

Proposed Tg. Aru Eco Development

Special Environmental Impact Assessment

Volume IV of IV : Appendix E - J



Tg. Aru Eco Development Sdn. Bhd.

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Socioeconomic Study

Proposed Tanjung Aru Eco Development

Socioeconomic Survey at Tanjung Aru Beach

Dr. Paul Porodong and Dr. Gaim. J. Lunkapis

February 2016

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1 Introduction

This report describes the socioeconomic survey carried out at two (2) phases. The first phase at Tg. Aru Beach from 19 to 21 February 2016. The second phase of survey was carried out around the Tanjung Aru area including Petagas from 2nd to 16th June 2016.

1.1 Background Information

Population statistical data for the project site obtained from the Department of Statistics are provided in Table 1.1 to Table 1.5.

Table 1.1 Citizen and non citizen near the project site

Area	Malaysian citizen	Non – Citizen	Total
Petagas/Putatan	14,899	993	15,892
Tanjung Aru	6,494	1150	7,644
Total	21,393	2,143	23,536

Source: Department of Statistics, Malaysia. 2010.

Table 1.2 Number of family and houses near the project site

Areas	Number of family	Number of houses
Petagas/Putatan	3,266	3,530
Tanjung Aru	1,605	1,748
Total	4,871	5,278

Source: Department of Statistics, Malaysia. 2010.

Table 1.3 Citizen's ethnicity near the project site

Ethnicity	Petagas/Putatan	Tanjung Aru	Total
Malay	3 029 (20.3%)	1 370 (21.1%)	4 399 (20.1%)
Kadazandusun	1 459 (9.8%)	1 212 (18.7%)	2 571 (13.0%)
Bajau	5 093 (34.2%)	1 780 (27.4%)	6 873 (32.1%)
Murut	150 (1.0%)	119 (1.8%)	269 (1.3%)
Other Bumiputra	2 989 (20.0%)	917 (14.1)	3 906 (18.2%)
Chinese	1 432 (9.6%)	904 (13.9%)	2 336 (10.9%)
Indian	135 (1.0%)	69 (1.2%)	204 (1.0%)
Others	12 (4.1%)	123 (1.8%)	735 (3.4%)
Total	14,899	6,494	21,393

Source: Department of Statistics, Malaysia. 2010.

Table 1.4 Gender distribution near the project site

Areas	Male	Female	Total
Petagas/Putatan	8,180	7,712	15,892
Tanjung Aru	3,916	3,728	7,644
Total	12,096	11,440	23,536

Source: Department of Statistics, Malaysia. 2010.

Table 1.5 Age structure of population near project site and number of respondents

Age	Petagas, Putatan	Tanjung Aru	Total	Number of respondents	
0-4	1 376 (8.6%)	618 (8.1%)	1 994 (8.4%)	104	
5-9	1 391 (8.7%)	517 (6.7%)	1 908 (8.1%)		
10-14	1 813 (11.4%)	569 (7.4%)	2 382 (10.1%)		
15-19	1 864 (11.7%)	896 (11.7%)	2 760 (11.7%)		
20-24	1 611 (10.1%)	883 (11.5%)	2 494 (10.6%)	361	
25-29	1 731 (10.9%)	931 (12.1%)	2 662 (11.3%)		
30-34	1 073 (6.7%)	608 (7.9%)	1 681 (7.1%)	193	
35-39	1 071 (6.7%)	520 (6.8%)	1 591 (6.7%)		
40-44	961 (6.0%)	465 (6.1%)	1 426 (6.15)	274	
45-49	1 005 (6.3%)	527 (6.8%)	1 532 (6.5%)		
50-54	728 (4.5%)	420 (5.5%)	1 148 (4.8%)		
55-59	564 (3.5%)	278 (3.6%)	842 (3.5%)		
60-64	301 (1.8%)	137 (2.0%)	438 (1.850)		
65-69	175 (1.1%)	122 (1.6%)	297 (1.3%)		
70-74	121 (1.0%)	61 (1.0%)	182 (1.0%)		
75 and above	107 (1.0%)	92 (1.2%)	199 (1.0)		
Total	15,892	7,644	23,536		932

Source: Department of Statistics, Malaysia. 2010.

2 Methodology

Structured interviews were conducted by 19 well trained enumerators, all of whom are currently undertaking their master degree in various fields of Social Science in UMS and the head of enumerators have master degree in Social Sciences.

The respondents are first briefed about the project showing the location map and project component (Attachment A). A prepared questionnaire (Attachment B) was developed prior to the field surveys.

Respondents were selected using convenience sampling. Nineteen enumerators were placed at TA Beach 1, 2, 3, Kg. Tanjung Aru and in Putatan and Petagas Area especially Kg. Contoh respectively to interview any consenting respondents. . Each enumerators were instructed to have almost equal proportion of male and female respondents to ensure balanced gender representation. The research population limited to only 15 year old and above to a total of 17,252.

There were 932 respondents interviewed with 479 male and 453 female. Despite less than 10% from 17, 252 the confidence level is actually 99% with 4.11 margin of error. (<https://www.surveymonkey.com/mp/sample-size-calculator/>). Confidence level is measure of how certain you are that your sample accurately reflects the population, within its margin of error. Common standards used by researchers are 90%, 95%, and the highest is 99%.



Photo 2.1 Survey interview at Tanjung Aru Beach 2 (Phase 1 survey)



Photo 2.2 Survey interview at the residences (Phase 2 survey)

3 Findings

3.1 Respondents Age Group

The working age group (21 to 55 years old) makes up about 80.0 percent of the respondents. The older group > 56 years old comprised about 6 percent (Table 3.1).

Table 3.1 Respondent's gender and age group

Age group	Male	Female	Total
<20	56 (53.8%)	48 (46.2%)	104 (11.15%)
21-25	90 (48.4%)	96 (51.6%)	186 (20.0%)
26-30	88 (50.3%)	87 (49.7%)	175 (18.8%)
31-35	59 (50.4%)	58 (49.6%)	117 (12.5%)
36-40	44 (57.9%)	32 (42.1%)	76 (8.2%)
41-45	37 (51.4%)	35 (48.6%)	72 (7.7%)
46-50	32 (65.3%)	17 (34.7%)	49 (5.25%)
51-55	26 (45.6%)	31 (54.4%)	57 (6.1%)
>56	47 (49.0%)	49 (51.0%)	96 (10.3%)
Total	479 (51.4%)	453 (48.6%)	932 (100.0%)

3.2 Community Values and Lifestyles

Photo 3.1 to Photo 3.6 shows typical activities in Tanjung Aru Beach.



Photo 3.1 Taking photos is a must in Tanjung Aru Beach



Photo 3.2 Family time at Tanjung Aru Beach 2



Photo 3.3 Group picnic at Tanjung Aru Beach 2



Photo 3.4 Picnic with grandma



Photo 3.5 Sunset viewing is favourite activity for everyone at this hour



Photo 3.6 Enjoying sweet corn at Tanjung Aru Beach 1

3.2.1 Employment

Table 3.2 Respondent's profession

Profession	Gender		Total
	Male	Female	
Professional	18 (4.0%)	24 (5.3%)	42 (4.5%)
Managerial	34 (7.1%)	21 (5.0%)	55 (5.9%)
Government servant	70 (14.6%)	66 (15.0%)	136 (14.5%)
Clerical	99 (20.6%)	75 (16.6%)	174 (18.6%)
General worker	41 (8.5%)	7 (1.5%)	48 (5.1%)
Sales assistant	43 (9.0%)	39 (8.0%)	82 (8.7%)

Profession	Gender		Total
	Male	Female	
Fisherman	11 (2.3%)	1 (0.2%)	12 (1.3%)
Student	73 (15.2%)	82 (18.1%)	155 (16.6%)
Pensioner	19 (3.9%)	7 (1.5%)	26 (2.7%)
Housewife	0 (0.0%)	88 (19.4%)	88 (9.4%)
Small scale business	64 (13.4%)	31 (6.8%)	95 (10.2%)
Unemploy	4 (0.8%)	10 (2.2%)	14 (1.5%)
Other	3 (0.6%)	2 (0.4%)	5 (1.0%)
Total	479 (100.0%)	453 (100.0%)	932 (100.0%)

Table 3.3 Respondent's income

Income category (RM)	Sex		Total
	Male	Female	
<2000	274 (67.5%)	236 (63.6%)	510 (65.6%)
2001-4000	79 (19.5%)	74 (19.9%)	153 (19.7%)
4001-6000	34 (8.3%)	14 (3.8%)	48 (6.2%)
6001-8000	8 (2.0%)	7 (1.9%)	15 (1.9%)
8000>	9 (2.2%)	8 (2.2%)	17 (2.2%)
Refuse To Tell	2 (0.5%)	32 (8.6%)	34 (4.4%)
Total	406 (100.0%)	371 (100.0%)	777 (100.0%)

3.2.2 Local Business

Table 3.4 Respondent's perception on potential short term profits during construction

Business Type	Potential Profit			Total
	Very Good	Satisfactory	Bad	
Hotels/Motels/Backpackers	3 (30.0%)	5 (50.0%)	2 (20.0%)	10 (100.0%)
Restaurants/Tuck shops/food stalls	16 (32.0%)	13 (26.0%)	21 (42.0%)	50 (100.0%)
Health and beauty shop, clothes retailers, /stationary shop/sports shop	2 (28.6%)	3 (42.8%)	2 (28.6%)	7 (100.0%)
Hardware/spare parts/car workshop	0 (0.0%)	1 (100.0%)	0 (0.0%)	1 (100.0%)
Total	21 (30.8%)	22 (32.4%)	25 (36.8%)	68 (100.0%)

Table 3.5 Respondent perception on potential short term impacts on the number of customers.

Business Type	Potential number of customers			Total
	Very Good	Satisfactory	Bad	
Hotels/Motels/Backpackers	3 (30.0%)	5 (50.0%)	2 (20.0%)	10 (100.0%)
Restaurants/Tuck shops/food stalls	16 (32.0%)	13 (26.0%)	21 (42.0%)	50 (100.0%)
Health and beauty shop, clothes retailers, /stationary shop/sports shop	2 (28.6%)	4 (57.1%)	1 (14.3%)	7 (100.0%)
Hardware/spare parts/car workshop	1 (100.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)
Total	22 (32.4%)	22 (32.4%)	24 (35.2%)	68 (100.0%)

3.2.3 Community Project Perceptions and Expectations

Table 3.6 Who are the respondents in relation* to Tg. Aru?

Connection to Tanjung Aru	Frequency
Living nearby	339 (30.2%)
Workplace	111 (10.0%)
Regular visitor	487 (43.4%)
Business premise	35 (3.1%)
Education	9 (0.8%)
Property in Tg Aru	6 (0.5%)
Just passing	134 (12.0%)
Total	1121 (100.0%)

Note: *Respondents may mentioned more than one connection with Tg. Aru

Table 3.7 to Table 3.9 are tabulation of respondents most visited area in Tanjung area and popular activities.

Table 3.7 Beach areas that are frequently visited* in Tg. Aru

Beach areas	Male	Female	Total
Ist	372 (26.6%)	318 (26.0%)	690 (26.3%)
2 nd	211 (15.1%)	206 (16.9%)	417 (15.9%)
3 rd	125 (8.9%)	87 (7.1%)	212 (8.1%)
Restaurant	152 (10.8%)	154 (12.6%)	306 (11.7%)
Prince Phillip	94 (6.7%)	81 (6.6%)	175 (6.7%)
Perdana Park	150 (10.7%)	145 (11.9%)	295 (11.3%)

Shangri-La Tanjung Aru (STAR)	39 (3.0%)	42 (3.4%)	81 (3.1%)
Pekan Tanjung Aru	169 (12.1%)	129 (10.6%)	298 (11.4%)
Tanjung Aru Plaza	85 (6.1%)	60 (4.9%)	145 (5.5%)
Total	1397 (100.0%)	1222 (100.0%)	2619 (100.0%)

Note: *Respondents is free to choose/mentioned more than one areas they frequently visited in Tg. Aru

Table 3.8 Respondent's activities* in Tg. Aru

Activities	Frequency of mentioned and percentage
Recreation with no water activities	474 (24.8%)
Recreation with water activities	294 (15.4%)
Patronising restaurant/ food stalls	484 (25.3%)
Take a walk (jalan-jalan)	395 (20.0%)
Recreation with and without water activities (family day, group picnic) etc)	278 (14.5%)
Total	1909 (100.0%)

Note: *Respondents is allowed to name more than one activities.

Table 3.9 Respondents favourite water-based activities in Tg. Aru

Activities	Frequency (%)
Swimming/ Slime boarding/ Snorkelling	208 (28.0%)
Boating/jet ski	38 (5.1%)
Step into the water	196 (26.4%)
Games/sport by the beach	184 (24.8%)
Main activity are at the grass but sometime step into water	117 (15.7%)
Total	743 (100.0%)

Table 3.10 and Table 3.11 show the satisfaction level of respondents on the current issues in Tanjung Aru.

Table 3.10 Current issues in Tg. Aru that the majority of respondents are satisfied with.

Issues	Happy/ very satisfy	Satisfactory	Not happy/Not satisfy
Natural views of the beach	695 (74.6%)	174 (18.7%)	63 (6.8%)
Air quality	541 (58.0%)	307 (32.9%)	84 (9.0%)
Trees and grass	539 (57.8%)	295 (31.7%)	98 (10.5%)
Sea water quality	459 (49.2%)	335 (35.9%)	138 (14.8%)
Birds	456 (48.9%)	375 (40.2%)	101 (10.8%)

Entrance fees	421 (45.1%)	388 (41.6%)	123 (13.2%)
Public Toilet	385 (41.3%)	314 (33.7%)	233 (25.0%)
Traffic flow from KK	383 (41.1%)	361 (38.7%)	188 (20.2%)
Parking facilities	344 (36.9%)	355 (38.1%)	233 (25.0%)

Table 3.11 Current issues in Tg. Aru that the majority of respondents feel are satisfactory (moderate)

Issues	Happy/ very satisfy	Satisfactory	Not happy/Not satisfy
Condition of Prince Phillip Park	323 (34.7%)	474 (50.9%)	135 (14.5%)
Traffic flow to and from KKIA (Airport)	342 (36.7%)	463 (49.6%)	127 (13.6%)
Traffic flow along the beach	355 (38.1%)	443 (47.5%)	134 (14.4%)
General cleanliness	377 (40.5%)	432 (46.4%)	123 (13.2%)
Organisation of business premises	306 (32.8%)	432 (46.4%)	194 (20.8%)
Safety	311 (33.4%)	424 (45.5%)	197 (21.1%)
Restaurant facilities	295 (31.6%)	416 (44.6%)	221 (23.7%)

Table 3.12 to Table 3.16 are respondents' level of approval and reasons for perception.

Table 3.12 Respondents' level of approval for the Project

Response	Frequency	Percentage (%)
Refused to respond (no comment)	14	1.5
Strongly agreed with the project	180	19.3
Agreed but with reservations	170	18.2
It is up to government/developer	255	27.4
Disagree	139	14.9
Strongly disagree	174	18.7
TOTAL	932	100

Table 3.13 Reasons for strongly agree

Reasons for strongly agree	Frequency (%)
No particular reason	15 (8.3%)
Project will beautify the landscape	52 (29.0%)
Project will improve infrastructure	51 (28.3%)
Project will provide employment	25 (13.9%)
Project will increase tourism	33 (18.3%)
Project will maintain environment	4 (2.2%)
Total	180 (100.0%)

Table 3.14 Agree with some reservation (n=170)

Reasons for agree with some reservation	Frequency (%)
No particular reason	5 (2.8%)

Project will improve beautification but lost the natural beauty	12 (7.1%)
Project will improve infrastructure but may insufficient for public	10 (5.9%)
Employment opportunity but limited	3 (1.8%)
Influx of foreign workers	2 (1.2%)
Project will limit public access	22 (12.9%)
Project will create negative impact to environment	54 (31.7%)
Profit only for developer	8 (4.7%)
Project will improve tourism	5 (2.9%)
Small businesses will be negatively affected	9 (5.3%)
Nearby home owner will be affected	9 (5.3%)
Will create more traffic	4 (2.4%)
Security concern	3 (1.8%)
Not enough information about the project	6 (3.5%)
Loss of employment	4 (2.4%)
Disrupt current recreational activity	12 (7.1%)
Fisherman's income sources will be negatively affected	2 (1.2%)
Total	170 (100.0%)

Table 3.15 Reasons for "do not agree" (n=139)

Reasons for disagree	Frequency (%)
No particular reason	7 (5.0%)
Project will limit public access	20 (14.4%)
Project will create negative impact to environment	55 (39.6%)
Small business will be negatively affected	5 (3.7%)
Not enough information about the project	5 (3.7%)
Will reduce tourist in Tanjung Aru	2 (1.4%)
Loss of employment	2 (1.4%)
Disrupt current recreational activity	20 (14.4%)
Profit only for developer	2 (1.4%)
Nearby home owner will be affected	1 (0.7%)
Security concern	1 (0.7%)
Maintain the environment	17 (12.2%)
Fisherman's income sources will be negatively affected	2 (1.4%)
Total	139 (100.0%)

Table 3.16 "Strongly do not agree" with the project (n=174)

Reason for strongly disagree	Frequency (%)
No particular reason	8 (4.6%)
Project will limit public access	18 (10.3%)
Project will create negative impact to environment	69 (40.0%)
Profit only for developer	8 (4.6%)
Small business will be negatively affected	11 (6.3%)
Nearby home owner will be affected	3 (1.7%)
Will create more traffic	1 (0.5%)

Not enough information about the project	4 (2.3%)
Will reduce tourist in Tanjung Aru	3 (1.7%)
Loss of employment	7 (4.0%)
Disrupt current recreational activity	24 (13.8%)
Security concern	1 (0.5%)
Maintain the environment	16 (9.2%)
Fisherman's income sources will be negatively affected	1 (0.5%)
Total	174 (100.0%)

About half of 313 respondents who are strongly disagree and disagree are concerned about negative impact of the project to existing environment. Other reason by respondents who are strongly disagree to the project are; disruption of recreational activities (13.8%), public access (10.3%), maintain the environment (9.2%) and negative impact to small businesses (6.3%). Similarly the disagree group, also stated public access and disruption to recreational activities both at 14.4% as their other two important concern besides effect to natural environment.

Table 3.17 Respondents' level of knowledge about the project (n=932)

Level of knowledge	Gender		Total
	Male	Female	
I know this project very well	17 (63.0%)	10 (37.0%)	27 (2.9%)
I know about this project	56 (56.6%)	43 (43.4%)	99 (10.6%)
I know a little about this project	123 (55.2%)	100 (44.8%)	223 (23.9%)
I heard but not sure	100 (47.4%)	111 (52.6%)	211 (22.6%)
Never heard	183 (49.2%)	189 (50.8%)	372 (40.0%)
Total	479 (51.4%)	453 (48.6%)	932 (100.0%)

Table 3.17 shows that 40% of the respondents state that they never heard about the project and another 46.5% claim they know very little about the project or not sure about what they know. This shows that, public is very much ill informed about the project.

Table 3.18 on the other hand shows that majority of respondents (68.4%) get their information about the project from their friend and social media (15.1%). The source of information also indicate the possibilities of inaccurate and misleading information about the project.

Table 3.18 Source of information about the project (n=298)

Source of information	Gender		Total
	Male	Female	
Newspaper	28 (18.3%)	14 (9.6%)	42 (14.1%)
Friends	104 (68%)	100 (69%)	204 (68.4%)

Social media	17 (11.1%)	28 (19.3%)	45 (15.1%)
Radio	2 (1.3%)	0	2 (0.6%)
Forum	2 (1.3%)	3 (2.1%)	5 (1.7%)
Total	153	145	298

Attachment A

Project Brief

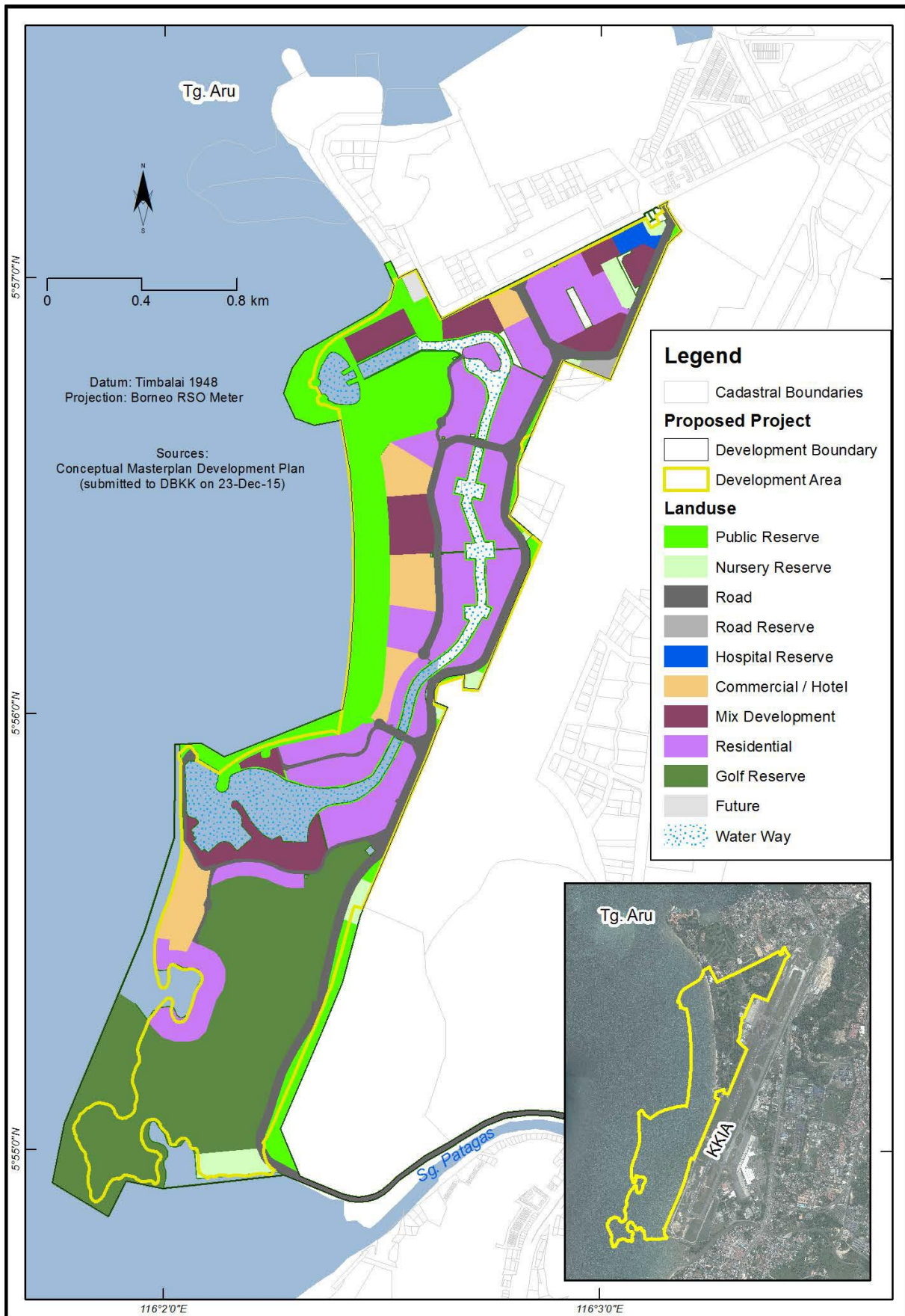


Figure 1.1 : Project Layout Plan for Tanjung Aru Eco Development



Figure 1.3 : Project Brief for Tanjung Aru Eco Development



Figure 2.1 : Google Earth map showing the questionnaire survey conducted in Kg Tanjung Aru, Taman Sempelang Tanjung Aru, Pekan Tanjung Aru and Wakiki Condominium

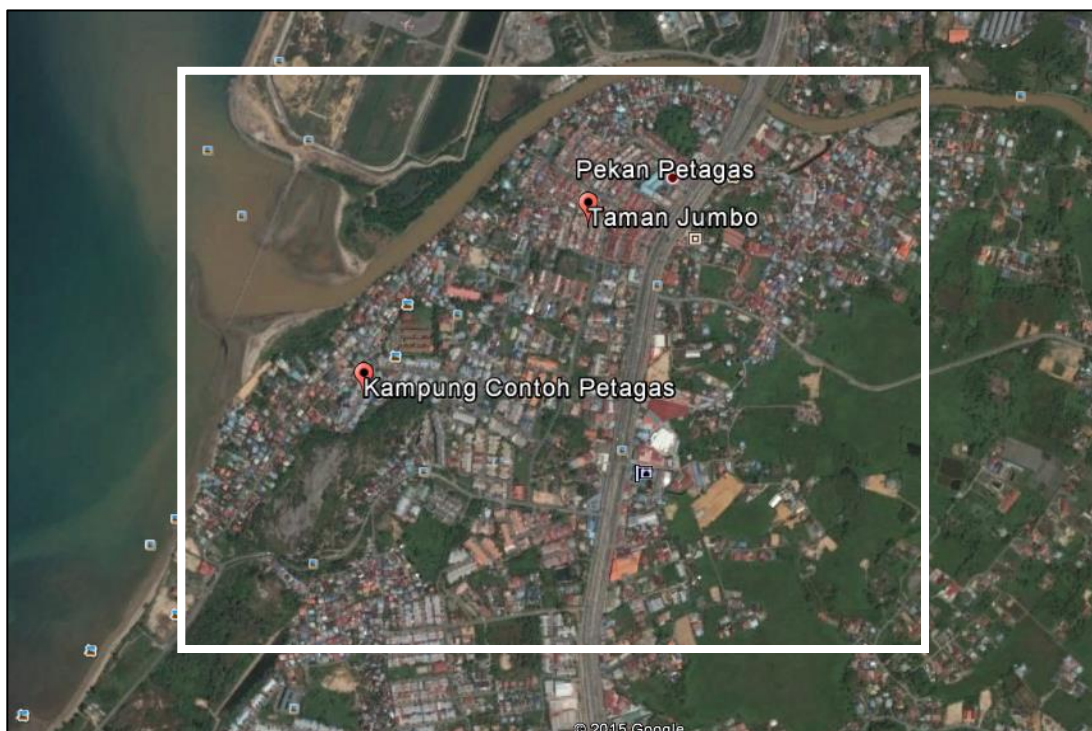


Figure 2.2: Google Earth map showing the questionnaire survey conducted in Kg Contoh Petagas, Pekan Petagas and Taman Jumbo

Attachment B

Questionnaire

**Social Survey Questionnaire/Soal selidik kajian sosial
Tanjung Aru Eco-Development / Pembangunan Eco Tanjung Aru
Februari 2016**

Untuk Pertanyaan: Sila berhubung dengan;
Dr. Paul Porodong: 012 8331737
Dr. Gaim J. Lunkapis: 013-8583399

Tujuan kajian ini adalah untuk menilai impak sosio ekonomi yang mungkin timbul dari cadangan pembangunan Pantai Tanjung Aru, Kota Kinabalu. Maklumbalas anda adalah sangat penting untuk membantu pihak berkuasa membuat keputusan terbaik mengenai cadangan pembangunan ini

Anda adalah layak menjadi responden jika anda berusia **16 tahun** dan ke atas serta mempunyai sekurang-kurangnya salah satu daripada dua berikut;

1. Anda **tinggal** di sekitar kawasan Tanjung Aru (Waikiki Kondominium, Kampung Tanjung Aru, Taman Sempelang, Pekan Tanjung Aru, Pekan Petagas, Taman Jumbo, Kampung Contoh Petagas)
2. Anda merasakan anda **mempunyai kepentingan** atau terkesan daripada projek ini – Contoh pemilik premis perniagaan, pemilik rumah, bekerja, bersekolah di kawasan Tanjung Aru (termasuk menghantar anak), biasa mengadakan aktiviti rekreasi dan pengunjung.




A. Butiran responden (tanda atau bulatkan)

1. Jantina: L P
2. Usia anda: 20 and below, 21 – 25, 26 – 30, 31-35, 36 – 40, 41 – 45, 46 – 50, 51 – 55, 56 and above
3. Pendidikan tertinggi: Master/PhD, Sarjana Muda, Diploma/STPM, SPM, Lain-lain: _____
4. Pendapatan : RM0 - 2000 RM2001-4000 RM4001-6000 RM6001-8000 RM8001 keatas
5. Jenama kenderaan yang digunakan seharian : _____
6. Apa hubungan anda dengan kawasan Tanjung Aru? (tanda lebih dari satu jika berkenaan)
 - a. Saya tinggal (menyewa) di kawasan ini
 - b. Saya tinggal di kawasan ini di rumah sendiri
 - c. Saya kerja di kawasan ini
 - d. Saya selalu berkunjung ke sini
 - e. Premis perniagaan saya ada di Tanjung Aru (**Pastikan mengisi Bahagian E**)
 - f. Saya bersekolah di kawasan ini
 - g. Saya ada hartanah di kawasan ini
 - h. Saya selalu melalui kawasan ini

- i. Hubungan
lain: _____
7. Apa nama kawasan kediaman perumahan / kediaman anda?
- Waikiki Kondominium, Kg. Tanjung Aru, Taman Sempelang, Pekan Tanjung Aru, Pekan Petagas, Taman Jumbo, Kg. Contoh Petagas
 - Kota Kinabalu (Penampang, Inanam, Menggatal, Putatan: _____)
 - Di luar Kota Kinabalu (Tuaran, K.Belud, Keningau, Sandakan: _____)
 - Luar Sabah (Sarawak, Labuan, Semenanjung)
 - Luar Malaysia
8. Apakah profesyen/pekerjaan anda? (Tandakan yang paling sesuai)
- Professional (i.e. Lawyer, Doctor, Accountant, Architect)
 - Pengurusan/Managerial (i.e. pengarah, pemilik perniagaan)
 - Kakitangan kerajaan (Negeri dan Persekutuan)
 - Perkeranian swasta (kerani, cashier dll)
 - Pekerja kilang, binaan, bengkel kereta.
 - Bekerja di kedai (pembantu jualan, restoran, kedai perabot, salon kecantikan dll)
 - Nelayan
 - Pelajar
 - Lain-lain: _____
9. Adakah anda mengenali sesiapa di kawasan Tanjung Aru/Petagas yang bekerja sebagai nelayan?
- Ada
 - Tiada

B. Persepsi Kawasan Pantai Tanjung Aru pada masa ini

1. Nyatakan perasaan anda tentang perkara berikut di Pantai dan kawasan Tanjung Aru?

No	Perkara			
a	Keadaan lalulintas dari KK ke Pantai Tanjung Aru			
b	Pemandangan tepi laut			
c	Kemudahan Parking/letak kereta			
d	Kemudahan restoran			
e	Tempat Perniagaan			
f	Keselamatan			
g	Kebersihan udara			
h	Bayaran masuk			

l	Kebersihan air laut			
j	Tumbuhan (pokok/rumput)			
k	Binatang (burung)			
L	Kemudahan tandas			
m	Kebersihan keseluruhan			
n	Lalulintas –Jalan ke Airport Terminal 1 (MAS)			
o	Lalulintas –Jalan ke Airport Terminal 2 (Air Asia)			
p	Keadaan lalulintas di kawasan pantai Tanjung Aru			
q	Taman rekreasi di Taman Prince Phillip			

C. Pelawat/Pengunjung/Pengguna Tanjung Aru

1. Bahagian pantai mana yang anda sering berkunjung?
 - a. First beach (STAR-Sugar Bun)
 - b. Second beach (Taman Prince Phillip – Skating Ring- Lalulintas)
 - c. Third beach (selepas Lalulintas)
2. Berapa kekerapan anda berkunjung ke Pantai Tanjung Aru
 - a. Sekali – 5 kali setahun (lebih kurang 3 bulan sekali)
 - b. 6-10 kali setahun (lebih kurang dua bulan sekali)
 - c. 11-15 kali setahun (lebih kurang sebulan sekali)
 - d. 16-20 kali setahun (lebih kurang dua kali sebulan)
 - e. Lebih 21 kali setahun
 - f. Lebih 30 kali setahun
 - g. Lebih 40 kali setahun
3. Apa tempat yang PALING KERAP anda kunjungi di kawasan Tanjung Aru? (boleh tanda lebih dari satu)
 - a. First Beach
 - b. Second Beach
 - c. Third Beach
 - d. Restoran dan gerai
 - e. Taman Prince Phillip
 - f. Taman Perdana (Perdana Park)
 - g. Shangri-La Tanjung Aru (STAR)
 - h. Pekan Tanjung Aru
 - i. Tanjung Aru Plaza
4. Apa aktiviti utama anda Tanjung Aru? (boleh tanda lebih dari satu)
 - a. Berkelah/Beriadah/Bermain
 - b. Mandi/Berenang (Jika ini ditanda – jawab soalan C5)
 - c. Makan/Minum di restoran
 - d. Berjalan-jalan

- e. Piknik/Hari Keluarga
 - f. Lain:_____
5. Kalau melakukan aktiviti air, apa aktiviti yang selalu dilakukan (boleh tanda lebih dari satu)
- a. Mandi, berenang, 'slime boarding', snookerling'
 - b. Belayar, perahu layar, boat
 - c. Membasahkan kaki – tapi tidak mandi
 - d. Bermain/aktiviti di tepi air/pantai – bola, fresbie etc
 - e. Bermain/aktiviti di kawasan berumput

D. Maklumbalas “Projek Tanjung Aru”

Question 1 of Part D below is regarding the proposed project in your area. Please refer to the attached project development layout plan (**Attachment 1**).

1. Gambarkan pengetahuan anda mengenai “Projek Tanjung Aru”? (pilih satu sahaja)
 - a. Sangat tahu
 - b. Tahu
 - c. Tahu sedikit
 - d. Tahu tapi tidak pasti
 - e. Tidak pernah dengar

2. Kalau tahu (jawapan a,b,c,d) dari mana sumber maklumat?
 - a. Surat khabar
 - b. Cerita kawan-kawan
 - c. Facebook dan media sosial lain
 - d. Radio
 - e. Forum
 - f. Lain-lain:_____

3. Sebagai pengunjung/pelawat/pengguna apakah perasaan anda kepada Projek Tanjung Aru?
 - a. Sangat menyokong kerana:_____
 - b. Menyokong tapi agak risau kerana:_____
 - c. Terpulanglah kepada pemaju/kerajaan.
 - d. Kurang setuju kerana:_____
 - e. Sangat tidak setuju kerana:_____

4. Pada pandangan anda, apa kebaikan dan keburukan projek Tanjung Aru untuk setiap perkara berikut;

Perkara					
	-2	-1	0	+1	+2
a.Peluang perniagaan/meningkatkan pendapatan					
b.Kesan kepada peniaga di Tanjung Aru					
c.Pelancongan: _____ _____					
d.Keadaan lalulintas					
e.Kebebasan keluar masuk oleh orang awam					
f.Peluang pekerjaan : _____					
g.Peningkatan kemudahan :					
h.Kesan alam sekitar (pokok)					
i.Kesan alam sekitar (burung)					
j.Taman Prince Phillip					
k.Taman Perdana					
l.Kesihatan: _____					
m: Bunyi					
n:Air laut					
o: padang golf KGC					
p: Kelab Perahu Layar (Yacht club)					
q: Aktiviti rekreasi					
r: Hotel S.T.A.R					






s: Lain _____					
t: Lain _____					

E. Pemilik Premis Perniagaan

1. Apakah jenis perniagaan anda?

- a. Hotel/Penginapan/Pelancongan
- b. Restoran
- c. Gerai
- d. Kecantikan
- e. Elektronik, computer dan telekomunikasi
- f. Runcit
- g. Kain dan pakaian
- h. Hiburan/Gift shop/Bunga/Pets
- i. Buku/stationary/pendidikan
- j. Ubat-ubatan/Farmasi/Kesihatan/Baby
- k. Sukan/permainan
- l. Hardware/Spare parts/Kereta/Bengkel
- m. Kewangan
- n. Lain: _____

2. Projek Tanjung Aru akan;

Perkara					
	Sangat tidak setuju	Tidak setuju	Neutral	Setuju	Sangat Setuju
Jangka Masa Pendek:					
Menambahkan keuntungan perniagaan saya					
Menambah pelanggan saya					
Saya lebih senang berniaga					
Jangka Masa Panjang:					
Menambahkan keuntungan perniagaan saya					
Menambah pelanggan saya					
Saya lebih senang berniaga					

Terima kasih di atas penyertaan anda dalam kajian ini. Maklum balas anda akan dianalisa bagi membantu pihak berkuasa tempatan dalam preses membuat keputusan untuk projek ini.

Social Survey Questionnaire/Soal Selidik Kajian Sosial
Tanjung Aru Eco-Development / Pembangunan Eco Tanjung Aru
February 2016

For any enquiries, contact the following:

Dr. Paul Porodong: 012 8331737

Dr. Gaim J. Lunkapis: 013-8583399

The objective of this research is to assess socio-economic impacts that may arise due to the proposed development project for Pantai Tanjung Aru, Kota Kinabalu. Your feedbacks are crucial for assisting the local authorities to come up with the best possible decision concerning the proposed development project.

You are eligible to become a respondent **if** you are **16 years old** and above as well as meeting/fulfilling one of the two following criterias;

3. You are a **resident** of Tanjung Aru area (Waikiki Kondominium, Kampung Tanjung Aru, Taman Sempelang, Pekan Tanjung Aru, Pekan Petagas, Taman Jumbo, Kampung Contoh Petagas)
4. You feel that you are one of the **stakeholders** in this issue or **your interests** are affected by the proposed development plan. – Example: owner of a business premise, house owner, work or go to school in Tanjung Aru area (including sending your children to school), regularly involved in recreational activities and regular visitors of the area.

B. Respondent Details (tick or circle the relevant answer)

10. Gender : M F
11. Age: 20 and below, 21 – 25, 26 – 30, 31-35, 36 – 40, 41 – 45, 46 – 50, 51 – 55, 56 and above
12. Highest Education Attained: Master/PhD, Degree, Diploma/STPM, SPM, Others: _____
13. Income : RM0 – 2000 RM2001-4000 RM4001-6000 RM6001-8000 RM8001 above
14. Model of the motor vehicle used daily : _____
15. How are you related to Tanjung Aru? (if relevant, you may tick more than one)
 - a. I live (renting) in the area.
 - b. I live in my own house in the area
 - c. I work in the area.
 - d. I am a regular visitor
 - e. I have a business premise in Tanjung Aru. **(Please ensure you answer Section E)**
 - f. I go to school in the area.
 - g. I own a property in the area.
 - h. I regularly go through this area
 - i. Other types of relation: _____
16. What is the name of your residential area / dwelling place?
 - a. Waikiki Kondominium, Kg. Tanjung Aru, Taman Sempelang, Pekan Tanjung Aru, Pekan Petagas, Taman Jumbo, Kg. Contoh Petagas
 - b. Kota Kinabalu (Penampang, Inanam, Menggatal, Putatan: _____)

- c. Outside Kota Kinabalu (Tuaran, K.Belud, Keningau, Sandakan: _____)
- d. Outside Sabah (Sarawak, Labuan, Semenanjung)
- e. Outside Malaysia

17. What is the type of your employment/job? (Tick the relevant answer)




- a. Professional (i.e. Lawyer, Doctor, Accountant, Architect)
- b. Management/Managerial (i.e. director, business owner)
- c. Government Servant (State and Federal)
- d. Works at Private sectors (kerani, cashier dll)
- e. Factory worker, construction worker, mechanics.
- f. Works at a shop (sales assistant, restaurant worker/waitress, works at furniture shops, works at salon)
- g. Fisherman
- h. Students
- i. Others: _____

18. Do you know anybody from Tanjung Aru/Petagas that works as a fisherman?

- a. Yes
- b. No

B. Current Perception on Tanjung Aru beach and area

1. State your perception regarding Tanjung Aru beach and Tanjung Aru?

No	Item			
a	Traffic condition from KK to Tanjung Aru beach			
b	Seaside/beach scenery			
c	Parking Facilities			
d	Restaurant Facilities			
e	Business Premises			
f	Security			
g	Air Quality			
h	Entrance Fee			
i	Sea water quality			
j	Plants (trees/grass)			
k	Animal (bird)			
l	Toilet facility			
m	Overall Cleanliness			
n	Traffic –Route to Airport Terminal 1 (MAS)			
o	Traffic –Route to Airport Terminal 2 (Air Asia)			
P	Traffic Condition at Tanjung Aru beach			
q	Recreational Park at Prince Phillip Park			

D. Visitors/Tourists/ Users of Tanjung Aru

6. Which part of the beach that you visit regularly?
 - a. First beach (STAR-Sugar Bun)
 - b. Second beach (Taman Prince Phillip – Skating Ring- Traffic Light)
 - c. Third beach (After Traffic Light)
7. State the frequency of your visit to Tanjung Aru beach
 - a. 1 – 5 times a year (approximately once every 3 months)
 - b. 6-10 times a year (approximately once every 2 months)
 - c. 11-15 times a year (approximately once a month)
 - d. 16-20 times a year (approximately twice a month)
 - e. Over 21 times a year
 - f. Over 30 times a year
 - g. Over 40 time a year
8. Which part of the Tanjung Aru beach area that you visit THE MOST? (You may tick more than one)
 - a. First Beach
 - b. Second Beach
 - c. Third Beach
 - d. Restaurants and stalls
 - e. Prince Phillip Park
 - f. Perdana Park
 - g. Shangri-La Tanjung Aru (STAR)
 - h. Tanjung Aru Town
 - i. Tanjung Aru Plaza
9. What is your main activity/activities at Tanjung Aru? (You may tick more than one)
 - a. Picnic/recreation/games
 - b. Bath/Swimming (if you do, please answer question C5)
 - c. Eat/Drink/Dine at the restaurant/club
 - d. Taking a walk
 - e. Picnic/Family Day
 - f. Others: _____
10. If you do water sport or water recreational activities, what are your regular activities? (You may tick more than one)
 - a. Bath/swim, 'slime boarding', snokerling'
 - b. Sailing, boat
 - c. Wet the feet – not swimming
 - d. Play games /activities by the seaside/beach – ball game, freesbie ,etc
 - e. Play games /activities at grass areas






D. Feedback on “Tanjung Aru Project”

Question 1 of Part D below is regarding the proposed project in your area.

3. Describe your knowledge/awareness of “Tanjung Aru Project”? (choose one)
 - a. Very knowledgeable/very aware

- b. Have knowledge/aware
 - c. Little Knowledge/ little awareness
 - d. Have the knowledge/aware but not certain/sure
 - e. Not knowledge at all/ Not aware at all
4. If you know (answer is a,b,c,d), what is your source of information?
- a. Newspaper
 - b. Heard from friends
 - c. Facebook and other social media
 - d. Radio
 - e. Forum
 - f. Others: _____
3. As a tourist/ regular visitor/user of Tanjung Aru beach, what is your feeling towards the Tanjung Aru Project?
- a. I strongly support because: _____
 - b. I am supporting but I have some concerns because: _____
 - c. Depends on the government/contractor:
 - d. I don't really support because: _____
 - e. I strongly disagree because: _____

4. In your opinion, what are the benefits and the drawbacks of Tanjung Aru project for the following issues/concerns;






Issues/concerns					
	-2	-1	0	+1	+2
a. Business opportunity /increase income					
b. Effects on business owners at Tanjung Aru					
c. Tourism: _____					
d. Traffic Condition					
e. Public freedom of entry					
f. Job opportunity : _____					
g. Improved facilities :					
h. Environmental impacts (trees/plants)					
i. Environmental impacts (birds)					
j. Prince Phillip Park					
k. Perdana Park					

l. Health : _____					
m. Noise					
n. Sea Water/Sea					
o. Golf course KGC					
p. Yacht club					
q. Recreational activities					
r. Hotel S.T.A.R					
s. Others _____					
t. Others _____					

E. Business Owners/Business Premise Owner

1. What is the type of your business?
 - a. Hotel/inns/tourism
 - b. Restaurants
 - c. Stalls
 - d. Cosmetic and Beauty
 - e. Electronic, computer and telecommunication
 - f. Groceries
 - g. Clothing
 - h. Entertainment/Gift shop/florist/Pets
 - i. Books/stationary/education
 - j. Medication/pharmacy/healthcare/Baby
 - k. Sport/games
 - l. Hardware/Spare parts/motor vehicle/workshop
 - m. Finance
 - n. Others: _____

2. Tanjung Aru Project will have the following impacts:

Matters					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Short Term:					
Increase my business income/profit					
Increase the number of my customers					
Easier to operate my business					
Long Term					
Increase my business income/profit					
Increase the number of my customers					
Easier to operate my business					

Thank you very much for your participation. Your Feedbacks will be analyzed in order to assist the local authorities to make the best decision for the project.

