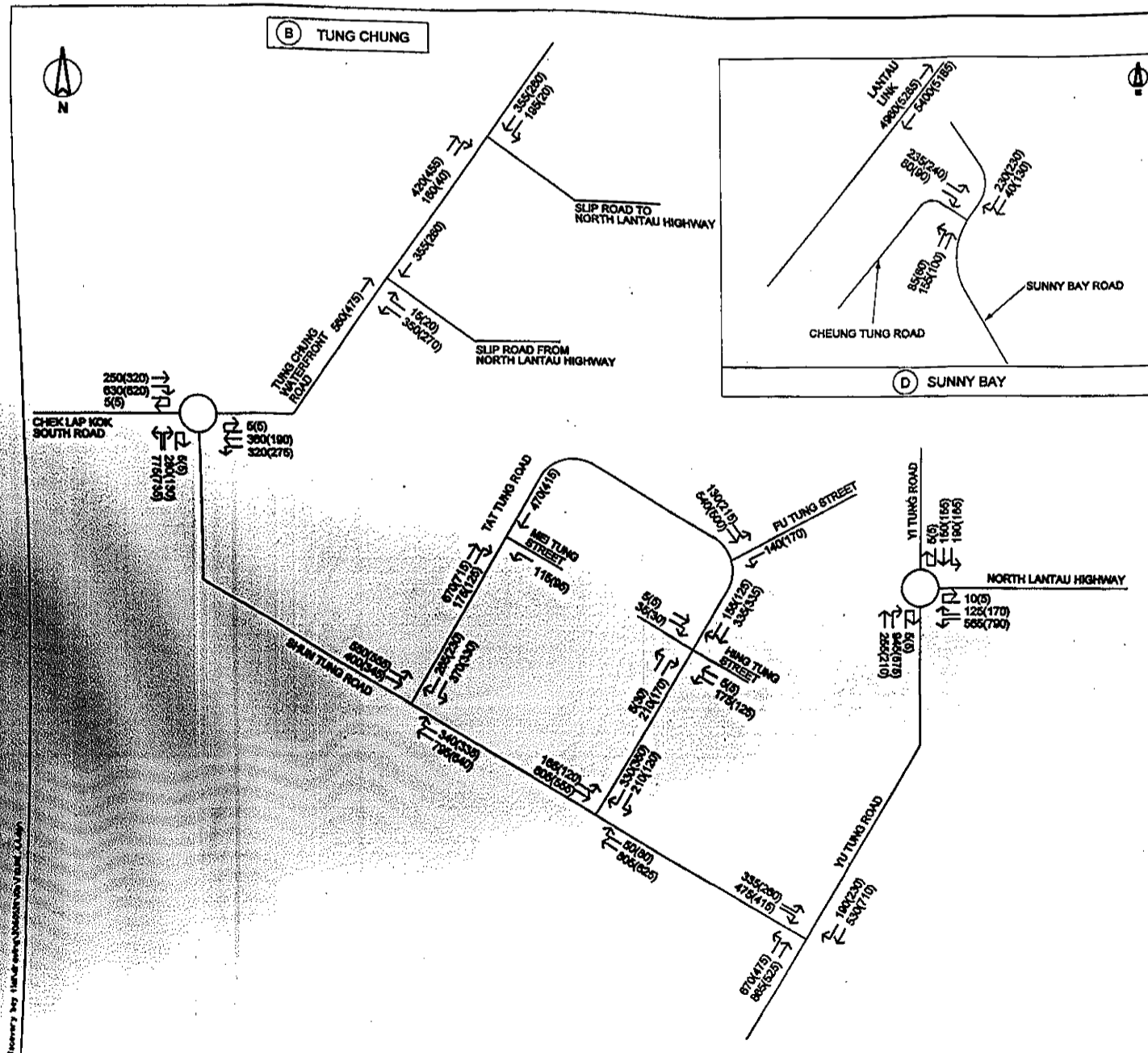
TRAFFIC STUDY FOR PROPOSED DEVELOPMENTS IN AREA N1 NORTH, AREA 10B, DISCOVERY BAY