Attachment C

Consultations

SOCIO-ECONOMIC IMPACT ASSESSMENT (SEIA)

CONSULTATION MEETING

PROJECT TITLE : SOCIO-ECONOMIC IMPACT ASSESSMENT FOR THE PROPOSED TG. ARU ECO-DEVELOPMENT PROJECT

Venue : TAED Project Office, First Floor Meeting Room, H-0-10, Lot 10, Block H, Metro Town, Jalan Bunga Alam Raja, Off Jalan Tuaran, 88100 Kota Kinabalu

Date : 2nd March 2016 (Wednesday)

Time : 3:00 pm

ATTENDANCE LIST

No	Name	Organization
1.	Janie Liew – Tsonis	TAED
2.	Siti Amalina Mustaffa	TAED
3.	Siti Saodah Zakaria	TAED
4.	Peter Adam	Savills
5.	Datuk Yap Pak Leong	Chairman – Waikiki Committee
6.	Mr Lee Hwa Ban	Vice Chairman – Waikiki Committee
7.	Datuk Anthony Lamb	Waikiki Committee Member
8.	Mr Steven Chiau	Wakiki Committee Member
9.	Ir. Alan Benjamin	Wakiki Committee Member
10.	Datuk Ar. Ho Jia Lit	PAM
11	Dr Paul Porodong	UMS
12	Velerie Siambun	DHI
13	Amy Lim Ping Ping	UMS

NOTES:

Item	Description
1.0	OPENING REMARKS
2.0	BRIEFING ABOUT TAED
2.1	Vision: <ul style="list-style-type: none">• Preserve the natural beauty of Tg Aru Beach• Revitalize Prince Phillip Park (PPP)• Realize an eco-friendly master plan• Attract foreign investment• Boost tourists visiting Sabah• Create sustainable employment for the local community• Retain the beach
2.2	Masterplan – 340 hectares 7 distinct character zones

2.3	<p>Land-use:</p> <ul style="list-style-type: none"> • Hotels • Park • 18-hole golf course • Marina • Apartment, villas, terraced homes • Retail F&B, commercial offices
2.4	<p>Benefits:</p> <ul style="list-style-type: none"> • Safe Tg Aru Beach • Rejuvenate and enlarge PPP • Improve water quality • Reduce pollution • Improve community health • Remove existing dilapidating buildings • Provide greater choice – retail F&B, etc • Retain the beach and park for public use
2.5	<p>Move north to south (?) Disruption : Traffic, etc</p>
3.0	ISSUES/QUESTIONS/COMMENTS WITH REMARKS/RESPONSE BY WAIKIKI COMMITTEE MEMBERS
3.1	<p>Datuk Yap Pak Leong</p> <ul style="list-style-type: none"> • Should be no more buildings • Original beach and new PPP • Marina to be shifted
5.2	<p>Datuk Ar Ho Jia Lit (on behalf of residents)</p> <ul style="list-style-type: none"> • Gave his statements: Always cycle and see horizon. Told Datuk Victor and he agreed and gave his word that no building blocking Waikiki. • Gave his alternative views: He doesn't blame architect in engaging to provide beautiful/the best (part of the plan) • Alternative solution (win2 situation) – concrete over – water channel, water still drain out • Best interest – public • If expensive to concrete over, another alternative solution is to have shift slightly closer to hotel. • Give back park to public • No high rise apartment – block • Do 2 storey restaurant • Don't use the place to build condo • Condo should be public facility for poorer people (not only for rich people) • Condo – shift to other side – exclusive • This side maintain low rise • Advice: Don't use engineer to submit town planning plan. Use architect/town planner instead.
	TAED was glad that Wakiki came out with solution matter than complains/problems

Minutes of Meeting with Madam Monica Chua of Seri Mengasih Centre(SM)

August 29th 2016 (Monday)

KPMG Office, Third Floor, Wisma Geck Poh, City Centre Kota Kinabalu

9.00am

Attendees:

Madam Monica Chua (Director of Seri Mengasih Centre)

Dr. Paul Porodong (UMS)

Miss Melissa Mathews (DHI)

1. Dr. Paul started the meeting by thanking Madam Monica Chua for agreeing to meet in short notice.
2. Madam Monica Chua introduced SM purpose and activities which is to provide support for children with special needs. SM is also involved in giving family counselling as well as giving training and talks. Their facilities also equipped with physiotherapy facilities. Currently SM has about 60 pupils and a number of carer whom mostly come from outside KK. The pupils are sent by their parents everyday while some of the carers are provided with accommodation inside the SM facilities while others are daily commuters from Petagas and surrounding areas.
3. Melissa introduced the TAED project briefly (information provided from TAEDSB) including Tg. Aru Eco-Development Schematic Master Plan and Construction Phasing during construction as well as time frame of relocation. Madam Monica Chua is well versed with the TAED project.
4. Madam Monica pointed out that SM is offered by the State Government a piece of land along Jalan Sulaman and currently discussing and finalising the purpose built structures and facilities. She pointed out that TAED is a “blessing in disguise” for SM because the relocation give them opportunity to works closer with relevant government agencies as well as providing major improvement to their facilities and capacities to serve the needs of their client and public in general.
5. On relocation time line. Madam pointed out that she hopes that the 12- month period is sufficient to get the new facilities ready. In case of delay, she hopes that TAED will give them ample of time to make sure the new facility is completed and safe to move.
6. In the meantime, she is worried that TAED activities might worsen the mosquito infested drain near SM facilities and inquiry if TAED can make sure fogging are conducted regularly near SM as well as in the project area in the interest of health and safety.
7. Melissa also addressed her concern about road access to SM while the project is on-going by showing the TAEDSB construction stages and public road available for use during construction and subsequent Special EIA proposed mitigation.

Discussion ended at about 10.30am

Prepared by

Dr. Paul Porodong

Verified by

Melissa Mary Mathews

PUBLIC MEETING SUMMARY

SPECIAL ENVIRONMENTAL IMPACT ASSESSMENT (SEIA) ON PROPOSED TANJUNG ARU ECO DEVELOPMENT

DATE : 20 August 2016 (Saturday)

TIME : 9.00 am – 5.30 pm

(1st Session @ 9.00 am - 1.30 pm)

(2nd Session @ 2.00 pm - 5.30 pm)

VANUE : Meeting Hall, 1st Floor, Dewan Bandaraya Kota Kinabalu Headquarters

PROJECT : Tanjung Aru Eco Development (TAED)

ATTENDANCE LIST:

No.	Name	Organisation/Association/ Public
1.	TONY CHIFFINGS	PUBLIC
2.	JACK LEE VUN ZAC	PUBLIC
3.	EDWIN LO	PUBLIC
4.	EDGAR PETER DABBI	PUBLIC
5.	JOHN TAY	WWF (MALAYSIA)
6.	TAN KOH YON	IEM (SABAH)
7.	MICHAEL R. HASTIE	PUBLIC
8.	PETER OBYRNE	PUBLIC
9.	JANET AUGUSTINE	PUBLIC
10.	CHERYL YE	PUBLIC
11.	ZAKARIA BESAR	KINTA SAMUDERA
12.	JEFFERI CHONG	ENVIRONMENT
13.	NICKY AZIZ	PUBLIC
14.	TAN HUI SHIM	WWF (MALAYSIA)
15.	TAN HAO JIN	WWF (MALAYSIA)
16.	MARY ANN WILLIE	PUBLIC

17.	ROLAND LING	PUBLIC
18.	THIEN SHING VUI	PUBLIC
19.	IR. PAUL YAP	ACEM
20.	DR. NANCY J. SAMBUN	PUBLIC
21.	HO JIA LIE	PAM SABAH
22.	DONALD NG	PUBLIC
23.	IR. LEE TET FON	ACEM
24.	MARY LYN	PUBLIC
25.	SUM KUAN YUN	SEE HUE DAILY
26.	DONALD PETER	PUBLIC
27.	LOU CHI NAM	IEM
28.	DATUK DR. TONG LEWIS	C/O FRC SEPILOK
29.	DATIN ANTHES	-
30.	AVTAR SINGH SANDHU	-
31.	JUDY O'BYRNE	PUBLIC
32.	ERIC YE	PUBLIC
33.	LEE WAH BAN	WAKIKI CONDO
34.	ESTHER LANG	PUBLIC
35.	SHEELA SHEENA DALMIAR	WWF (MALAYSIA)
36.	KARTINI ARIF	PUBLIC
37.	YAP YEN KEI	PUBLIC
38.	VOO PHIN JANG	PUBLIC
39.	PETRUS PHUI	JPC
40.	JOSHUA YC KONG	SEPA/KPSB/MIA
41.	MARY SYCHIN	NAR BIOGREEN
42.	HORI HIROSHI	PUBLIC
43.	SADHANA M. BORHAN	-
44.	BETSY SYLVESTER	PUBLIC
45.	MAK CHEE CHONG	MAK ARKITEK KONSULT
46.	RACHEL FUNG	PUBLIC
47.	FARVIAN LIU	PUBLIC

48.	LOUISA YAPP	PUBLIC
49.	NANNETTE HNDELSON	PUBLIC
50.	ERMYZA HILLARY	PUBLIC
51.	EJRIA SALEH	PUBLIC
52.	JOHN STEPHEN	PUBLIC
53.	JAMAIN SANDI	PUBLIC
54.	APPLE WONG	MEDIA
55.	WONG LI PIN	SABAH HERITAGE SOCIETY
56.	NORAZRINA AG. AHMAD	PUBLIC
57.	DS. C. Y. YUN	PUBLIC
58.	SM MUTHU	MNS
59.	WONG HUI EE	PENNLAJU
60.	WONG K TSHNG	UOS
61.	RAPHOELE DEAU	INDEPENDENT
62.	SYERAPH	COSAP
63.	OH TING YAN	PUBLIC
64.	DAVID FUNG	PUBLIC
65.	JOSHUA FUNG	PUBLIC
66.	ANNABELLE FUNK	PUBLIC
67.	MELANIE CHIA	SAPP
68.	YONG YIT YOONG	SAPP
69.	MAGUL LE	PUBLIC
70.	RICHARD YONG	SAPP
71.	CHIA MIN LEE	SAPP
72.	MARIASTER HAN	PUBLIC
73.	ANGELA TAN	SIN CHEW DAILY
74.	STEPHAN GAIMIN	SOLIDIRIT BELIA SABAHI
75.	DATUK YEO BOON HAI	DBKK/MAYOR

NOTES (1st Session @ 9.00 am - 1.30 pm):

No.	Description
1.	Introduction on purpose of the meeting by DHI Water & Environment as the SEIA Consultant.
2.	Description of Tg. Aru Eco Development Project & Masterplan details.
3.	Rationale of the Masterplan Design Strategy and Alternatives.
4.	Special Environmental Impact Assessment (SEIA) Presentation of findings and impacts on the key issues of concern.
5.	<p>Question & Answers</p> <p>(Summary of Public Meeting).</p> <ol style="list-style-type: none">1. What is the original idea/plan for this development project is is an idea from Sabah state government or TAED itself proposed to the State government. - This idea/plan is from the Sabah State Government.2. Is the TAED development plan follow tastes/request/Sabah public mind?3. What is the actual area to be devoted to public area after the TAED project is completed and the next?4. Please be informed that the design of this project is characteried as nature but why there are still great risks to Sg. Petagas.5. In front of Wakiki Condo is only one road and if the project is to start will cause massive traffic jams because even nowadays also the congestion especially in the morning is common in the area.6. This project will affect the hydrology around/near the Youth Club.7. Between Sg. Dumpit and Sg. Petagas, whether affected or not, especially in terms of pollution, even TAED development to be done.

8. The signage for TAED project 'Pulangkan Tg. Aru Kepada Orang Sabah' but nevertheless, judging from this project, it prefers real estate and property ownership to outsiders/non-local @ private
9. This project will develop an exclusive new area but will this condition be compatible with the ability of the local communities and around Tg. Aru to spend in the new area later since most of the communities in the area are from middle and subordinate classes.
10. Putatan area falls under Putatan District Council jurisdiction and what is the risk/impact that will be faced by the region.
11. Parking facility problems and will there be any charges for parking facility later when entering the public areas.
12. What is the significant changes before and after the project, especially on the positive effect?
13. Where will the sand supply for this project be acquired and how can it be transported. What is the effect arising from this transportation of the supply of sand.
14. *Water flow, water management, water impact, water movements, water pump, water control.*
15. The presentation in this Public meeting was seen to be academical. However, DHI did not inform or explain about the consultant and the team involved in the SEIA process in this TAED project. Other than that, the public was not involved as well in the previous meetings while they are the stakeholders in this project.
16. How is the method/format used for the acquisition of land for this project.
17. What is the area of land devoted to pedestrians to enable the public to see the beauty of the Tg Aru beach.
18. It is expected that the amount of sand to be used in this project and from which area it will be taken. This is because we want to see the

impact on the affected area where sand will be taken from this area.
(NGO associated with the Environment wanted to do research on the impact of this case.

19. 3 electric buses devoted/prepared for visitors' facility or for public usage around Tg. Aru area will later be charged with any payment or vice-versa.
20. What is the alternative plan for the traffic along the project.
21. Heritage in this Tg Aru area is an expensive thing, is the company will be responsible towards the destruction of Heritage at the involved area.
22. Tg. Aru is not an area that needs multi-storey parking facilities but an area which can be highlighted and viewed of its beauty of the beaches and surrounding areas. Is the construction of the high buildings will block the scenery/beauty of the beaches and water at the area.
23. This project will cause massive traffic around Tg Aru area especially for the surrounding people especially those involved in and out of the Tg Aru to town (Kota Kinabalu, vice-versa).
24. How much is the area/percentage provided for public area compared to the real project area.
25. Is there a guarantee of security in the new beach area later especially for children?
26. After completion of development, what is the other alternative that needs to be accomplished to reduce the damage/detrimental impact in the future.
27. Many public were *concerned with* the project but the Master Plan that was introduced was not very clear. Masterplan supposed to be clearly shown but the company didn't manage to do so.

	<p>28. The period of time to conduct public meeting should be at least two days to allow the public to ask more questions. This is because the time allocated to the public to ask questions. This is because the time allotted to the public to ask questions was very limited while issues TAED development project is a huge project and become an issue in Sabah.</p>
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NOTES (2nd Session @ 2.00 pm - 5.30 pm):

No.	Description
1.	Introduction on purpose of the meeting by DHI Water & Environment as the SEIA Consultant.
2.	Description of Tg. Aru Eco Development Project & Masterplan details.
3.	Rationale of the Masterplan Design Strategy and Alternatives.
4.	Special Environmental Impact Assessment (SEIA) Presentation of findings and impacts on the key issues.
5.	<p>Question & Answers</p> <p>(Summary of Public Meeting).</p> <ol style="list-style-type: none"> 1. That is the real objective of this TAED project? 2. What is the changes will happen here at the Tg Aru area before and after this project? 3. What is the impact of the water quality when the project ends. 4. Why require too large an area for this project? This causes a lot of issues such as the water issue and opposition from local communities

5. When the design of this TAED project will be conducted, the design company for the Sabah or to a particular party?
6. Projects undertaken by TAED is seen as want to build or develop the Tg Aru region. Tg Aru is new but did not like want to improve in this area.
7. Development of Phillip Park area is contrast with the present existing one and why there is a need to build a hotel at the area.
8. Figures shown on the slide show were selective cause did not show better pictures/illustration. The company is selective in selecting photos that wanted to be shown to the pulic.
9. Is the TAED project the best way to save Tg. Aru?
10. It can be ascertained whether or not the species of birds that exist in Tg Aru will remain in the area or go? Will successful program will be creased for the purpose of conservation of this bird.
- 11.** Will the birds in Tg Aru fly away during the cosntruction work.
12. Concerning *traffic control*.
13. How is the public access to the new Tg. Aru area later?
14. Who is the panel involved in the SEIA for this project?
15. Sek. Keb. Tg. Aru will be involved in this project and will eliminate the school.
16. The huge design and cost of this project are hazardous to the enviornment cause will destroy the natural environment.
17. Concerning Tunku Abdul Rahman Park (TARP). May damage and affect this area because the pumping of water work will be continuous for a period of almost 3 years.

- | | |
|--|---|
| | <p>18. Alternative route will be created and connected to the Putatan Highway or not?</p> <p>19. What is the percentage of the natural environment @ heritage that is expected to disappear/destroyed because of this project?</p> <p>20. 5,000 apartments will be built, will the Jalan Tg Aru be used? Supposed to built new highway before starting the construcion to resolve the traffic problem at the involved area.</p> |
|--|---|

PUBLIC MEETING SUMMARY

SPECIAL ENVIRONMENTAL IMPACT ASSESSMENT (SEIA) ON PROPOSED TANJUNG ARU ECO DEVELOPMENT

DATE : 30 August 2016 (Tuesday)
TIME : 9.00 - 10.30 am
VANUE : Bilik Mesyuarat Mutiara, Sek. Keb. Tg. Aru 1
PROJECT : Tanjung Aru Eco Development (TAED)

ATTENDANCE LIST:

No.	Name	Organisation/Association/ Public
1.	ALHAZMI ABDDULLAH	HEADMASTER (SEK. KEB. TG. ARU 1)
2.	MIMI SUKRANI HJ. OSMAN	HEADMISTRESS (SEK. KEB. TG. ARU 2)
3.	PG SITI NOORSIAH BT PG ABDULLAP	TEACHER (SEK. KEB. TG. ARU 2)
4.	RINIE BT YUNUS	TEACHER SEK. KEB. TG. ARU 2
5.	ZALIHA SAID	PENOLONG KANAN I (SEK. KEB. TG. ARU 1)
6.	ELIASSEN BTE DUNGKIM	PENOLONG KANAN II (SEK. KEB. TG. ARU 1)
7.	RUSSIDN RUKIMAN	PENOLONG KANAN III (HEM) (SEK. KEB. TG. ARU 1)
8.	MOHD WALI ABD. RAHMAT	YG DIPERTUA PTA (SEK. KEB. TG. ARU 1)
9	DR PAUL PORODONG	SOCIOECONOMIST (SEIA TG. ARU ECO DEVELOPMENT/DHI WATER & ENVIRONMENT)

10	MELISSA MARY MATHEWS	ENVIRONMENTAL CONSULTANT (DHI WATER & ENVIRONMENT)
11	NUR SURIANA SHAI FODDIN	ASSISTANT SOCIOECONOMIST (SEIA TG. ARU ECO DEVELOPMENT/DHI WATER & ENVIRONMENT)

NOTES:

No.	Description
1.	<p>Introduction on purpose of the meeting by DHI Water & Environment as the SEIA Consultant. (Dr. Paul Porodong & Ms. Melissa Mathews)</p> <p>The Schematic Masterplan was colour printed and distributed to the audience. Explanation of the stages of construction and public access (for the first 2 years prior to school relocation)</p>
2.	<p>Question & Answers</p> <p>(Summary of Public Meeting).</p> <p>1. If the project has not been approved yet, why does the work of leveling, clearing and opening up of some areas around the beach, Anjung Perdana and MCH 2 has already begun? (ALHAZMI ABDDULLAH)</p> <p>In respect of the matter, it is not under TAED project but under the jurisdiction of the City Hall (DBKK) because the area is under their administration.</p> <p>2. What is the area that involves TAED project? (ALHAZMI ABDDULLAH)</p> <p>From Anjung Perdana until KKIA. Please refer to Developer Schematic Masterplan.</p> <p>3. How will this area be developed? (MIMI SUKRANI HJ. OSMAN)</p>

The developer will sell the lots of the area in TAED project to certain companies to be developed based on the layout of the project.

4. Where is the new site for Sek. Keb. Tg. Aru 1 & 2? It is important for us to know this information so that we can inform the parents as well as assess impacts of moving to the new school (example, if located near Tg. Aru Town there will be issues of traffic (ALHAZMI ABDDULLAH and MIMI SUKRANI)

It is not known yet as it will be determined by the Ministry of Education and TAEDSB.

5. Distance within students' housing area from school area?
(DR. PAUL PORODONG)

25 km because some students studying here but staying in area such as Telipok and Kinarut. (ALHAZMI ABDDULLAH)

6. When will the expected transfer to the new school be conducted?
(MOHD WALI ABD. RAHMAT)

The school will be moved/transferred after 24 months from the date of the project started/approved.

7. If possible, the school authorities need to be informed as soon as possible of the new construction area for the school to enable the school to inform the parents regarding this matter.
(MIMI SUKRANI HJ. OSMAN)

To refer inquiry to TAEDSB whom will communicate with Ministry of Education

8. Actually in this meeting today is to inform the school authorities that within the coming 2 years period ie. after the commencement of this project, the school authorities/area will received impact from this project, especially in terms of noise, air and traffic. (MOHD WALI ABD. RAHMAT)

Noted. The SEIA will detail the impacts of noise, air and traffic as well as corresponding mitigation. For example, hoarding of the construction site.

9. Where is the new site for the school so that we can inform this matter to the parents and guardian of the students? (MIMI SUKRANI HJ. OSMAN)

The new site is yet to be determined because the Ministry of Education will make a decision on this matter.

10. Is it true that the new site for Sek. Ren. Tg. Aru 1 dan 2 will be the site of the current Rumah Pangsa LPPB as mentioned to me by Datuk Victor Paul? (MOHD WALI ABD. RAHMAT)

It is currently one of the considerations by TAEDSB but no final decision has been made.

11. Will the teachers' quarters be provided too? (MIMI SUKRANI HJ. OSMAN)

To refer inquiry to TAEDSB whom will communicate with Ministry of Education.

12. Will both Sek. Kek. Tg. Aru 1 dan 2 be combined to become a new school or remained separated as it is now? (MOHD WALI ABD. RAHMAT)

To refer inquiry to TAEDSB whom will communicate with Ministry of Education

13. Request that the two new schools will not combine, especially to maintain the current position or rank of the teachers (ALHAZMI ABDDULLAH)

To refer request to TAEDSB whom will communicate with Ministry of Education

14. With regards to security issues, request that the developer to create alternative/special route(s) for construction work so as not to pose a threat to the safety of the students who use the existing roads for commuting to and from school. (MIMI SUKRANI HJ. OSMAN)

The developer will provide the alternative route for this purpose (road from Patagas) and most of the raw materials such as sand, etc, which will be used for the project will be transported via sea.

15. What is the development or buildings that will be built on this original site of the school? (ALHAZMI ABDDULLAH)

Residential area

16. The overall total of students in Sek. Keb. Tg. Aru 1 is 916 while Sek. Keb. Tg. Aru 2 is 692. From this total, 70% stay at Tg. Aru area and/or nearby. (ALHAZMI ABDDULLAH & MIMI SUKRANI HJ. OSMAN)

Noted.

17. The total of teachers' quarters is 18 in Sek. Keb. Tg. Aru 1 and 13 in Sek. Keb. Tg. 2. (ALHAZMI ABDDULLAH & MIMI SUKRANI HJ. OSMAN)

Noted.

18. Request that for the construction of the new school, the total number of quarters to be increased two times from the available numbers. This is because the building of the new school is supposed to increase or accomodate the existing shortage of the facilities in the current old school. (MOHD WALI ABD. RAHMAT)

To refer request to TAEDSB whom will communicate with Ministry of Education.

19. When the project is expected to commence? (MIMI SUKRANI HJ. OSMAN)

- Expected to be in April 2017 and fully complete in 2025.

20. Request that important facilities ie. field and hall at the new school site be provided later. (MIMI SUKRANI HJ. OSMAN)

To refer inquiry to TAEDSB whom will communicate with Ministry of Education

21. The size of the new hall needs to be built according/suitable with the current capacity of students. Besides that, the construction of the new schools should be modern and complete with all the necessary facilities needed in a school, suitably towards heading to a developed nation.

(MOHD WALI ABD. RAHMAT)

To refer inquiry to TAEDSB whom will communicate with Ministry of Education

22. With regards to health issues, there is an existing problem of sewage flow in the school area because the residues could not flow and therefore, stagnate due to the bad drainage system. In addition, request that a once-a-month fogging to be carried out at the school area to prevent health problems such as dengue fever when the project commence later. (ALHAZMI ABDDULLAH)

Noted. This will be added as part of the SEIA mitigation measures for the school.

23. If these problems are not addressed, this will give rise to even more major problems within the two years period when the construction works started

(MOHD WALI ABD. RAHMAT)

Noted. This will be added as part of the SEIA mitigation measures for the school.

APPENDIX F

Land Traffic Impact Assessment

Tanjung Aru Eco Development

TRAFFIC IMPACT ASSESSMENT

REPORT

Prepared for

TANJUNG ARU ECO DEVELOPMENT SDN BHD



Surbana Jurong Consultants Pte. Ltd.
168 Jalan Bukit Merah
#01-01 Surbana One
Singapore 150168

Document Issue

Project Title	Tanjung Aru Eco Development Traffic Impact Assessment
Client	Tanjung Aru Eco Development Sdn Bhd

Version	Prepared by	Reviewed by	Approved by	Date	Issued to
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Appendix B	Traffic Site Plan
Appendix C	Traffic Generation Count
Appendix D	Junction Traffic Count
Appendix E	Junction Analysis and Assessment

Abbreviations	
AR	Weekend Arterial Peak Hour
BC	Weekend Beach Peak Hour
BRT	Bus Rapid Transit
DBKK	Dewan Bandar Kota Kinabalu
GFA	Gross Floor Area
JKR	Jabatan Kerja Raya Sabah
KKIA	Kota Kinabalu International Airport
Km	Kilometres
LOS	Level Of Service
m	Metre
SIDRA	A software for junction modelling and assessment
SJ	Surbana Jurong Consultants Pte Ltd
TAED	Tanjung Aru Eco Development
V/C	Volume Capacity Ratio
VISUM	A software for strategic transport modelling and assessment

EXECUTIVE SUMMARY

Surbana Jurong Consultants Pte Ltd was commissioned by the Tanjung Aru Eco Development Sdn Bhd to undertake a Traffic Impact Assessment (TIA) for the proposed Tanjung Aru Eco Development (TAED) at Tanjung Aru in Sabah, Malaysia.

The proposed development comprises land use of residence, hotel, retail space, marina, hospital and office. The development is scheduled to complete by 2023.

Traffic survey was conducted at eight (8) existing junctions during the identified peak period. The peak period identified from link count survey at Jalan Kepayan and Jalan Mat Salleh are as follows:

- Weekday AM Peak Period : 06:30 to 09:30
- Weekday PM Peak Period : 16:00 to 19:00
- Weekend Arterial (AR) Peak Period : 11:45 to 14:45
- Weekend Beach (BC) Peak Period : 16:45 to 19:45

The existing junctions studied are:

- J1 - Jalan Kepayan/Jalan Lintas
- J2 - Jalan Kepayan/Jalan Pahlawan
- J3 - Jalan Coastal/Jalan Mat. Salleh
- J4 - Jalan Coastal/Jalan Sembulan
- J5 - Jalan Mat. Salleh/Jalan Sembulan
- J6 - Jalan Mat. Salleh/Jalan Aru
- J7 - Jalan Mat. Salleh/Jalan Lapangan Terbang (lama)
- J8 - Jalan Mat. Salleh/Jalan Tanjung Aru

A three percent (3%) annual growth rate was also applied to the background traffic travelling between the city centre of Kota Kinabalu and Jalan Putatan. The generated traffic from the proposed development was applied onto the road network in the study area to give the Design Year 2025 total traffic.

The assessment for the existing condition showed that the road links and junctions though not at ideal condition - are performing satisfactorily. The assessment for Design Year (Year 2025), however, showed that most junctions are experiencing unsatisfactory performance.

The junctions would perform in acceptable level of service after the suggested improvement schemes. The improvement scheme proposed includes the following:

- new road linking western tip of Jalan Mat Salleh with Jalan Coastal. This and the above scheme will divert some traffic away from Jalan Mat Salleh, easing its expected congestion; and
- widening of Jalan Mat Salleh to a dual-3 carriageway to accommodate high traffic generated/attracted from/to the proposed Tanjung Aru Eco Development.

Local physical improvements were proposed for junction J8 (Jalan Mat. Salleh/Jalan Tanjung Aru) to ensure acceptable performance at junctions adjacent to the proposed development. The proposed improvement involves conversion to a signalised junction with additional storage lanes.

This TIA also studied the scenario of having a higher public transport mode share during peak hour. The proposed TAED includes good accessibility to last mile public transport system, such as bus stops and extensive pedestrian and cycling network. Coupled with the proposed

high capacity transit system in close proximity to the proposed TAED, road traffic volume generated/attracted by the proposed development is assumed to drop by 20%.

1 INTRODUCTION

1.1 Background

Tanjung Aru Eco Development Sdn Bhd proposes to develop a township comprising of hotel, serviced apartment, villas, retail, office, a golf course and park. The impact of loading additional travel demand (generated by the proposed development on the existing road system) is of paramount interest and a Traffic Impact Assessment (TIA) is necessary. Hence, Surbana Jurong has been appointed to investigate the probable impact of this development on the surrounding road network, and to recommend mitigation measures to reduce any adverse impact.

1.2 Study Objective and Procedure

1.2.1 Study Objective

The objectives of this Traffic Impact Assessment are:

- To assess and mitigate (where required) the impact of the proposed development of the surrounding roads network and junctions; and
- To identify the required transport infrastructure and facilities to ensure the facilities serve the development efficiently.

1.2.2 Study Procedure

This report sets out the methodology assessment for the existing traffic conditions within the study area and assesses expected future traffic conditions, including consideration of following:

- Evaluation of the current performance of the network and assess the latent traffic capacity for each intersection;
- Forecast future traffic conditions in the area through traffic survey, trip forecast, and trip distribution;
- Assess the traffic impact of planned land uses and future developments on the existing and proposed road network and junctions;
- Investigate the potential for improvements based on a number of given time horizon.

2 EXISTING TRAFFIC SITUATION

2.1 Study Area and Surrounding Network

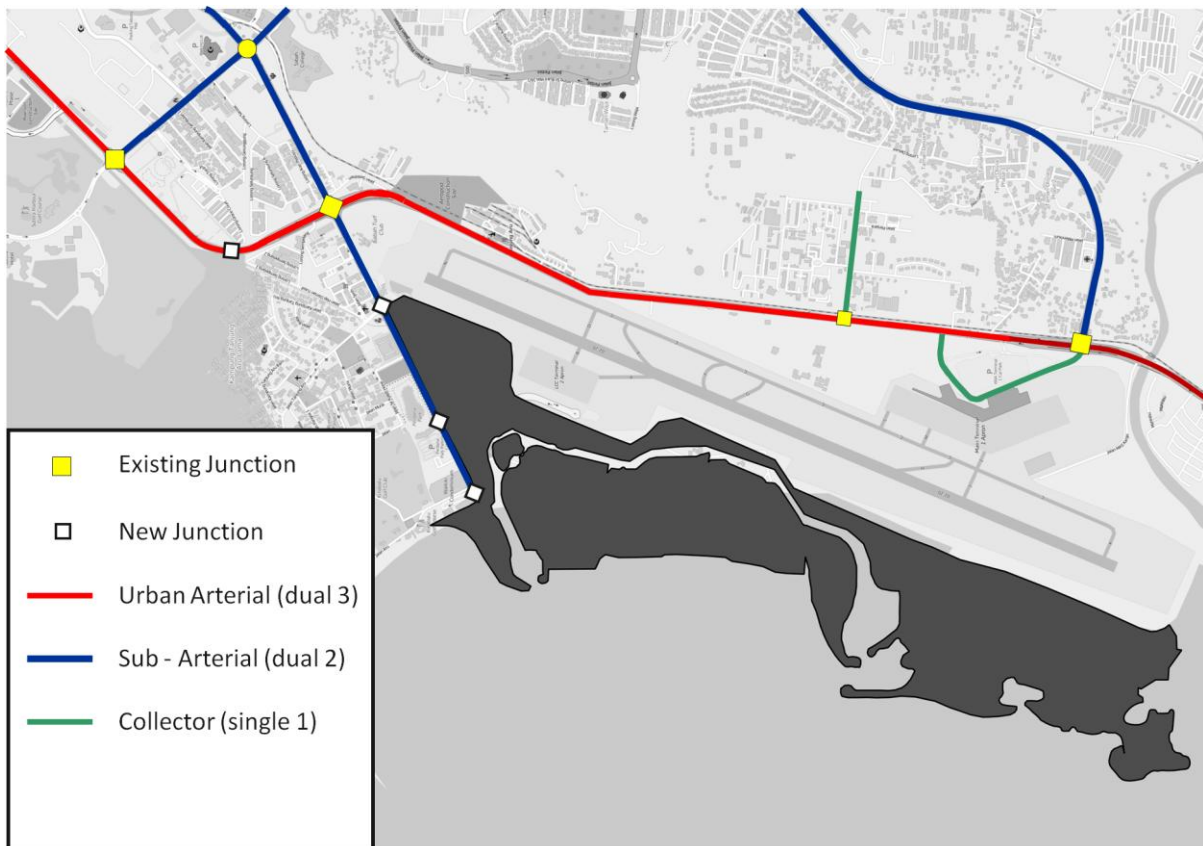


FIGURE 2-1 STUDY AREA

After consultation with Jabatan Kerja Raya (JKR) Sabah and Dewan Bandar Kota Kinabalu (DBKK), the study area is as demarcated in Figure 2-1. It covers the main roads and junctions leading to the proposed development, including Jalan Kepayan, Jalan Mat Salleh, and part of Jalan Coastal.

2.2 Traffic Survey

2.2.1 Link Count Survey

Link Traffic Count Survey was conducted to identify the 3-hr peak periods in the study area. The surveys were carried out, from 06:30 to 22:30, at Jalan Kepayan on the 9th of April 2016 and on 28th May 2016. The survey was to count the vehicle volume on Jalan Kepayan (L1) throughout the 16 hours. A similar survey was conducted on 16th April 2016 at Jalan Mat Salleh (L2). The location of the link count survey is given in Figure 2-2.

The survey at Jalan Kepayan (L1) is to capture the Weekday AM Peak Period, Weekday PM Peak Period and also Weekend Arterial Peak Period. On the other hand, the survey at Jalan Mat Salleh (L2) is to identify the Weekend Beach Peak Period, i.e. period with a spike in traffic volume due to beach visitor traffic.

From the volume obtained, the peak periods identified from the hourly traffic profile are as follow:

- Weekday AM Peak Period : 06:30 to 09:30
- Weekday PM Peak Period : 16:00 to 19:00
- Weekend Arterial (AR) Peak Period : 11:45 to 14:45
- Weekend Beach (BC) Peak Period : 16:45 to 19:45

The 3-hour peak period is obtained by adding one hour before and after the identified peak hour (highlighted red in Figure 2-3 to Figure 2-7).

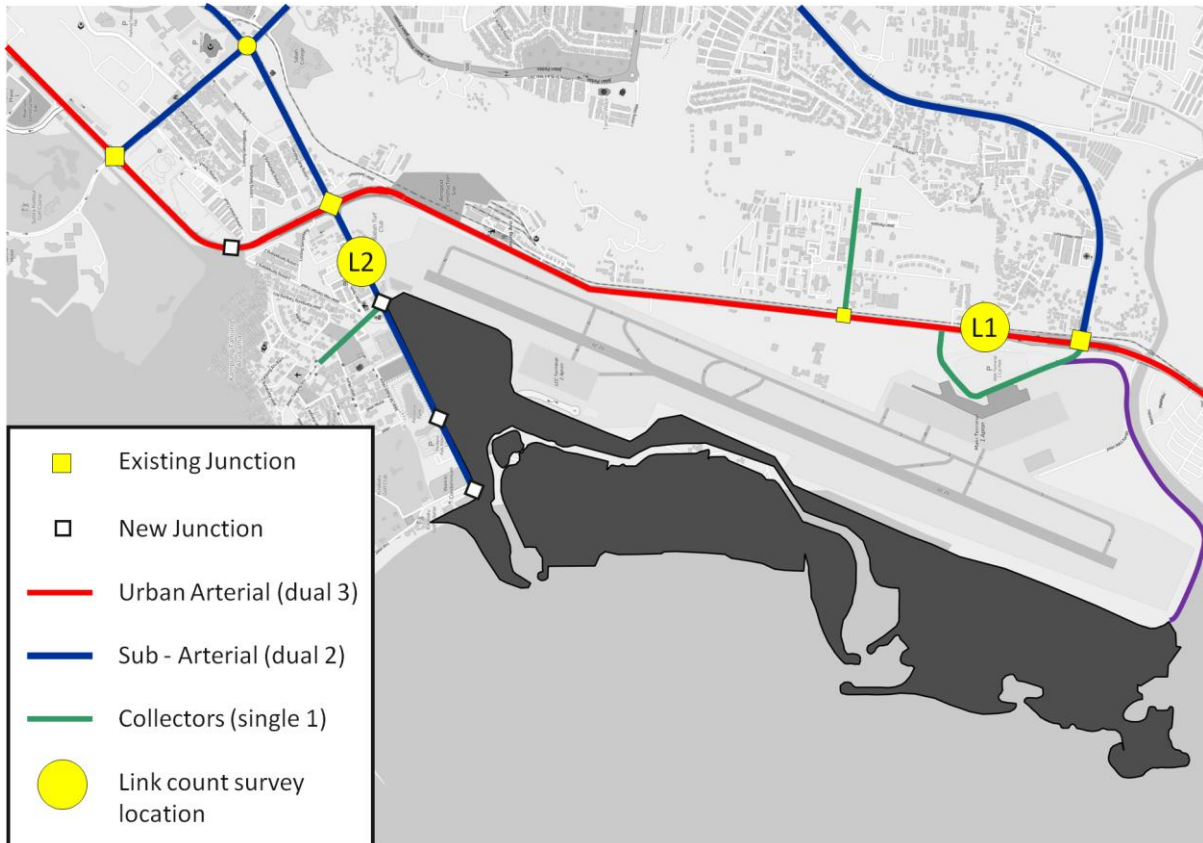


FIGURE 2-2 LOCATION OF LINK COUNT SURVEY

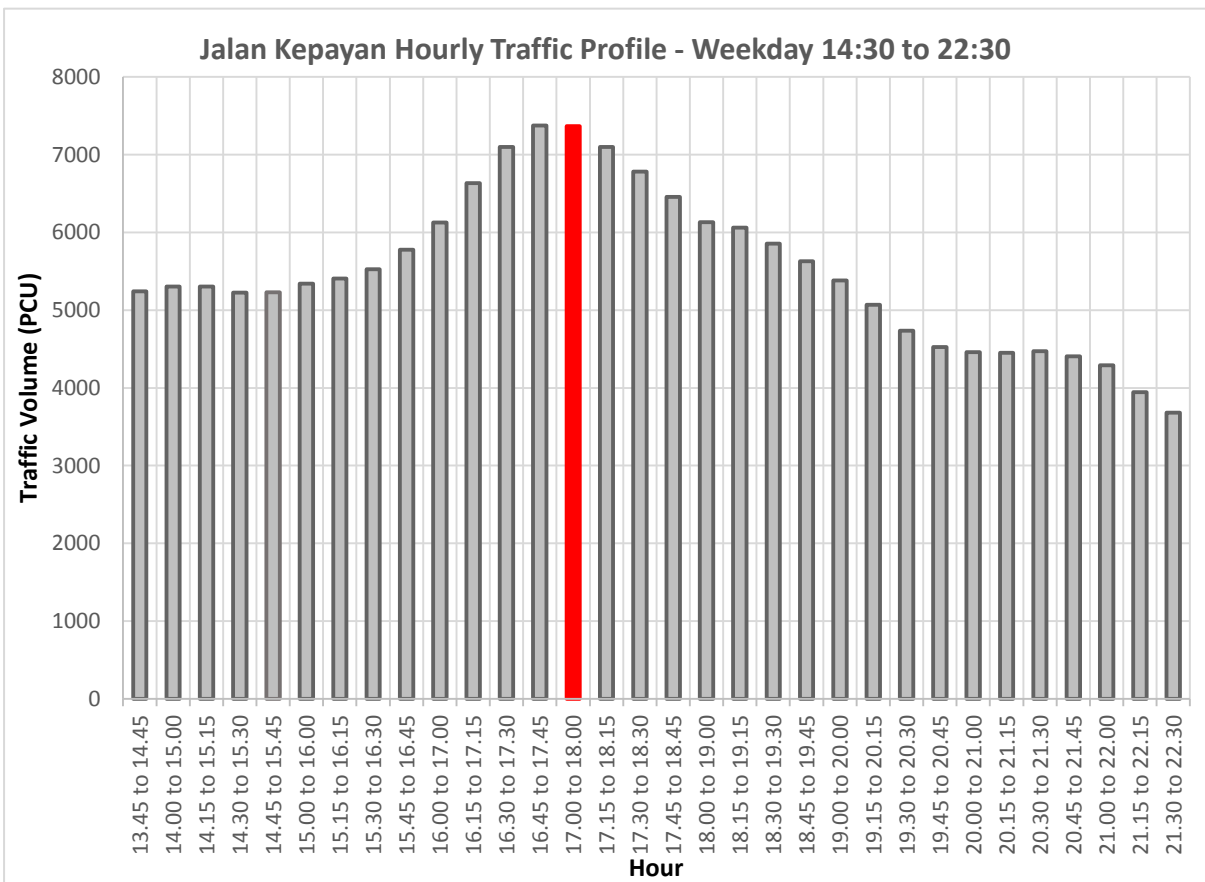
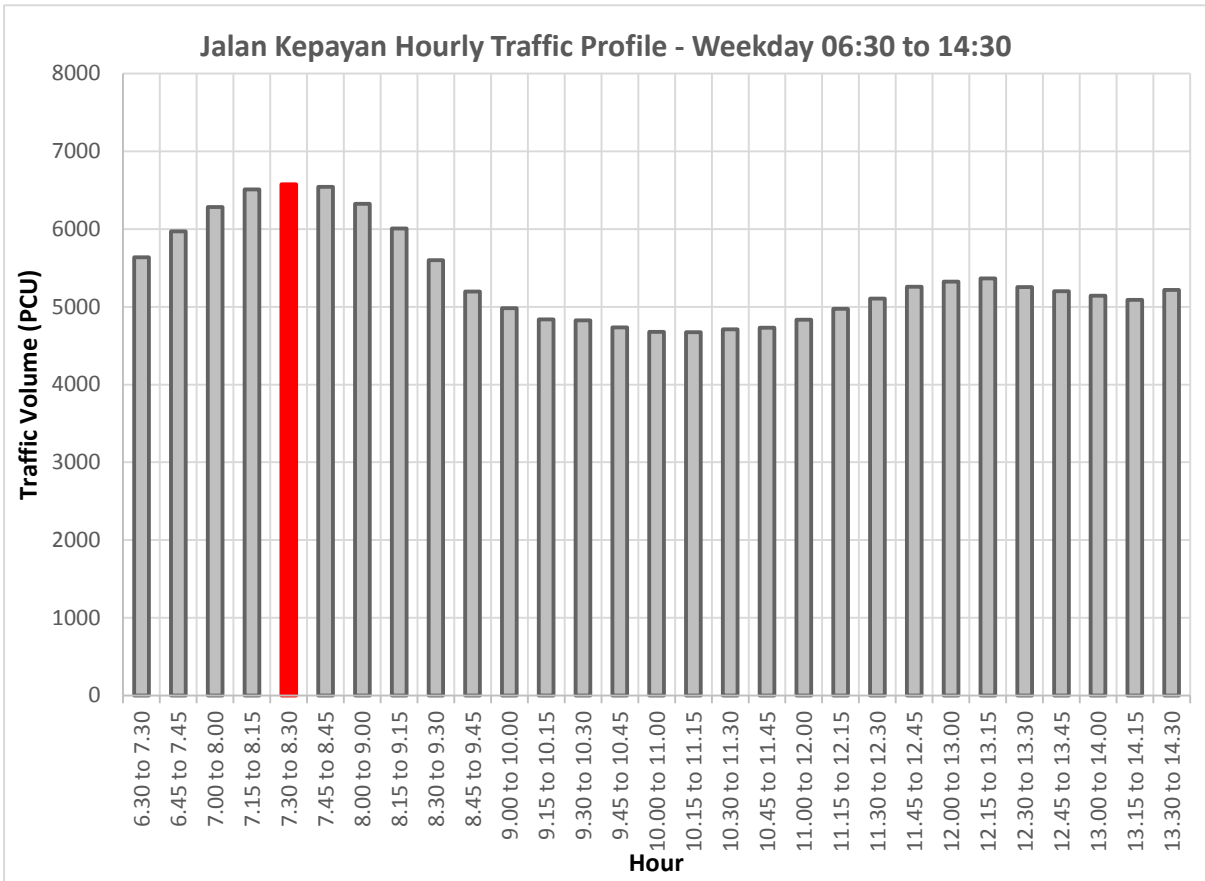


FIGURE 2-3 WEEKDAY HOURLY TRAFFIC PROFILE (PCU) ALONG JALAN KEPAYAN TO DETERMINE 3-HOUR PEAK PERIOD

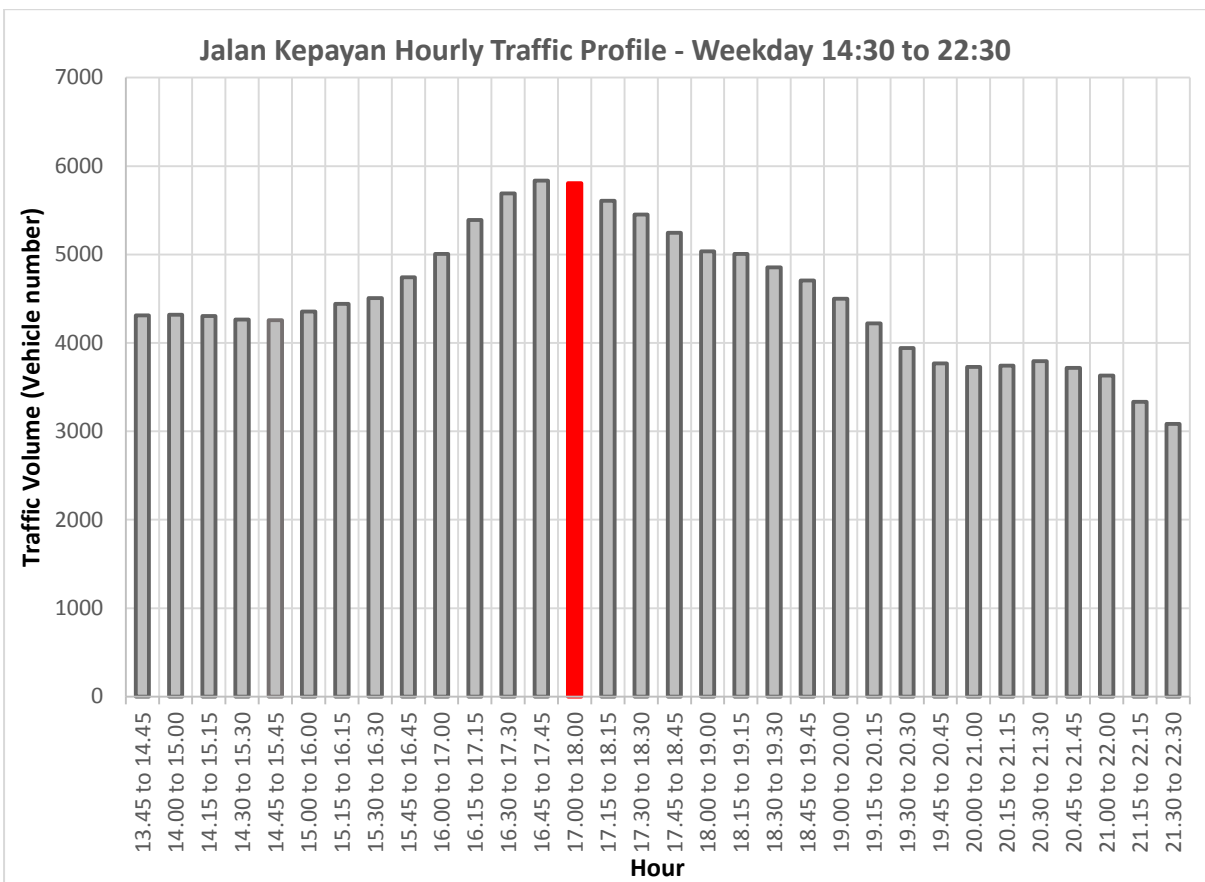
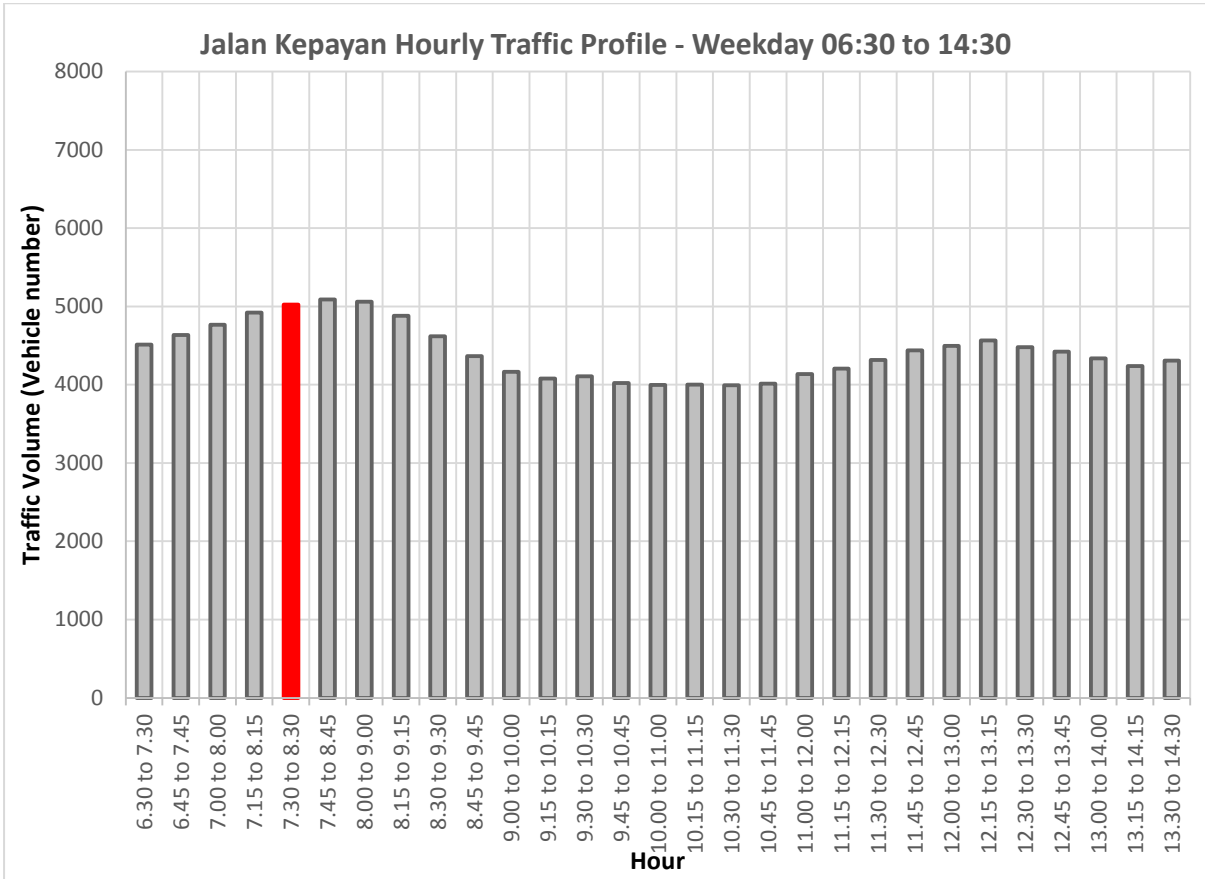


FIGURE 2-4 WEEKDAY HOURLY TRAFFIC PROFILE (VEHICLE NUMBER) ALONG JALAN KEPAYAN TO DETERMINE 3-HOUR PEAK PERIOD

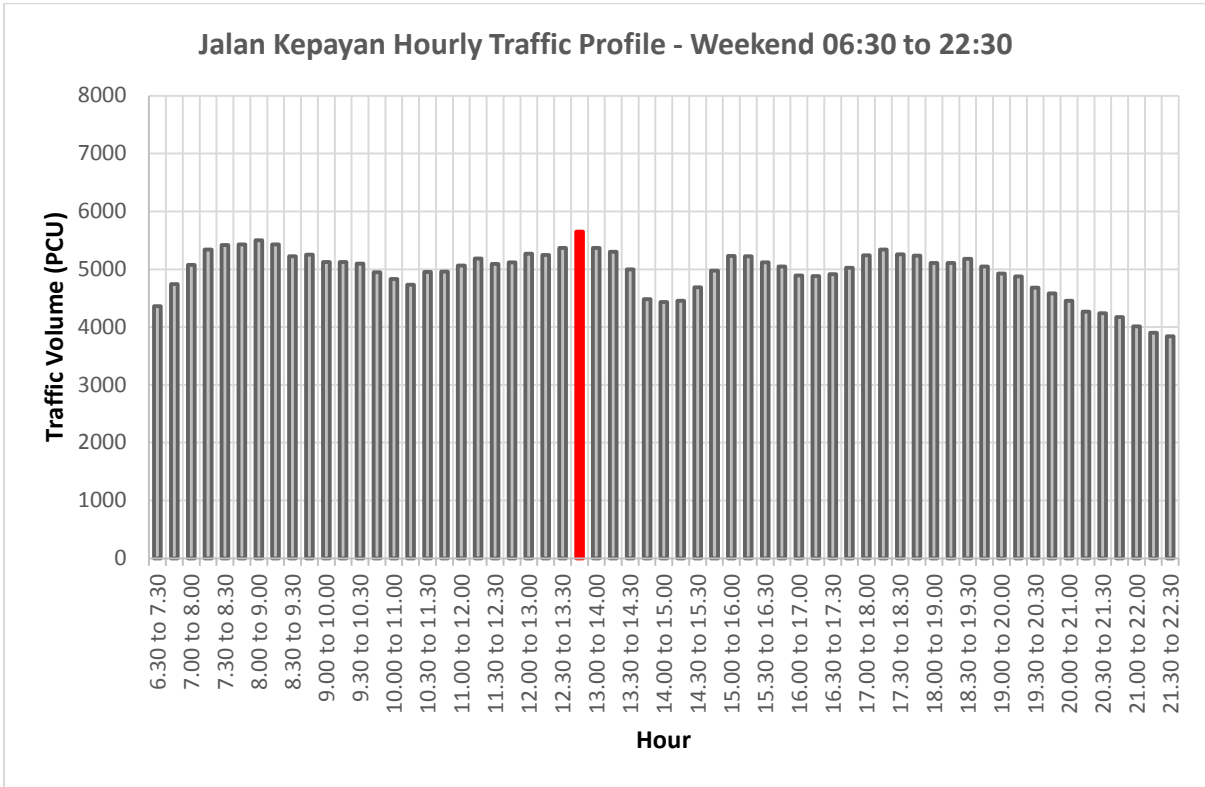


FIGURE 2-5 WEEKEND HOURLY TRAFFIC PROFILE (PCU) ALONG JALAN KEPAYAN TO DETERMINE 3-HOUR PEAK PERIOD

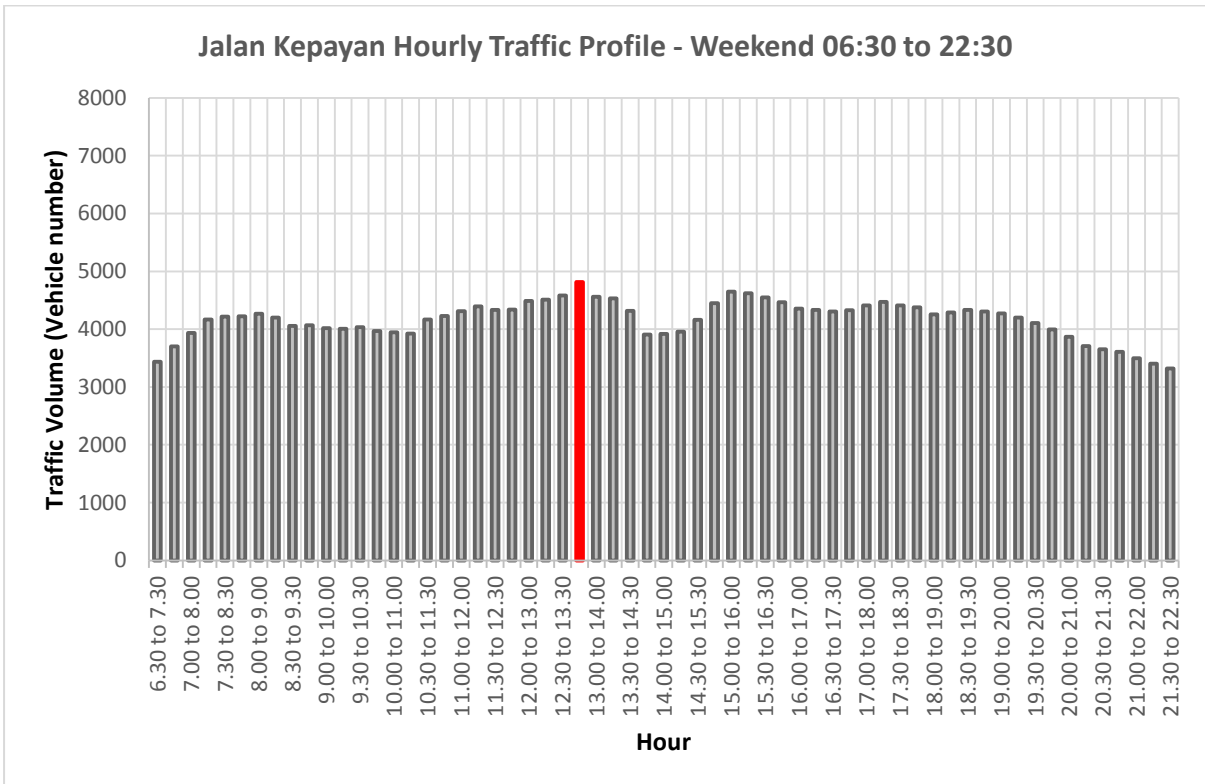


FIGURE 2-6 WEEKEND HOURLY TRAFFIC PROFILE (VEHICLE NUMBER) ALONG JALAN KEPAYAN TO DETERMINE 3-HOUR PEAK PERIOD

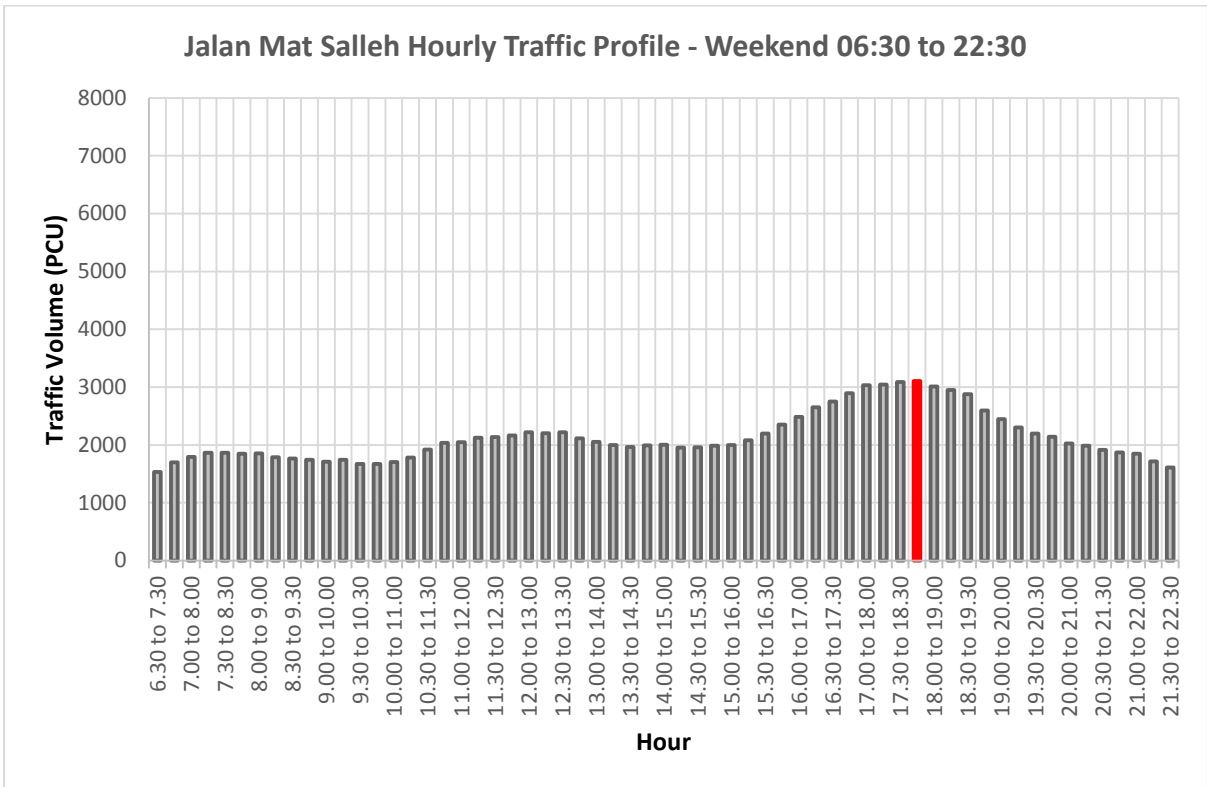


FIGURE 2-7 WEEKEND HOURLY TRAFFIC PROFILE (PCU) ALONG JALAN MAT SALLEH TO DETERMINE 3-HOUR PEAK PERIOD

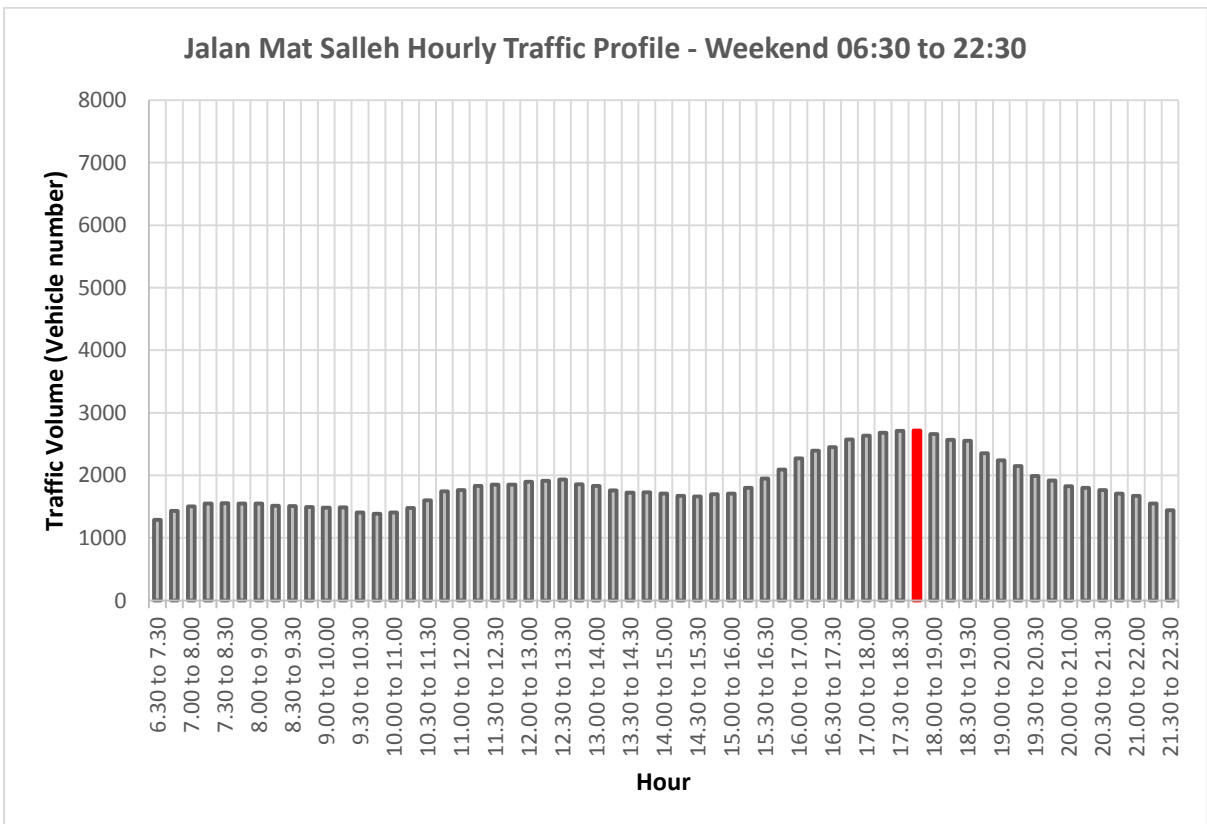


FIGURE 2-8 WEEKEND HOURLY TRAFFIC PROFILE (VEHICLE NUMBER) ALONG JALAN MAT SALLEH TO DETERMINE 3-HOUR PEAK PERIOD

2.2.2 Junction Count Survey

Junction Traffic Count Survey was then conducted at peak periods identified in Link Traffic Count Survey.

Figure 2-9 shows the junctions where traffic count surveys were conducted. The eight (8) existing junction count survey date are as given in Table 2-1.

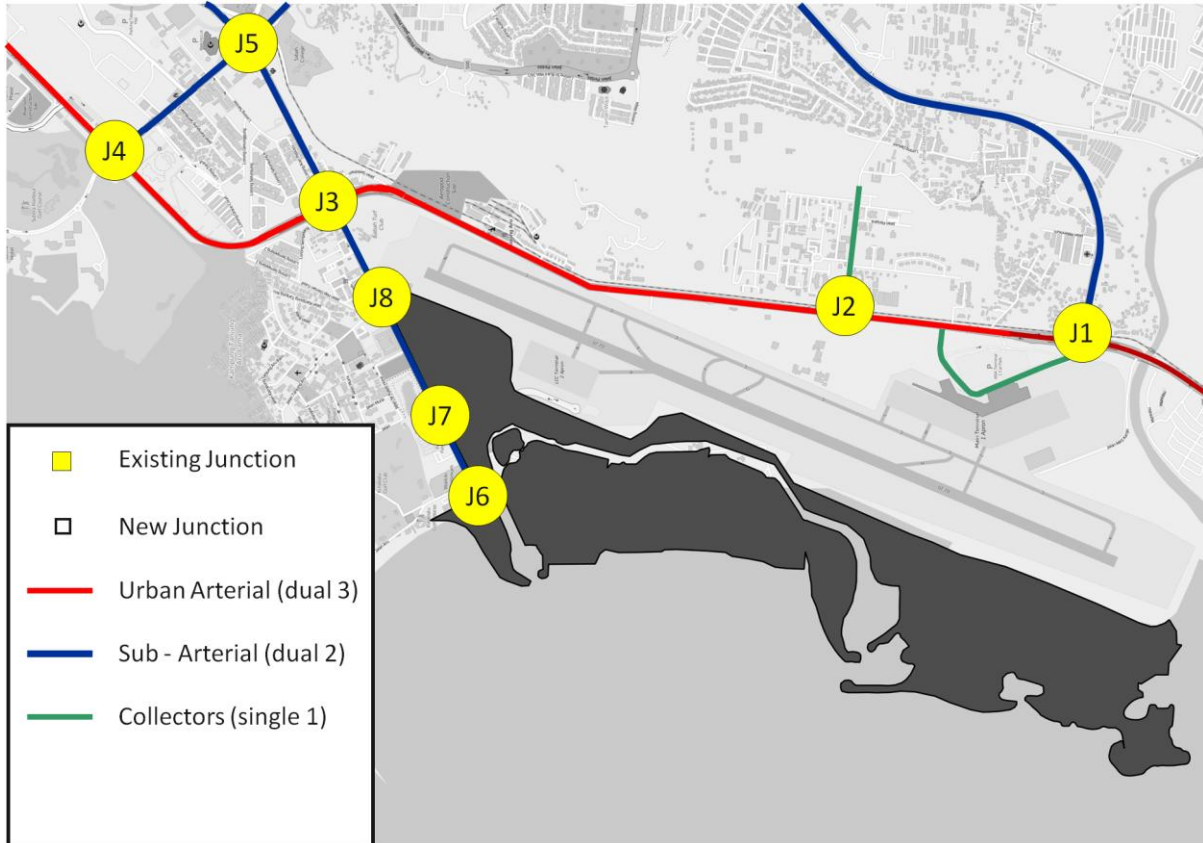


FIGURE 2-9 LOCATION OF JUNCTION SURVEYED

Junction	Description	Survey Date	
		Weekday	Weekend
1	Jalan Kepayan/Jalan Lintas	27-Apr	28-May
2	Jalan Kepayan/Jalan Pahlawan	6-Apr	21-May
3	Jalan Coastal/Jalan Mat. Salleh	14-Apr	30-Apr
4	Jalan Coastal/Jalan Sembulan	19-Apr	7-May
5	Jalan Mat. Salleh/Jalan Sembulan	20-Apr	14-May
6	Jalan Mat. Salleh/Jalan Aru	13-Apr	21-May
7	Jalan Mat. Salleh/Jalan Lapangan Terbang (lama)	13-Apr	21-May
8	Jalan Mat. Salleh/Jalan Tanjung Aru	12-Apr	28-May

TABLE 2-1 JUNCTION SURVEYED AND IT'S DATE OF SURVEY

All the traffic data were collected in 15-minute intervals. The data collected at junctions included:

- Classified vehicle movement counts
- Traffic signal phasing and timing

The count data for the various vehicle types were converted to Passenger Car Units (PCU) as per JKR's TIA guideline (See Table 2-2). PCU conversion allows different vehicle types within a traffic flow group to be assessed in a consistent manner.

Type of Vehicle	Equivalent in PCU	
	Link	Junction
Passenger Cars	1.00	1.00
Motor Cycles	0.75	0.22
Light Vans	2.00	1.00
Medium Lorries	2.50	1.19
Heavy Lorries	3.00	2.27
Buses	3.00	2.08

TABLE 2-2 PCU CONVERSION FACTOR

Based on the data collected from the junction traffic counts, the overall hourly traffic profile for the peak traffic flows is plotted in Figure 2-10. The peak hour identified for each period are:

- Weekday AM Peak Period : 06:30 to 07:30
- Weekday PM Peak Period : 17:15 to 18:15
- Weekend Arterial (AR) Peak Period : 12:45 to 13:45
- Weekend Beach (BC) Peak Period : 17:45 to 18:45

The existing hourly traffic flows during weekday and weekend peak hours are summarised in Figure 2-10 and Figure 2-11.

The turning volume in each junction during weekday and weekend peak hours are summarised in Appendix D1 and D2 respectively.

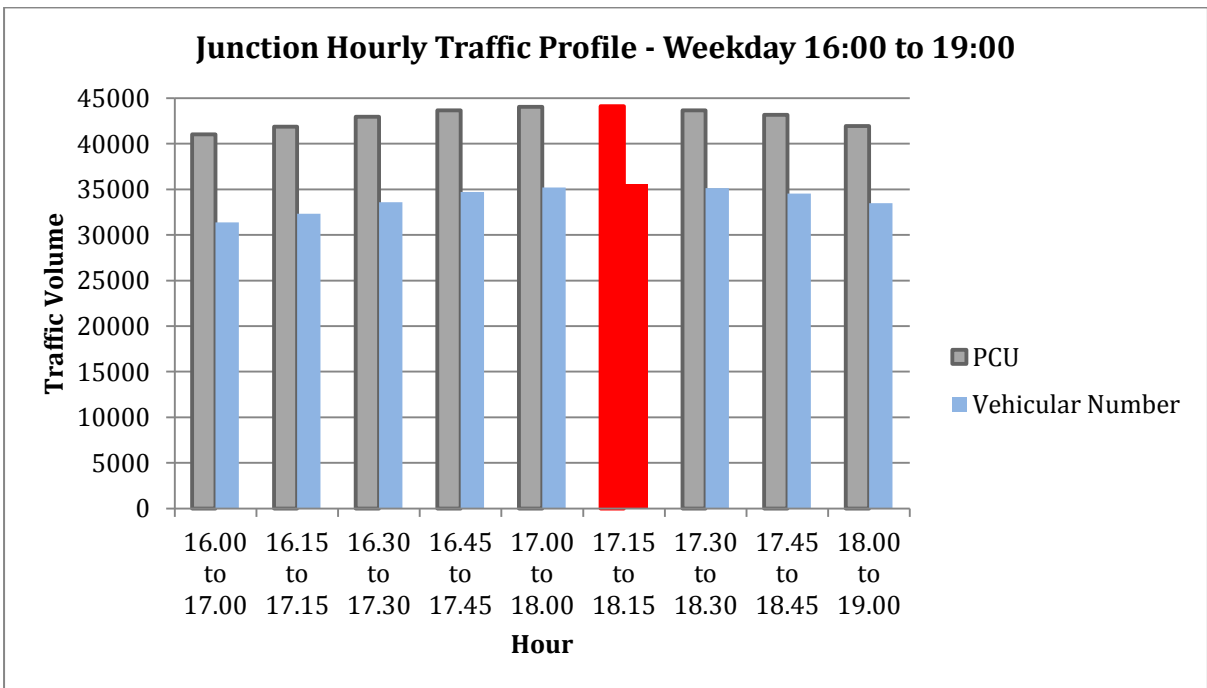
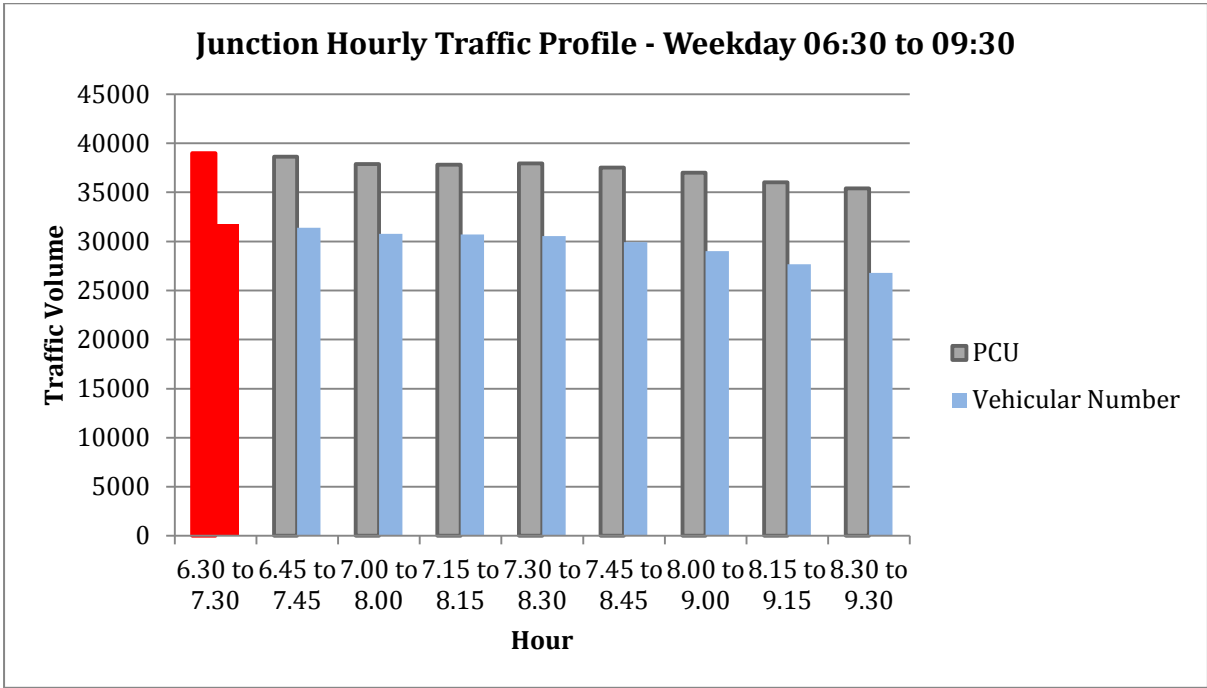


FIGURE 2-10 WEEKDAY HOURLY PEAK TRAFFIC PROFILE TO DETERMINE 1-HOUR PEAK

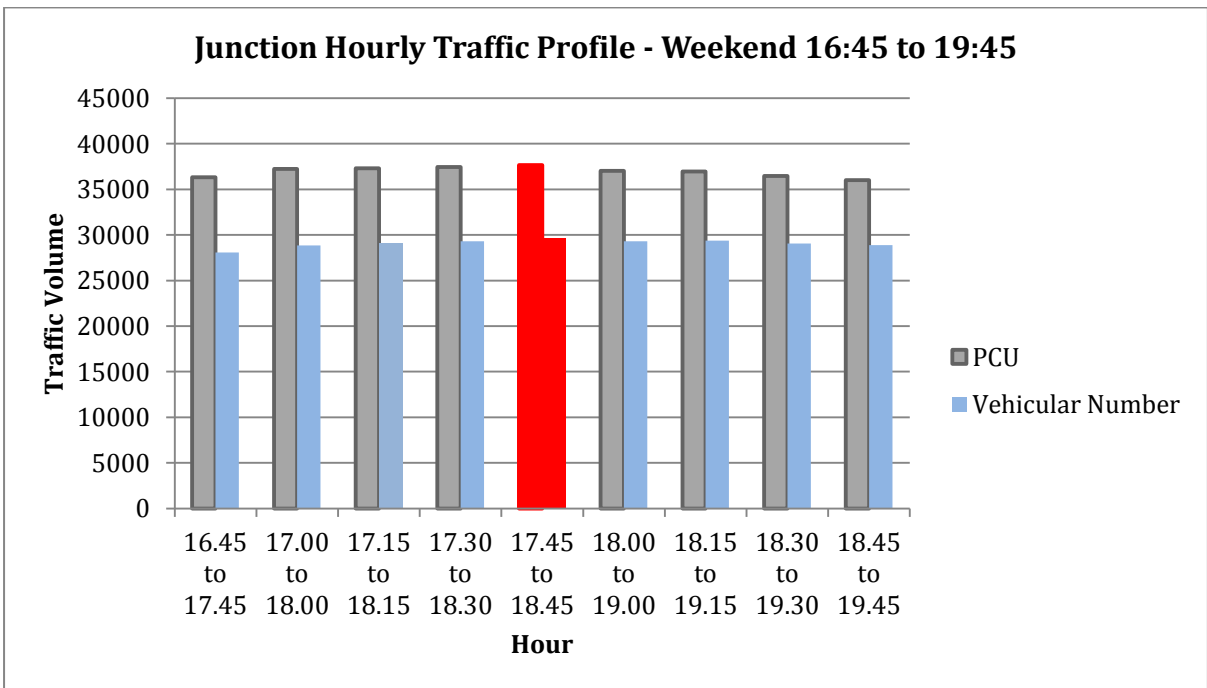
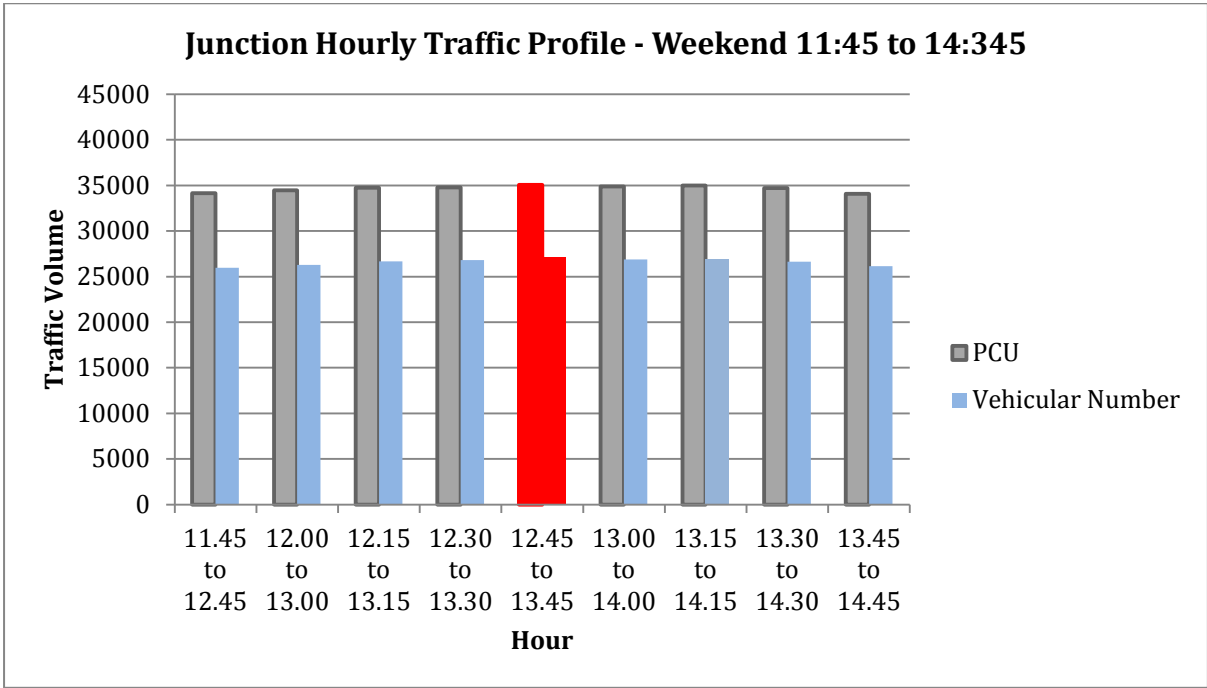


FIGURE 2-11 WEEKEND HOURLY PEAK TRAFFIC PROFILE TO DETERMINE 1-HOUR PEAK

2.3 Evaluation of Existing Transport Infrastructure

2.3.1 Road Network

The two main roads in this study area are Jalan Kepayan and Jalan Mat Salleh. Jalan Kepayan is a dual 3-lane major arterial road that is observed to be heavy during peak hours. It is a critical road that connects to the Terminal 1 of the Kota Kinabalu International Airport (KKIA). Jalan Mat Salleh is a dual 2-lane minor arterial road with moderate traffic plying through during peak hours. Jalan Coastal is a dual two-lane road with flaring to minimum three lanes at the junction.

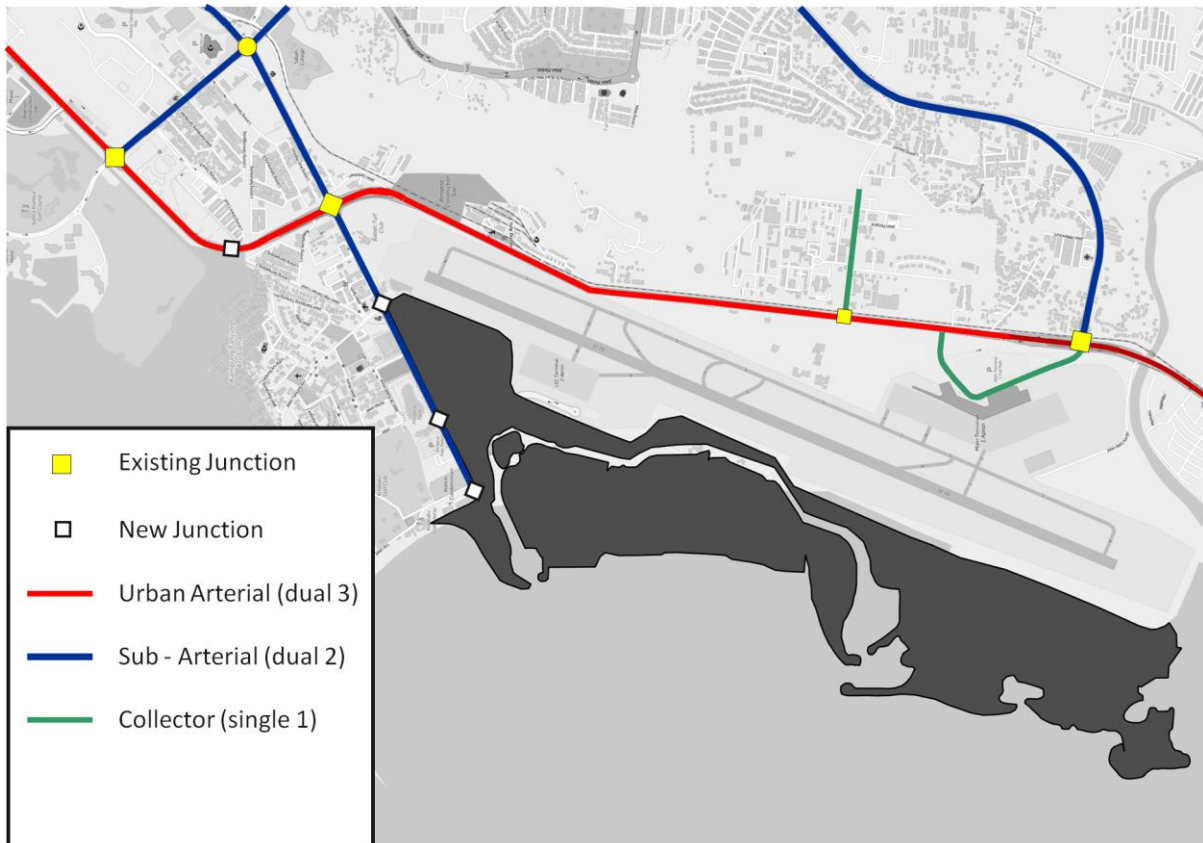


FIGURE 2-12 EXISITNG TRANSPORT NETWORK

2.3.2 Pedestrian Network

Pedestrian footpaths are provided along the major roads which provide ease of walking. Some walkways are also sheltered naturally by trees which provide some shade along the way. However, lighting is not adequately provided along certain stretches of Jalan Mat Salleh.

2.4 Evaluation of Existing Road Network

2.4.1 Trip Distribution and Assignment

Table 2-3 shows the potential catchment area of each major road.

S/N	Road	Catchment Area
1	Jalan Coastal	Kota Kinabalu city centre
2	Jalan Tunku Abdul Rahman	Kota Kinabalu city centre
3	Jalan Pintas	Kepayan
4	Jalan Mat Salleh (Tanjung Aru)	Tanjung Aru
5	Jalan Pahlawan	Kepayan
6	Jalan Lintas	Kepayan, Lintas
7	Jalan Putatan	Bandar Putatan and southern sub-districts
8	Jalan Lapangan Terbang (Baru)	Kota Kinabalu International Airport (KKIA)

TABLE 2-3 POTENTIAL CATCHMENT AERA OF EACH MAJOR ROAD

Figure 2-13 and Figure 2-16 summarise the trip origin and destination matrix (in vehicular number) in the study area, differentiated into 4 vehicle classes. The 4 classes are:

- Class 1 – Passenger car
- Class 2 – Light vans
- Class 3/4 – Medium/Heavy Lorries
- Class 6 – Motor Cycles

Bus (Class 5) is excluded as their volume during peak hour is less than 10 at each junction.

In AM peak hour, 38% of the total traffic head to Kota Kinabalu city centre via Jalan Coastal and Jalan Tunku Abdul Rahman. Other destinations have around 10% of total traffic each. On the other hand, 41% of traffic in the study area originates from Jalan Putatan, in which the catchment area includes Bandar Putatan and other sub-districts in the south.

PM traffic trend is the opposite of the AM peak traffic. Almost half, 48%, of the total traffic leaves Kota Kinabalu city centre. There's no distinct destination for PM traffic. Jalan Putatan attracts the most traffic (25%) while Jalan Mat Salleh (Tanjung Aru) attracts the least (3%).

Jalan Putatan and Kota Kinabalu, via Jalan Tunku Abdul Rahman and Jalan Coastal, are the main traffic generators during weekend arterial peak. Between them produced and attracted 58% and 44% of total traffic, respectively.

Weekend beach peak hour has a very similar traffic pattern to weekend arterial peak.

S/N	1	2	3	4	5	6	7	8
1	195	264	443	344	42	42	153	34
2	236	13	92	124	21	22	80	18
3	465	276	54	154	29	31	112	25
4	475	152	289	336	42	46	165	37
5	175	16	39	61	0	17	55	13
6	158	15	38	59	12	2	518	160
7	1413	131	329	513	93	850	184	763
8	0	0	0	0	0	0	0	0

(a) Class 1 – Passenger car

S/N	1	2	3	4	5	6	7	8
1	86	115	147	72	23	24	79	13
2	72	5	36	35	10	10	34	6
3	100	70	12	30	8	9	30	5
4	111	40	38	78	10	11	36	6
5	30	3	3	12	0	8	24	4
6	44	5	5	19	6	4	447	88
7	313	32	36	133	36	209	32	137
8	0	0	0	0	0	0	0	0

(b) Class 2 – Light vans

S/N	1	2	3	4	5	6	7	8
1	30	32	27	42	1	4	21	5
2	8	1	7	2	0	3	15	4
3	33	15	2	1	0	2	10	3
4	45	19	12	41	0	3	16	4
5	1	1	1	2	0	1	4	1
6	1	1	1	1	0	1	47	11
7	24	26	21	42	2	54	20	33
8	0	0	0	0	0	0	0	0

(c) Class 3/4 – Medium/heavy Lorries

S/N	1	2	3	4	5	6	7	8
1	28	17	49	31	12	9	33	2
2	28	1	18	10	4	3	11	1
3	64	25	19	13	6	4	16	1
4	47	20	27	39	7	6	21	1
5	17	5	9	6	0	6	21	1
6	7	2	4	3	2	2	73	5
7	142	42	80	55	34	174	30	26
8	0	0	0	0	0	0	0	0

(d) Class 6 – Motor cycles

FIGURE 2-13 ORIGIN - DESTINATION TRAFFIC DURING AM PEAK HOUR

S/N	1	2	3	4	5	6	7	8
1	387	565	1336	1033	159	257	939	125
2	237	15	66	42	40	66	241	32
3	303	329	42	26	25	42	151	20
4	347	187	351	291	49	86	307	41
5	32	5	11	26	0	50	164	23
6	53	8	20	46	18	29	866	133
7	343	51	129	290	101	648	140	125
8	0	0	0	0	0	0	0	0

(a) Class 1 – Passenger cars

S/N	1	2	3	4	5	6	7	8
1	109	200	298	227	68	68	312	28
2	44	5	21	21	10	10	45	4
3	74	93	17	24	11	11	52	5
4	92	51	35	64	16	17	77	7
5	5	2	1	4	0	12	48	5
6	10	3	2	7	6	10	840	39
7	116	36	27	82	55	246	49	41
8	0	0	0	0	0	0	0	0

(b) Class 2 – Light vans

S/N	1	2	3	4	5	6	7	8
1	32	90	164	71	6	11	48	9
2	14	2	12	7	2	3	13	3
3	52	57	24	11	3	5	23	4
4	43	23	18	23	2	4	16	3
5	2	1	1	1	0	3	14	3
6	2	1	1	1	1	1	36	5
7	35	19	17	23	14	69	23	15
8	0	0	0	0	0	0	0	0

(c) Class 3/4 – Medium/Heavy Lorries

S/N	1	2	3	4	5	6	7	8
1	49	117	222	56	28	49	242	3
2	58	5	32	21	6	11	52	1
3	62	68	18	12	4	7	33	0
4	52	45	14	57	5	8	42	1
5	6	4	1	5	0	6	32	0
6	3	2	1	3	2	7	159	2
7	41	30	10	35	18	83	36	7
8	0	0	0	0	0	0	0	0

(d) Class 6 – Motor cycles

Figure 2-14 ORIGIN - DESTINATION TRAFFIC DURING PM PEAK HOUR

S/N	1	2	3	4	5	6	7	8
1	403	461	422	530	96	145	501	123
2	279	26	68	57	36	56	191	47
3	275	373	14	22	15	24	83	20
4	210	198	53	148	26	43	145	36
5	47	19	5	11	0	25	76	20
6	66	28	8	17	16	8	603	150
7	656	277	76	168	132	621	217	177
8	0	0	0	0	0	0	0	0

(a) Class 1 – Passenger cars

S/N	1	2	3	4	5	6	7	8
1	121	197	137	97	21	43	140	29
2	76	9	62	23	6	13	42	9
3	102	42	22	17	5	10	31	6
4	58	59	31	54	6	14	43	9
5	13	4	3	5	0	14	40	9
6	16	6	4	7	6	2	202	43
7	167	59	38	70	48	212	53	91
8	0	0	0	0	0	0	0	0

(b) Class 2 – Light vans

S/N	1	2	3	4	5	6	7	8
1	62	39	28	38	5	12	44	26
2	17	2	11	9	1	4	13	8
3	23	22	2	3	0	1	5	3
4	31	17	13	14	1	4	13	8
5	3	2	2	1	0	1	4	3
6	7	5	5	3	1	1	88	21
7	45	34	33	17	5	82	14	13
8	0	0	0	0	0	0	0	0

(c) Class 3/4 – Medium/heavy lorries

S/N	1	2	3	4	5	6	7	8
1	32	23	67	32	12	16	62	4
2	22	2	13	7	6	8	30	2
3	24	16	3	2	2	2	9	1
4	26	17	14	29	3	5	19	1
5	6	2	2	2	0	5	17	1
6	6	2	2	2	2	2	53	3
7	48	15	17	13	12	62	27	15
8	0	0	0	0	0	0	0	0

(d) Class 6 – Motor cycles

FIGURE 2-15 ORIGIN - DESTINATION TRAFFIC DURING ARTERIAL PEAK HOUR

S/N	1	2	3	4	5	6	7	8
1	500	301	610	271	77	179	563	139
2	234	17	121	153	17	41	128	31
3	256	298	41	73	8	20	61	15
4	669	157	44	223	11	28	85	21
5	46	21	6	21	0	32	88	23
6	67	31	9	33	16	12	633	154
7	568	268	80	276	118	580	180	194
8	0	0	0	0	0	0	0	0

(a) Class 1 – Passenger car

S/N	1	2	3	4	5	6	7	8
1	182	158	364	128	28	49	103	25
2	148	13	102	47	6	12	24	6
3	148	45	64	46	6	11	24	6
4	132	137	181	67	9	17	34	8
5	20	3	5	6	0	12	23	6
6	17	2	5	5	5	4	175	40
7	140	19	37	43	32	245	37	73
8	0	0	0	0	0	0	0	0

(a) Class 2 – Light vans

S/N	1	2	3	4	5	6	7	8
1	38	35	50	38	5	11	53	13
2	8	2	6	8	1	3	13	3
3	17	26	3	6	1	2	11	3
4	24	15	4	19	1	2	11	3
5	2	1	0	1	0	2	10	3
6	2	1	0	1	0	1	55	11
7	45	32	9	23	7	83	20	10
8	0	0	0	0	0	0	0	0

(a) Class 3/4 – Medium/heavy lorries

S/N	1	2	3	4	5	6	7	8
1	83	33	33	33	14	20	89	4
2	19	1	12	7	3	4	19	1
3	46	38	5	7	3	4	20	1
4	45	15	5	45	2	3	13	1
5	10	5	2	2	0	5	22	1
6	5	2	1	1	3	4	99	6
7	34	17	6	9	15	82	34	4
8	0	0	0	0	0	0	0	0

(a) Class 6 – Motor cycles

FIGURE 2-16 ORIGIN - DESTINATION TRAFFIC DURING BEACH PEAK HOUR

2.4.2 Mid-Block Performance – V/C Ratio

The modelling software adopted in this study for traffic forecasting is PTV VISUM (ver.15). The architecture of PTV VISUM is represented in Figure 2-17.