FIGURE 4.3

NOV 15	N.T.S.
WTL	238078

PROJECTED YEAR 2026 TRAFFIC FLOWS - DESIGN SCENARIO (INTERNAL ROAD NETWORK)

ARUP



LEGEND :  
 558 (454) ← PM PEAK (PCU/HR)  
 ← AM PEAK (PCU/HR)

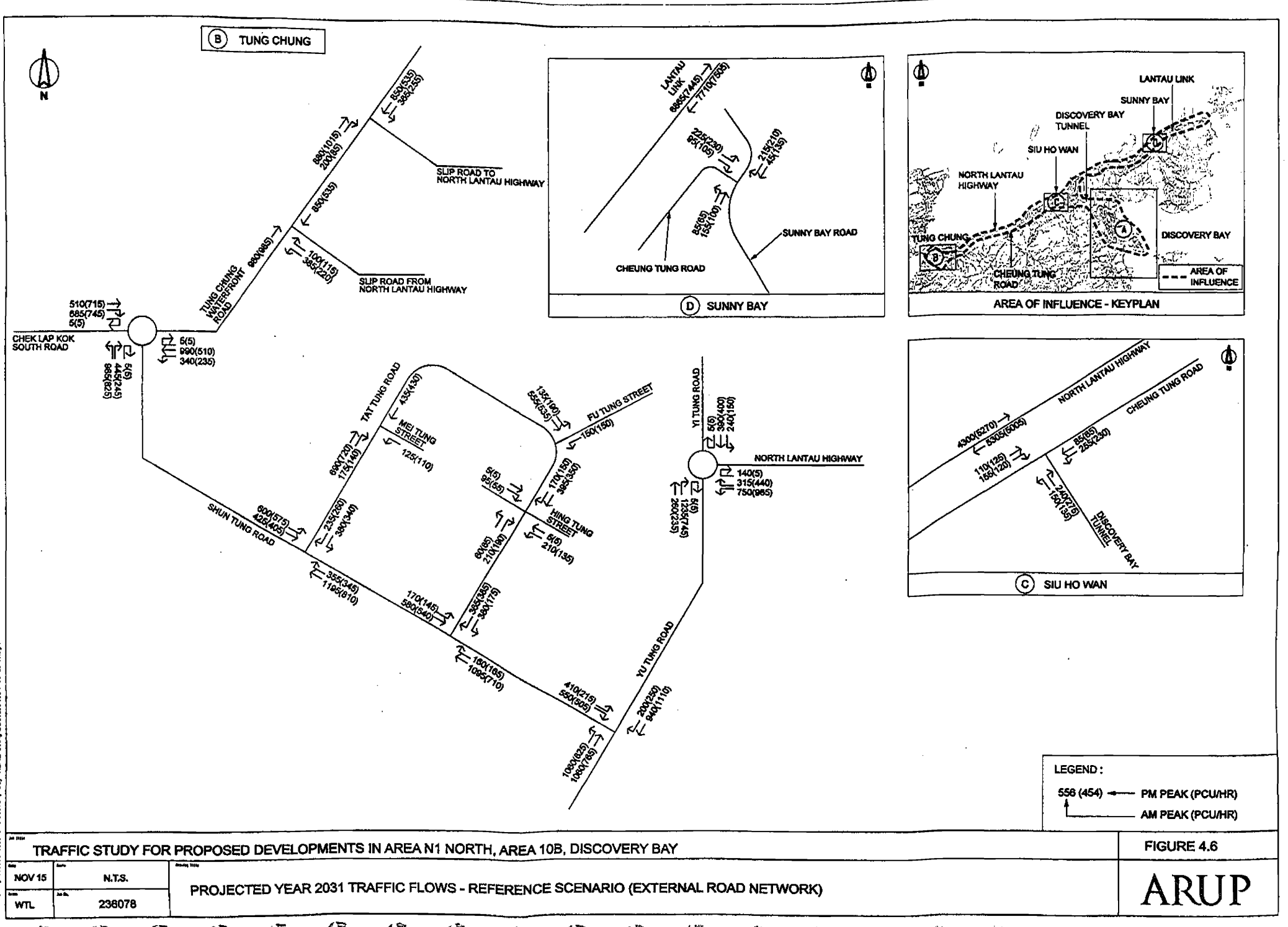
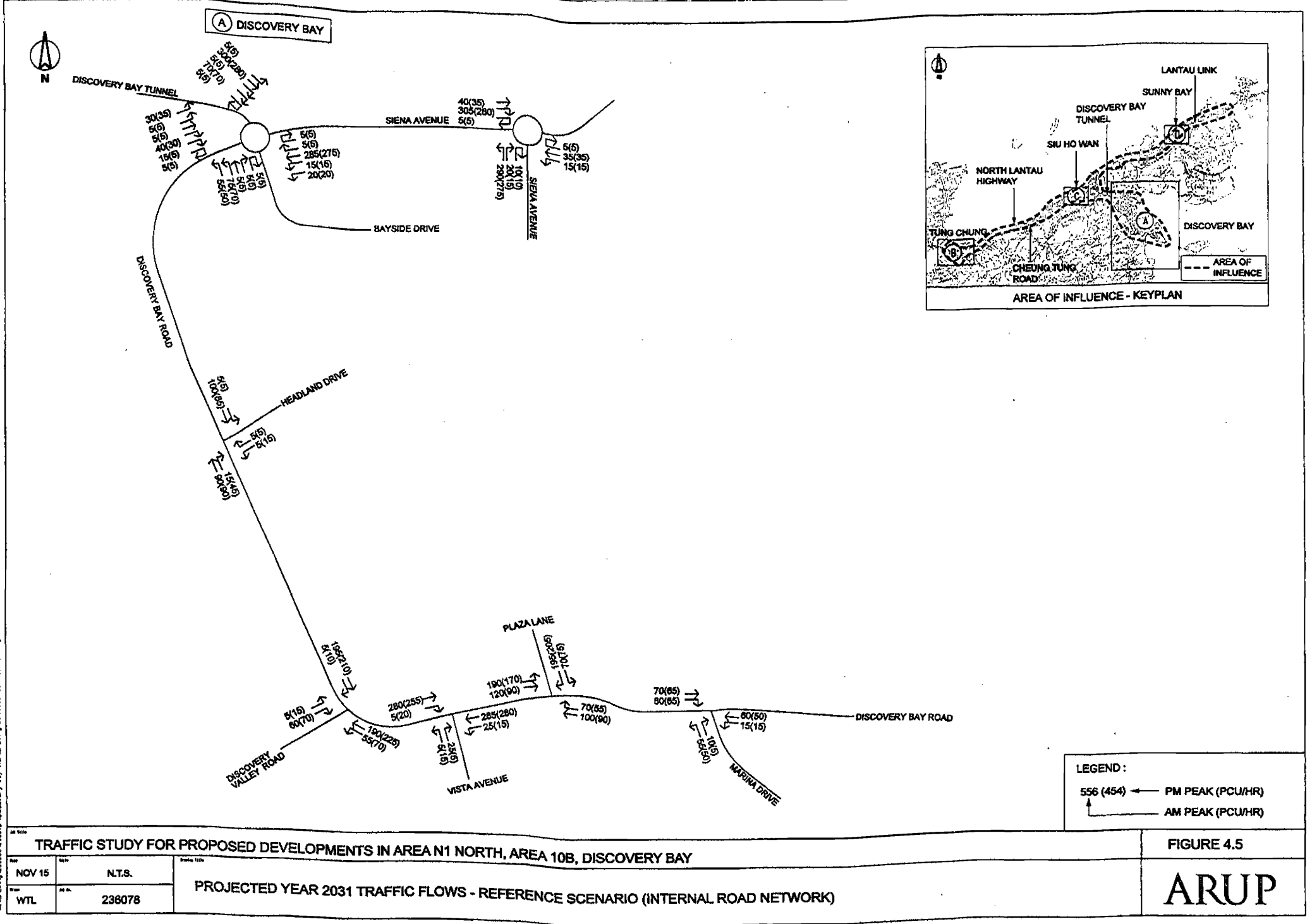
TRAFFIC STUDY FOR PROPOSED DEVELOPMENTS IN AREA N1 NORTH, AREA 10B, DISCOVERY BAY