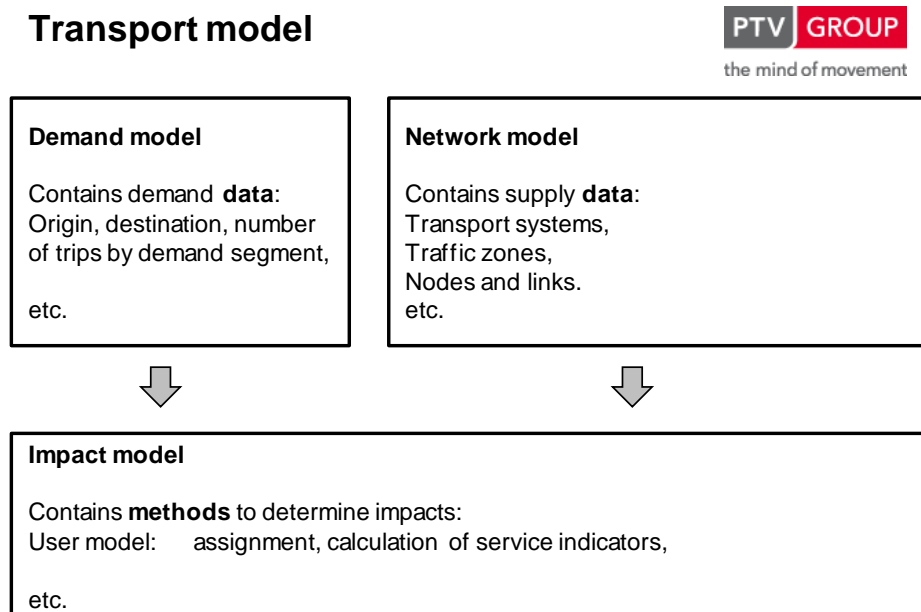


FIGURE 2-17 VISUM MODEL DEVELOPMENT STRUCTURE

The DEMAND MODEL contains travel demand data. Information on the planning area is required for the analysis of transportation networks. Demand matrices can only partially be created based on survey data. This is why mathematical models are used to reproduce real demand ratios. They are able to calculate the traffic flows between zones of the planning area based on structure and behaviour data, the spatial utilization structure and the transport system. The standard 4-step model is used in this demand model.

The NETWORK MODEL stores the transport supply side. The network model consists of traffic zones, nodes, and links representing roads. Transport supply data can be visualized and edited interactively with different methods.

The IMPACT MODEL uses input data provided by the network model and the demand model. VISUM offers several impact models for analysis and evaluation of transport supply. The impact model for this study is the Volume Capacity (V/C) ratio.

Volume Capacity (V/C) ratio stands for ratio of traffic volume over the theoretical capacity of a road. It is commonly used to correlate with level of service (LOS) of a road link. The LOS is a qualitative measure that evaluates the traffic condition.

Road/Link	Capacity per lane (pcu/hr/lane)	No. of lane	Capacity (pcu/hr)
Jalan Kepayan	1800	3	5400
Jalan Coastal	1800	2-3	3600-5400
Jalan Mat Salleh	1500	2	3000
Jalan Lintas	1500	2	3000
Others	1100	-	-

TABLE 2-4 CAPACITY OF ROAD IN THE STUDY AREA

There are six LOS values ranging from 'A' to 'F', with 'A' corresponding to free flow conditions and 'F' congested or traffic jam conditions. Where possible, it is aimed to provide a desired LOS "D" or better in the peak periods for roads affected by development traffic. The LOS definitions for road links in this study are provided in Table 2-5.

Level of Service	Volume-Capacity Ratio (v/c %)	General Operating Conditions
A	<28	<ul style="list-style-type: none"> Unimpeded flow Extremely easy to travel at desired speeds
B	<47	<ul style="list-style-type: none"> Unimpeded flow at tolerable level Manoeuvre within traffic stream is constrained by presence of some road users
C	<80	<ul style="list-style-type: none"> Steady flow Manoeuvre within traffic stream is constrained by presence of some road users
D	<90	<ul style="list-style-type: none"> Reaching unsteady flow Manoeuvre within traffic stream is severely constrained by presence of some road users. Freedom to travel at desired speeds is severely restricted.
E	<100	<ul style="list-style-type: none"> Unsteady flow Unable to manoeuvre freely within traffic stream At or close to capacity
F	>100	<ul style="list-style-type: none"> Over capacity

TABLE 2-5 LOS DEFINITION FOR ROAD LINKS



FIGURE 2-18 EXISTING V/C RATIO AT WEEKDAY AM PEAK HOUR

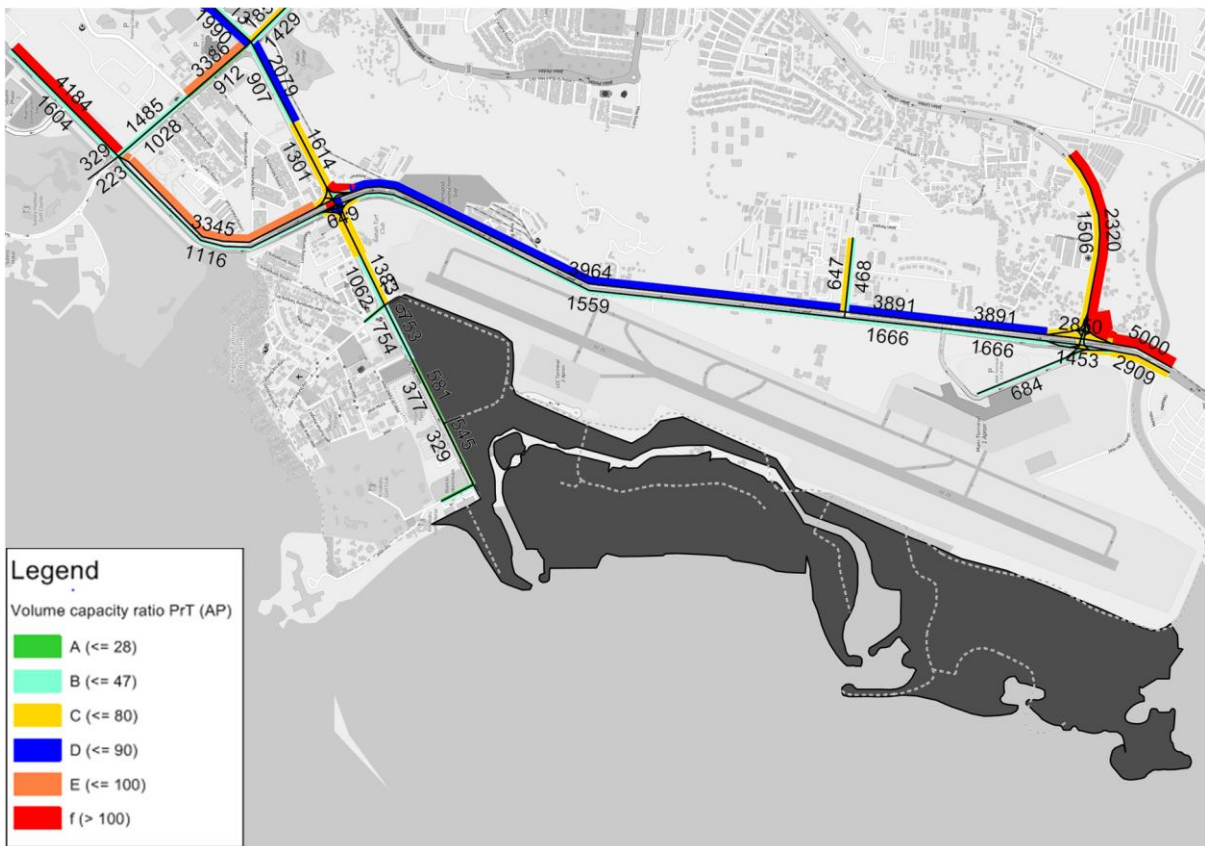


FIGURE 2-19 EXISTING V/C RATIO AT WEEKDAY PM PEAK HOUR

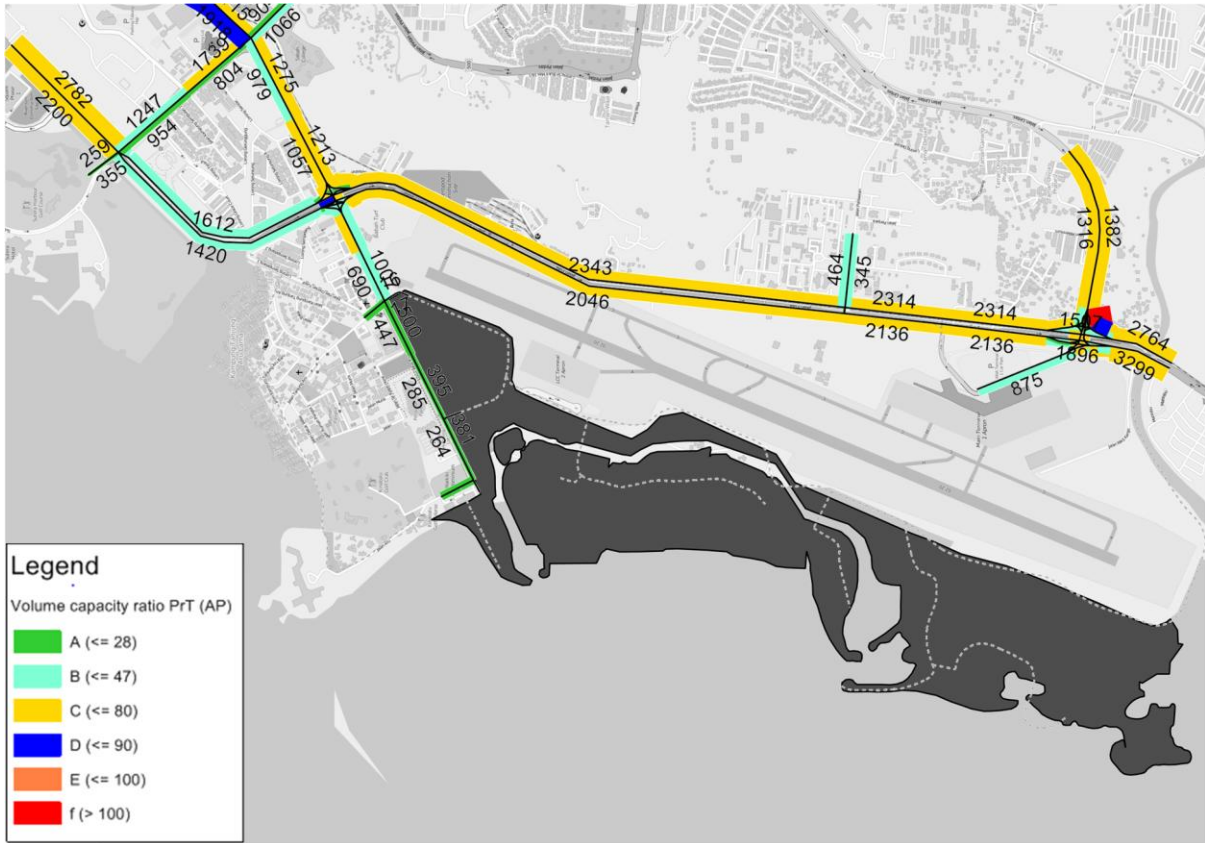


FIGURE 2-20 EXISTING V/C RATIO AT WEEKEND ARTERIAL PEAK HOUR

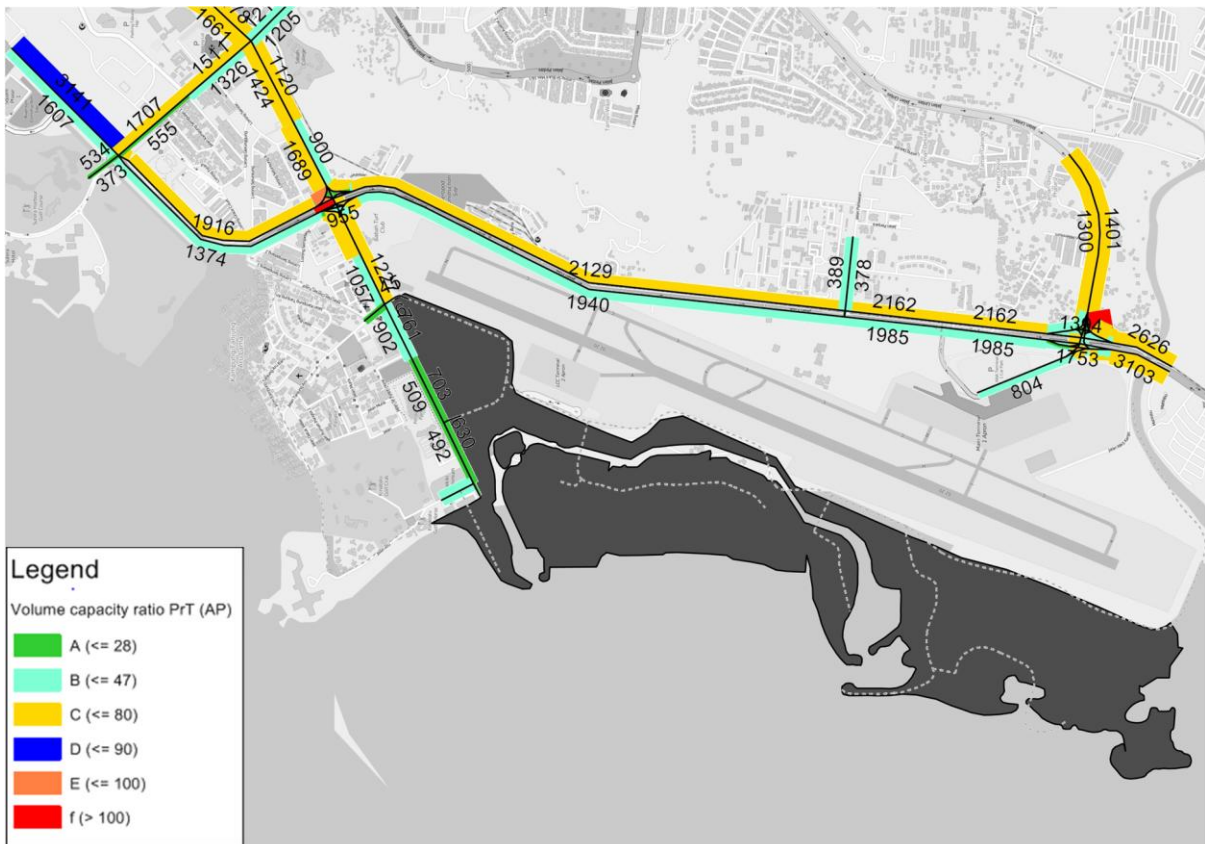


FIGURE 2-21 EXISTING V/C RATIO AT WEEKEND BEACH PEAK HOUR

Figure 2-18 to Figure 2-21 show the traffic condition at the four (4) identified peak hour respectively. The results show that Jalan Kepayan is operating close to its capacity, at $v/c > 90\%$. Jalan Coastal on the other hand, owing to its dual-two lane configuration, suffers from overcapacity. In summary, traffic congestion is certain to occur on Jalan Kepayan to Jalan Coastal during peak hour.

2.4.3 Assessment of Junctions

In the context of accessibility for the proposed development, eight (8) junctions have been identified as being of prime importance to the development.

The analysis of the junctions was undertaken using SIDRA Intersection analysis software. The following assumptions were made when undertaking the use of SIDRA Intersection analysis:

- Cycle Time: Based on the most optimised performance cycle time within the range of 90-150 seconds to determine the existing and future traffic signals along arterial roads
- Peak Flow Factor: 0.95 in general
- Basic saturation flow rate: 1950pcu/hr/lane for arterial roads. Lower values are to be used for residential streets and environment with high roadside friction
- Delay definition: Control Delay
- Queue definition: 95% back of queue
- Fixed Time Signals

Junction performance is mainly evaluated using the Level of Service (LOS) criteria summarized on Table 2-6. LOS A - LOS E are generally considered acceptable.

Level of Service (LOS) (for $v/c \leq 1.0$)	Average Control Delay (d) per Vehicle for Signalised Junctions (sec)	Average Control Delay (d) per Vehicle for Priority Junctions (sec)	Description
A	$d \leq 10$	$d \leq 10$	The highest quality of traffic service giving very good operation on all approaches to the junction.
B	$10 \leq d \leq 20$	$10 \leq d \leq 15$	Represents good traffic operation with acceptable delay and spare traffic capacity.
C	$20 \leq d \leq 35$	$15 \leq d \leq 25$	Describes further increases in flow but operation is still satisfactory.
D	$35 \leq d \leq 55$	$25 \leq d \leq 35$	The junction is operating nearer to capacity.
E	$55 \leq d \leq 80$	$35 \leq d \leq 50$	The junction is operating at capacity
F	$d > 80$	$d > 50$	Poor operation. Heavily congested flow with traffic demand exceeding capacity.

TABLE 2-6 LOS DEFINITION FOR INTERSECTIONS (DELAY & V/C (HCM 2010) METHOD)

The junction performance summary for existing Year 2016 is given in Table 2-7 and Table 2-8. Detailed SIDRA analysis results for all junctions for Existing Year (2016) are presented in Appendix E3.

Junction	Results (AM)		Results (PM)		Performance
	LOS	Others	LOS	Others	
1	F	DOS: 0.87 Delay: 34s QL: 390m	C	DOS: 0.78 Delay: 21s QL: 121m	During the AM peak, almost all movements experience LOS F with long queues and delays. However, during the PM peak, the junction performed better with only an LOS F along the East approach U-turn
2	F	DOS: 1.13 Delay:128s QL: 1.09km	F	DOS: 1.06 Delay: 82s QL: 1.07km	During the both peak periods, the junction is not performing satisfactorily. During the AM peak, almost all movements experience LOS F with long queues and delays. However, during the PM peak, the junction performed better with fewer movements experiencing LOS F.
3	F	DOS: 1.07 Delay: 32s QL: 190m	F	DOS: 0.86 Delay: 33s QL: 162m	During the both peak periods, the junction is not performing satisfactorily. Both the South and West approaches experience LOS F during both peaks with the North approach also experiencing LOS F during the PM peak.
4	F	DOS: 0.94 Delay:57s QL: 400m	F	DOS: 1.00 Delay: 54s QL: 678m	During both peak periods, the junction is not performing satisfactorily with LOS F, long queues and delays along the West approach during the AM peak and East approach during the PM peak.
5	F	DOS: 0.85 Delay: 14s QL: 66m	F	DOS: 1.63 Delay:177s QL: 1.16km	During both peak periods, the junction is not performing satisfactorily, with LOS F, long queues and delays along most approaches.
6	A	DOS: 0.12 Delay: 7s QL: 3m	A	DOS: 0.29 Delay: 8s QL: 11m	The junction is performing satisfactorily during both peak periods.
7	B	DOS: 0.25 Delay: 17s QL: 38m	A	DOS: 0.27 Delay: 9s QL: 57m	The junction is performing satisfactorily during both peak periods.
8	B	DOS: 0.60 Delay: 8s QL: 35m	C	DOS: 0.55 Delay: 9s QL: 29m	The junction is performing satisfactorily during the AM peak. However, during the PM peak, the U-turn movement along the West approach experiences LOS F.

TABLE 2-7 PERFORMANCE OF JUNCTIONS (YEAR 2016 EXISTING WEEKDAY CONDITION)

Junction	Results (AR)		Results (BC)		Performance
	LOS	Others	LOS	Others	
1	C	DOS: 0.80 Delay: 24s QL: 130m	C	DOS: 0.76 Delay: 23s QL: 116m	The junction is performing satisfactorily during both peak periods.
2	E	DOS: 0.79 Delay: 28s QL: 258m	D	DOS: 0.71 Delay: 24s QL: 215m	The junction is generally performing satisfactorily with the exception of the Right-turn movement during both peak periods.
3	B	DOS: 0.58 Delay: 20s QL: 91m	C	DOS: 0.58 Delay: 21s QL: 84m	The junction is performing satisfactorily during both peak periods.
4	D	DOS: 0.79 Delay: 38s QL: 212m	D	DOS: 0.78 Delay: 32s QL: 219m	During both peak periods, the junction is not performing satisfactorily with LOS F for some movements at the East and North approaches.
5	B	DOS: 1.11 Delay: 62s QL: 381m	C	DOS: 1.73 Delay: 236s QL: 2.25km	The junction is performing satisfactorily during both peak periods.
6	A	DOS: 0.18 Delay: 7s QL: 6m	A	DOS: 0.44 Delay: 6s QL: 18m	The junction is performing satisfactorily during both peak periods.
7	A	DOS: 0.15 Delay: 9s QL: 27m	A	DOS: 0.26 Delay: 8s QL: 58m	The junction is performing satisfactorily during both peak periods.
8	A	DOS: 0.42 Delay: 8s QL: 19m	A	DOS: 0.58 Delay: 9s QL: 34m	The junction is performing satisfactorily during both peak periods.

TABLE 2-8 PERFORMANCE OF JUNCTIONS (YEAR 2016 EXISTING WEEKEND CONDITION)

3 THE DEVELOPMENT PROPOSALS

3.1 Proposed Development Location

The proposed Tanjung Aru Eco Development is a township comprising hotel, serviced apartment, villas, retail, office, golf course and park with an approximate site area of 348.14 hectares (3,481,400 sqm) to the west of Kota Kinabalu International Airport (KKIA). The development site, highlighted in yellow, is located in Tanjung Aru and is bounded by Jalan Mat Salleh to the north and KKIA to its east. Jalan Kepayan and Jalan Mat Salleh are the main accesses that serve the proposed development.

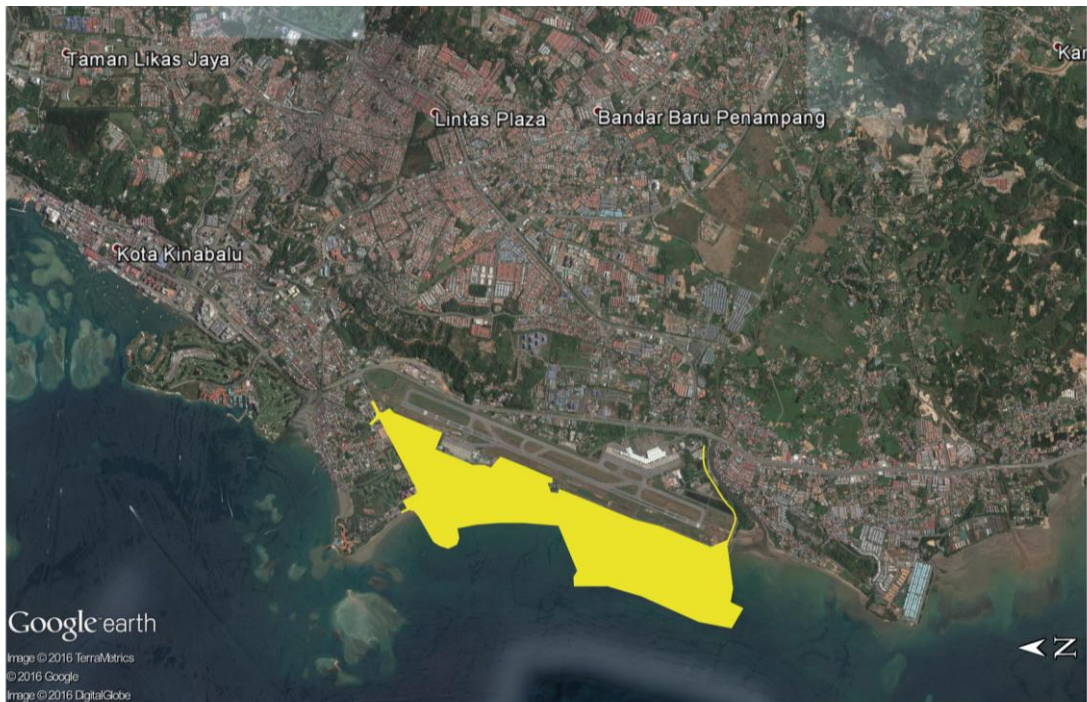


FIGURE 3-1 LOCATION OF PROPOSED TANJUNG ARU ECO DEVELOPMENT (GOOGLE, 2015)



FIGURE 3-2 TANJUNG ARU ECO DEVELOPMENT (TAED) DEVELOPMENT PLAN

3.2 Proposed Land-Use and Development Phasing

The proposed Tanjung Aru Eco Development (TAED) comprises land uses of residence, hotel, retail space, marina, hospital and office. Table 3-1 below tabulates details of the proposed development.

Land Use	Quantity
Apartment	7,038 units
Villa	568 units
Hotel	1,818 keys
Retail	22,900 sq.m
Golf Course	756,802 sq.m
Marina	70,788 sq.m

TABLE 3-1 PROPOSED LAND USE OF THE DEVELOPMENT

3.2.1 Development Phasing

The proposed Tanjung Aru Eco Development is scheduled to develop in four (4) phases. Figure 3-3 shows the site of each phase, and Table 3-2 shows the timeline of each phase.

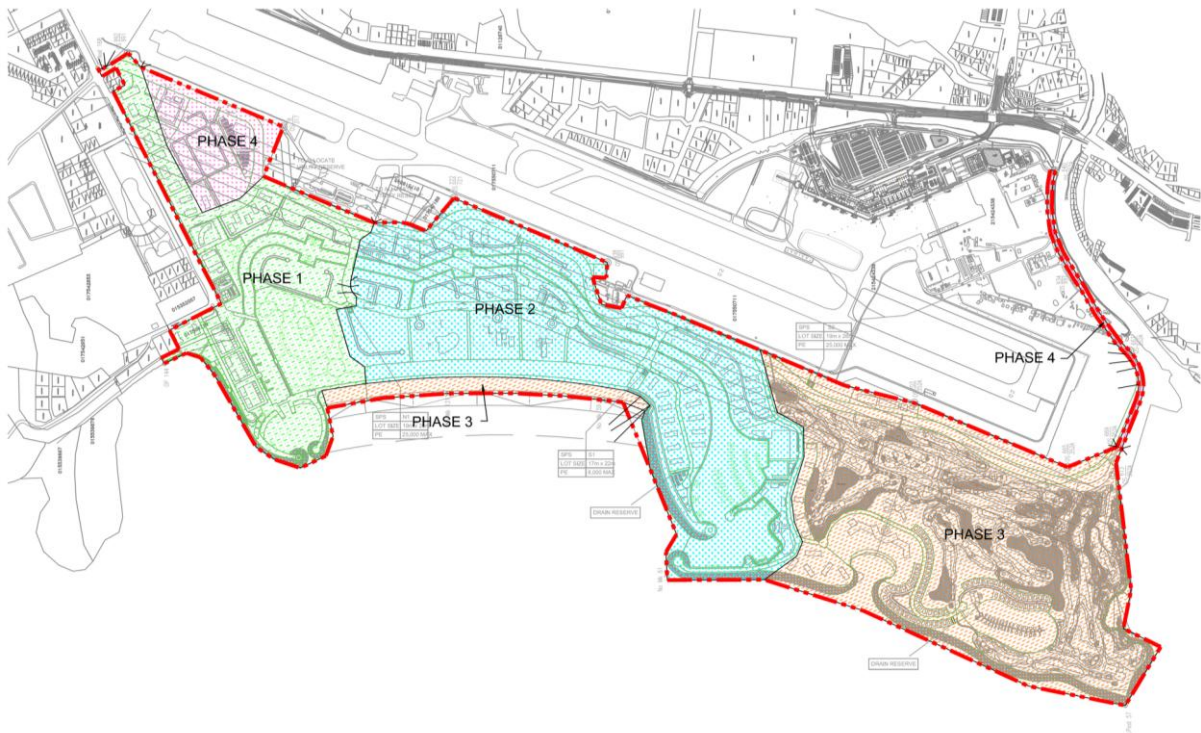


FIGURE 3-3 DEVELOPMENT PHASING

S/N	Horizontal Development	Vertical Development
Phase 1	2017 Jan – 2018 Jun	2018 Jul – 2022 Jun
Phase 2	By 2018 Dec	2019 Jan – 2022 Dec
Phase 3	By 2019 Jun	2019 Jul – 2023 Jun
Phase 4	By 2019 Sep	2019 Oct – 2023 Sep

TABLE 3-2 DEVELOPMENT PHASING TIMELINE

3.2.2 Assessment Scenarios

The proposed development is scheduled for completion/opening by 2023. The assessment years for this study therefore are:

- 2016 – Existing Year
- 2025 – Design year (2 years after anticipated Opening Year)

Table 3-3 below summarises the assessment scenarios of this study. Only the ultimate phase, i.e. Year 2025, is investigated as TAED is a master-planned development in which infrastructure is first developed before the individual developer comes in later. As the timing of each land plot development is not certain as of now, this Traffic Impact Assessment will only cover the ultimate phase in which traffic volume will be at maximum.

Assessment Year	Development	Peak Period
2016	Nil	Weekday AM
		Weekday PM
		Weekend Day
		Weekend Beach
2025	Without TAED	Weekday AM
		Weekday PM
		Weekend Day
		Weekend Beach
	With TAED	Weekday AM
		Weekday PM
		Weekend Day
		Weekend Beach

TABLE 3-3 ASSESSMENT SCENARIO

3.3 Access Proposal and Internal Traffic Circulation Proposals

The proposed accesses to Tanjung Aru Eco Development are located at:

- J7 - Junction between Jalan Mat Salleh / Jalan Lapangan Terbang (Lama)
- J8 - Junction between Jalan Mat Salleh/Lorong Cermin
- From Kota Kinabalu International Airport (KKIA) Terminal 1



FIGURE 3-4 TANJUNG ARU ECO DEVELOPMENT PROPOSED ROAD HIERARCHY

4 TRAFFIC GENERATION AND FORECASTED TRAFFIC FLOWS

4.1 Similar Development Traffic Generation

To estimate the trip generation of the proposed Tanjung Aru Eco Development (TAED), a traffic survey was conducted for similar land use in Kota Kinabalu, Sabah. Land use type and location surveyed are as shown in Table 4-1 and Figure 4-1. Trip generation survey was conducted at all four peak periods indentified in Chapter 2.2.

Land Use	Location	Variable	Quantity
Apartment	The Peak Condominium	Dwelling unit	208
Landed Rest.	Sutera Harbour D'Banyan	Dwelling unit	122
Hotel/Resort	Shangri-La Tanjung Aru Resort & Spa	Keys	492
Retail	Suria Sabah Shopping mall	GFA (m2)	78,968
Beach Park	Tanjung Aru Beach	Coast length (m)	283
Gold Course	Sutera Harbour Golf Club	Area (acre)	260
Hospital	KPJ Hospital Sabah	Beds	245

TABLE 4-1 SURVEYED LAND USE TYPE AND LOCATION



FIGURE 4-1 LOCATION OF TRIP GENERATION SURVEY

The traffic attracted/generated from/to each location is summarised in Table 4-2.

Location	Weekday AM (veh/hr)		Weekday PM (veh/hr)		Weekend Arterial (veh/hr)		Weekend Beach (veh/hr)	
	Out	In	Out	In	Out	In	Out	In
The Peak Condominium	58	19	31	43	20	20	27	32
Suture Harbour D'Banyan	49	41	67	73	41	53	88	29
Shangri-La Tanjung Aru Resort & Spa	49	116	120	96	152	182	169	177
Suria Sabah Shopping mall	3	74	453	304	335	577	121	372
Tanjung Aru Beach	8	16	49	38	39	45	39	56
Sutera Harbour Golf Club	13	39	30	17	35	47	50	14
KPJ Hospital Sabah	23	79	128	50	73	49	22	20

TABLE 4-2 TRAFFIC ATTRACTED/GENERATED TO/FROM EACH LOCATION

Trip generation rates for each land use were calculated from the attracted/generated traffic and are shown in Table 4-3.

Land Use	Weekday AM (veh/hr/var)		Weekday PM (veh/hr/var)		Weekend Arterial (veh/hr/var)		Weekend Beach (veh/hr/var)	
	Out	In	Out	In	Out	In	Out	In
The Peak Condominium	0.279	0.091	0.149	0.207	0.096	0.096	0.130	0.154
Suture Harbour D'Banyan	0.402	0.336	0.549	0.598	0.336	0.434	0.721	0.238
Shangri-La Tanjung Aru Resort & Spa	0.100	0.236	0.244	0.195	0.309	0.370	0.344	0.360
Suria Sabah Shopping mall	0.000	0.001	0.006	0.004	0.004	0.007	0.002	0.005
Tanjung Aru Beach	0.028	0.057	0.134	0.173	0.138	0.159	0.138	0.198
Sutera Harbour Golf Club	0.050	0.150	0.115	0.065	0.135	0.181	0.192	0.054
KPJ Hospital Sabah	0.094	0.322	0.522	0.204	0.298	0.200	0.090	0.082

TABLE 4-3 TRIP GENERATION RATES FOR EACH LAND USE

Table 4-4 shows the summary of the trips attracted/generated by the proposed TAED.

Land Use	Weekday AM (veh/hr)		Weekday PM (veh/hr)		Weekend Arterial (veh/hr)		Weekend Beach (veh/hr)	
	Out	In	Out	In	Out	In	Out	In
Apartment	1962	643	1049	1455	677	677	914	1082
Landed Residential	228	191	312	340	191	247	410	135
Hotel / Resort	181	428	442	354	560	671	623	653
Retail	16	37	224	149	165	287	59	185
Beach Park	34	68	161	208	165	191	165	237
Golf Course	4	11	9	5	10	14	15	4
Hospital	24	82	133	52	76	51	23	21
Office	44	108	95	47	0	0	0	0
Sum	2492	1567	2425	2609	1845	2137	2208	2317

TABLE 4-4 TRIP GENERATION BY TANJUNG ARU ECO DEVELOPMENT

A comparison of the trip generation survey result and the trip generation rate from Malaysia Trip Generation Manual is available in Appendix C.

4.2 Distribution and Assignment of Generated Traffic

Traffic attracted/generated by the proposed Tanjung Aru Eco Development is distributed and assigned to the road network. The traffic is distributed based on the assumption that future traffic flow is comparable to existing directional percentage of Jalan Mat Salleh (West). In addition to that, 80% of trips generated by hotel in TAED are assumed to travel to and from the Kota Kinabalu International Airport (KKIA). Also, beach goers will head to the multi-storey car park at Lot 09. The current number of beach visitor is summarised in Table 4-5.

Peak Hours Observation	Weekend	Weekday
School Holiday	392	485
Non School Holiday	1401	571

TABLE 4-5 PROJECTED BEACH VISITORS

For instance, 61% of the existing Jalan Mat Salleh (East) traffic heads to Kota Kinabalu City Centre (Jalan Mat Salleh and Jalan Coastal) in the weekday AM peak period. 61% of the generated traffic from TAED is therefore assumed to head to Kota Kinabalu City Centre in the future.

S/N	Road	Catchment Area
1	Jalan Coastal	Kota Kinabalu city centre
2	Jalan Tunku Abdul Rahman	Kota Kinabalu city centre
3	Jalan Pintas	Kepayan
4	Jalan Mat Salleh (Tanjung Aru)	Tanjung Aru
5	Jalan Pahlawan	Kepayan
6	Jalan Lintas	Kepayan, Lintas
7	Jalan Putatan	Bandar Putatan and southern sub-districts
8	Jalan Lapangan Terbang (Baru)	Kota Kinabalu International Airport (KKIA)

TABLE 4-6 POTENTIAL CATCHMENT AERA OF EACH MAJOR ROAD

Table 4-7 and Table 4-8 show the trip distribution of traffic attracted/generated by the proposed TAED.

To TAED	1	2	3	4	5	6	7	8
AM (veh)	24%	9%	7%	0%	4%	4%	32%	20%
PM (veh)	57%	3%	2%	0%	2%	4%	22%	10%
AR (veh)	23%	19%	19%	0%	1%	2%	16%	19%
BC (veh)	26%	15%	7%	0%	2%	3%	26%	20%

To TAED	1	2	3	4	5	6	7	8
AM (veh)	370	137	117	0	62	59	508	314
PM (veh)	1477	91	57	0	52	93	580	259
AR (veh)	512	437	437	0	26	37	363	432
BC (veh)	622	354	167	0	50	73	620	478

TABLE 4-7 DISTRIBUTION OF TRAFFIC ATTRACTED TO THE PROPOSED TAED

From TAED	1	2	3	4	5	6	7	8
AM (veh)	45%	16%	7%	0%	4%	4%	18%	5%
PM (veh)	25%	16%	10%	0%	4%	6%	26%	13%
AR (veh)	25%	23%	6%	0%	3%	4%	17%	22%
BC (veh)	17%	27%	27%	0%	1%	2%	7%	20%

From TAED	1	2	3	4	5	6	7	8
AM (veh)	1124	404	183	0	112	98	439	132
PM (veh)	604	386	243	0	101	134	633	324
AR (veh)	466	437	117	0	57	80	320	411
BC (veh)	396	614	614	0	21	41	160	457

TABLE 4-8 DISTRIBUTION OF TRAFFIC GNERATED FROM THE PROPOSED TAED

The distributed traffic is then assigned to a route (roads connecting origin to destination) using the Equilibrium assignment. The Equilibrium method assigns the route for each Origin-Destination pair according to Wardrop's first principle. The principle states that every road user selects route in such a way that the travel time for all alternative routes is the same, and that switching to a different route would increase personal travel time. Quickest routes are searched for in an iterative process based on the total travel distance and estimated delay due to traffic volume.

4.3 Background Traffic Growth

Background traffic (non TAED generated traffic) along Jalan Kepayan, and Jalan Coastal are expected as these roads connect to major trip attraction / generation destinations, i.e. the city centre of Kota Kinabalu. Therefore, a compounding three percent (3%) annual growth rate was also applied to the background traffic travelling between the city centre of Kota Kinabalu and Jalan Putatan to obtain the background traffic volume at design year, Year 2025.

Thus, traffic in the design year is derived as follows:

$$\text{Design Year Background Traffic (Yr 2025)} = \text{Existing Background Traffic (Yr 2016)} \times 1.03^{12}$$

5 TRAFFIC IMPACT AND LOCAL ROAD NETWORK CAPACITY ANALYSIS

5.1 Assessment Procedure

To better understand the impact of the traffic generated from the proposed Tanjung Aru Eco Development (TAED) to the study area, peak hours of the three (3) scenarios in Design Year 2025 will be investigated:

- without TAED
- with TAED
- with TAED + proposed improvement measures (where required)

The following sub-chapters present the traffic impact assessment on the study area for each of the above scenarios through mid block performance analysis and junction assessment.

5.2 Design Year 2025 (Without TAED)

5.2.1 Mid-Block Performance – V/C Ratio

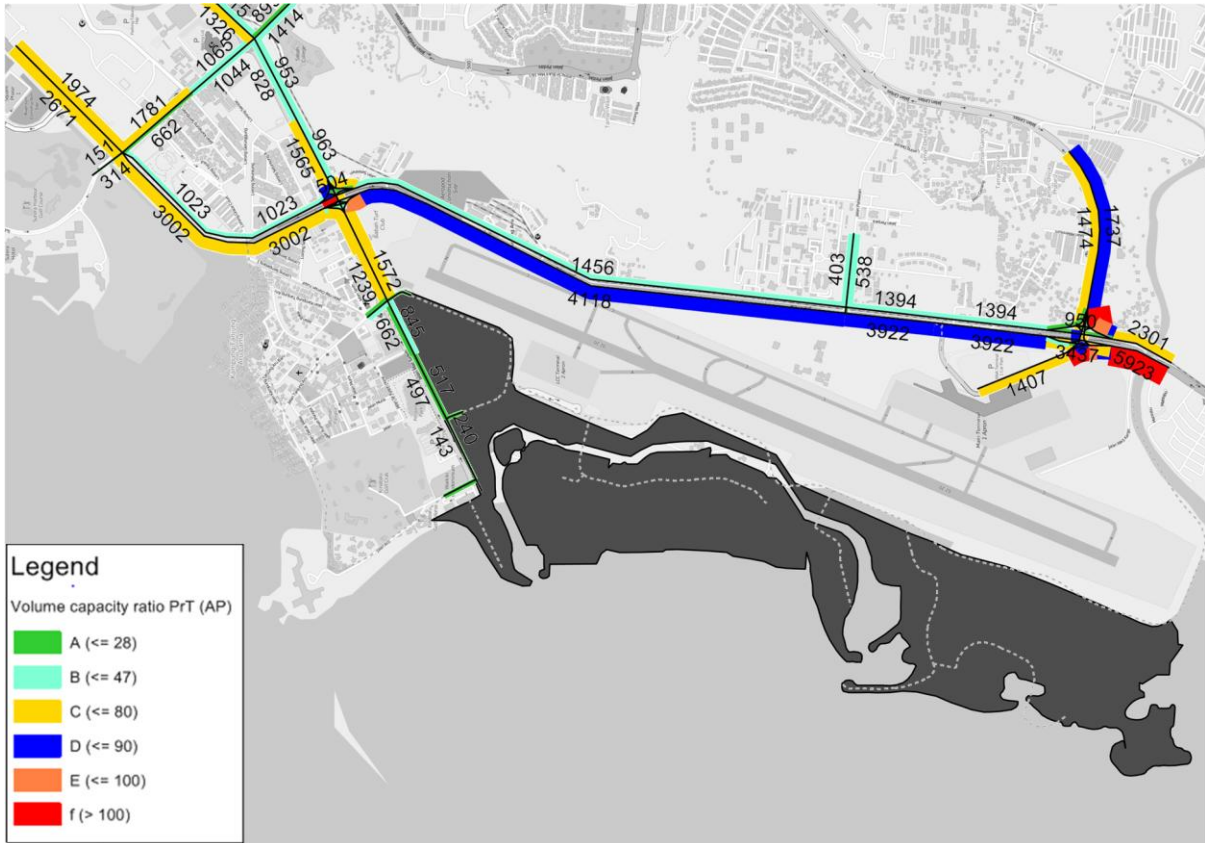


FIGURE 5-1 YEAR 2025 V/C RATIO AT WEEKDAY AM PEAK HOUR WITHOUT TAED

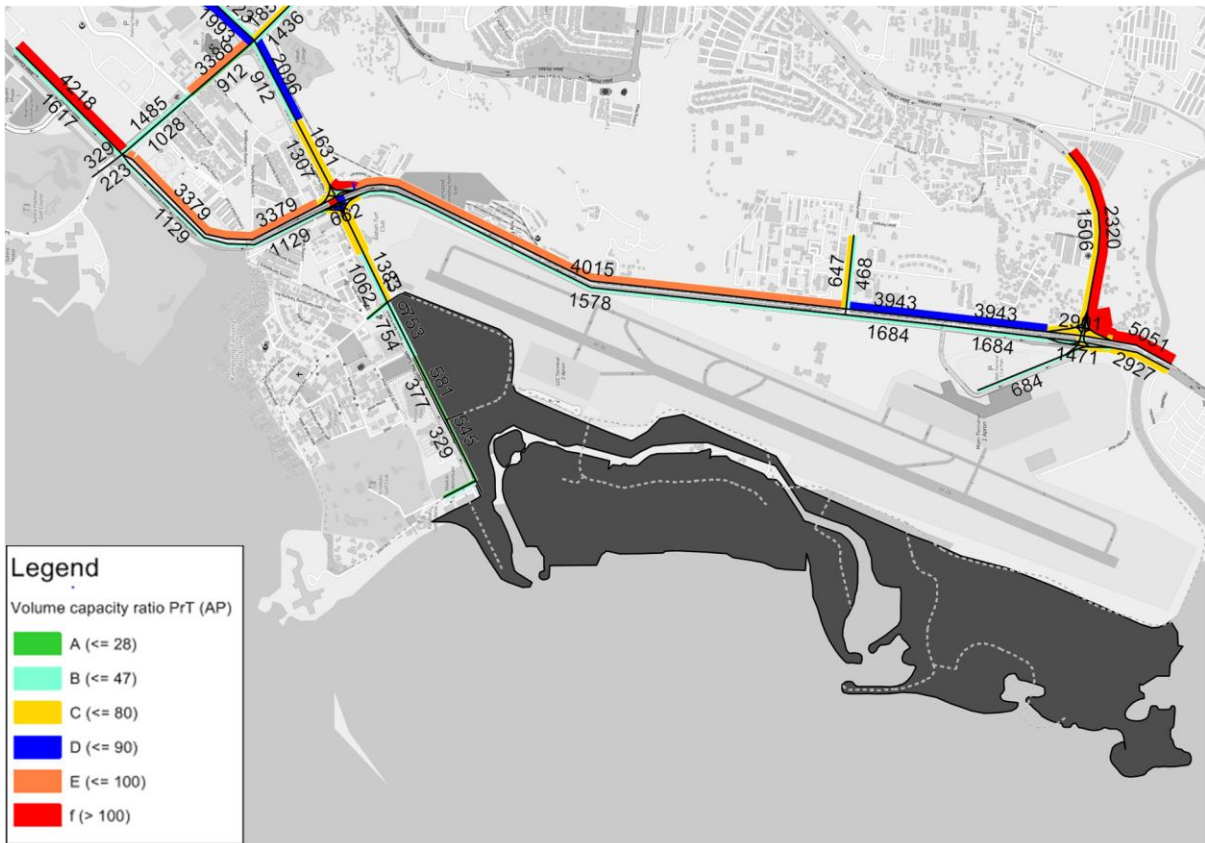


FIGURE 5-2 YEAR 2025 V/C RATIO AT WEEKDAY PM PEAK HOUR WITHOUT TAED

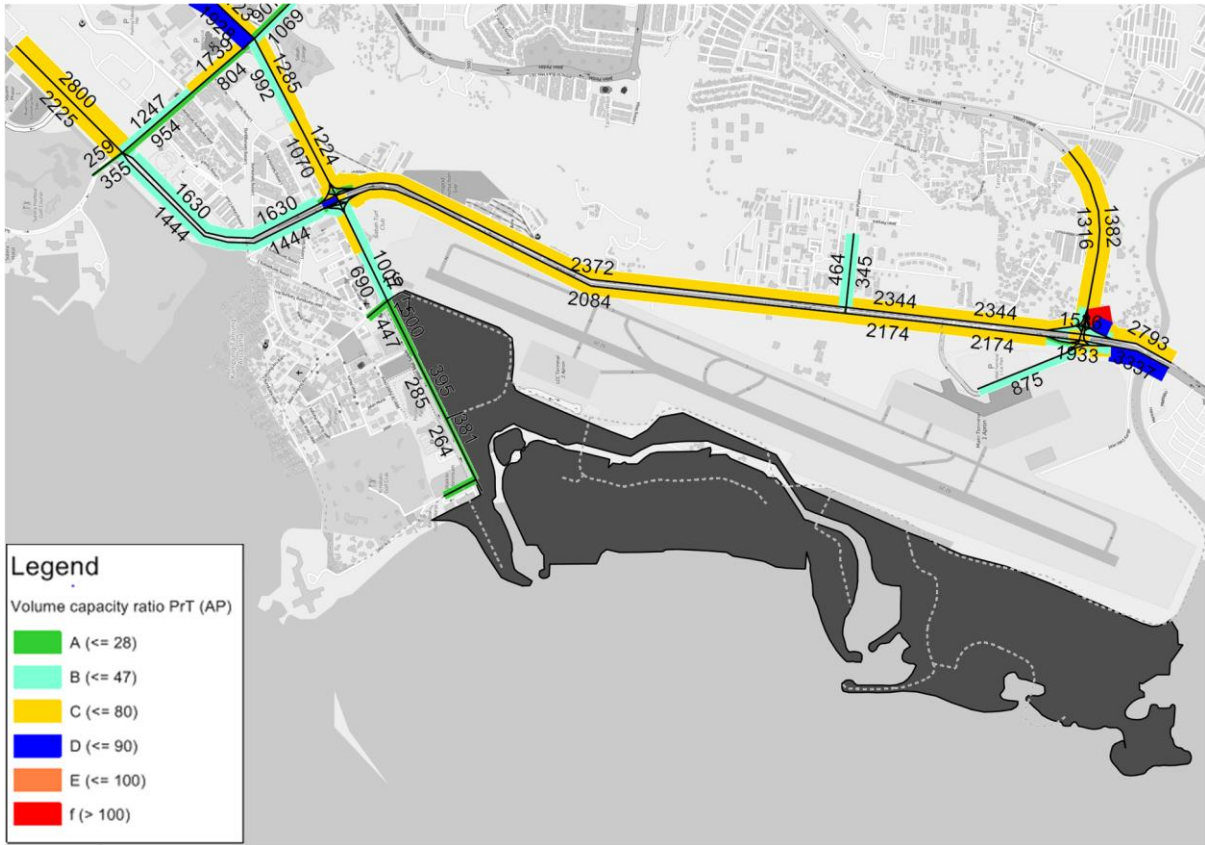


FIGURE 5-3 YEAR 2025 V/C RATIO AT WEEKEND ARTERIAL DAY PEAK HOUR WITHOUT TAED

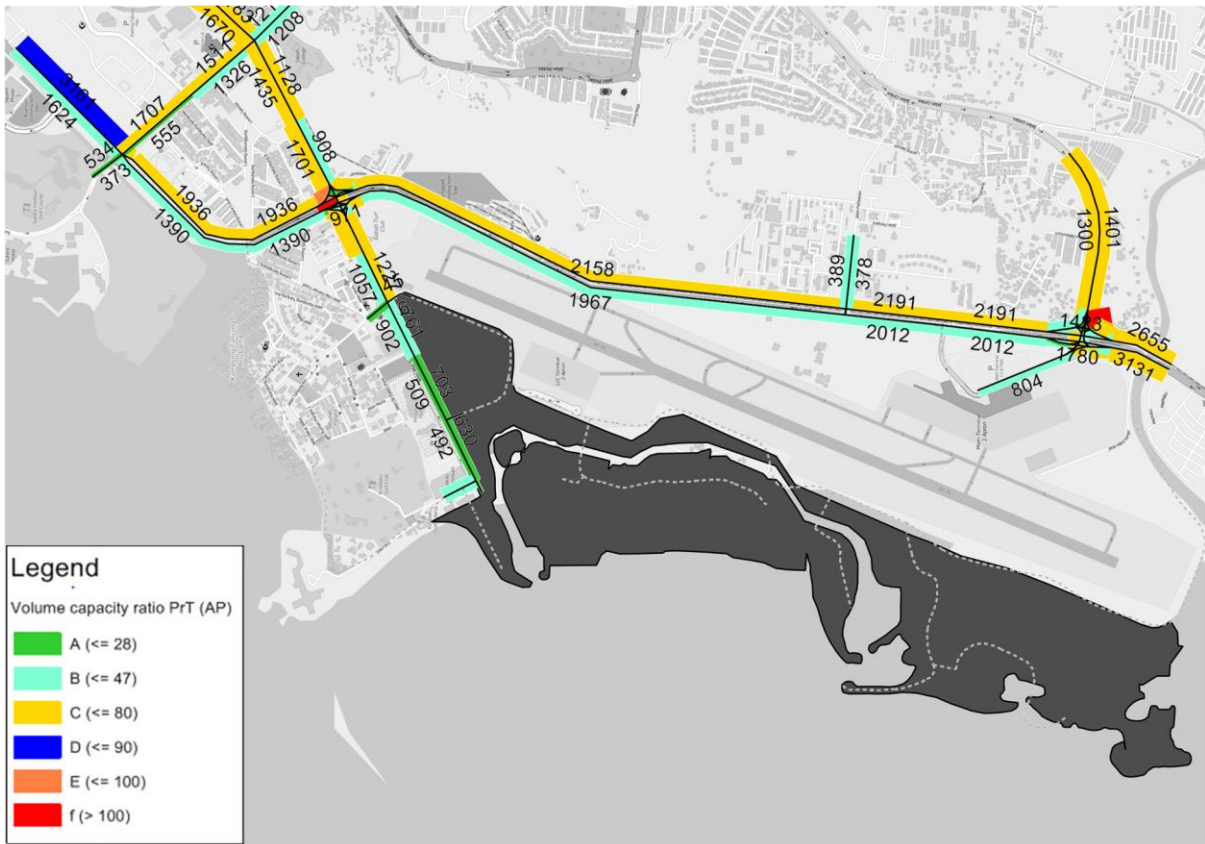


FIGURE 5-4 YEAR 2025 V/C RATIO AT WEEKEND BEACH PEAK HOUR WITHOUT TAED

As shown in Figure 5-1 to Figure 5-4, the road condition deteriorates further even without the proposed development, as traffic volumes continue to grow at 3% annually. Jalan Kepayan, Jalan Coastal and majority of Jalan Mat Salleh will experience heavy congestion during peak hour, as the traffic volume is much higher than the road capacity.

5.2.2 Assessment of Junctions

The junction performance summary for Year 2025 without TAED is given in Table 5-1 and Table 5-2.

Detailed SIDRA analysis results for all junctions for Design Year (2025) without TAED are presented in Appendix E4.

Junction	Results (AM)		Results (PM)		Performance
	LOS	Others	LOS	Others	
1	F	DOS:0.81 Delay: 25s QL: 312m	C	DOS: 1.04 Delay: 22s QL: 200m	J1 is not performing satisfactorily during AM peak period with most movements experiencing LOS F with long queues and delays. During the PM peak, the junction is performing satisfactorily.
2	F	DOS: 1.04 Delay: 84s QL: 880m	F	DOS: 1.05 Delay: 81s QL: 992m	J2 is not performing satisfactorily. During the AM Peak, all movements along the South and East approaches experience LOS F with long queues and delays. In the PM Peak, some movements along the South and North approaches experience LOS F with long queues and delays.
3	F	DOS: 0.90 Delay: 26s QL: 193m	F	DOS: 0.88 Delay: 27s QL: 207m	J3 is not performing satisfactorily with some movements experiencing LOS F in both AM and PM peak hours.
4	F	DOS: 0.91 Delay: 53s QL: .362m	F	DOS: 0.96 Delay: 46s QL: 556m	J4 is not performing satisfactorily with some movements experiencing LOS F in both AM and PM peak hours.
5	F	DOS: 0.49 Delay: 8s QL: 22m	F	DOS: 1.65 Delay: 114s QL: 1103m	J5 is not performing satisfactorily with a certain movements experiencing LOS F with long queues and delays during both peak hours.
6	A	DOS: 0.17 Delay: 7s QL: 5m	A	DOS: 0.33 Delay: 6s QL: 12m	J6 is performing satisfactorily during both peak periods.
7	B	DOS: 0.26 Delay: 18s QL: 42m	A	DOS: 0.27 Delay: 9s QL: 56m	J7 is performing satisfactorily during both peak periods.
8	B	DOS: 0.76 Delay: 11s QL: 66m	A	DOS: 0.69 Delay: 10s QL: 57m	J8 is performing satisfactorily during both peak periods.

TABLE 5-1 PERFORMANCE OF JUNCTION (YEAR 2025 WEEKDAY WITHOUT TAED)

Junction	Results (AR)		Results (BC)		Performance
	LOS	Others	LOS	Others	
1	C	DOS: 0.78 Delay: 22s QL: 130m	C	DOS: 0.78 Delay: 21s QL: 121m	The junction is performing satisfactorily during both peak periods.
2	F	DOS: 0.79 Delay: 27s QL: 241m	F	DOS: 0.70 Delay: 24s QL: 203m	The junction is not performing satisfactorily. Most movements experience LOS F with long queues and delays during both peak hours.
3	C	DOS: 0.55 Delay: 21s QL: 92m	D	DOS: 0.73 Delay: 20s QL: 140m	The junction is performing satisfactorily during both peak periods.
4	F	DOS: 0.79 Delay: 36s QL: 191m	E	DOS: 0.79 Delay: 34s QL: 217m	The junction is not performing satisfactorily. Certain movements along most approaches experience LOS F with long queues and delays during both peak hours.
5	D	DOS: 0.78 Delay: 12s QL: 59m	D	DOS: 1.04 Delay: 27s QL: 289m	The junction is not performing satisfactorily. The North approach during AM peak period and the South approach during PM peak both experience LOS F.
6	A	DOS: 0.23 Delay: 6s QL: 7m	A	DOS: 0.41 Delay: 6s QL: 16m	The junction is performing satisfactorily during both peak periods.
7	A	DOS: 0.19 Delay: 9s QL: 36m	A	DOS: 0.29 Delay: 8s QL: 67m	The junction is performing satisfactorily during both peak periods.
8	A	DOS: 0.50 Delay: 7s QL: 26m	A	DOS: 0.67 Delay: 9s QL: 51m	The junction is performing satisfactorily during both peak periods.

TABLE 5-2 PERFORMANCE OF JUNCTION (YEAR 2025 WEEKEND WITHOUT TAED)

5.3 Design Year 2025 (With TAED)

5.3.1 Mid-Block Performance – V/C Ratio

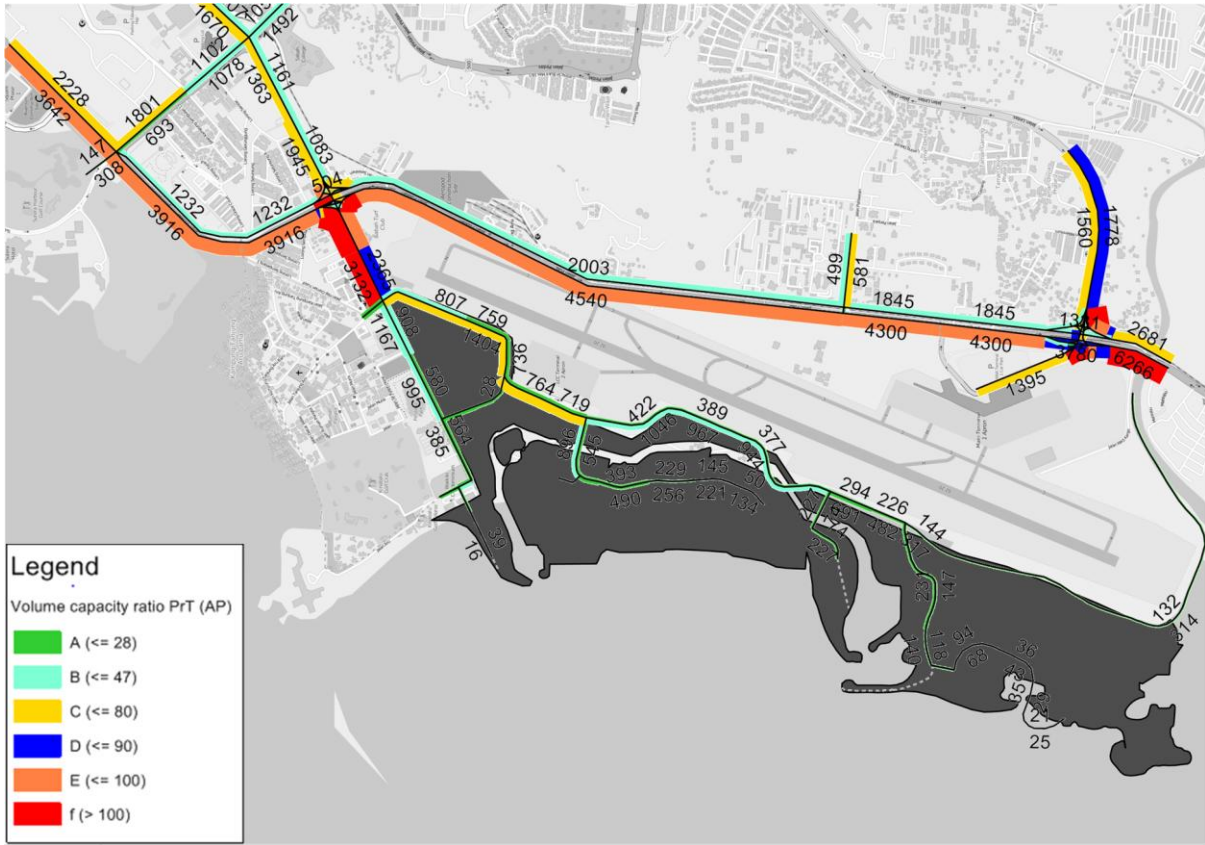


FIGURE 5-5 YEAR 2025 V/C RATIO AT WEEKDAY AM PEAK HOUR WITH TAED

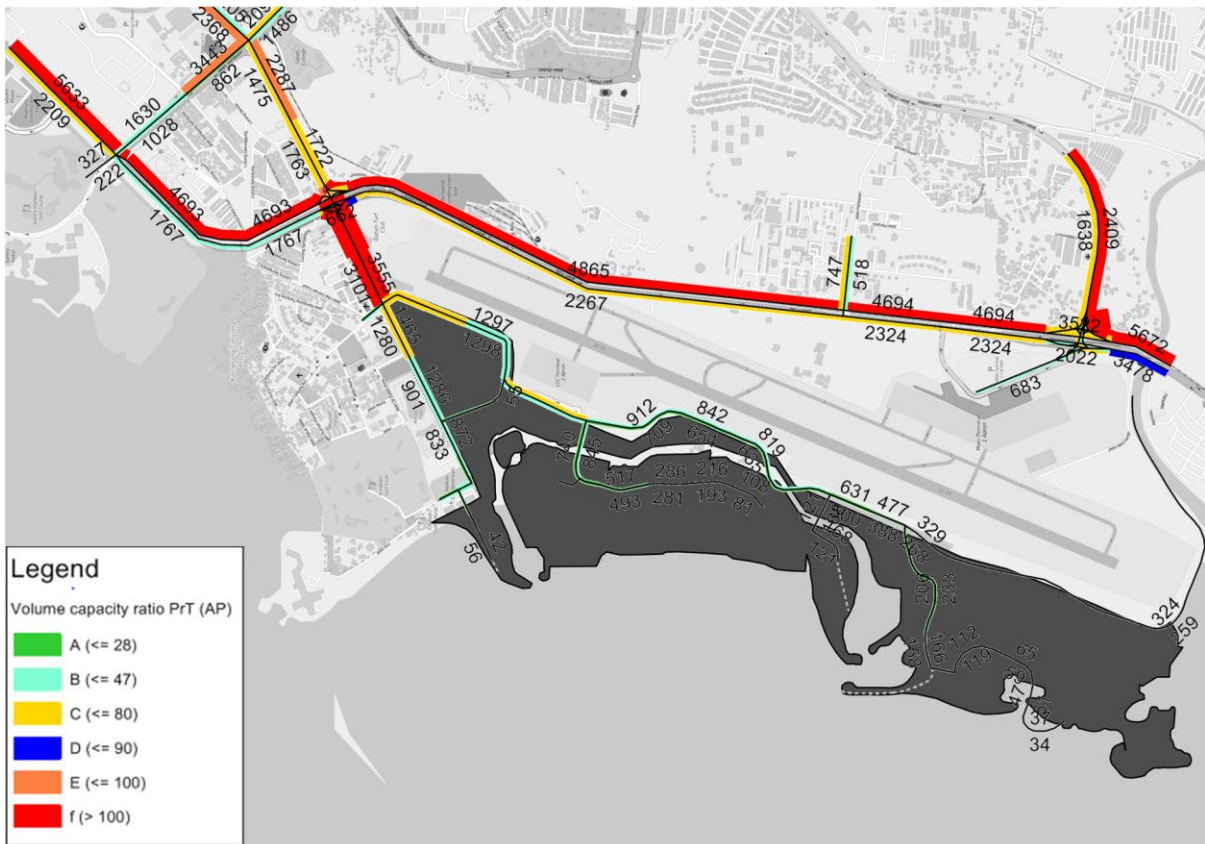


FIGURE 5-6 YEAR 2025 V/C RATIO AT WEEKDAY PM PEAK HOUR WITH TAED

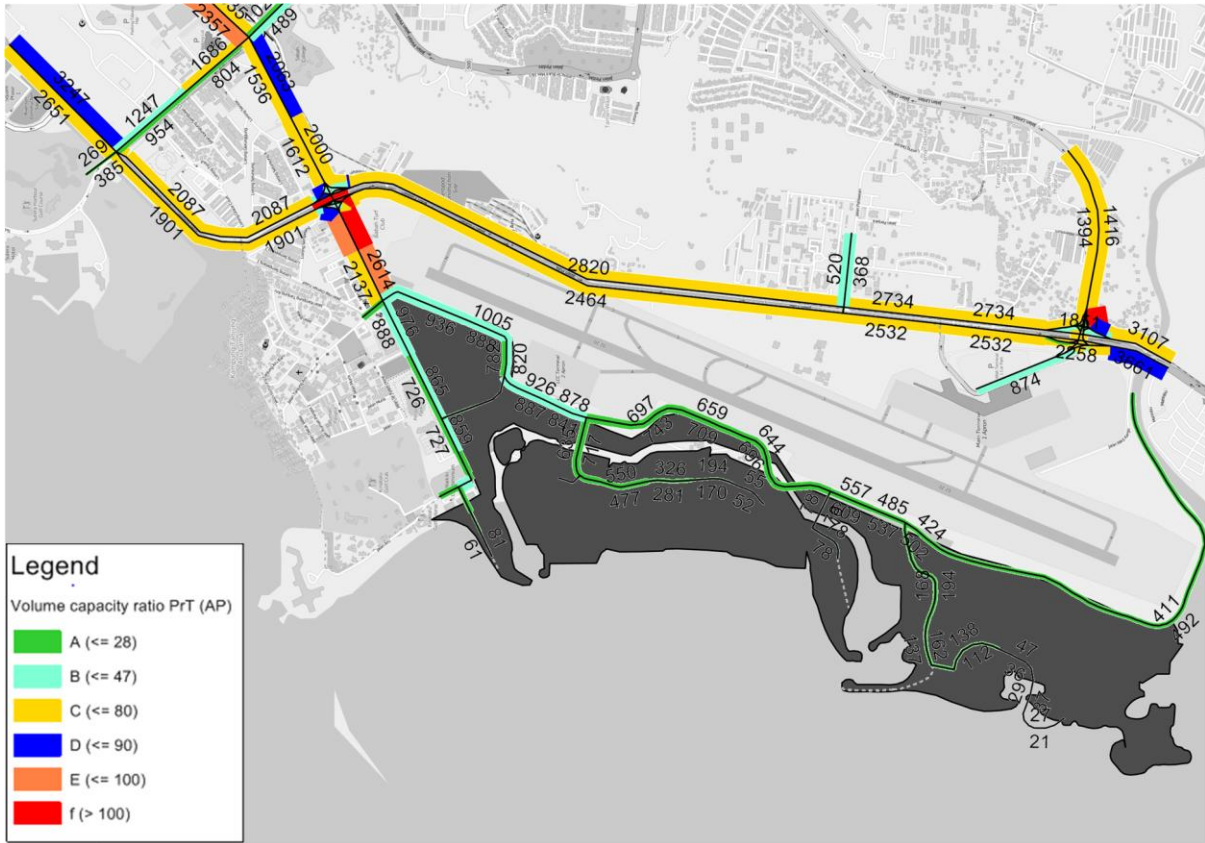


FIGURE 5-7 YEAR 2025 V/C RATIO AT WEEKEND ARTERIAL PEAK HOUR WITH TAED

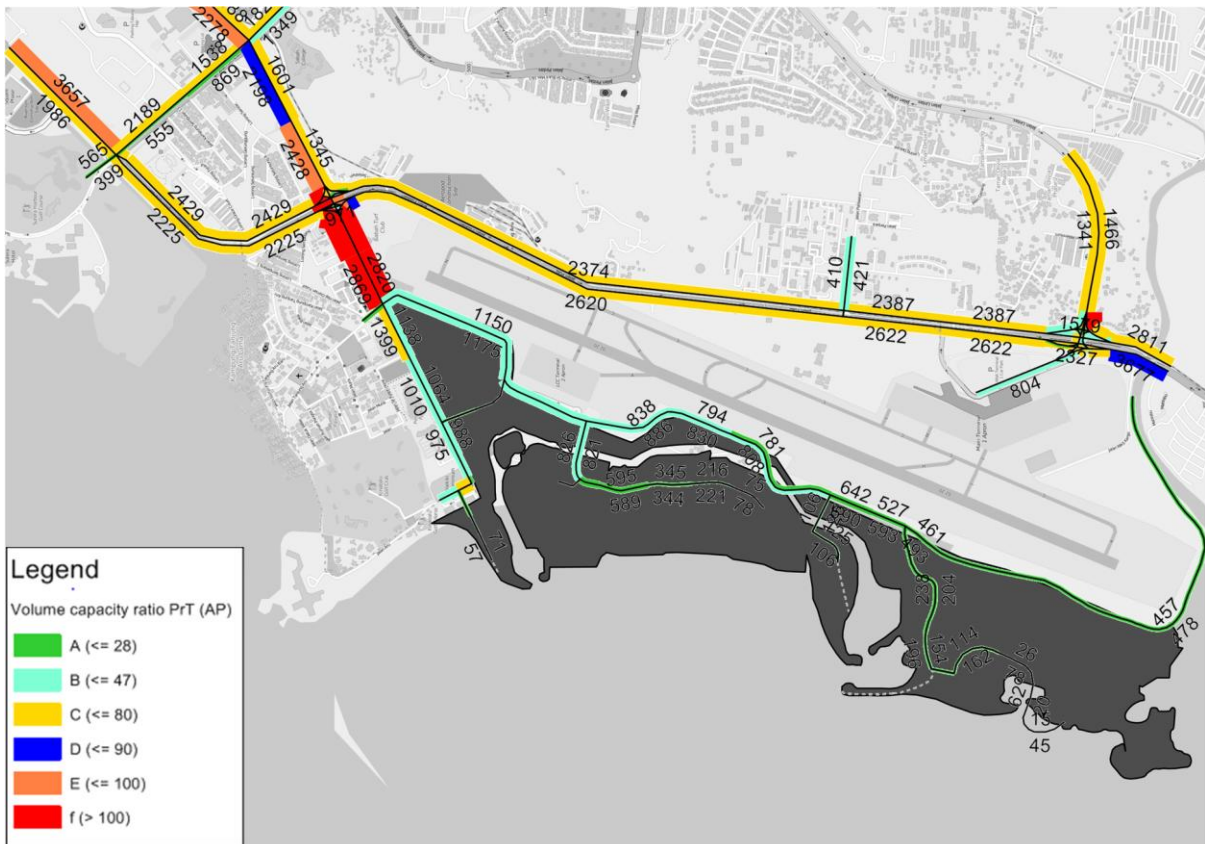


FIGURE 5-8 YEAR 2025 V/C RATIO AT WEEKEND BEACH PEAK HOUR WITH TAED

With traffic generated by the proposed TAED, the already bad road condition worsened. Almost all road links in the study will almost certainly experience heavy congestion during peak hour. Mitigation measures must be taken to avoid the traffic conditions displayed in Figure 5-5 to Figure 5-8.

5.3.2 Assessment of Junctions

The junction performance summary for Design Year 2025 with TAED is given in Table 5-3 and Table 5-4.

Detailed SIDRA analysis results for all junctions for Design Year (2025) with TAED are presented in Appendix E5.

Junction	Results (AM)		Results (PM)		Performance
	LOS	Others	LOS	Others	
1	F	DOS: 0.81 Delay: 26s QL: 321m	E	DOS: 1.28 Delay: 76s QL: 162m	J1 is not performing satisfactorily with most movements across all approaches during the AM peak period experiencing LOS F. While the overall junction performance during the PM peak is satisfactory, however, a number of movements are also experiencing LOS F.
2	F	DOS: 1.18 Delay: 161s QL: 1.43km	F	DOS: 1.26 Delay: 184s QL: 1.86km	J2 is not performing satisfactorily with most movements across all approaches and peak periods experiencing LOS F.
3	F	DOS: 1.69 Delay: 306s QL: 3.09km	F	DOS: 2.28 Delay: 619s QL: 2.24km	J3 is not performing satisfactorily with both peaks having LOS F, long queues and delays along most movements, post-addition of the development traffic.
4	F	DOS: 1.25 Delay: 192s QL: 1.26km	F	DOS: 1.42 Delay: 245s QL: 2.04km	J4 is not performing satisfactorily with some movements experiencing LOS F in both AM and PM peak hours.
5	F	DOS: 1.00 Delay: 20s QL: 193m	F	DOS: 1.48 Delay: 224s QL: 1.61km	J5 is not performing satisfactorily. With the additional traffic from the development, the performance of the junction has deteriorated.
6	A	DOS: 0.23 Delay: 7s QL: 8m	A	DOS: 0.35 Delay: 6s QL: 14m	J6 is performing satisfactorily during both peak periods.
7	C	DOS: 0.44 Delay: 22s QL: 77m	B	DOS: 0.35 Delay: 10s QL: 74m	J7 is performing satisfactorily during both peak periods.
8	F	DOS: 2.63 Delay: 478s QL: 4.39km	F	DOS: 5.15 Delay: 958s QL: 5.87km	J8 is not performing satisfactorily. With the additional traffic from the development, the performance of the junction has deteriorated, with most approaches and movements experiencing LOS F.

TABLE 5-3 PERFORMANCE OF JUNCTION (YEAR 2025 WEEKDAY WITH TAED)

Junction	Results (AR)		Results (BC)		Performance
	LOS	Others	LOS	Others	
1	C	DOS: 0.78 Delay: 22s QL: 130m	C	DOS: 0.78 Delay: 22s QL: 121m	The junction is performing satisfactorily during the AM peak. However, two movements along the North approach experience LOS F during the PM peak period.
2	F	DOS: 0.83 Delay: 29s QL: 354m	F	DOS: 0.80 Delay: 28s QL: 333m	The junction is not performing satisfactorily. Most movements experience LOS F with long queues and delays during both peak hours.
3	F	DOS: 2.11 Delay: 231s QL: 1.34km	F	DOS: 2.17 Delay: 282s QL: 2.08km	The junction is not performing satisfactorily. Most movements experience LOS F with long queues and delays during both peak hours.
4	F	DOS: 0.84 Delay: 40s QL: 302m	F	DOS: 1.14 Delay: 81s QL: 586m	The junction is not performing satisfactorily. Most movements experience LOS F with long queues and delays during both peak hours.
5	F	DOS: 1.23 Delay: 98s QL: 852m	F	DOS: 1.57 Delay: 243s QL: 2.14km	The junction is not performing satisfactorily. Most movements experience LOS F with long queues and delays during both peak hours.
6	A	DOS: 0.30 Delay: 7s QL: 11m	A	DOS: 0.41 Delay: 6s QL: 19m	The junction is performing satisfactorily during both peak periods.
7	B	DOS: 0.28 Delay: 8s QL: 66m	B	DOS: 0.38 Delay: 11s QL: 84m	The junction is performing satisfactorily during both peak periods.
8	F	DOS: 2.10 Delay: 223s QL: 2.57km	F	DOS: 3.71 Delay: 579s QL: 4.57km	The junction is not performing satisfactorily. Most movements experience LOS F with long queues and delays during both peak hours.

TABLE 5-4 PERFORMANCE OF JUNCTION (YEAR 2025 WEEKEND WITH TAED)

5.4 Proposed Physical Improvement

5.4.1 Proposed Physical Improvement Measures

Considering the poor condition (LOS F) of the road traffic network, three improvement measures are proposed:

- new road linking western tip of Jalan Mat Salleh with Jalan Coastal, see Figure 5-9 yellow line. This and the above scheme will divert some traffic from Jalan Mat Salleh, easing its expected congestion;
- widening of Jalan Mat Salleh to a dual-3 carriageway to accommodate high traffic generated/attracted from/to the proposed Tanjung Aru Eco Development; and
- localised improvement of junctions, see Table 5-5. Refer Appendix to E2 for the layout of each junction.

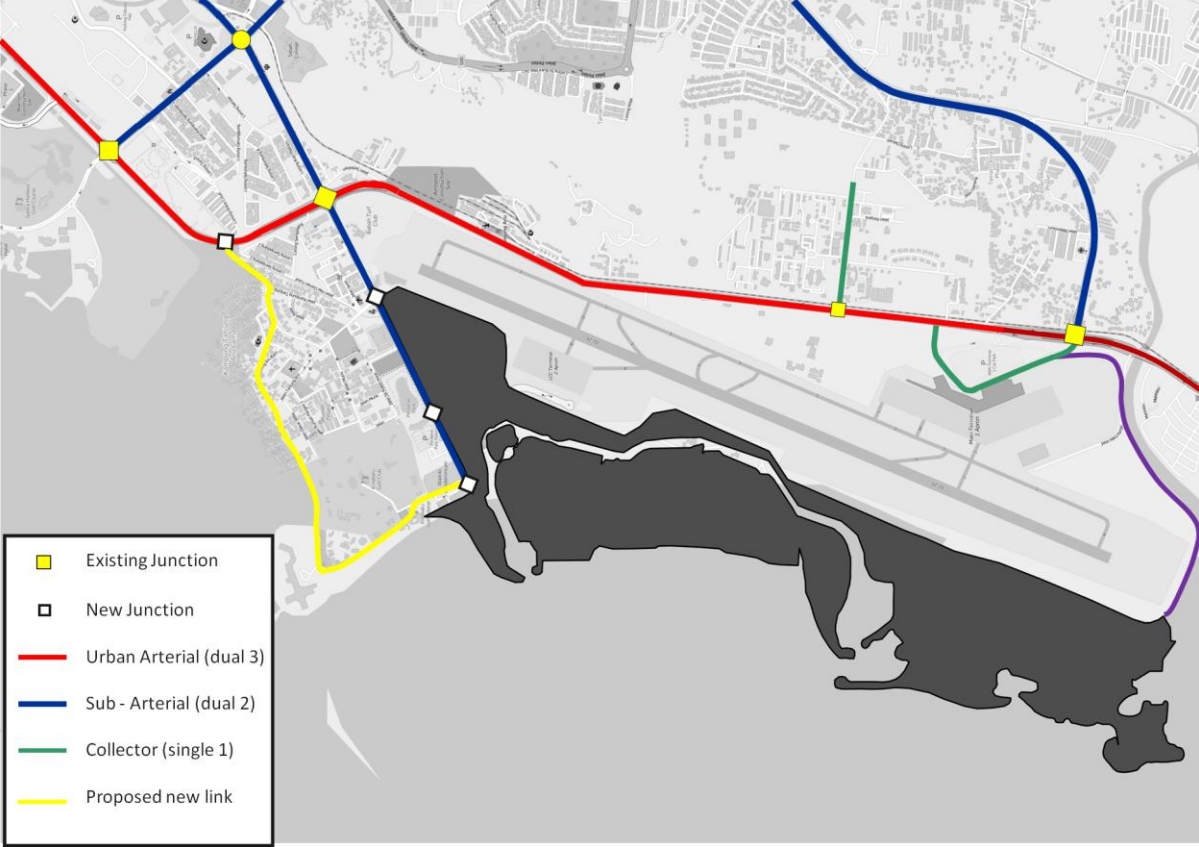


FIGURE 5-9 PROPOSED IMPROVEMENT TO THE STUDY AREA

Junction	Improvement Proposal
J7	<p>North approach:</p> <ul style="list-style-type: none"> • Extension of short Left-turn lane to full lane • Addition of an exit lane <p>South approach</p> <ul style="list-style-type: none"> • Addition of a full Through-lane • Addition of a full exit lane • Addition of a short 100m exit lane <p>East approach:</p> <ul style="list-style-type: none"> • Conversion of the shared Left-/Right-turn lanes to an exclusive Left-turn continuous lane • Addition of a full Left-turn continuous lane • Reduction of Right-turn lane to short 70m • Removal of short 15m exit lane
J8	<p>General</p> <ul style="list-style-type: none"> • Conversion to signalized junction <p>North approach:</p> <ul style="list-style-type: none"> • Addition of 70m Left-turn lane • Conversion of shared Left-turn/Through lane to an exclusive Through lane • Removal of U-turn • Addition of a full Right-turn lane • Addition of a full exit lane <p>West approach:</p> <ul style="list-style-type: none"> • Extension of the short Left-turn lane to a shared Through/Right-turn lane • Removal of U-turn • Extension of the short exit lane to a full lane <p>South approach:</p> <ul style="list-style-type: none"> • Addition of a slip lane for the shared Left-turn/Through lane • Addition of an exclusive Through-lane • Removal of U-turn • Addition of a full exit lane <p>East approach:</p> <ul style="list-style-type: none"> • Addition of a short 70m Left-turn lane • Conversion of shared Left-turn/Through lane to a shared Through/Right-turn lane • Removal of U-turn • Extension of the short Right-turn lane to a full lane • Addition of a full exit lane

TABLE 5-5 PROPOSED LOCALISED JUNCTION IMPROVEMENT

5.4.2 Mid-Block Performance – V/C Ratio

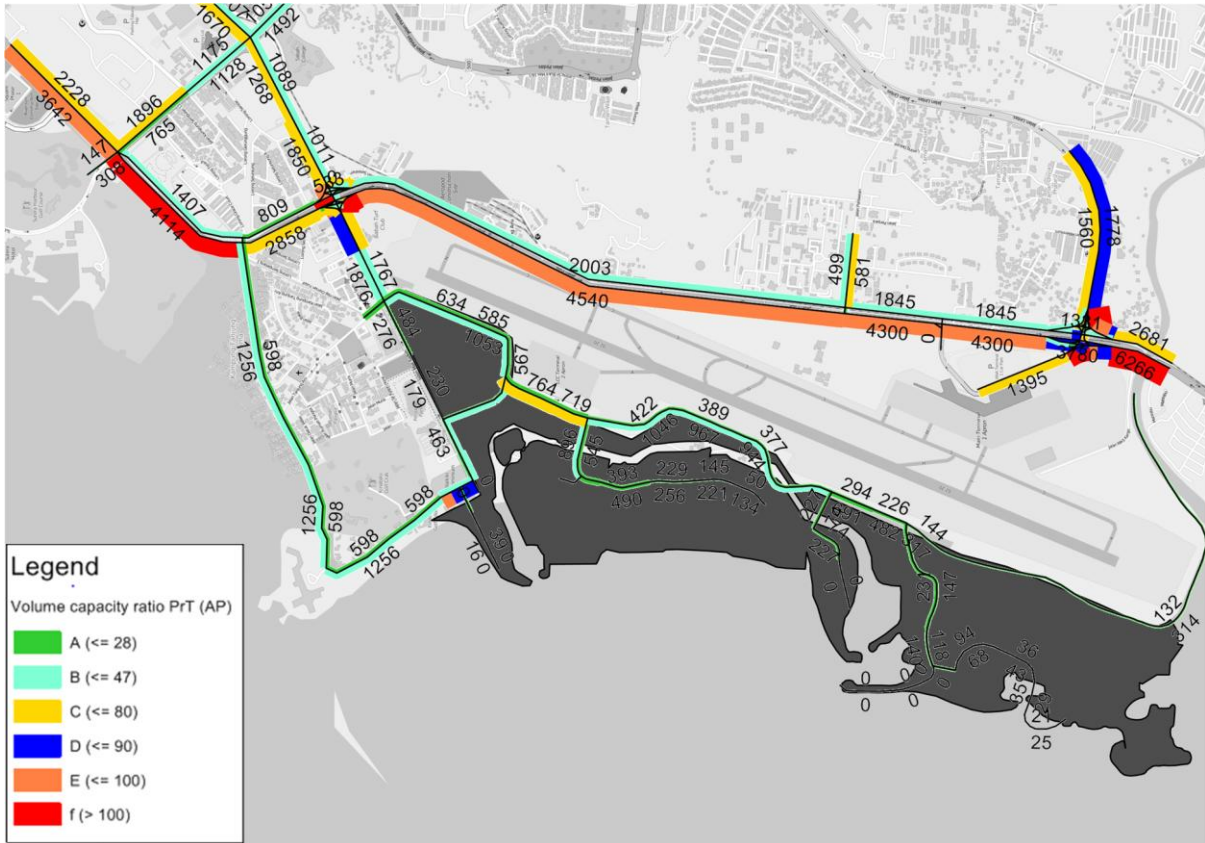


FIGURE 5-10 YEAR 2025 V/C RATIO AT WEEKDAY AM PEAK HOUR WITH TAED AND WITH PHYSICAL IMPROVEMENT

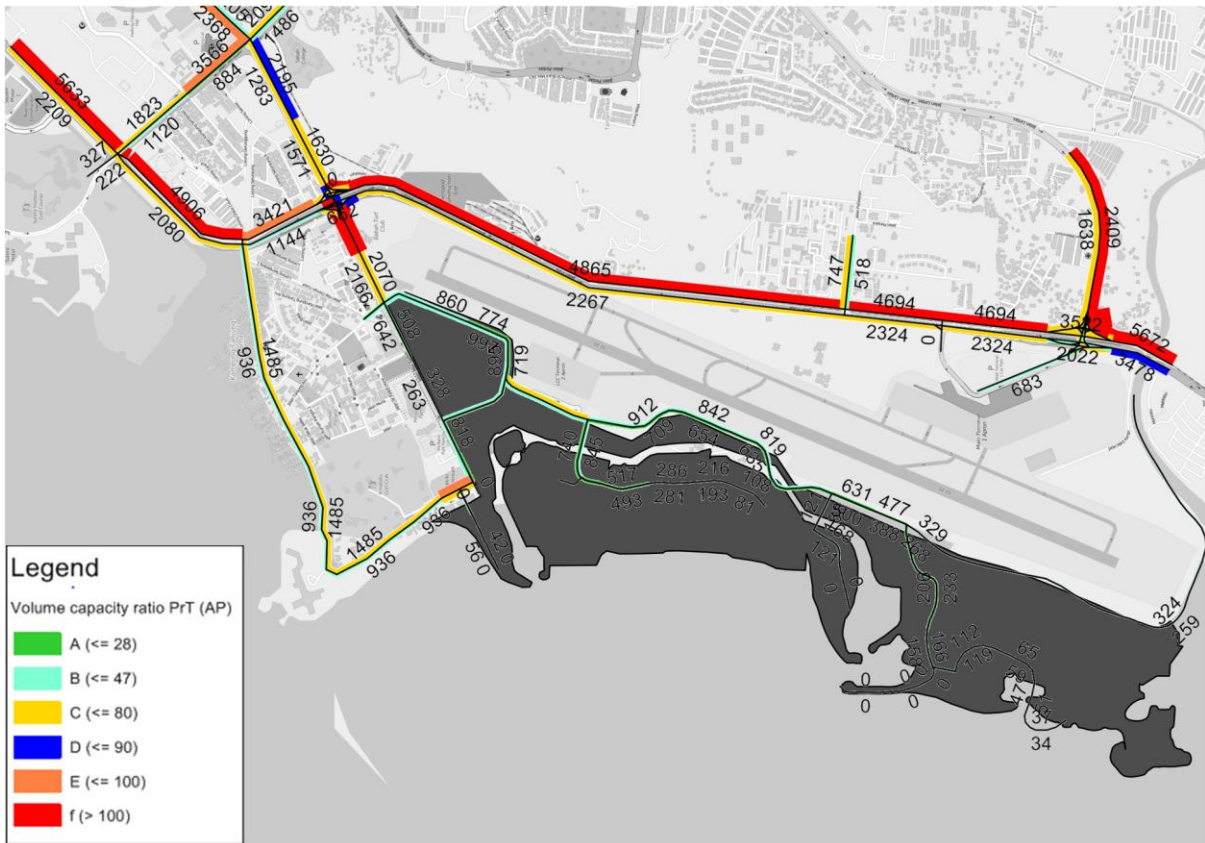


FIGURE 5-11 YEAR 2025 V/C RATIO AT WEEKDAY PM PEAK HOUR WITH TAED AND WITH PHYSICAL IMPROVEMENT

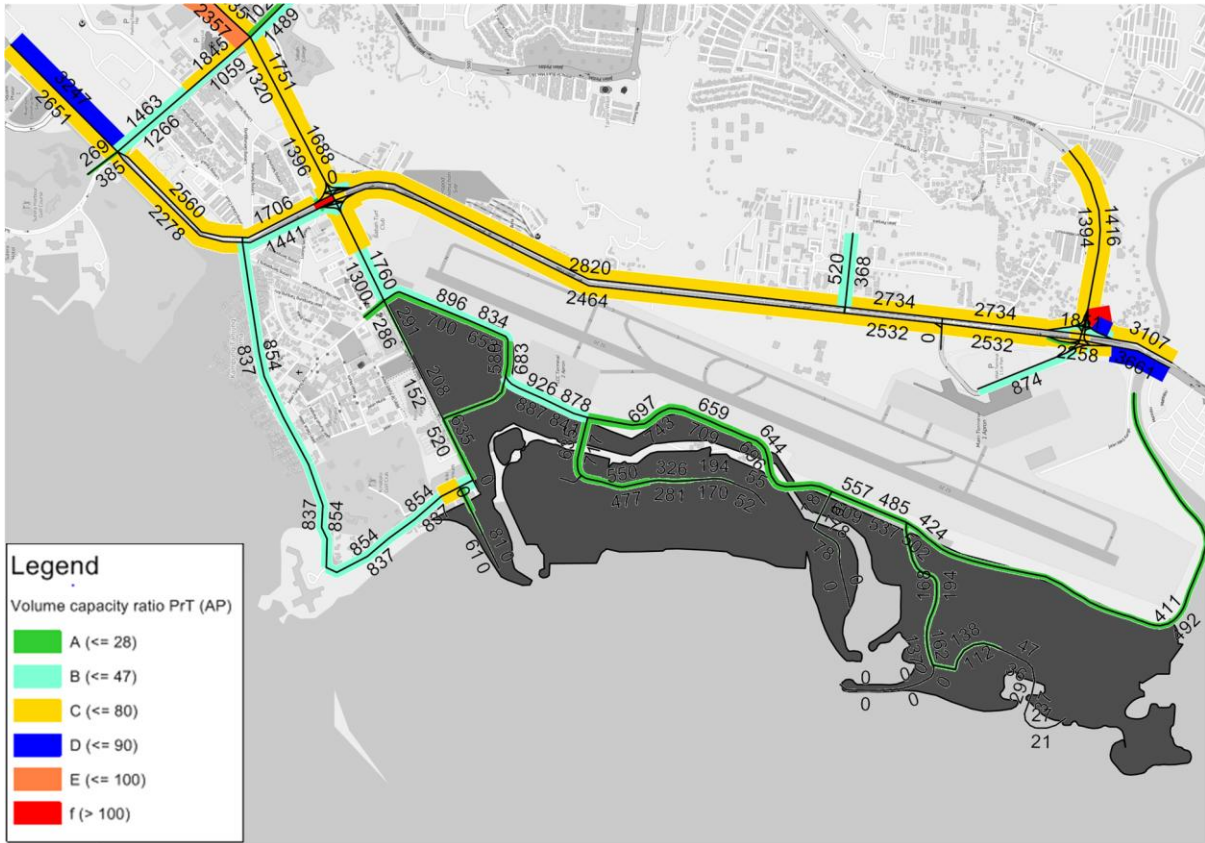


FIGURE 5-12 YEAR 2025 V/C RATIO AT WEEKEND ARTERIAL PEAK HOUR WITH TAED AND WITH PHYSICAL IMPROVEMENT

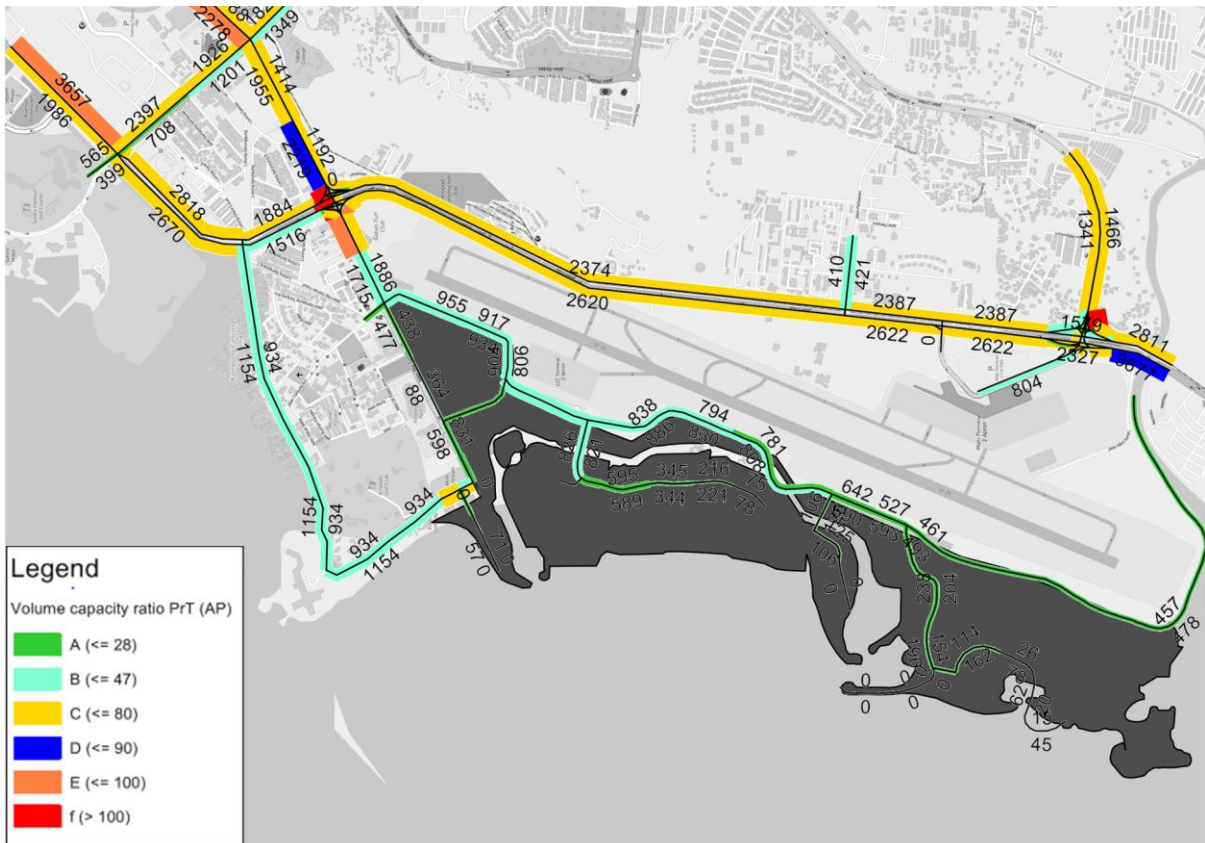


FIGURE 5-13 YEAR 2025 V/C RATIO AT WEEKEND BEACH PEAK HOUR WITH TAED AND WITH PHYSICAL IMPROVEMENT

5.4.3 Assessment of Junctions

The junction performance summary for Design Year 2025 with TAED and proposed physical improvement is given in Table 5-6 and Table 5-7. Detailed SIDRA analysis results for junctions J7 and J8 for Design Year (2025) with TAED and proposed physical improvement are presented in Appendix E6.