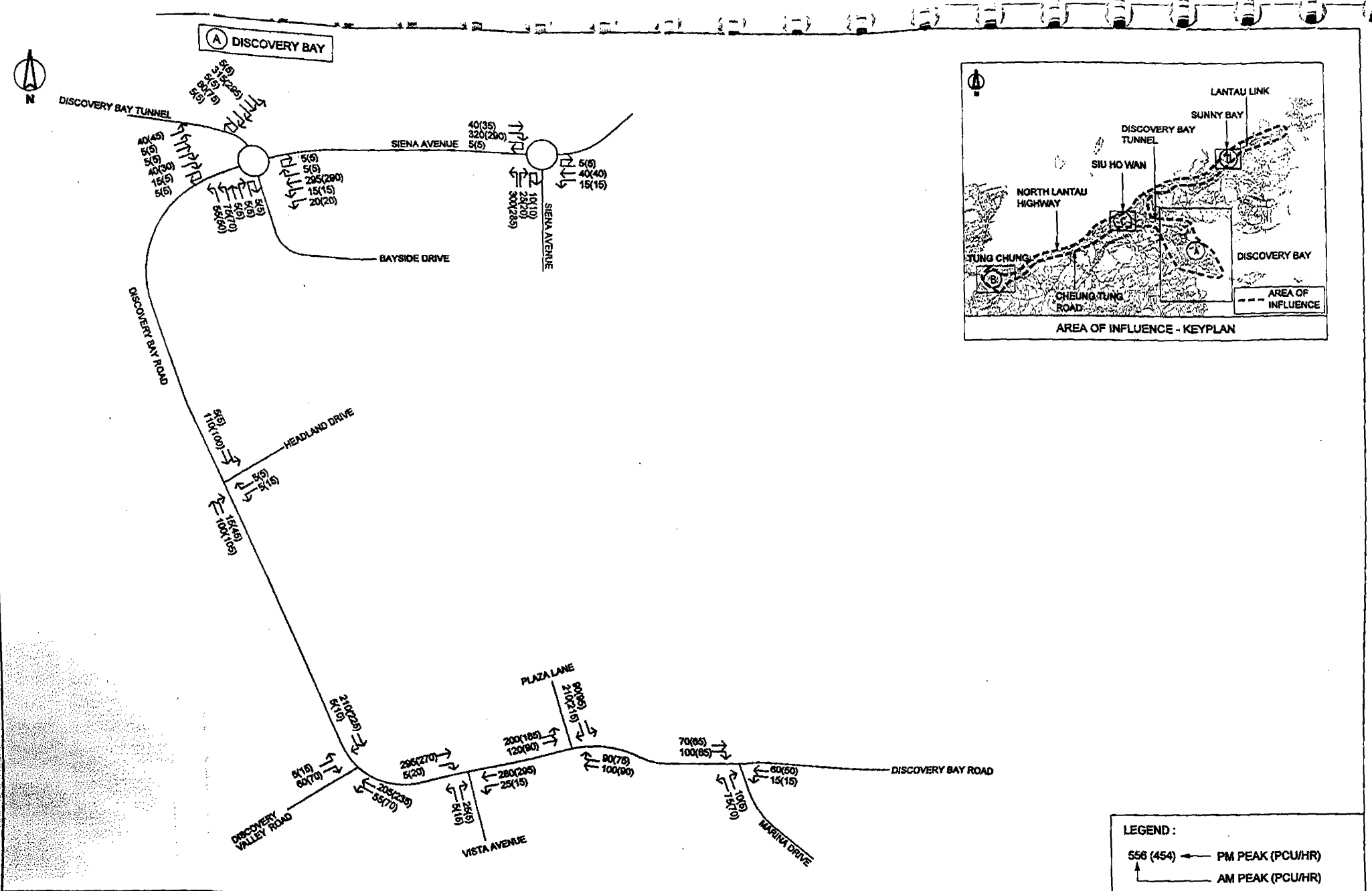
FIGURE 4.4

NOV 15	N.T.S.
WTL	238078

PROJECTED YEAR 2026 TRAFFIC FLOWS - DESIGN SCENARIO (EXTERNAL ROAD NETWORK)