Junction	Results (AM)		Results (PM)		Performance
	LOS	Others	LOS	Others	
7	B	DOS: 0.80 Delay: 19s QL: 143m	E	DOS: 1.02 Delay: 71s QL: 858m	J7 is not performing satisfactorily during PM Peak with long queues along the South approach.
8	F	DOS: 1.05 Delay: 114s QL: 480m	F	DOS: 1.04 Delay: 98s QL: 495m	While the improvement is significant, however, J8 is not performing satisfactorily with long queues and delays during both peak hours.

TABLE 5-6 PERFORMANCE OF JUNCTION (YEAR 2025 WEEKDAY WITH TAED AND WITH PHYSICAL IMPROVEMENT)

Junction	Results (AR)		Results (BC)		Performance
	LOS	Others	LOS	Others	
7	C	DOS: 0.54 Delay: 21s QL: 92m	C	DOS: 0.74 Delay: 24s QL: 143m	J7 is performing satisfactorily during both peak periods.
8	D	DOS: 0.88 Delay: 37s QL: 159m	D	DOS: 0.88 Delay: 44s QL: 245m	J8 is performing satisfactorily during both peak periods..

TABLE 5-7 PERFORMANCE OF JUNCTION (YEAR 2025 WEEKEND WITH TAED AND WITH PHYSICAL IMPROVEMENT)

6 Other Assessment Issues

6.1 Public Transport

As part of the process to improve public transportation in Greater Kota Kinabalu, Dewan Bandaraya Kota Kinabalu (DBKK) is in progress of working out an Integrated Kota Kinabalu Public Transport Masterplan. The masterplan proposes two main public transport modes, which are city bus and high capacity transit, e.g. Bus Rapid Transit (BRT). The masterplan, once implemented, will significantly expand public transport coverage area in Kota Kinabalu.

A station of the proposed high capacity transit is proposed in close vicinity of Tanjung Aru Eco Development (TAED). Its proposed location is around the junction between Jalan Mat Salleh and Jalan Coastal. The proposed stop is anticipated to increase the mode share of public transport user in the vicinity of TAED. It was also suggested, if necessary, to convert the inner lane of Jalan Mat Salleh to accommodate the proposed transit alignment.

Public transport mode share for the residents of TAED is expected to be significant for the following reasons:

- good last mile public transport connectivity, results of high density bus stations and a good cycle hire scheme proposed in the Tanjung Aru Eco Development Schematic Masterplan (see Figure 6-1 to Figure 6-3);
- close proximity to a station of the proposed high capacity transit; and
- tourist as the main component of TAED residential demographic.

Taking the above into consideration, an assumed 20% vehicular traffic reduction for all the traffic generated from TAED is derived.



FIGURE 6-1 TAED PROPOSED PUBLIC TRANSPORT SYSTEM



FIGURE 6-2 TAED PROPOSED PEDESTRIAN NETWORK



FIGURE 6-3 TAED PROPOSED CYCLING NETWORK

6.1.1 Mid-Block Performance – V/C Ratio



FIGURE 6-4 YEAR 2025 V/C RATIO AT WEEKDAY AM PEAK HOUR WITH TAED AND WITH PUBLIC TRANSPORT

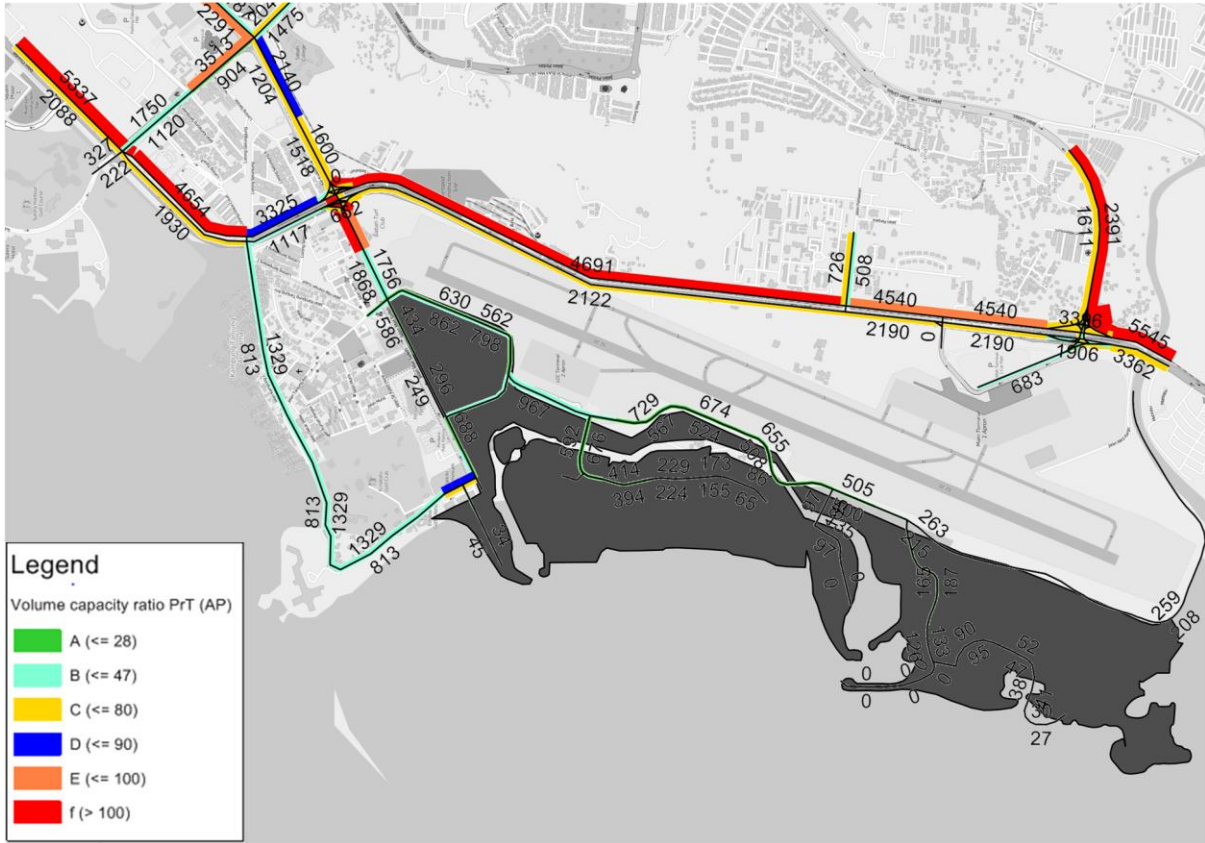


FIGURE 6-5 YEAR 2025 V/C RATIO AT WEEKDAY PM PEAK HOUR WITH TAED AND WITH PUBLIC TRANSPORT

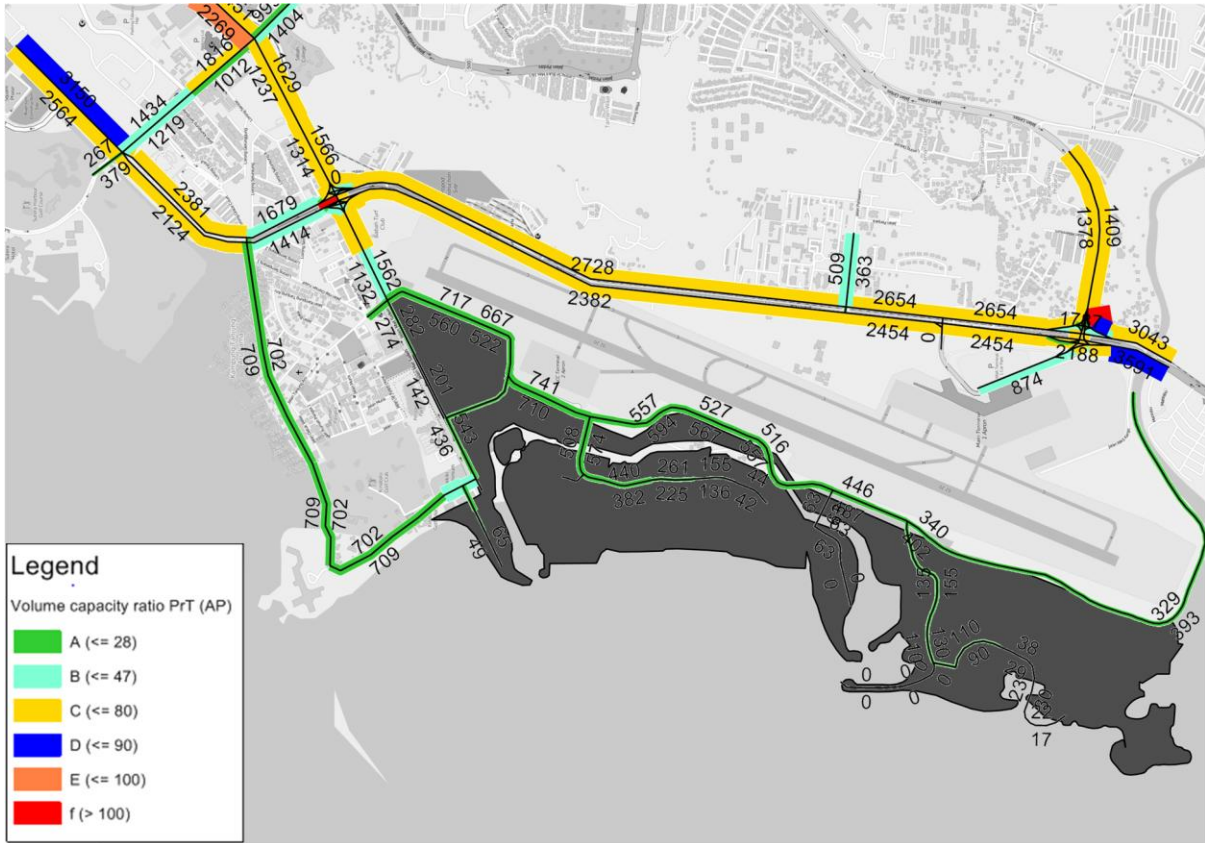


FIGURE 6-6 YEAR 2025 V/C RATIO AT WEEKEND ARTERIAL PEAK HOUR WITH TAED AND WITH PUBLIC TRANSPORT

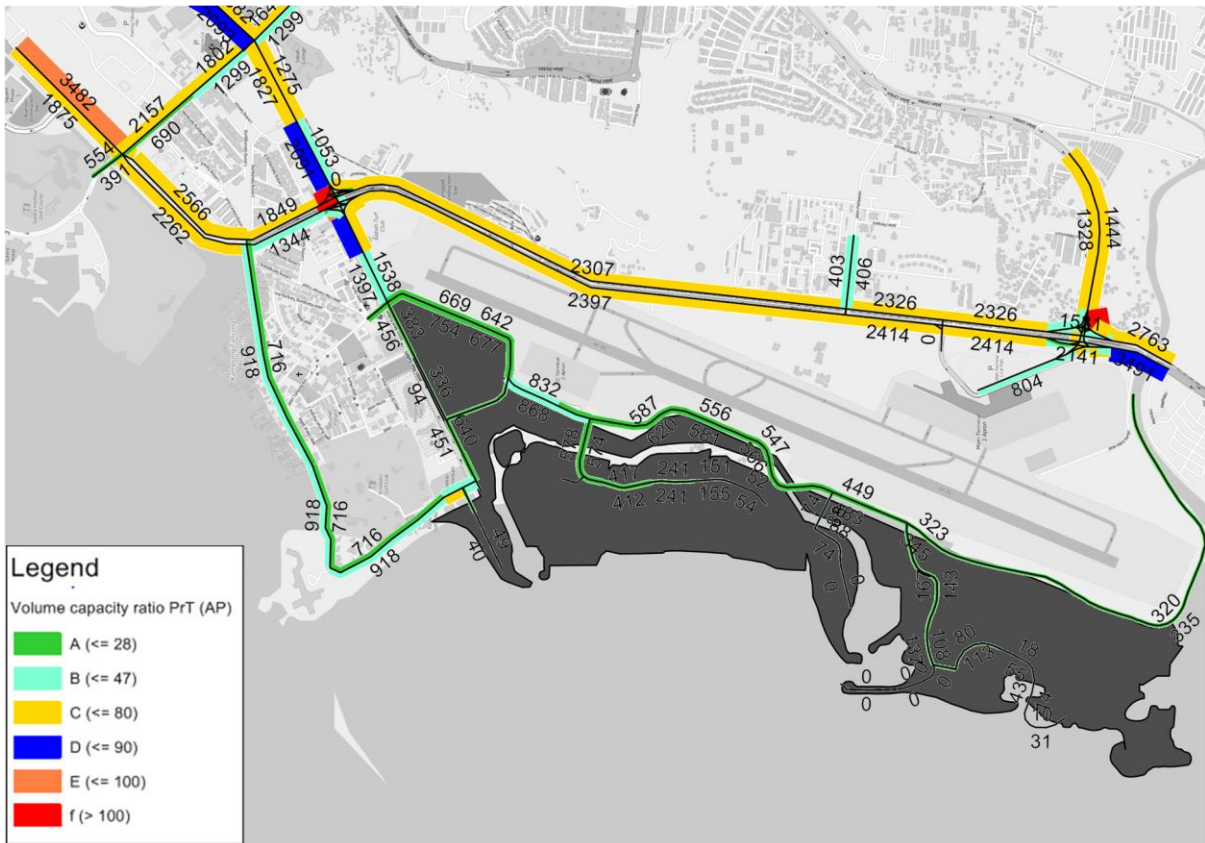


FIGURE 6-7 YEAR 2025 V/C RATIO AT WEEKEND BEACH PEAK HOUR WITH TAED AND WITH PUBLIC TRANSPORT

6.1.2 Assessment of Junctions

The junction performance summary for Design Year 2025 with TAED and with proposed physical and public transport improvement is given in Table 6-1 and Table 6-2. Detailed SIDRA analysis results for junctions J7 and J8 for Design Year (2025) with TAED and with proposed physical and public transport improvement are presented in Appendix E7.

Junction	Results (AM)		Results (PM)		Performance
	LOS	Others	LOS	Others	
1	C	DOS: 0.81 Delay: 26s QL: 321m	C	DOS: 1.04 Delay: 25s QL: 128m	J1 is performing satisfactorily during both peak periods.
2	F	DOS: 1.15 Delay: 144s QL: 1.3km	F	DOS: 1.22 Delay: 166s QL: 1.69km	J2 did not perform satisfactorily during both peak periods with LOS F, coupled with long queues and delays.
3	E	DOS: 1.09 Delay: 73s QL: 350m	F	DOS: 1.34 Delay: 118s QL: 678m	J3 did not perform satisfactorily during both peak hours with LOS F (and long queues and delays) along certain approaches, particularly the South approach.
4	F	DOS: 1.25 Delay: 191s QL: 1.15km	F	DOS: 1.52 Delay: 221s QL: 1.73km	J4 did not perform satisfactorily during both peak hours with LOS F (and long queues and delays), particularly in the South and East approaches.
5	B	DOS: 0.87 Delay: 11s QL: 73m	F	DOS: 1.45 Delay: 167s QL: 1.12km	J5 did not perform satisfactorily during the PM peak only, with long queues and delays along the West approach.
6	A	DOS: 0.60 Delay: 8s QL: 36m	A	DOS: 0.72 Delay: 6s QL: 62m	J6 is performing satisfactorily during both peak periods.
7	B	DOS: 0.65 Delay: 19s QL: 72m	D	DOS: 0.88 Delay: 36s QL: 384m	J7 is performing satisfactorily during both peak periods.
8	F	DOS: 0.98 Delay: 81s QL: 340m	E	DOS: 0.93 Delay: 65s QL: 300m	J8 has improved but AM Peak requires slightly more improvement.

TABLE 6-1 PERFORMANCE OF JUNCTION (YEAR 2025 WEEKDAY WITH TAED AND WITH PUBLIC TRANSPORT)

Junction	Results (AR)		Results (BC)		Performance
	LOS	Others	LOS	Others	
1	C	DOS: 0.78 Delay: 22s QL:130m	C	DOS: 0.78 Delay: 22s QL: 121m	J1 is performing satisfactorily during both peak periods.
2	C	DOS: 0.81 Delay: 29s QL: 331m	C	DOS: 0.79 Delay: 27s QL: 275m	J2 is performing satisfactorily during both peak periods.
3	C	DOS: 0.90 Delay: 32s QL: 152m	D	DOS: 0.98 Delay: 39s QL: 307m	J3 is performing satisfactorily during both peak periods.
4	D	DOS: 0.87 Delay: 45s QL: 300m	F	DOS: 1.18 Delay: 106s QL: 620m	J4 did not perform satisfactorily with LOS F (and long queues and delays) particularly along the South and East approaches during both peak periods. During BC peak, the North approach also experiences LOS F.
5	D	DOS: 1.12 Delay: 50s QL: 459m	F	DOS: 1.40 Delay: 156m QL: 1.42km	J5 did not perform satisfactorily with LOS F (and long queues and delays) experienced particularly along the North approach during both peak periods. During the BC peak, the South approach also experiences LOS F.
6	A	DOS: 0.30 Delay: 7s QL: 11m	A	DOS: 0.33 Delay: 7s QL: 13m	J6 is performing satisfactorily during both peak periods.
7	C	DOS: 0.43 Delay: 21s QL: 70m	C	DOS: 0.52 Delay: 24s QL: 89m	J7 is performing satisfactorily during both peak periods.
8	D	DOS: 0.88 Delay: 36s QL: 124m	D	DOS: 0.92 Delay: 38s QL: 142m	J8 is performing satisfactorily during both peak periods.

TABLE 6-2 PERFORMANCE OF JUNCTION (YEAR 2025 WEEKEND WITH TAED AND WITH PUBLIC TRANSPORT)

6.2 Construction Traffic Management

The proposed accesses for construction traffic are the same anticipated accesses for the Tanjung Aru Eco Development. They are located at:

- J8 - Junction between Jalan Mat Salleh/Lorong Cermin (J8)
- J7 - Junction between Jalan Mat Salleh / Jalan Lapangan Terbang Lama (J7)

A third access, dedicated only for construction traffic, is located at the south of the Kota Kinabalu International Airport (KKIA) runway, as indicated in Figure 6-8. The access will provide direct connection to Jalan Putatan.



FIGURE 6-8 DEVELOPMENT PHASING

The construction traffic should avoid peak hours identified in Chapter 2.2. This is to avoid further deteriorating the traffic condition along Jalan Mat Salleh during peak hour. The peak hours are as follow:-

- Weekday AM Peak Period : 06:30 to 07:30
- Weekday PM Peak Period : 17:15 to 18:15
- Weekend Arterial Peak Period : 12:45 to 13:45
- Weekend Beach Peak Period : 17:45 to 18:45

During the construction period, Junction J7 may be temporarily converted into a yield junction. The reasoning is that construction traffic is not high enough to demand a signalised control, and also because no public traffic is expected to enter Jalan Lapangan Terbang Lama from Jalan Mat Salleh during construction. The junction should then be converted into one with a permanent control when junction J7 and J8 are reconfigured into the proposed junction layout described in Table 5-5.

Traffic diversion is required during the reconstruction of Junction J8. Junction J8 is to be converted from a roundabout to a signalised junction. During the construction period, traffic along Jalan Mat Salleh, may use Lorong Cermin to bypass Junction 8.

Although pedestrian volume is not particularly high, clear information signs should be posted to guide pedestrian and the traffic of heavy vehicles moving in and out of the site.

Also, the contractor(s) should provide access schedules, coverage of the load and traffic management plans to relevant authorities before commencement of work. When required, the contractor(s) should request for a police escort, and obtain approvals on out of hours haulage. The construction site should provide wash bays and use of water trucks to reduce environmental impact.

6.3 Proposed Future Responsibility

After in-depth discussions with the TAED Sdn. Bhd., Jabatan Kerja Raya Sabah (JKR) and Dewan Bandaraya Kota Kinabalu (DBKK), the responsible parties for each proposed improvement is proposed in Table 6-3 below.

Mitigation Measures	Responsible Party	Remarks
New Road Link (Yellow)	DBKK/JKR	Preferably before 2025.
Widening of Jalan Mat Salleh (Brown section)	DBKK/JKR	Preferably before 2025.
Widening of Jalan Mat Salleh (Blue section)	Developer (TAED)	To be constructed by developer and transferred to JKR in 2023.
KKIA link road (Purple)	Developer (TAED)	To be constructed by developer and transferred to JKR in 2023.
Junction Improvement at J8 & J7	Developer (TAED)	To be constructed by developer and transferred to JKR in 2023.

TABLE 6-3 PROPOSED RESPONSIBLE PARTY FOR EACH IMPROVEMENT SCHEME

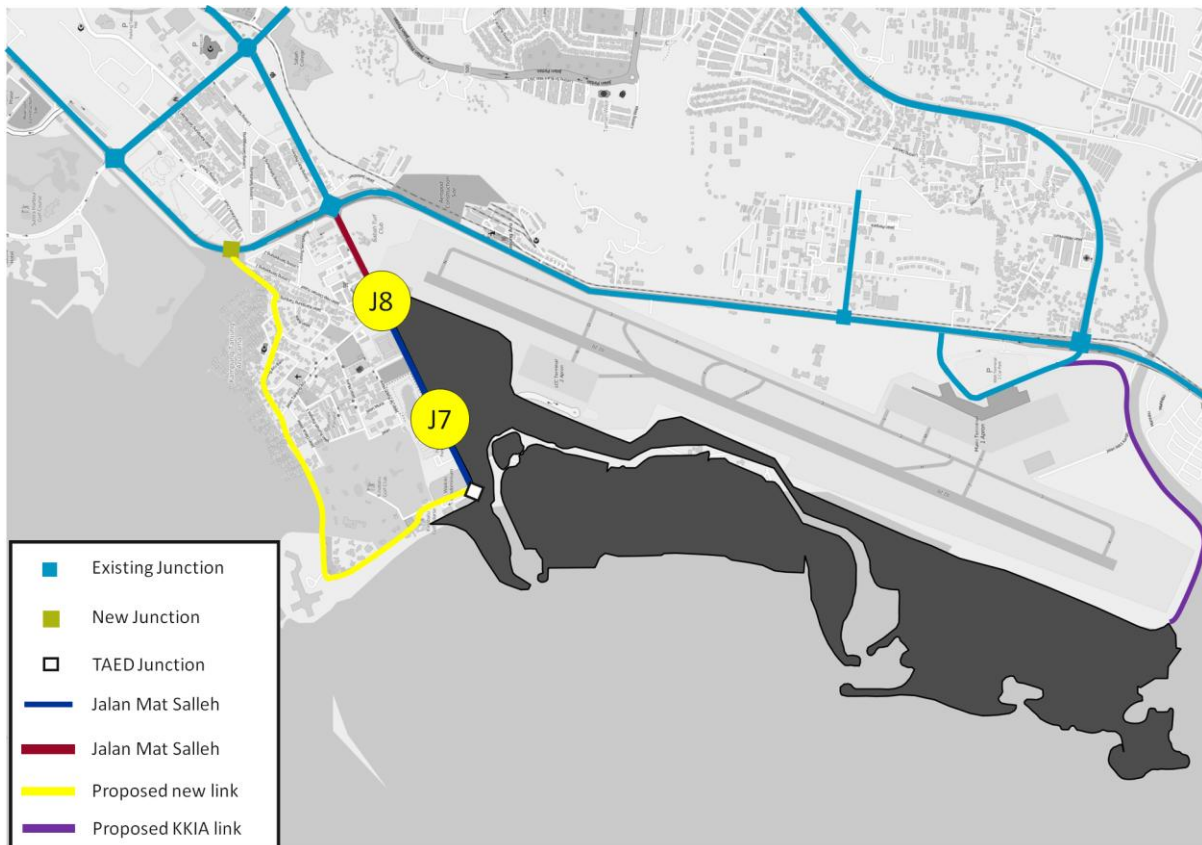


FIGURE 6-9 PROPOSED IMPROVEMENT SCHEMES

7 SUMMARIES AND CONCLUSION

7.1 Summary of Traffic Performance

This report examined the traffic impact of the proposed Tanjung Aru Eco Development (TAED) on the surrounding road network. In summary, the following preliminary conclusions can be drawn from this Traffic Impact Assessment study:

Firstly, the study has shown that the existing road network has sufficient capacity to accommodate the existing traffic volume. This is evident from the results of the models which have shown that all the roads have acceptable LOS 'D' during peak hours.

However, moving forward to Year 2025, the results showed that the road networks in the study area are expected to perform unsatisfactorily regardless of the presence of the proposed TAED. Although the road links technically have the capacity to cater to future traffics, most junctions in the study area do not.

After the proposed TAED is developed, congestion along Jalan Mat Salleh is foreseen. Widening Jalan Mat Salleh and the addition of a new link, to divert some traffic away, have been proposed to accommodate the anticipated surge in traffic once TAED is fully developed.

A scenario with a higher public transport mode share during peak hour was also tested. Promoting the use of public transport in TAED is achievable by coupling the effect of extensive last mile public transport system proposed in TAED with the proposed high capacity transit station located around the junction between Jalan Mat Salleh and Jalan Coastal. The traffic generated from the proposed development is expected to drop by 20%. The drop allows improved level of service at the immediate junctions (J7 and J8) from the proposed TAED.

Lastly, the internal traffic circulation of the development was shown to be smooth. The various land uses had minimal or insignificant negative impact on the internal traffic circulation. However, congestion at the junctions/accesses (Junction J7 and J8) to TAED is imminent and would require a major improvement scheme. The recommendation is to reconfigure junction J8 into a full signalised junction.

7.2 Traffic Site Plans

Traffic Site Plans is provided in Appendix B, which the following are included:

- Road hierarchy plan of road network in the study area
- Traffic Control plan in Tanjung Aru Eco Development (TAED)
- Road cross-section plan in Tanjung Aru Eco Development (TAED)

7.3 Traffic Impact and Relative Contribution

Junction	Total Traffic (veh) 2025 w/o TAED	TAED Traffic	
		Traffic (veh)	Percentage (%)
J1	4796	107	2%
J2	5916	968	14%
J3	4954	807	14%
J4	6910	1464	21%
J5	6433	721	11%
J6	493	1283	260%
J7	1271	727	57%
J8	3847	640	17%

TABLE 7-1 RELATIVE CONTRIBUTION OF TAED GENERATED TRAFFIC (WEEKDAY AM PEAK HOUR)

Junction	Total Traffic (veh) 2025 w/o TAED	TAED Traffic	
		Traffic (veh)	Percentage (%)
J1	4864	172	3%
J2	6167	1540	20%
J3	5482	1762	24%
J4	6704	2456	37%
J5	6857	684	10%
J6	881	1240	141%
J7	963	1184	123%
J8	2655	1746	66%

TABLE 7-2 RELATIVE CONTRIBUTION OF TAED GENERATED (WEEKDAY PM PEAK HOUR)

Junction	Total Traffic (veh) 2025 w/o TAED	TAED Traffic	
		Traffic (veh)	Percentage (%)
J1	3806	111	3%
J2	4891	829	14%
J3	3640	1375	27%
J4	5457	1603	29%
J5	4924	1265	26%
J6	1123	998	89%
J7	687	468	68%
J8	1852	1325	72%

TABLE 7-3 RELATIVE CONTRIBUTION OF TAED GENERATED (WEEKEND ARTERIAL PEAK HOUR)

Junction	Total Traffic (veh) 2025 w/o TAED	TAED Traffic	
		Traffic (veh)	Percentage (%)
J1	3734	104	3%
J2	4548	869	16%
J3	4125	1367	25%
J4	5640	1960	35%
J5	5337	1381	26%
J6	1143	147	13%
J7	1240	189	15%
J8	2459	1260	51%

TABLE 7-4 RELATIVE CONTRIBUTION OF TAED GENERATED (WEEKEND BEACH PEAK HOUR)

APPENDIX G

Marine Traffic Risk Assessment



**Report : Marine Traffic Risk Assessment for the
Proposed Construction of a Marina at
Tanjung Aru Eco Development**

June 2016

Prepared by:



KASI (MALAYSIA) SDN BHD



Marine Traffic Risk Assessment (MTRA) for the Proposed Construction of a Marina at Tanjung Aru Eco Development

Report

Prepared by

Name: Tan Seng Leong / Low Hui Jin
Position: Manager / Senior Simulation Engineer
Signature: - SOFTCOPY, NO SIGNATURE -

Reviewed by

Name: Benjamin Nair
Position: Executive Director
Signature: - SOFTCOPY, NO SIGNATURE -

Approved by

Name: Datuk Captain Walter J. Nair
Position: Managing Director
Signature: - SOFTCOPY, NO SIGNATURE -

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Abbreviations	
AtoNs	Aids to Navigation
COLREGs	Collision Regulations
CPA	Closest Point of Approach
DWT	Dead Weight Tonne
IALA	International Association of Lighthouse Authorities
IWRAP	IALA's Waterway Risk Assessment Program
JLM	Jabatan Laut Malaysia
JPDS	Jabatan Pelabuhan dan Dermaga Sabah
KASI	KASI (Malaysia) Sdn. Bhd.
Km	Kilometres
kt(s)	Knot(s)
KYC	Kinabalu Yacht Club
LOA	Length Overall
m	Metre
MTRA	Marine Traffic Risk Assessment
nm	Nautical Mile
NRT	Net Registered Tonnage
STAR	Shangri-La's Tanjung Aru Beach Resort
TAED	Tanjung Aru Eco Development
TARP	Tunku Abdul Rahman Marine Park
TOR	Terms of Reference
TSHD	Trailing Suction Hopper Dredger
t	Tonnes

Conversions	
1 nautical mile (nm)	1852m or 1.852km or 10 chains
1 knot	1 nm/hour or 0.514 m/s

Executive Summary

Project Description

Tanjung Aru Eco Development Sdn. Bhd., a company wholly owned by the Sabah State Government, intends to undertake the Tanjung Aru Eco Development (TAED) project, Kota Kinabalu, Sabah, referred to hereinafter as “the Project”.

The Project’s marine facilities include a marina and a passenger facility referred to as the Prince Philip Wharf.

KASI (Malaysia) Sdn. Bhd. (KASI) carried out a Marine Traffic Risk Assessment (MTRA) of the proposed construction of the marine facilities.



Figure: Conceptual Masterplan of the proposed Tanjung Aru Eco Development, Kota Kinabalu, Sabah

Findings

The MTRA report addresses the terms of reference as approved by Jabatan Pelabuhan dan Dermaga Sabah (JPDS) and covers the Construction as well as the Operational phases of the Project.

Existing marine traffic, facilities and marine operations

There are no existing public marine traffic facilities at the project site. There is a privately owned Kinabalu Yacht Club (KYC), located north of the project site. Boating activities thereat are confined to within a 1km radius of the yacht club.

Existing port operating procedures

Existing port operating procedures are governed by legislation by the relevant authorities ie. JPDS and Jabatan Laut Malaysia (JLM).

Small passenger boats of less than 15 NRT are subject to the Ports and Harbours (Ports, Harbours and Dues) Regulations 2008 and are licensed by JPDS. The regulations include operating procedures for harbour craft / fishing vessels in the port limits and requirements for insurance of small ships carrying more than 12 passengers.

Vessels exceeding 15 NRT fall under the jurisdiction of JLM, as per the Merchant Shipping Ordinance 1960.

Accident statistics

JLM maintains a record of accident statistics for the port of Kota Kinabalu. Over the last 10 years, there are only two (2) marine accidents, one due to cargo unloading mishap at Kota Kinabalu Port and the other was attributed to a collision between a speedboat and a yacht at Pulau Gaya, which resulted in the loss of a life.

Safe navigational approach to the Marina

The proposed TAED project is accessible directly from open sea with no known marine hazards. The navigation approach is well clear (more than 1.5km away) from Tunku Abdul Rahman Marine Park (TARP) and coral reefs.

Basic restrictions on size of vessels expected to use the Facility (Marina)

The Marina is expected to be designed to cater for vessels with drafts not exceeding 5m.

Reefs and restrictions of access to other facilities at Tanjung Aru

A shallow coral reef exists at the foreshore of the Shangri-La's Tanjung Aru Beach Resort (STAR). This will pose a marine hazard to small vessels navigating to and from the Prince Philip Wharf. There are no other restrictions of access to the facilities of the Project.

Night-time navigation risks

The construction of the Project will be carried out on a 24 hours a day basis and involves reclamation works at the foreshore. A trailing suction hopper dredger (TSHD) will be used to carry reclamation material from the Sunken Barrier Shoals, about 60 km offshore. Therefore, there is a need to enhance night time navigation in the form of lit marker buoys to delineate the boundaries of the work zones, particularly at night.

For the operational phase of the marine facilities of the Project, beacons are to be installed for the guidance of vessels proceeding to and from the Marina as well as ferry / passenger boats transiting between Jesselton Point and the Prince Philip Wharf.

Usage Conflicts

Marine traffic that may be temporarily impacted during the construction phase caused by the operation of the TSHD transiting between the development site and the sand source at the Sunken Barrier Shoals, are as follows:

- Ferry traffic operating between Kota Kinabalu and Labuan with 4 scheduled transits daily, operating in daylight hours only;
- Recreational traffic proceeding to and from Kota Kinabalu to Pulau Mangalum;r
- Commercial shipping traffic proceeding to and from the Port of Kota Kinabalu and beyond.

The TSHD route to the sand source area will intersect with the marine traffic routes. However, the statistical probability of a collision occurring is considered to be insignificant, at 50 years between incidents.

Summary of Potential Risks

During Construction Phase

- Risk of collision between TSHD and coastal marine traffic;
- Risk of collision between existing marine traffic and construction vessels.

During Operational Phase

- New marine traffic proceeding to and from TAED may run the risk of grounding on the shallow reef present at the foreshore of STAR;
- Risk of contact with the entrances to the breakwater areas of the Marina and the Prince Philip Wharf, particularly at night.

Proposed Risk Mitigation Measures

Proposed risk mitigation measures to address the potential risks are as follows:

- **Establishment of a Temporary Safety Exclusion Zone**

During the construction phase, it is proposed to establish a temporary safety exclusion zone to prevent encroachment by unauthorized marine traffic into the working area and to reduce risk of collision between marine traffic.

- **Compliance with International Regulations**

Construction vessels, especially the TSHD, should display appropriate lights and shapes as prescribed under the International Regulations for Preventing Collisions at Sea 1972 [COLREGS]. All fixed and movable structures, such as barges, and construction vessels should be well illuminated by night and be clearly visible by day.

- **Issuance of Notices to Mariners by JLM**

Notices to Mariners are to be issued by JLM to alert mariners of the works being carried out and to keep well clear of the construction zone.

- **Precautions in Inclement Weather**

During periods of inclement weather conditions, fog lights should be activated on construction barges to alert approaching vessels of their presence. The lights should be switched on during low-light condition.

Construction work is to be suspended in the event of inclement weather and/or reduced visibility conditions.

- **Vessel Traffic Management System (VTMS)**

It is recommended to setup a VTMS to monitor and manage local traffic so as to minimize risk of collisions and groundings.

- **Appointment of Local Marine Consultant**

During the Construction Phase, it is recommended that a local marine consultant be appointed to monitor the construction works and to provide weekly / monthly reports to JPDS on compliance and progress of the reclamation works.

- **Installation of Aids to Navigation for Construction and Operational Phases**

The aids to navigation (AtoNs) that are to be installed consists of a number of beacons and buoys, the specifications of which should be compliant with the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Buoyage System 'A'.

During Construction Phase

Yellow portable marker buoys are to be installed at regular spacing of approximately 100m apart to delineate the boundaries of the temporary safety exclusion zone. It is estimated that approximately 25 nos. yellow portable marker buoys are required to adequately demarcate the safety exclusion zone.

During Operational Phase

- Shallow reef at foreshore of STAR
 - 1 no. isolated danger mark
 - 3 nos. channel marker beacons to mark safe passage for the safe movement of ferry / passenger boats transiting between the Prince Philip Wharf and Jesselton Point
- Entrance to the Marina Breakwater
 - 2 nos. guide beacons
- Entrance to Prince Philip Wharf Breakwater
 - 2 nos. guide beacons

It is recommended that a bathymetric survey be conducted by project proponent to accurately map the reef on the foreshore of STAR.

Conclusion

In conclusion, the proposed construction of the Marina and Prince Philip Wharf at the TAED will raise potential risks to safe navigation of marine traffic during the Construction as well as Operational phases of the Project. These risks can however be mitigated by due observance of the proposed risk mitigation measures contained in this report.

1.0 Preamble

Tanjung Aru Eco Development Sdn. Bhd., a company wholly owned by the Sabah State Government, intends to undertake the TAED project, Kota Kinabalu, Sabah, referred to hereinafter as “the Project”. Surbana Consultants Sdn Bhd (Surbana) has been awarded the C&S and Marine Works detailed design packages.

The Marina is designed to cater for yachts between 20m to 110m LOA and will have approximately 200 berths. In addition to the Marina, there is a passenger facility called the “Prince Philip Wharf”. This facility is intended to cater for ferries and passenger boats. The location of the Marina and the Prince Philip Wharf is shown in **Figure 1**.

KASI (Malaysia) Sdn. Bhd. (KASI) has been appointed by Surbana to conduct an MTRA for the proposed construction of a Marina for the TAED, Kota Kinabalu.



Figure 1: Conceptual masterplan of the proposed Tanjung Aru Eco Development, Kota Kinabalu, Sabah

2.0 Introduction

2.1 Objective

The objective of the MTRA study is to assess potential risks associated with the Construction and Operational phases of the Project and to propose appropriate mitigating measures to ensure the safety of marine traffic.

2.2 Terms of Reference (TOR)

The TOR was submitted to JPDS on 14th January 2016 and was approved on 29th January 2016. The conditions of the approved TOR is as follows:-

- a. Compile relevant information regarding existing marine traffic, facilities and marine operations that may be impacted by this development in terms of navigational safety;
- b. Collate data related to the development, including:-
 - i. Existing port operating procedures;
 - ii. Accident statistics (sources include Sabah Ports Authority, Marine Department, Ports and Harbours Department and other sources of data).
- c. Propose a safe navigational approach to the Marina;
- d. By means of real-time shiphandling simulation and area modelling, assess navigation risks related to:-
 - i. Basic restrictions on size of vessels expected to use the Facility;
 - ii. Reefs and restrictions of access to other facilities at Tanjung Aru;
 - iii. Night-time navigation;
 - iv. Usage conflicts of the navigation routes currently used by ferry boats between Labuan, Brunei and Kota Kinabalu,
- e. Propose appropriate risk mitigation measures such as installation of signage and aids to navigation (AtoNs), if considered necessary for safe navigation;
- f. The scope of the work will cover construction phase issues and post-construction operations of the Marina and will address any other issues related to navigation that arise during the course of the study.

2.3 Methodology of MTRA Study

The methodology for the MTRA study is shown in the flow chart below:-

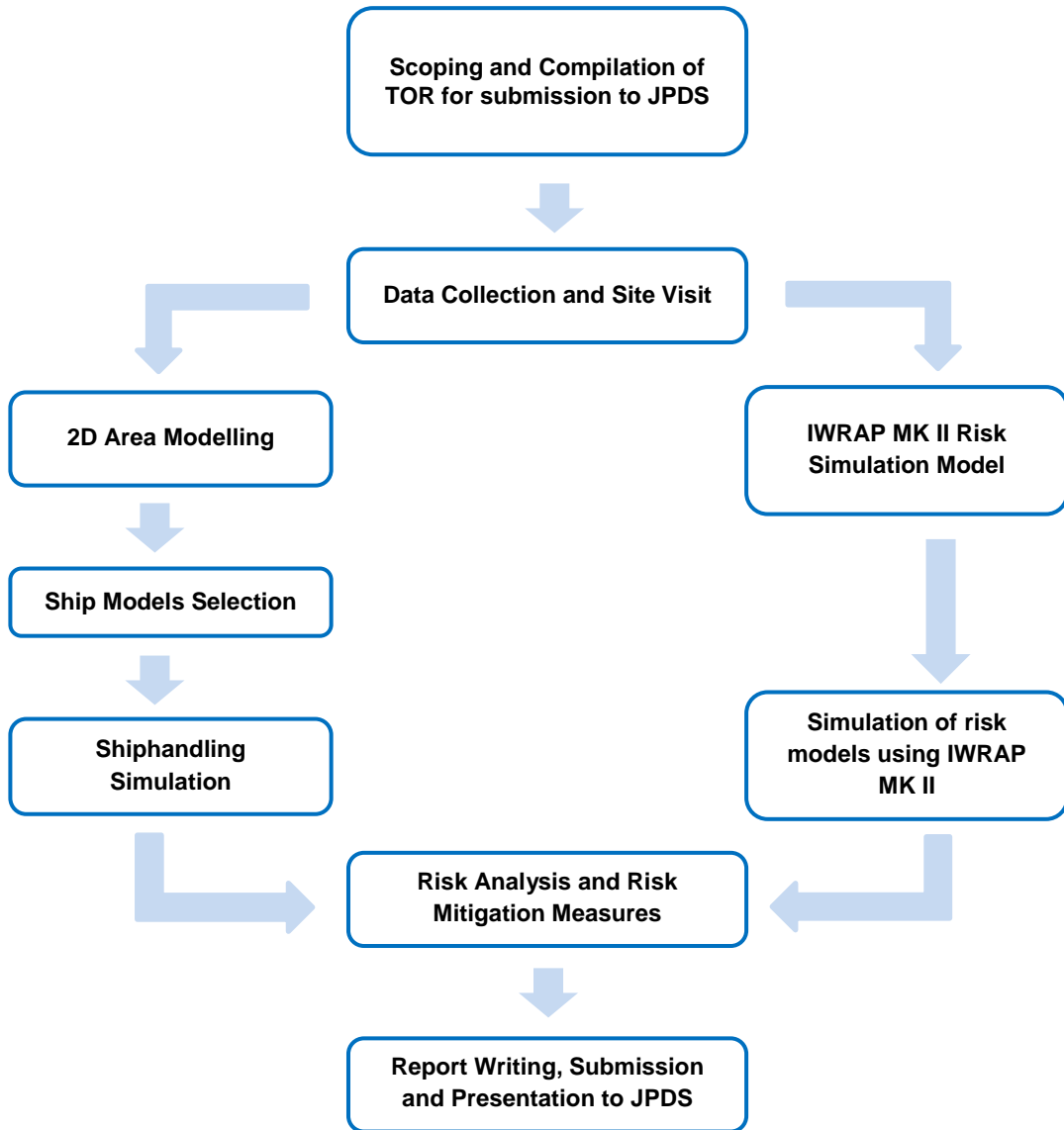


Figure 2: Methodology flow chart of MTRA study

2.4 Project Background

The TAED is located at Tanjung Aru, Kota Kinabalu, approximately 3 km southeast of TARP as shown in **Figure 3** below:

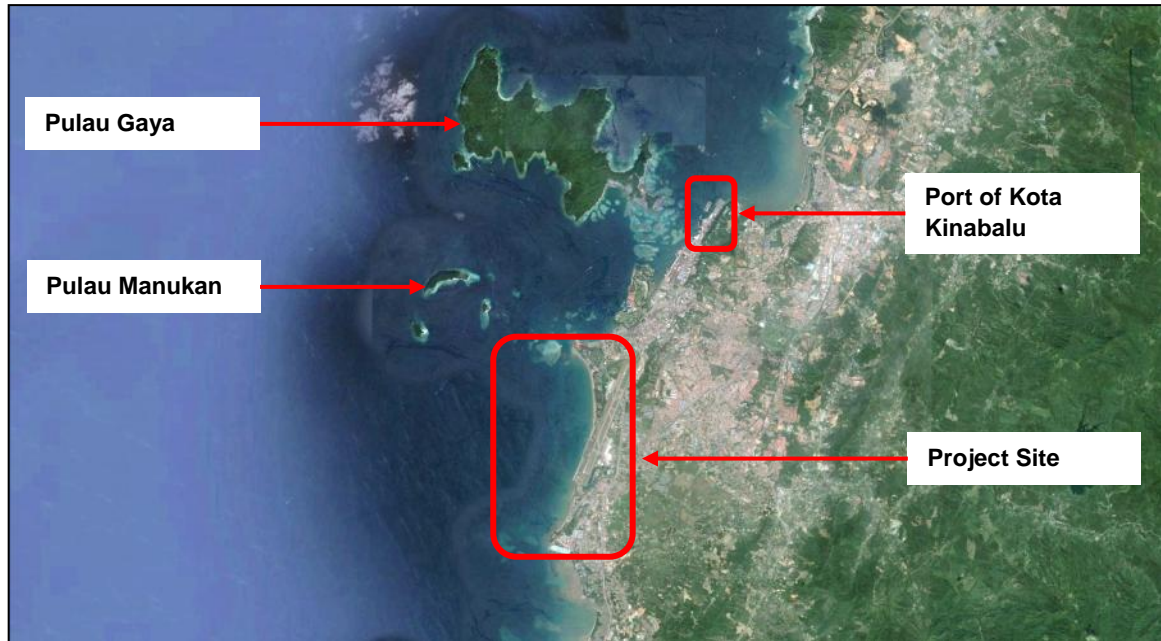


Figure 3: Location of the proposed Tanjung Aru Eco Development, Kota Kinabalu, Sabah

Reclamation is a major part of the Project, seeing that a comparison between the existing site and Masterplan footprint shows that the public beach will be moved seawards by about 300m. Preliminary estimates place the amount of fill volume required at about 17.1 million m³.