ARUP





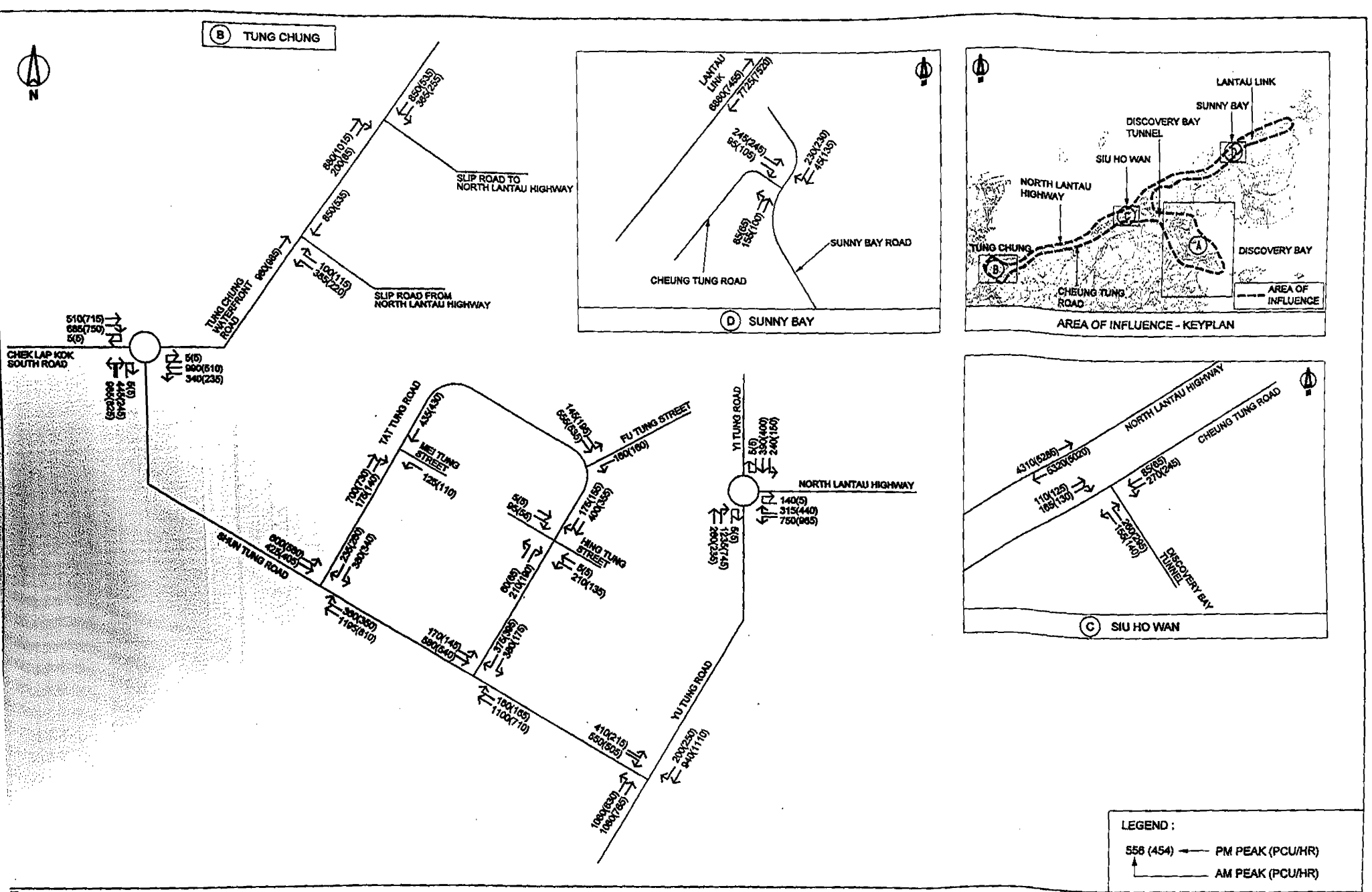
TRAFFIC STUDY FOR PROPOSED DEVELOPMENTS IN AREA N1 NORTH, AREA 10B, DISCOVERY BAY