The Construction Phase of the TAED is expected to take 33 months.

3.1 Passenger Ferry Traffic

There are two (2) ferry trips from Jesselton Point Ferry Terminal to Labuan daily and vice versa. The ferry service operates between 8.00am to 4.00pm. A photograph of the ferry in service is shown below:



3.2 Recreational Traffic

There is considerable recreational traffic plying between Kota Kinabalu and Pulau Mangalum, comprising mainly of small passenger boats of less than 12 persons per boat. It is estimated that there are approximately 150 calls per year.

Although there is traffic originating from Jesselton Point Ferry Terminal, STAR and Sutera Harbour Resort, these vessels do not normally go past the TARP.

Yachting traffic activity from the KYC at Tanjung Aru Beach is confined to a 1km radius around the club. Occasionally, a small number of boats are known to go beyond the TARP toward Pulau Mangalum.

3.3 Commercial Traffic

Based on figures obtained from the Kota Kinabalu port operator, Sabah Ports Sdn Bhd, an average of 3,000 commercial vessels proceed to and from Kota Kinabalu annually. Of the total number, it can be reasonably assumed that 50% of these vessels will pass along the transit route between the development area and the sand source site.

3.4 Fishing Activities

Although the development area is a designated fishing ground, fishing activity is on small scale and is confined to hook and line fishing only.

4.0 Existing Port Operating Procedures

Existing port operating procedures are governed by legislation by the relevant authorities ie. JPDS and JLM.

Small passenger boats of less than 15 NRT are subject to the Ports and Harbours (Ports, Harbours and Dues) Regulations 2008 and are licensed by JPDS. The regulations include operating procedures for harbour craft / fishing vessels in the port limits and requirements for insurance of small ships carrying more than 12 passengers.

Vessels exceeding 15 NRT fall under the jurisdiction of JLM, as per the Merchant Shipping Ordinance 1960.

5.0 Accident Statistics

JLM maintains a record of accident statistics for the port of Kota Kinabalu. Over the last 10 years, there are only two (2) marine accidents, one due to cargo unloading mishap at Kota Kinabalu Port and the other was attributed to a collision between a speedboat and a yacht at Pulau Gaya, which resulted in the loss of a life.

6.0 Proposed Construction Phases

The construction phase of the Project will potentially take 33 months and is split into four (4) phases with some work overlapping between phases, as shown below:



The phases will be split as follows:

Phase	Complete Duration including Horizontal Development (months)
1	18
2	24
3	17
4	5

7.0 Future Traffic

7.1 Construction Phase

7.1.1 Reclamation Vessel

The proposed reclamation vessel is a TSHD. It will be used to convey the fill material (sand) from the Sunken Barrier Shoals to the development site. The TSHD will make 3 trips back and forth daily and will be operated during both day and night.

Specifications of the proposed TSHD are detailed below:

Capacity	LOA (m)	Breadth (m)	Loaded Draft (m)
12,000 m ³	145	28	10

Table 1: Specifications of the proposed trailer suction hopper dredger (Source: Surbana)

A photograph of a TSHD is shown in **Plate 1**:



Plate 1: Photograph of the proposed TSHD

7.1.2 Construction Vessels

During the construction phase, construction vessels such as clamshell & barge combinations, tugboats and flat top barges will be operating close to the development site. These vessels are confined to the immediate area surrounding the development and are not expected to move past the 10m depth contour line.

Photographs of the proposed clamshell and backhoe dredger are shown below:



7.1.3 Bunkering Services during Construction Phase

Oil barges will be used to provide bunkering services during the Construction Phase. However, movements of the oil barges are not expected to have any significant impact or hinder the movements of other marine traffic as their numbers are small and their operations are infrequent.

7.2 Operational Phase

New traffic introduced from the marine operations of the Project is expected to comprise of:

- Ferry / passenger boats
- Recreational craft
- Pleasure yachts
- Internal waterway traffic
- Water sport boats

7.2.1 Ferry / Passenger Boats

A ferry / passenger boat service operating between Jesselton Point Ferry Terminal and Prince Philip Wharf is proposed. The ferry is expected to make stops at the Oceanus Waterfront Mall, Sutera Harbour Resort and STAR before reaching Prince Philip Wharf.

The proposed ferry / passenger boat route is shown in **Figure 5** (shown in yellow broken line).



Figure 5: Proposed ferry / passenger boat route between Jesselton Point and Prince Philip Wharf (Source: Surbana)

The proposed schedule for ferry / passenger boat services is shown in **Table 2** below:

Depart from Prince Philip Wharf	Depart from Jesselton Point
7.00 am	11.30 am
12.30 pm	4.45 pm

Table 2: Proposed schedule of ferry / passenger boat services between Jesselton Point and Prince Philip Wharf (Source: Surbana)

Specifications of the ferry / passenger boat is as follows:

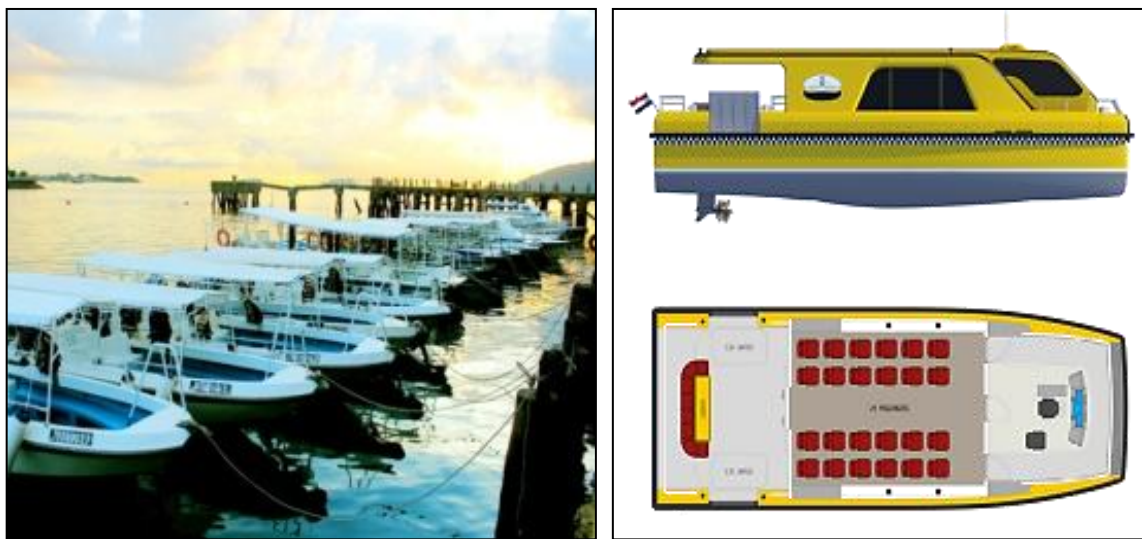


Plate 2: Proposed design vessel for ferry / passenger boat services (Source: Surbana)

Possible Capacity (pax)	24
LOA (m)	16
Breadth (m)	6
Draught (m)	1.4
Air Draft (m)	2.5

Table 3: Specifications of ferry / passenger boat services (Source: Surbana)

7.2.2 Recreational Craft

The Prince Philip Wharf and Marina are expected to be utilised for recreational traffic which brings local visitors and tourists from proposed TAED to TARP. The traffic routes from TAED to TARP are shown in **Figure 6** (shown in yellow broken line).



Figure 6: Proposed recreational traffic route from Prince Philip Wharf to TARP (Source: Surbana)

Specifications of the expected design vessel for recreational traffic is as follows:



Figure 7: Proposed design vessel for recreational traffic (Source: Surbana)

Capacity (pax)	30
LOA (m)	17
Breadth (m)	4
Draught (m)	1.2

Table 4: Specifications of recreational traffic (Source: Surbana)

7.2.3 Pleasure Yachts

Pleasure yachts are expected to transit between the Prince Philip Wharf and the Marina. The proposed route for yacht traffic is shown in **Figure 8** (indicated by a yellow broken line).



Figure 8: Proposed traffic route between the Prince Philip Wharf and the Marina (Source: Surbana)

There are three (3) zones in the Marina to cater for different sizes of yacht. The limits for each zone are shown below:



Plate 3: Typical yachts expected to utilize the Marina (Source: Surbana)

Marina Zone	Yacht Limits (Indicative)	
	LOA (m)	Breadth (m)
A	110	25
B	40	8
C	20	5

Table 5: Specifications of zones in Marina (Source: Surbana)

7.2.4 Internal Waterway Traffic

There is an inner waterway within the TAED for transiting between the Prince Philip Wharf and the Marina and for use of visitors and residents.

The proposed inner waterway route is shown in **Figure 9** (indicated by a yellow broken line).



Figure 9: Proposed internal route between Prince Philip Wharf and Marina (Source: Surbana)

Only Zone C yachts and water taxi traffic are expected to utilise the inner waterway. However, there is a bridge crossing the inner waterway which creates an air draft restriction for vessels transiting the inner waterway at approximately 2.5m.

	Capacity (pax)	12
	LOA (m)	9
	Breadth (m)	3.3
	Draught (m)	0.8
	Air Draft (m)	2.5

Figure 10: Water taxi specifications

7.2.5 Water Sport Activities

Water sport activities such as banana boat, jet-ski, parasailing, etc. are expected to be carried out at TAED.

The expected area for water sport activities is shown in **Figure 11** (shown in yellow).



Figure 11: Expected location of water sport activities at TAED (Source: Surbana)

Images and specifications of typical vessels for water sport activities are shown below:



Small recreational boat



Jetski

Plate 4: Typical small boat and jet-ski (Source: Surbana)

Type	Capacity (pax)	LOA (m)	Breadth (m)	Draught (m)
Small boat for parasailing and banana boat	4	6	2	0.8
Jet Ski	2	3	1	0.6
Fibre Glass Boats / Water Taxi	12	9	3.3	0.8

Table 6: Specifications of typical vessels for water sport activities (Source: Surbana)

8.0 Met-ocean Conditions

Met-ocean conditions at the project area are extracted from a document titled “Description of the Existing Environment” provided by DHI (Source: DHI, Doc. Ref. No.: 62800657-2-RPT-21-S4-reduced) and are reproduced below:-

8.1 Wind

Based on measurements taken from Kota Kinabalu airport, winds at the development site are generally weak, reaching speeds of about 5 m/s only, blowing to the east.

8.2 Wave

During the NE monsoon, wave height at the project site is low as it is sheltered by islands of the TARP which located at the northwest of the project site, ranging from 0.2 – 0.4m.

8.3 Current

The tidal wave approaches the coastline of Sabah almost perpendicular, which leads to negligible tidal currents along the coastline, reaching speeds of about 0.1 m/s only. However, stronger currents exist within Patagas River and its river mouth, reaching speeds of up to 1 m/s.

8.4 Tide

Tide levels in Kota Kinabalu were extracted from the Tide Tables Malaysia 2016 and are shown below:

Tide	Tide Levels (m)
Highest Astronomical Tide (HAT)	2.40
Mean High Water Spring (MHWS)	2.13
Mean High Water Neap (MHWN)	1.66
Mean Sea Level (MSL)	1.23
Mean Low Water Neap (MLWN)	0.79
Mean Low Water Spring (MLWS)	0.32
Lowest Astronomical Tide (LAT)	0.00

Table 7: Tide levels at Kota Kinabalu Port (Source: Tide Tables Malaysia 2016)

9.0 Project Site Visit

KASI conducted a project site visit on 21st April 2016, both on foot and by boat. The objectives of the visit were to:

- Collect site data such as the photographs of the project site and surrounding area;
- Collect information regarding local marine traffic activities;
- Confirm the presence of the reef on the foreshore of STAR;
- Locate existing AtoNs in the vicinity of the project site;
- Familiarise with the local site.

During the site visit, it was noted that there was a low level of marine activity in the vicinity of the development site.

A large shallow reef exists at the foreshore of the STAR. A navigable channel for small boats was noted. However, this channel should be adequately marked by means of channel beacons.

A large sand bank is visible close to the shallow reef. However, it does not appear to be an impediment to the approach channel to TAED as it lies further north of the shallow reef.

There are no existing public marine traffic facilities at the project site.

A privately owned yacht club known as the KYC is located north of the project site. Boating activities thereat are confined to within a 1km radius of the yacht club and the limit of the activity zone is marked by a red flag (see **Plate 5**).

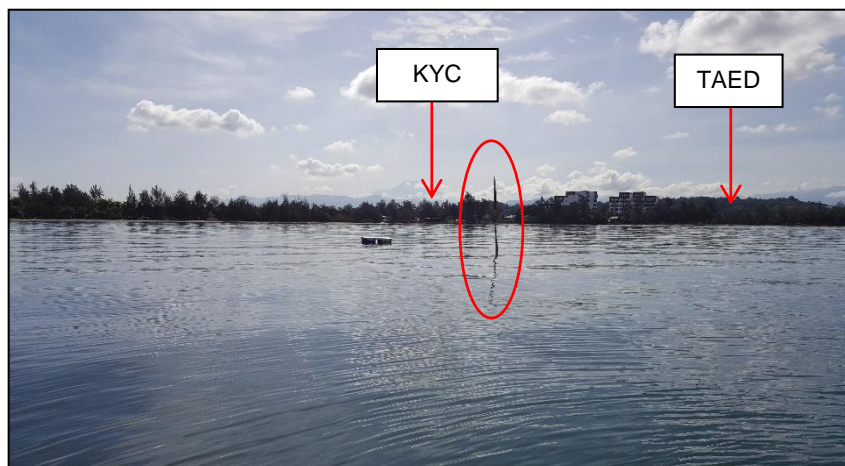


Plate 5: Red flag marking the limit of KYC activity zone



Existing Tanjung Aru Beach



Yachts and Small Boats at the compound of the KYC



Red flag to indicate the limit of boating activities for KYC



Ferry operating between Kota Kinabalu and Labuan



Guide Beacons at Entrance to Sutera Harbour Resort and Marina



Recreational Boats entering Sutera Harbour Resort and Marina

Plate 6: Site visit photographs

10.0 Simulation Setup

10.1 Area Modelling

A simulation exercise area model was created for use in simulation. Screenshots of the area model are shown below:

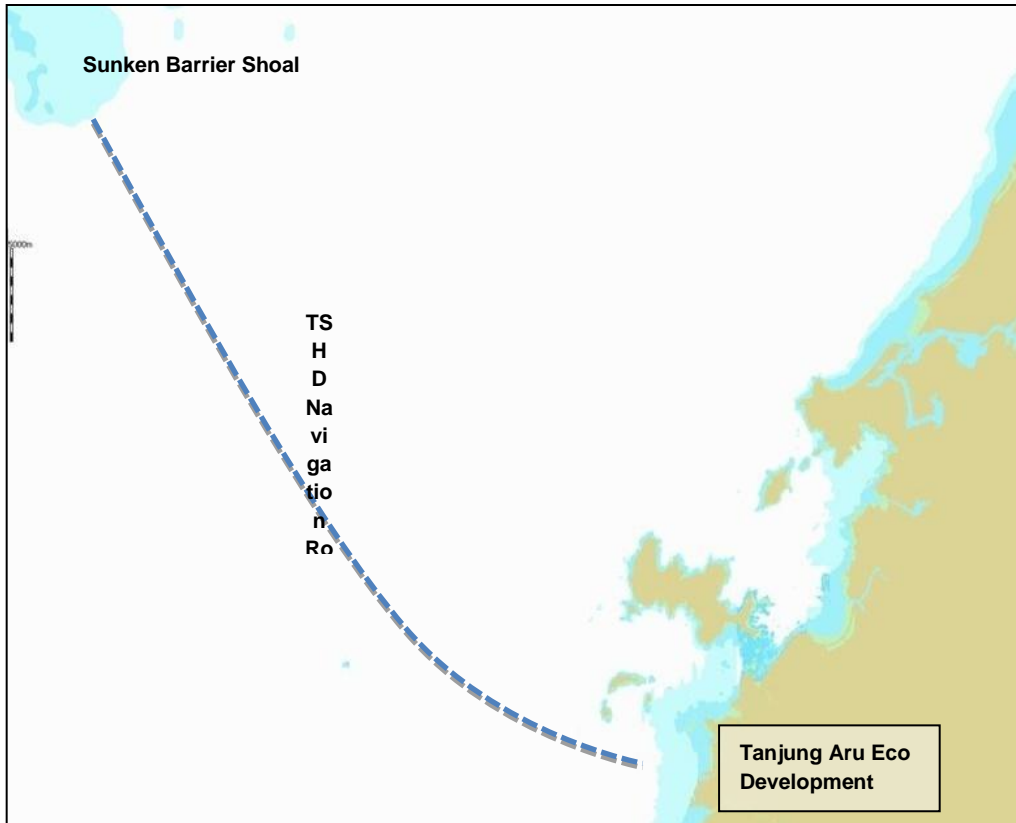


Figure 12: Simulation exercise area model – overall area

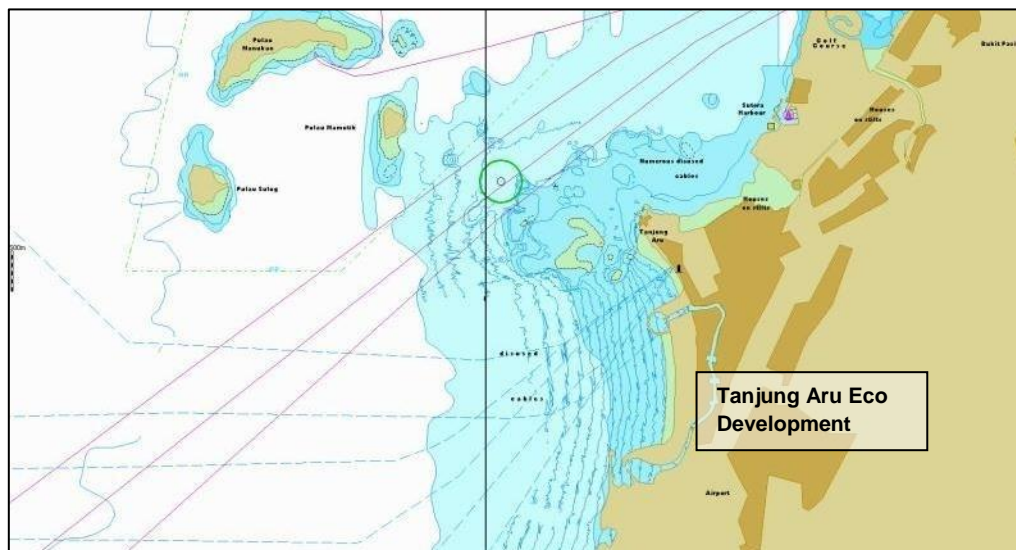




Figure 13: Simulation exercise area model – TAED


10.2 Ship Models used in Simulation


The following ship models were used in the real time shiphandling simulation:

TSHD Representational Model	
	
Model	Hopper Dredger
Displacement (t)	11,600
LOA (m)	122
Beam (m)	20.3
Draft (m)	8.5

Commercial Traffic Representational Models	
	
Model	Bulk Carrier
Displacement (t)	26,343
LOA (m)	200
Beam (m)	23.76
Draft (m)	6.66

	
Model	Container Ship
Displacement (t)	51,309
LOA (m)	222
Beam (m)	30
Draft (m)	12

Small Craft / Ferry Traffic Representational Models	
	
Model	Small Boat
Displacement (t)	2.65
LOA (m)	10
Beam (m)	2.95
Draft (m)	0.58

	
Model	Express Boat
Displacement (t)	99.6
LOA (m)	28
Beam (m)	6.7
Draft (m)	2.1

10.3 Met-ocean Data used in Simulation

Environmental conditions used in simulation are shown below:

Monsoon	Wind		Wave		Current	
	Speed	Direction	Height	Direction	Speed	Direction
NE monsoon	10 – 15	N	1.5 (open sea) 0.4 (shore)	N	0.2	Ebb
SW monsoon	5 – 10	SW	1.5 (open sea) 0.4 (shore)	SW	0.2	Ebb

Table 8: Met-ocean data used in simulation

10.4 Simulation Programme

Shiphandling simulation was carried out at KASI's Centre of Maritime Simulation.

The simulation program covered the following extract from the approved terms of reference (TOR):

- Propose a safe navigational approach to the Marina;
- To assess navigation risks related to usage conflicts of the navigation routes currently used by ferry boats between Labuan, Brunei and Kota Kinabalu.

10.5 Run Design

A run matrix comprising of eight (8) shiphandling simulation runs were designed to address the above issues. The run matrix is attached as **Appendix A**.

10.6 IWRAP Simulation Scenarios

The Marine Chart MAL 6 and MAL 8608 were used to create the IWRAP model of the study area.

Three (3) potential traffic scenario models were created as follows:

- Scenario 1: Existing Marine Traffic at the Study Area
- Scenario 2: Existing Marine Traffic + Traffic during Construction Phase of TAED
- Scenario 3: Existing Marine Traffic + Forecasted traffic during Operation Phase of TAED

Details of the marine traffic scenarios are shown below:

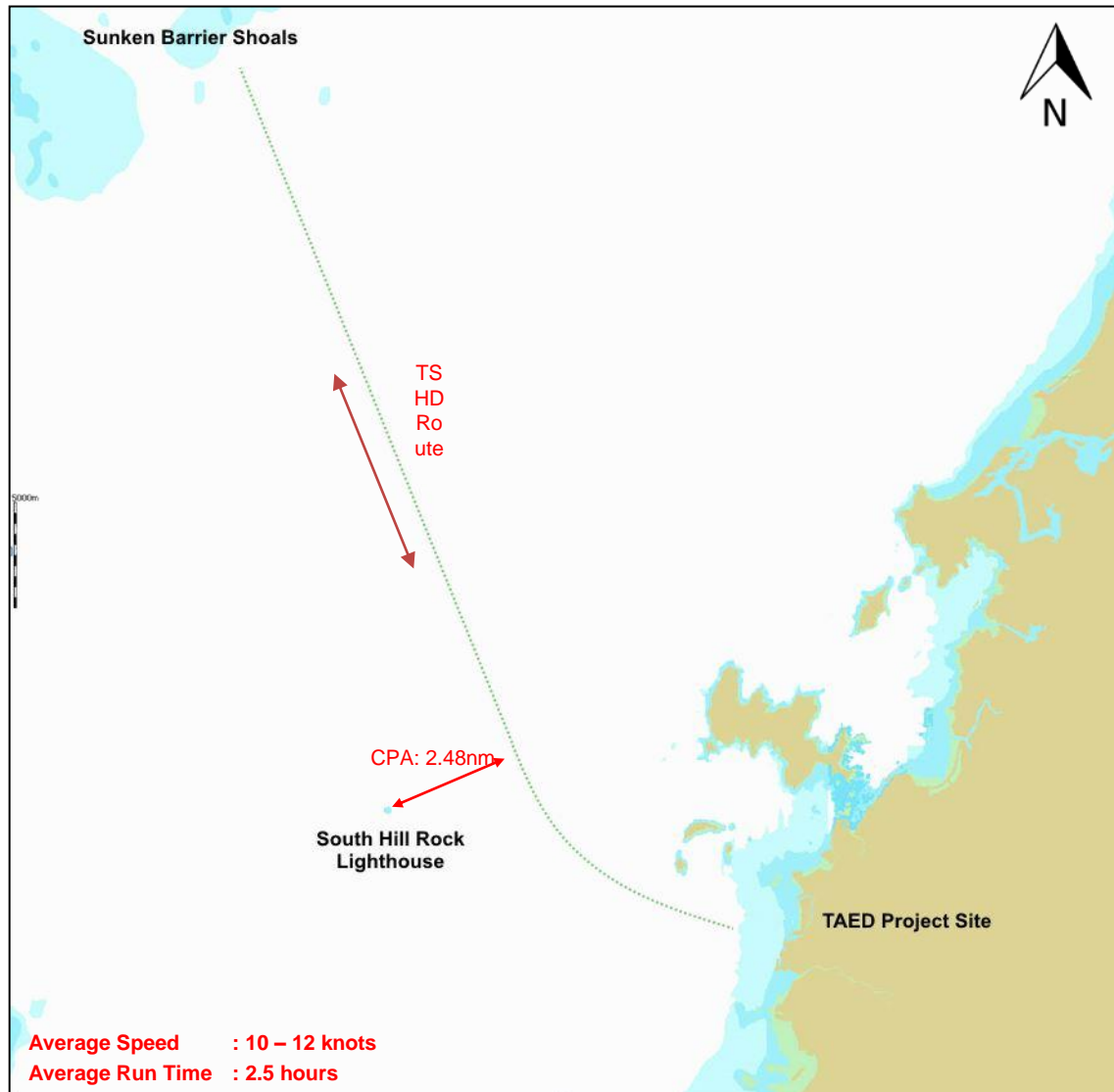
Scenarios	Marine Traffic Conditions
Scenario 1	<ul style="list-style-type: none"> • Traffic between Jesselton Point Ferry Terminal and Labuan • Traffic between Labuan and Sapangar Bay Oil Terminal • Traffic to/from Kota Kinabalu Port, Sapangar Bay Oil Terminal and Sapangar Bay Container Port (traffic from South direction) • Traffic between Kota Kinabalu and Pulau Mangalum • Traffic between STAR and TARP • Yacht sailing activities in front of KYC • Fishing activities in front of Tanjung Aru
Scenario 2	<ul style="list-style-type: none"> • Scenario 1 • Traffic between Sunken Barrier Shoal and Tanjung Aru • Construction activities in front of Tanjung Aru
Scenario 3	<ul style="list-style-type: none"> • Scenario 1 • Forecasted traffic between Prince Philip Wharf and Jesselton Point Ferry Terminal • Forecasted traffic between Marina and Prince Philip Wharf • Forecasted traffic between Prince Philip Wharf and TARP • Forecasted traffic between Marina and TARP • Water sport activities in front of TAED

Table 9: IWRAP traffic scenarios

11.0 Simulation Results

11.1 Realtime Shiphandling Simulation

Based on the results of the shiphandling simulations, the route between the Project site and sand source at the Sunken Barrier Shoals can be navigated safely and is well clear of marine hazards. The average time taken for the TSHD to transit the route is 2.5 hours.



There are four (4) possible meeting points, shown in **Figure 15** with the existing marine traffic along the proposed navigation route. However, as there is ample sea room for safe navigation, there is no notable risk for the safe navigation approach of TSHD to the project site.

The run plots of shiphandling simulation runs are attached as **Appendix B**.

11.2 IWRAP Simulation

Based on the simulations carried out and IWRAP geometric modelling, the possibility of the TSHD colliding with passing traffic is once every 100 years. Therefore, there is no notable impact to passing traffic in the area brought about by the operations of the TSHD.

However, during the operational phase, the probability of collision within the area is approximately once every 50 years.

The run plots of IWRAP simulations are attached as **Appendix C**.

12.0 Simulation Findings

12.1 Safe Navigational Approach to the Marina

The reclamation vessel, a single TSHD, will transit between the development site and Sunken Barrier Shoals three (3) times daily, during the construction phase. The TSHD will approach up to the 10m contour line only and pump the sand fill to the site.

Once developed, the proposed TAED project is accessible directly from open sea with no known marine hazards. The navigation approach is well clear (more than 1.5km away) from TARP and coral reefs.

12.2 Basic Restrictions on Size of Vessels Expected to use the Facility

The Marina can only cater for vessels with drafts not exceeding 5m. The navigational approach to the Marina is directly from the sea with adequate water depth, exceeding 5m. Hence, there is no restriction for the design vessels to proceed to and from the Marina.

12.3 Reefs and restrictions of access to other facilities at Tanjung Aru

A shallow coral reef exists at the foreshore of the STAR (marked in **Figure 14** below). This will pose a marine hazard to small vessels navigating to and from the Prince Philip Wharf. There are no other restrictions of access to the facilities of the Project.

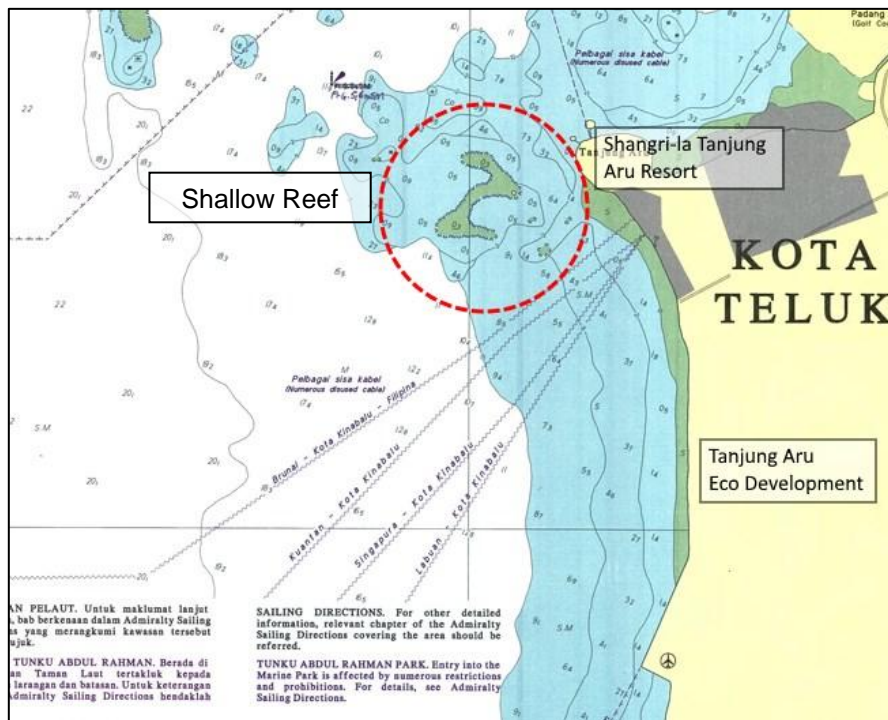


Figure 14: Coral reefs near the Tanjung Aru

12.4 Night-time Navigation

The construction phase of the Project will be carried out on a 24 hours a day basis and involves reclamation works at the foreshore. A TSHD will be used to carry reclamation material from the Sunken Barrier Shoals. Therefore, there is a need to enhance night time navigation in the form of lit marker buoys to delineate the boundaries of the work zones, particularly at night.

For the operational phase of the marine facilities of the Project, beacons are to be installed for the guidance of vessels proceeding to and from the Marina as well as ferry / passenger boats transiting between Jesselton Point and the Prince Philip Wharf. The beacons should be equipped with horizontal facing lights so as to not affect airport operations.

12.5 Usage Conflicts

Marine traffic that may be temporarily impacted during the construction phase caused by the operation of the TSHD transiting between the development site and the sand source at the Sunken Barrier Shoals, about 60 km offshore, are as follows:

- Ferry traffic operating between Kota Kinabalu and Labuan with 4 scheduled transits daily, operating in daylight hours only;
- Recreational traffic proceeding to and from Kota Kinabalu to Pulau Mangalum;
- Commercial shipping traffic proceeding to and from the Port of Kota Kinabalu and beyond.

There are also vessels operating between Labuan and the Erb West offshore installation, but the vessels do not cross the route taken by the TSHD.

The TSHD route to the sand source area will intersect with the marine traffic routes. However, the statistical probability of a collision occurring is considered to be insignificant, at 50 years between incidents.

The routes of the above mentioned marine traffic, including the proposed TSHD route, are shown below:

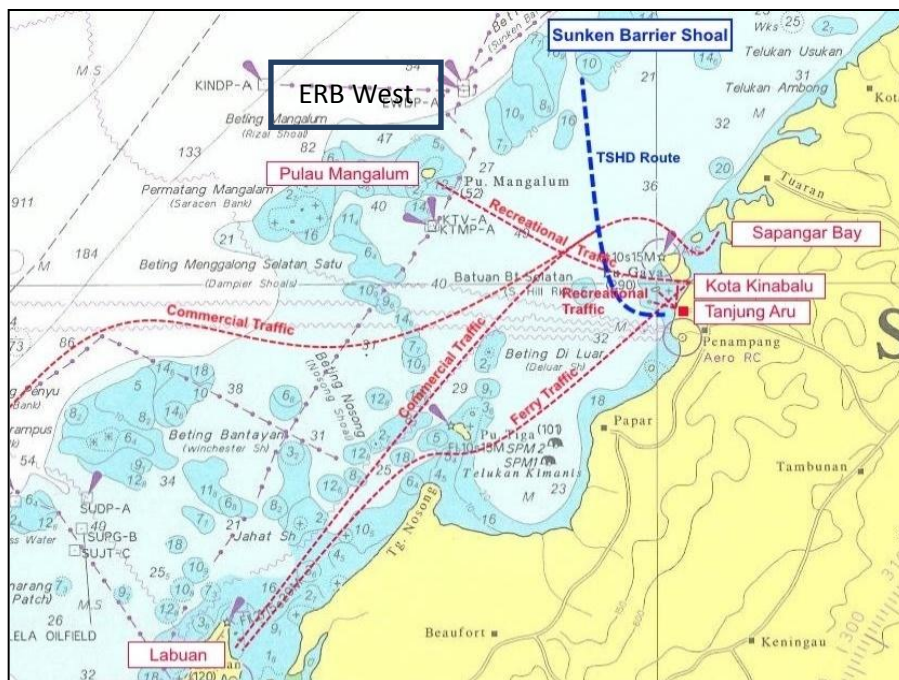


Figure 15: Possible usage conflicts in the project area

12.6 Summary of Potential Risks

Construction Phase

The statistical possibility of the TSHD colliding with marine traffic whilst en-route to and from the sand source, as extracted from IWRAP simulation, is 100 years between incidents, which is considered to be remote.

The following potential risks were derived from the MTRA:

- Risk of collision between TSHD and coastal marine traffic;
- Risk of collision between existing marine traffic and construction vessels.

Operational Phase

The probability of collision between new traffic and existing marine traffic within the area is approximately 50 years between incidents.

The following potential risks were derived from the MTRA:

- New marine traffic proceeding to and from TAED may run the risk of grounding on the shallow reef present at the foreshore of STAR;
- Risk of contact with the entrances to the breakwater areas of the Marina and the Prince Philip Wharf, particularly at night.

The risk mitigation measures for the identified risks are detailed in the following chapter below.

13.0 Proposed Risk Mitigation Measures

Proposed risk mitigation measures to address the potential risks arising from the MTRA are as follows:

- Establishment of a temporary safety exclusion zone
- Compliance with international regulations
- Issuance of notices to mariners by JLM and JPDS
- Precautions during the construction phase
- Appointment of local marine consultant to monitor construction works
- Installation of aids to navigation for construction and operational phases

13.1 Establishment of a Temporary Safety Exclusion Zone

During the construction phase, it is proposed to establish a temporary safety exclusion zone (shown in **Figure 16** below). This is to prevent encroachment by unauthorized marine traffic into the working area and to reduce risk of collision between marine traffic.

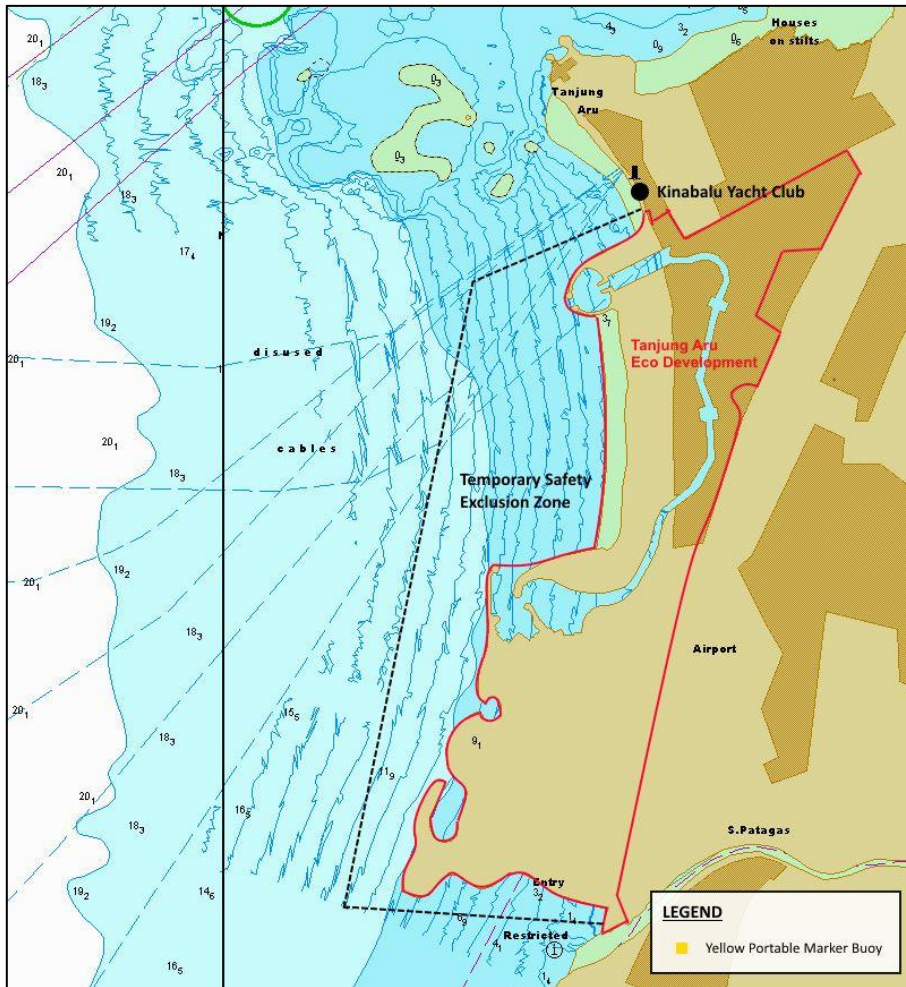


Figure 16: Proposed temporary safety exclusion zone

13.2 Compliance with International Regulations

Construction vessels, especially the TSHD, should display appropriate lights and shapes as prescribed under the International Regulations for Preventing Collisions at Sea 1972 [COLREGS]. All fixed and movable structures, such as barges, and construction vessels should be well illuminated by night and be clearly visible by day.

13.3 Issuance of Notices to Mariners by JLM

Notices to Mariners are to be issued by JLM to alert mariners of the works being carried out and to keep clear of the construction zone.

13.4 Precautions in Inclement Weather

During periods of inclement weather conditions, fog lights should be activated on construction barges to alert approaching vessels of their presence. The lights should be switched on during low-light condition.

Construction work is to be suspended in the event of inclement weather and/or reduced visibility conditions.

13.5 Vessel Traffic Management System (VTMS)

It is recommended to setup a VTMS to monitor and manage local traffic so as to minimize risk of collisions and groundings.

13.6 Appointment of Local Marine Consultant to Monitor Construction Works

During the Construction Phase, it is recommended that a local marine consultant be appointed to monitor the construction works and to provide weekly / monthly reports to JPDS on compliance and progress of the reclamation works.

13.7.2

Operational Phase

For the operational phase of TAED, the following aids to navigation are proposed:

- Shallow reef at foreshore of STAR
 - 1 no. isolated danger mark (marked in **Figure 18** as ID1)
 - ID1 (Location: 5° 57' 1" N, 116° 1' 58" E)
 - 3 nos. channel marker beacons to mark safe passage for the safe movement of ferry / passenger boats transiting between the Prince Philip Wharf and Jesselton Point (marked in **Figure 18** as B1, B2 and B3)
 - B1 (Location: 5° 57' 2" N, 116° 2' 16" E)
 - B2 (Location: 5° 57' 11" N, 116° 2' 26" E)
 - B3 (Location: 5° 57' 12" N, 116° 2' 10" E)
- Entrance to the Marina Breakwater
 - 2 nos. guide beacons (marked in **Figure 19** as GB1 and GB2)
 - GB1 (Location: 5° 55' 54" N, 116° 2' 15" E)
 - GB2 (Location: 5° 55' 51" N, 116° 2' 19" E)
- Entrance to Prince Philip Wharf Breakwater
 - 2 nos. guide beacon (marked in **Figure 19** as GB3 and GB4)
 - GB3 (Location: 5° 56' 40" N, 116° 2' 33" E)
 - GB4 (Location: 5° 56' 42" N, 116° 2' 32" E)

Although the coordinates of the beacons to mark the shallow reef at the foreshore of STAR are provided, these are based on navigation chart MAL 6. It is recommended that a bathymetric survey be conducted by project proponent to accurately map the reef on the foreshore of STAR.

The coral reef at the foreshore of STAR is to be marked using an isolated danger mark. Passage through the reef is to be marked with three (3) channel beacons to enhance navigation safety. The proposed locations of the aforementioned beacons are shown in **Figure 18**.

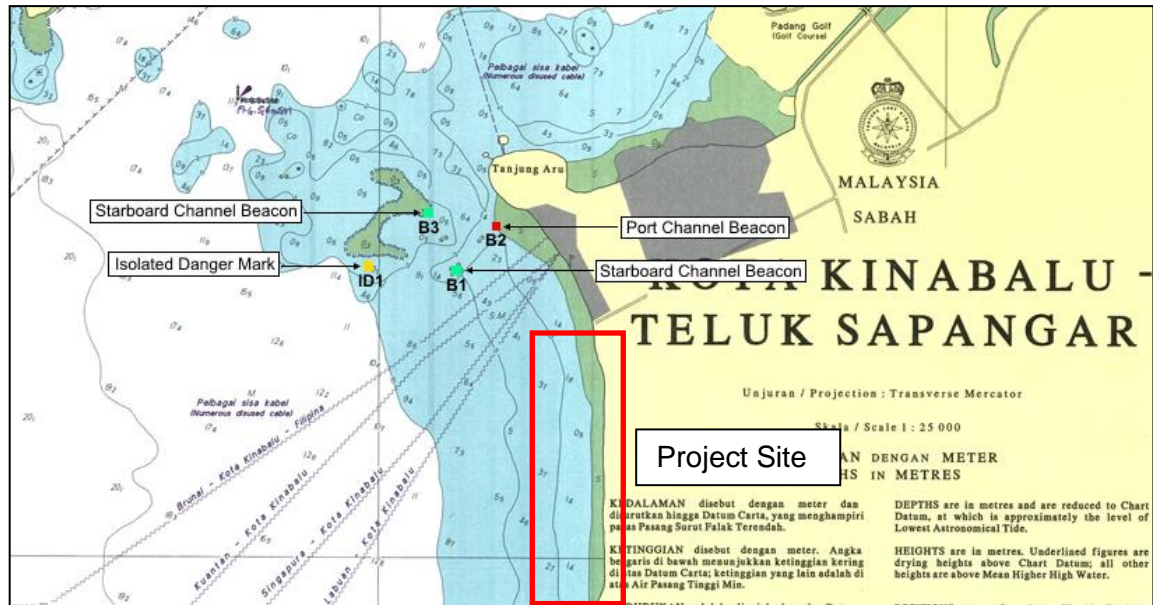


Figure 18: Proposed positions of shallow reef beacons

The sea approaches to the Marina and Prince Philip Wharf are to be marked with port and starboard guide beacons, positioned approximately 10m from the edge of each breakwater entrance. The proposed positions of the guide beacons are shown in **Figure 19**.