NOV 15 N.T.S.  
WTL 238078

PROJECTED YEAR 2031 TRAFFIC FLOWS - DESIGN SCENARIO (INTERNAL ROAD NETWORK)

FIGURE 4.7

**ARUP**



TRAFFIC STUDY FOR PROPOSED DEVELOPMENTS IN AREA N1 NORTH, AREA 10B, DISCOVERY BAY

OV 15 N.T.S.  
TL 238078

PROJECTED YEAR 2031 TRAFFIC FLOWS - DESIGN SCENARIO (EXTERNAL ROAD NETWORK)

FIGURE 4.8

**ARUP**



### Appendix A

### Bus Octopus and Ferry Ticket Gate Count Provided by Operators

### Bus Octopus Count Provided by Operators (Typical Weekday)

DB01R	to TC	to DB	DB02R	to DB	to DBN	DB03R	to SB	to DB	DB03P	to SB	to DB
	2092	2125		1376	113		3026	3177		832	523
00:00	4	8	00:00	16		00:00		39	00:00		
01:00		19	01:00	13		01:00		10	01:00		
02:00			02:00	8		02:00			02:00		
03:00			03:00	2		03:00			03:00		
04:00			04:00	13		04:00			04:00		
05:00	27	39	05:00	31		05:00			05:00		
06:00	54	58	06:00	70		06:00	141	31	06:00		
07:00	149	110	07:00	98	14	07:00	403	154	07:00	49	10
08:00	157	149	08:00	105	16	08:00	424	286	08:00	115	43
09:00	94	124	09:00	43	12	09:00	298	129	09:00	52	37
10:00	129	97	10:00	51	8	10:00	210	91	10:00	89	11
11:00	88	105	11:00	51	1	11:00	162	91	11:00	60	21
12:00	194	56	12:00	58	1	12:00	134	82	12:00	54	16
13:00	152	132	13:00	63	11	13:00	147	109	13:00	53	25
14:00	136	149	14:00	74	5	14:00	114	93	14:00	44	21
15:00	104	89	15:00	92	12	15:00	122	92	15:00	53	36
16:00	174	178	16:00	69	4	16:00	109	211	16:00	68	30
17:00	148	166	17:00	60	10	17:00	272	175	17:00	89	32
18:00	173	177	18:00	76	10	18:00	193	390	18:00	52	43
19:00	124	143	19:00	64	7	19:00	109	338	19:00	30	74
20:00	73	126	20:00	54	1	20:00	55	254	20:00	14	67
21:00	43	99	21:00	95	1	21:00	46	262	21:00	10	39
22:00	38	85	22:00	102		22:00	48	219	22:00		18
23:00	31	26	23:00	70		23:00	39	121	23:00		

### Ferry Ticket Gate Count Provided by Operators (Typical Weekday)

from Central Pier	Total		from DB Pier	Total	
	ridership	capacity		ridership	capacity
00:00	87	793	00:00	9	793
01:00	35	495	01:00	6	298
02:00	31	298	02:00	0	298
03:00	18	298	03:00		
04:00			04:00	4	298
05:00	15	298	05:00		
06:00	20	298	06:00	210	1289
07:00	117	1485	07:00	651	1980
08:00	177	1485	08:00	1277	1980
09:00	88	990	09:00	511	990
10:00	114	990	10:00	451	990
11:00	127	990	11:00	304	990
12:00	119	990	12:00	299	990
13:00	178	990	13:00	272	990
14:00	249	990	14:00	238	990
15:00	371	1485	15:00	167	990
16:00	277	990	16:00	172	990
17:00	440	990	17:00	199	990
18:00	926	1485	18:00	249	1485
19:00	563	990	19:00	97	990
20:00	503	990	20:00	45	990
21:00	418	990	21:00	64	990
22:00	364	990	22:00	57	990
23:00	204	990	23:00	30	990