Figure 19: Proposed positions of entrance guide beacons

13.7.3 Typical Specifications of Proposed Buoys and Beacons

Typical specifications of guide beacons, channel beacons, isolated danger marks and portable marker buoys are given below:

Temporary Marker Buoys

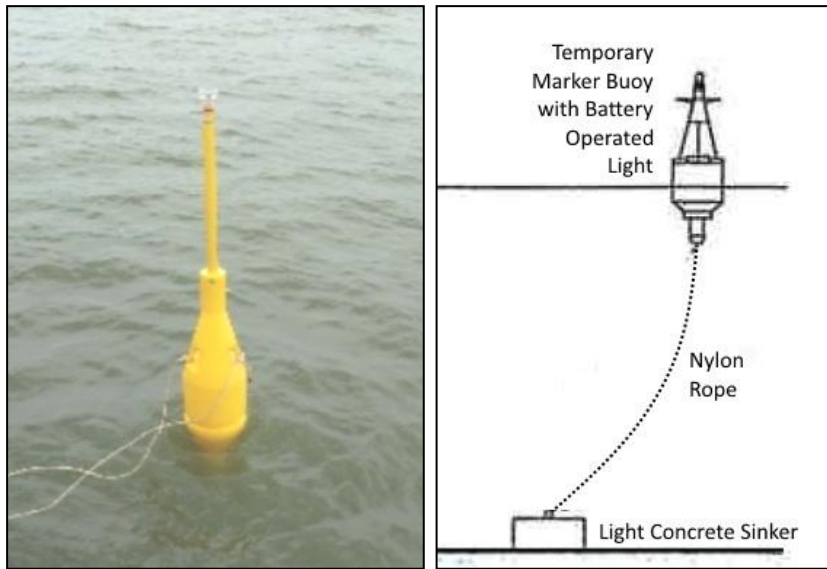


Plate 7: Sample portable marker buoy and typical configuration

Body Colour	Yellow
Lantern	High Brilliance LED Yellow
Nominal Range	1 nm
Power	Battery

Table 10: Typical specifications of temporary marker buoy

Guide Beacons



Plate 8: Photographs of port and starboard guide beacons at Sutera Harbour breakwater entrance

Typical Specification of Guide Beacon	
Main material	Mild Steel
Body colour	Red / Green
Light Source	High Power LED
Light Colour	Red / Green
Luminous Range	Not less than 7.0 nm
Power Source	Solar

Table 11: Typical specifications of guide beacons

Isolated Danger Mark (Beacon / Buoy)



Typical Specification of Isolated Danger Mark	
Body colour	White & Black
Light Source	High Power LED
Light Colour	Yellow
Luminous Range	Not less than 7.0 nm
Power Source	Solar

Table 12: Typical specifications of isolated danger mark beacon

Channel Beacons



Plate 9: Photographs of port and starboard channel beacons

Typical Specification of Channel Beacon	
Main material	Mild Steel
Body colour	Red / Green
Light Source	High Power LED
Light Colour	Red / Green
Luminous Range	Not less than 7.0 nm
Power Source	Solar

Table 13: Typical specifications of channel beacons

14.0

Conclusion

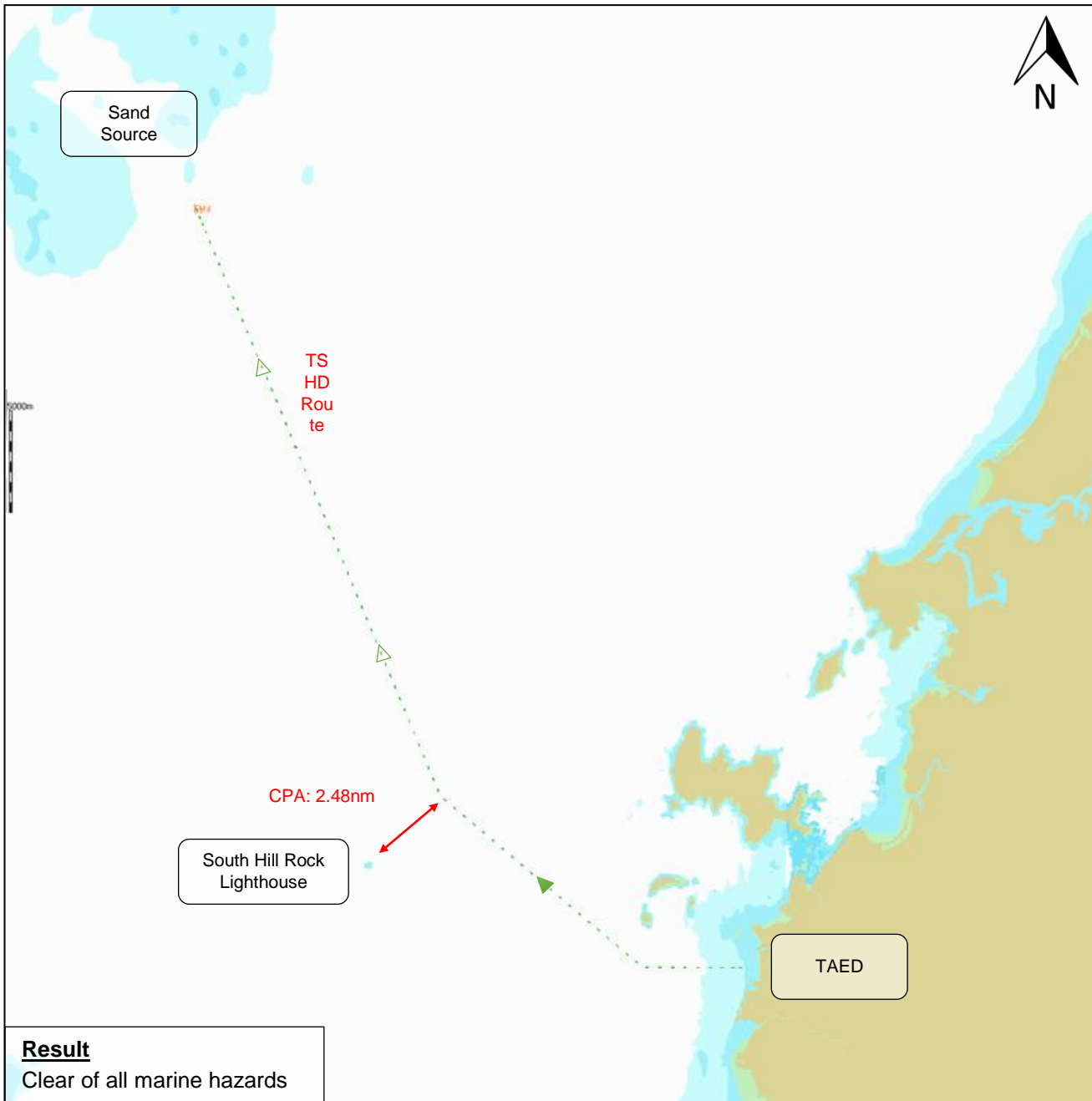
In conclusion, the proposed construction of the Marina and Prince Philip Wharf at the Tanjung Aru Eco Development will raise potential risks to safe navigation of marine traffic during the Construction as well as Operational phases of the Project. These risks can however be mitigated by due observance of the proposed risk mitigation measures contained in this report.

**Run Matrix for
Marine Traffic Risk Assessment (MTRA) for the Proposed Construction of a Marina at Tanjong Aru Eco Development**

No	Vessel				Scenario	Environmental Conditions					
	Type (Ship Model)	LOA (m)	Draft (m)	Manoeuvring Speed (knots)		Wind		Wave		Current	
						Speed (knots)	Direction	Height (m)	Direction	Speed (knots)	Direction
To assess the safe navigational approach to TAED and determine time taken to travel from Sunken Barrier Shoal to TAED (Construction Phase)											
1	Hopper Dredger	122	8.5	12	From TAED to South Sunken Barrier Shoal	10 - 15	N	1.5 (Open Sea) 0.4 (TAED)	N	0.2	SW / Ebb
2	Hopper Dredger	122	8.5	10	From South Sunken Barrier Shoal to TAED	10 - 15	N	1.5 (Open Sea) 0.4 (TAED)	N	0.2	SW / Ebb
3	Hopper Dredger	122	8.5	12	From TAED to South Sunken Barrier Shoal	5 - 10	SW	1.5 (Open Sea) 0.4 (TAED)	SW	0.2	SW / Ebb
4	Hopper Dredger	122	8.5	10	From South Sunken Barrier Shoal to TAED	5 - 10	SW	1.5 (Open Sea) 0.4 (TAED)	SW	0.2	SW / Ebb
To assess the safe navigational approach to TAED with existing marine traffics (Construction Phase)											
5	Hopper Dredger	122	8.5	12	From TAED to South Sunken Barrier Shoal	10 - 15	N	1.5 (Open Sea) 0.4 (TAED)	N	0.2	SW / Ebb
6	Hopper Dredger	122	8.5	10	From South Sunken Barrier Shoal to TAED	10 - 15	N	1.5 (Open Sea) 0.4 (TAED)	N	0.2	SW / Ebb
7	Hopper Dredger	122	8.5	12	From TAED to South Sunken Barrier Shoal	5 - 10	SW	1.5 (Open Sea) 0.4 (TAED)	SW	0.2	SW / Ebb
8	Hopper Dredger	122	8.5	10	From South Sunken Barrier Shoal to TAED	5 - 10	SW	1.5 (Open Sea) 0.4 (TAED)	SW	0.2	SW / Ebb

APPENDIX B
SHIPHANDLING SIMULATION RUN PLOTS

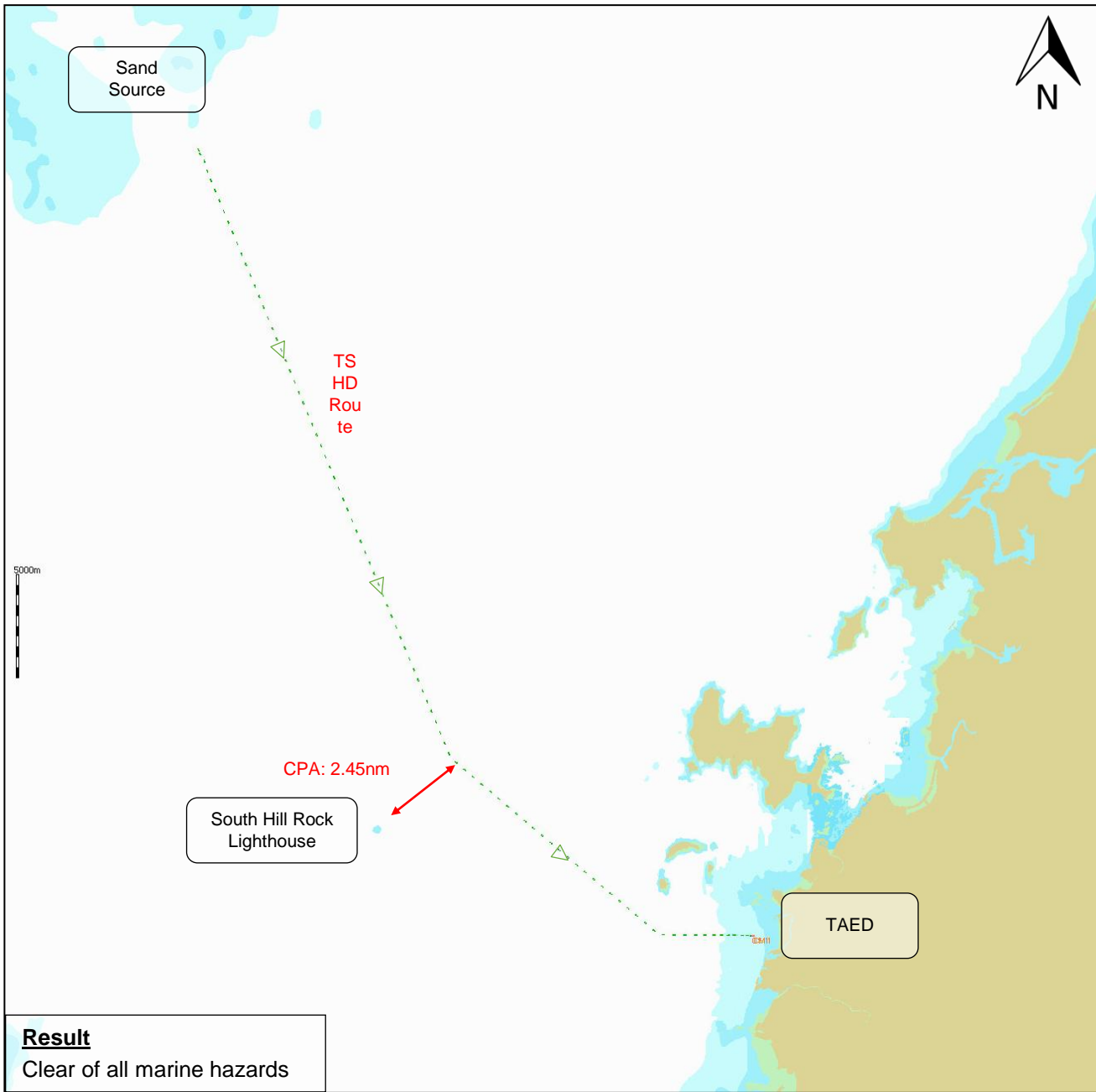
Run 1 – TSHD Passage from TAED to the Sand Source at Sunken Barrier Shoals in the NE Monsoon



Ship plotted every 2 minutes

Run No: 1	Ship Model: Hopper Dredger, 122m LOA, Loaded	Tug Assistance: No Tug
Met-ocean Conditions	Wind: 10 – 15kts, N	Wave: 1.5m (Open Sea), 0.4m (Site), N
Vessel Speed: 12 knots	Time Taken: 2 hrs 22 mins	Current: 0.2kts / SW, Ebb

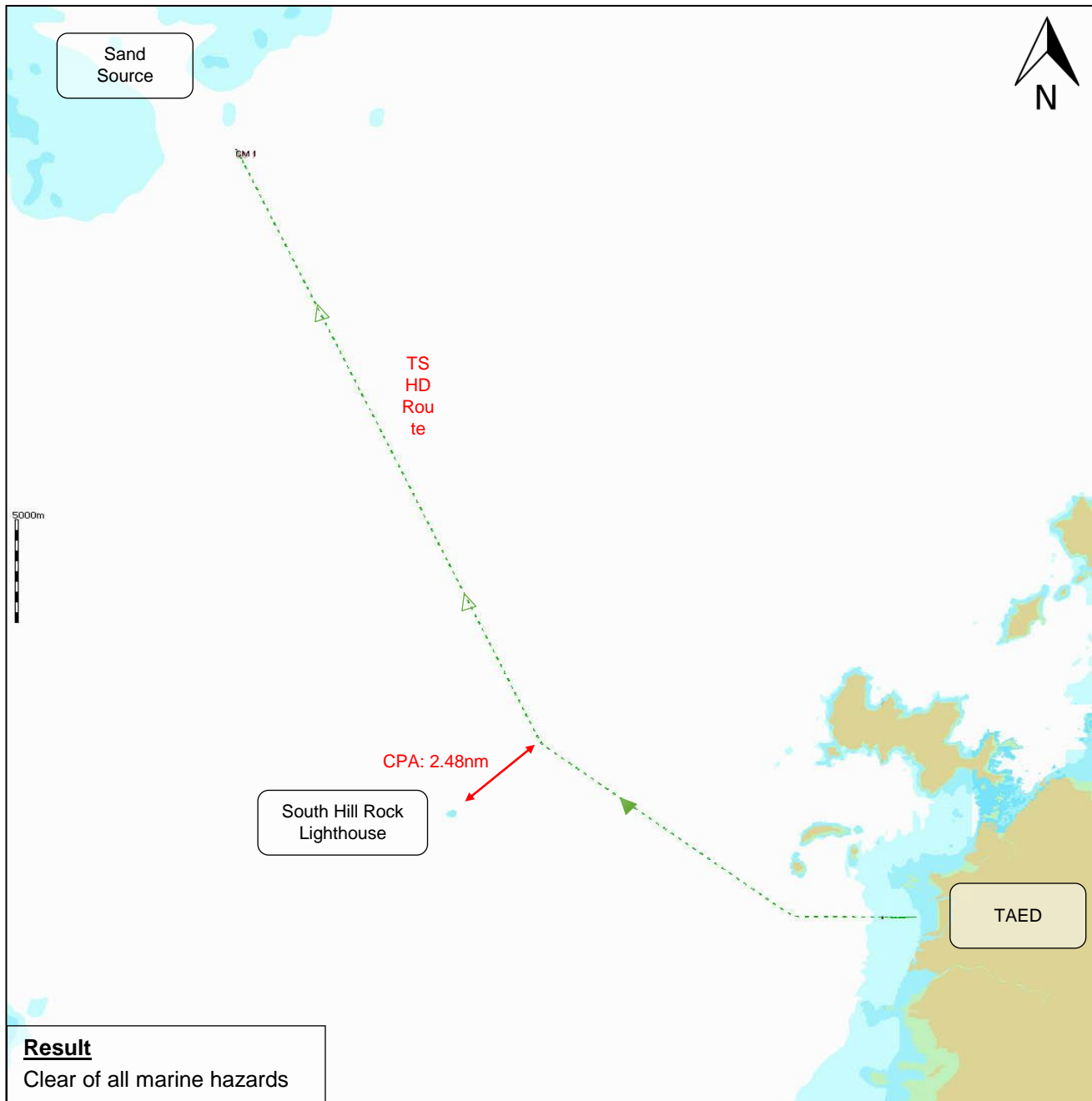
Run 2 – TSHD Passage from the Sand Source at Sunken Barrier Shoals to TAED in the NE Monsoon



Ship plotted every 2 minutes

Run No: 2	Ship Model: Hopper Dredger, 122m LOA, Loaded	Tug Assistance: No Tug
Met-ocean Conditions	Wind: 10 – 15kts, N	Wave: 1.5m (Open Sea), 0.4m (Site), N
Vessel Speed: 10 knots	Current: 0.2kts / SW, Ebb	Time Taken: 2 hrs 50 mins

Run 3 – TSHD Passage from TAED to the Sand Source at Sunken Barrier Shoals in the SW Monsoon

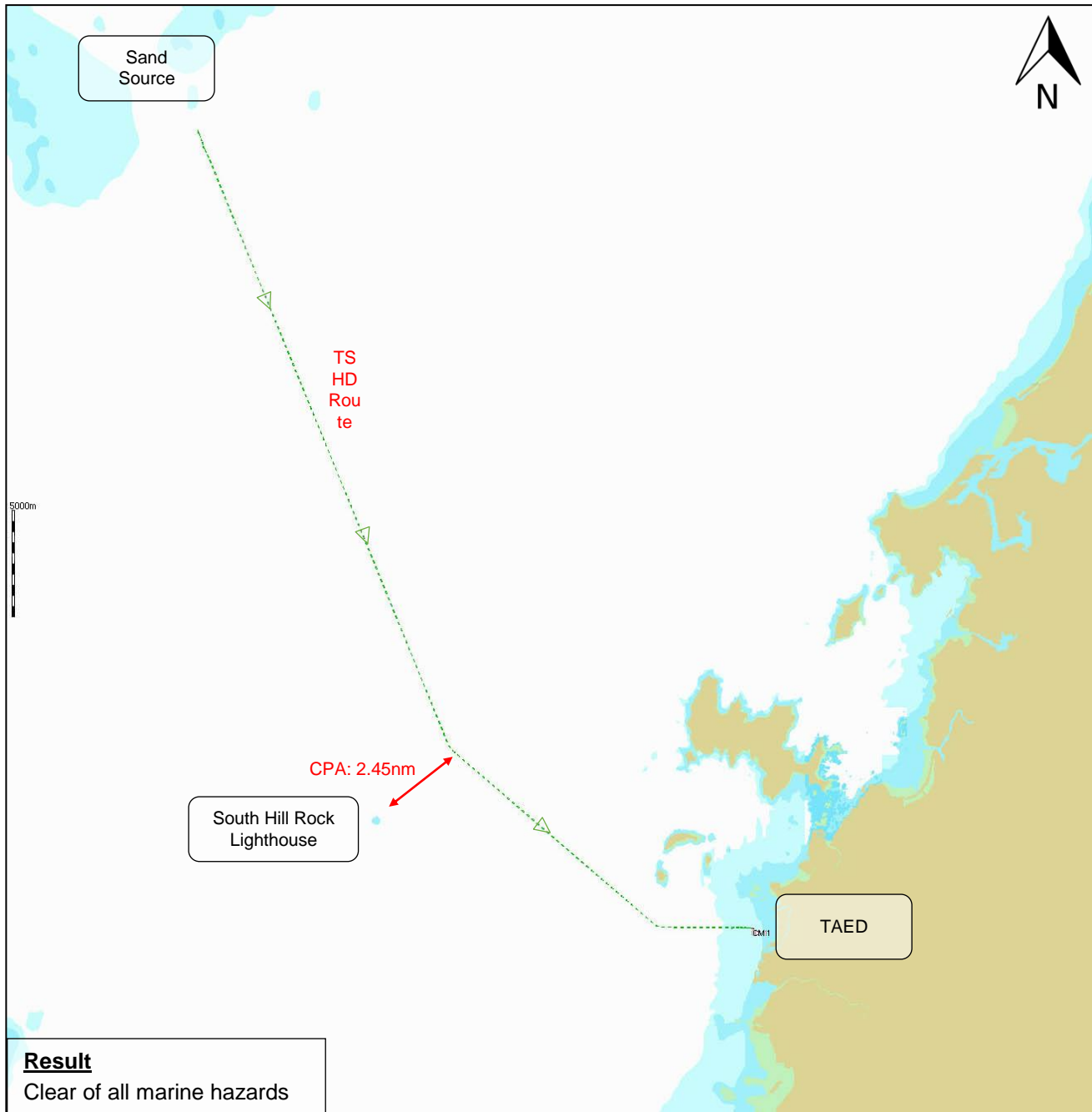


Result
 Clear of all marine hazards

Ship plotted every 2 minutes

Run No: 3	Ship Model: Hopper Dredger, 122m LOA, Loaded	Tug Assistance: No Tug
Met-ocean Conditions	Wind: 5 – 10kts, SW	Wave: 1m (Open Sea), 0.4m (Site), SW
Vessel Speed: 10 knots	Time Taken: 2 hrs 20 mins	Current: 0.2kts / SW, Ebb

Run 4 – TSHD Passage from the Sand Source at Sunken Barrier Shoals to TAED in the SW Monsoon

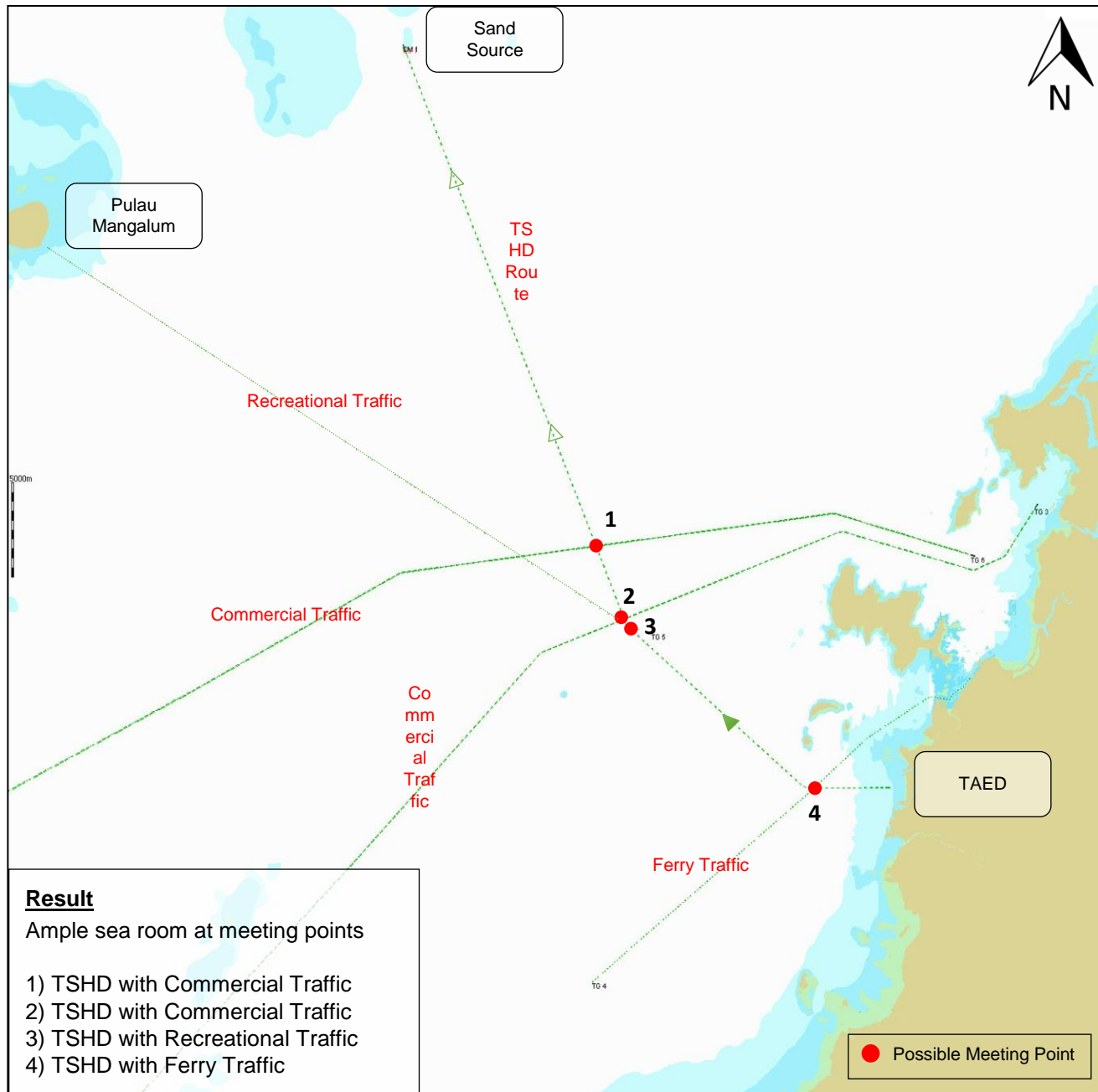


Result
Clear of all marine hazards

Ship plotted every 2 minutes

Run No: 4	Ship Model: Hopper Dredger, 122m LOA, Loaded	Tug Assistance: No Tug
Met-ocean Conditions	Wind: 10–15kts, N	Wave: 1.5m (Open Sea), 0.4m (Site), N
Vessel Speed: 12 knots	Current: 0.2kts / SW, Ebb	Time Taken: 2 hrs 45 mins

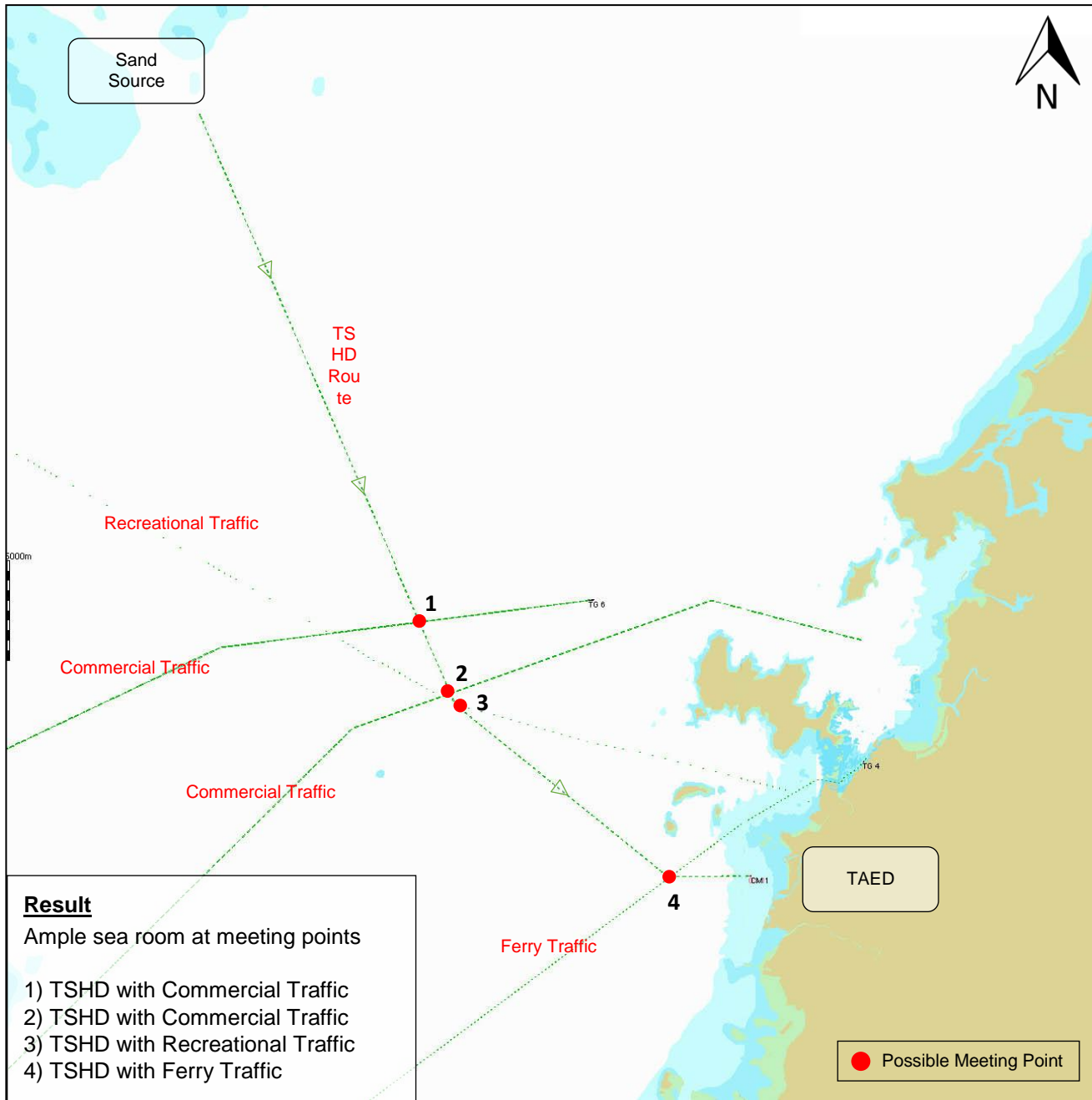
Run 5 – TSHD Passage from TAED to the Sand Source at Sunken Barrier Shoals during the NE Monsoon with Transiting Marine Traffic



Ship plotted every 2 minutes

Run No: 5	Ship Model: Hopper Dredger, 122m LOA, Loaded	Tug Assistance: No Tug
Met-ocean Conditions	Wind: 10–15kts, N	Wave: 1.5m (Open Sea), 0.4m (Site), N
Vessel Speed: 12 knots	Time Taken: 2 hrs 18 mins	Current: 0.2kts / SW, Ebb

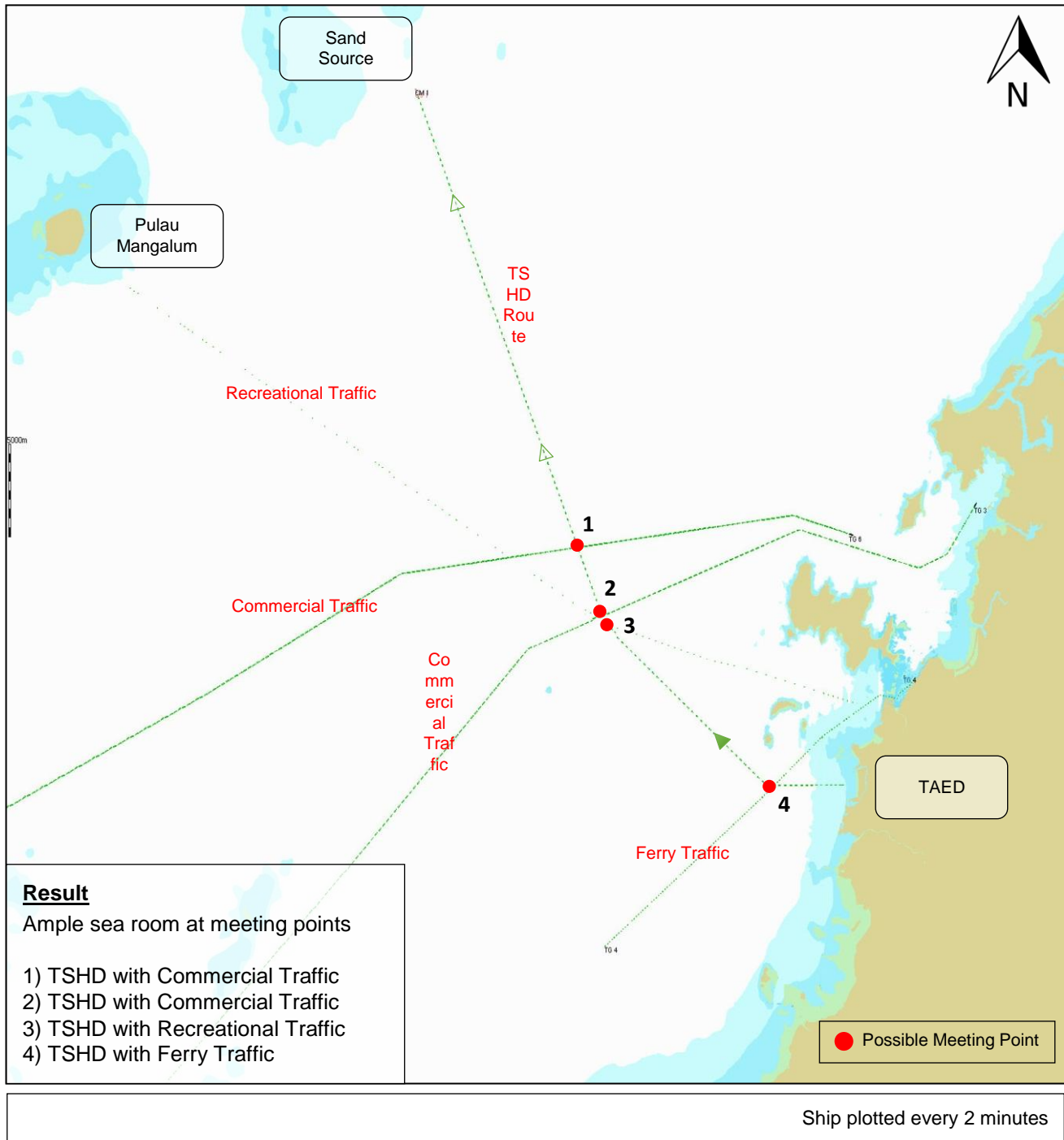
Run 6 – TSHD Route from Sunken Barrier Shoals to TAED with existing marine traffic



Ship plotted every 2 minutes

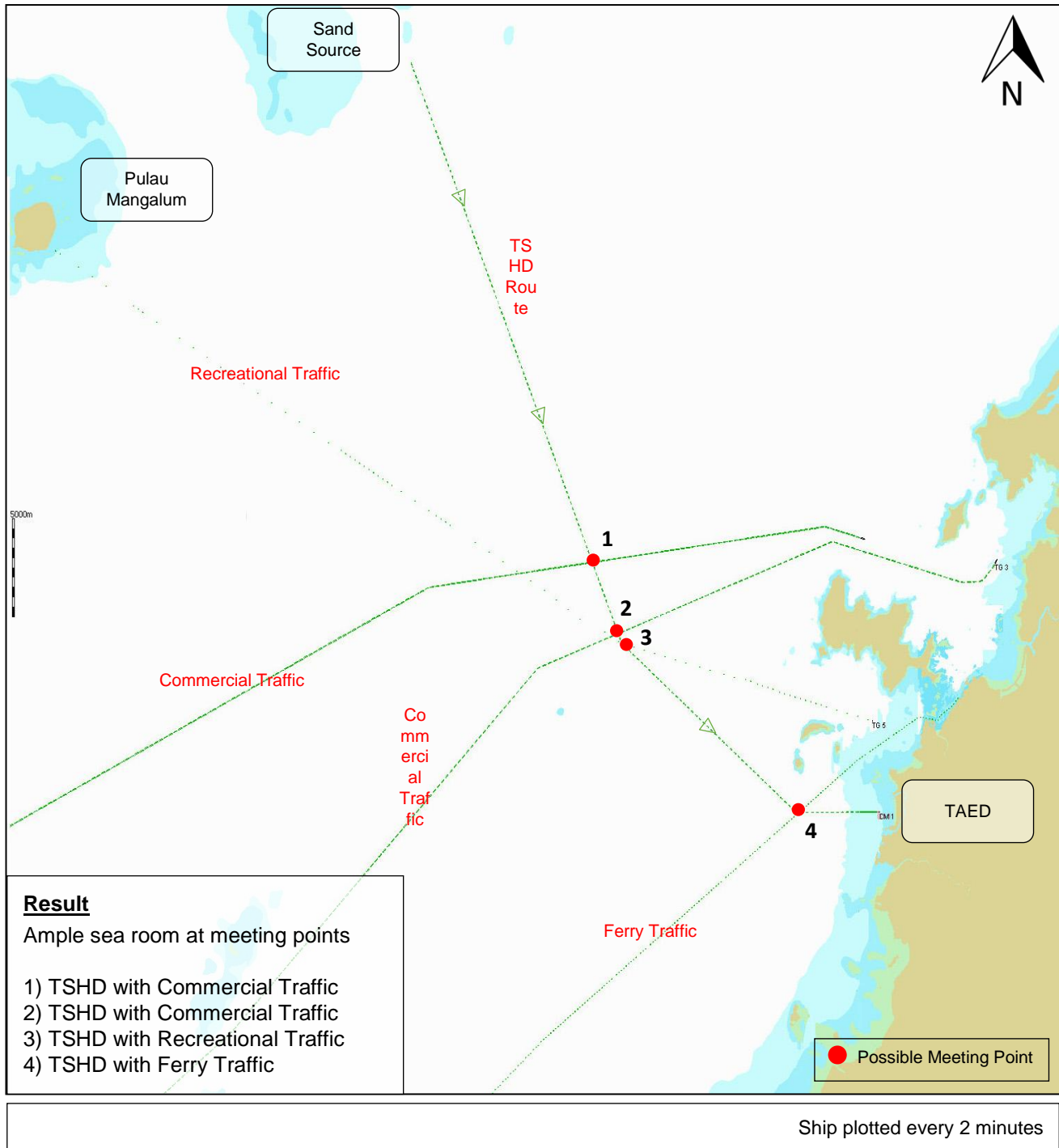
Run No: 6	Ship Model: Hopper Dredger, 122m LOA, Loaded	Tug Assistance: No Tug
Met-ocean Conditions	Wind: 10–15kts, N	Wave: 1.5m (Open Sea), 0.4m (Site), N
Vessel Speed: 10 knots	Time Taken: 2 hrs 43 mins	Current: 0.2kts / SW, Ebb

Run 7 – TSHD Route from TAED to Sunken Barrier Shoals with existing marine traffic



Run No: 7	Ship Model: Hopper Dredger, 122m LOA, Loaded	Tug Assistance: No Tug
Met-ocean Conditions	Wind: 5 – 10kts, SW	Wave: 1m (Open Sea), 0.4m (Site), SW
Vessel Speed: 12 knots	Time Taken: 2 hrs 20 mins	

Run 8 – TSHD Route from Sunken Barrier Shoals to TAED with existing marine traffic



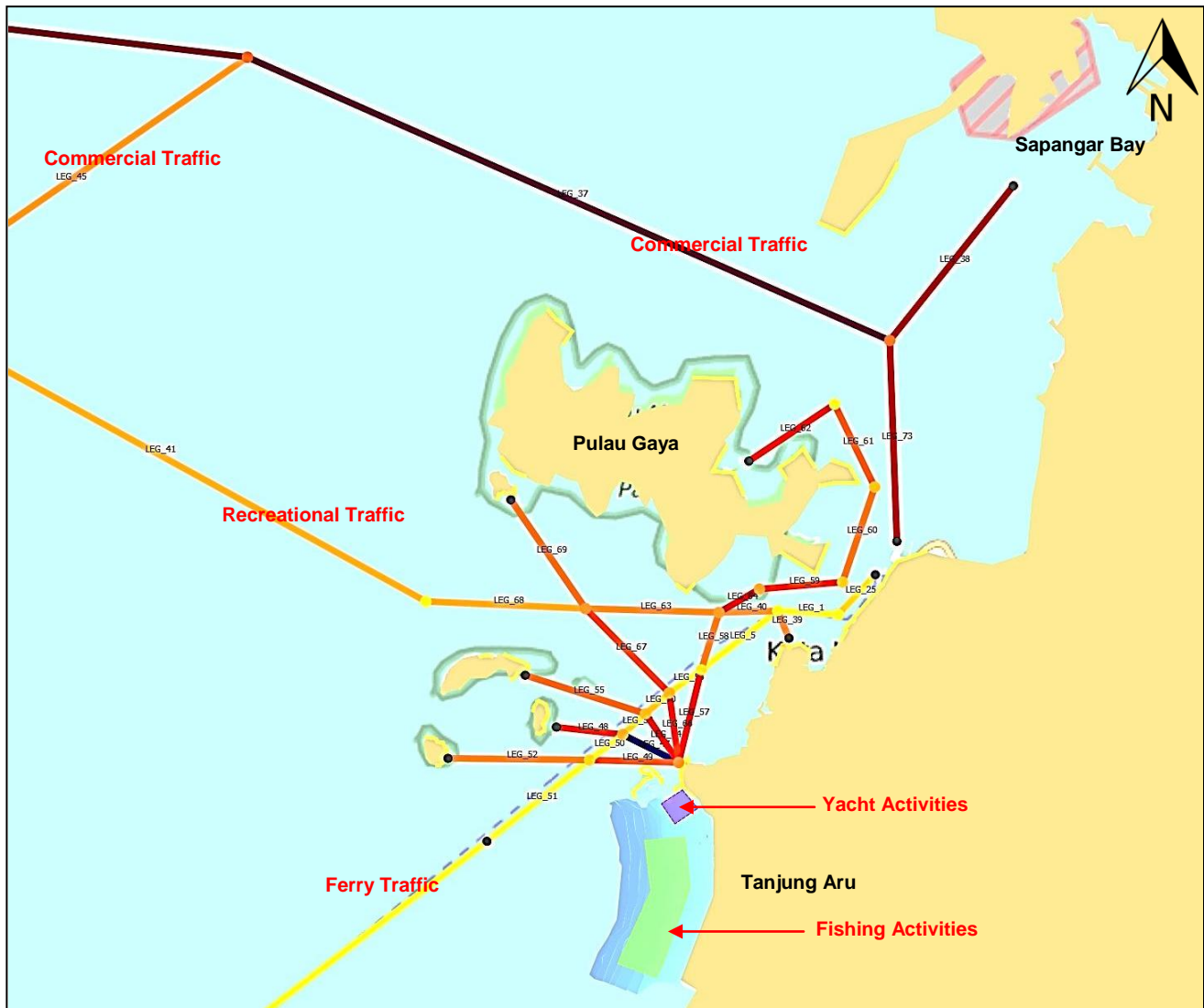
Run No: 8	Ship Model: Hopper Dredger, 122m LOA, Loaded	Tug Assistance: No Tug
Met-ocean Conditions	Wind: 5 – 10kts, SW	Wave: 1m (Open Sea), 0.4m (Site), SW
Vessel Speed: 10 knots	Current: 0.2kts / SW, Ebb	
Time Taken: 2 hrs 50 mins		

APPENDIX C
IWRAP SIMULATION RUN PLOTS

Traffic Risk Model 1 – Existing Marine Traffic (Macro View)

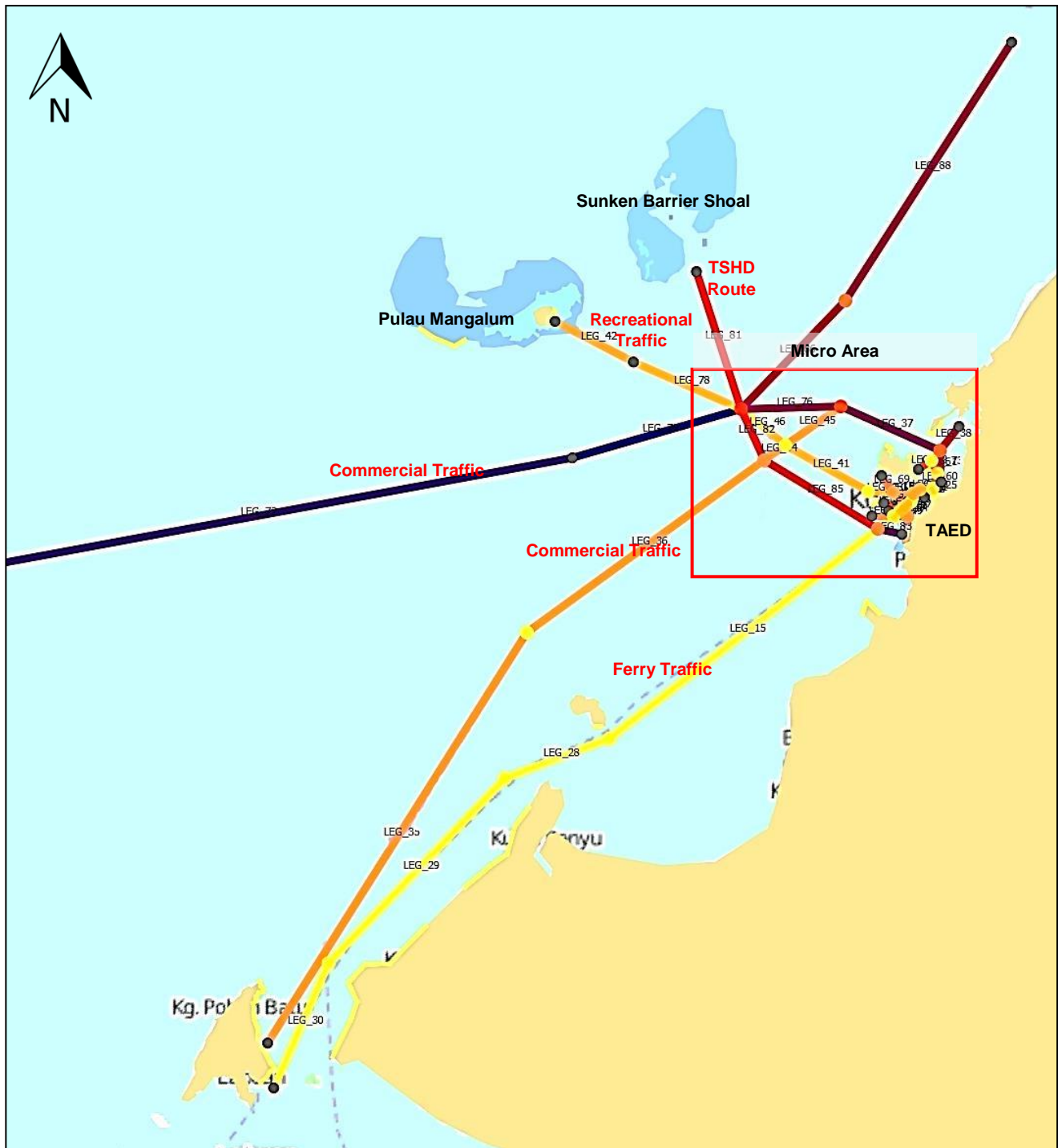


Traffic Risk Model 1 – Existing Marine Traffic (Micro View)



Type of Incidents	Unit (Year between incidents)
Overtaking	92.22
Head On	3,509.00
Crossing	1,471.00
Merging	1,281.00
Bend	220.20
Area	-
Total Collisions	58.37

Traffic Risk Model 2 – Existing Marine Traffic + TAED Construction Phase Traffic (Macro View)

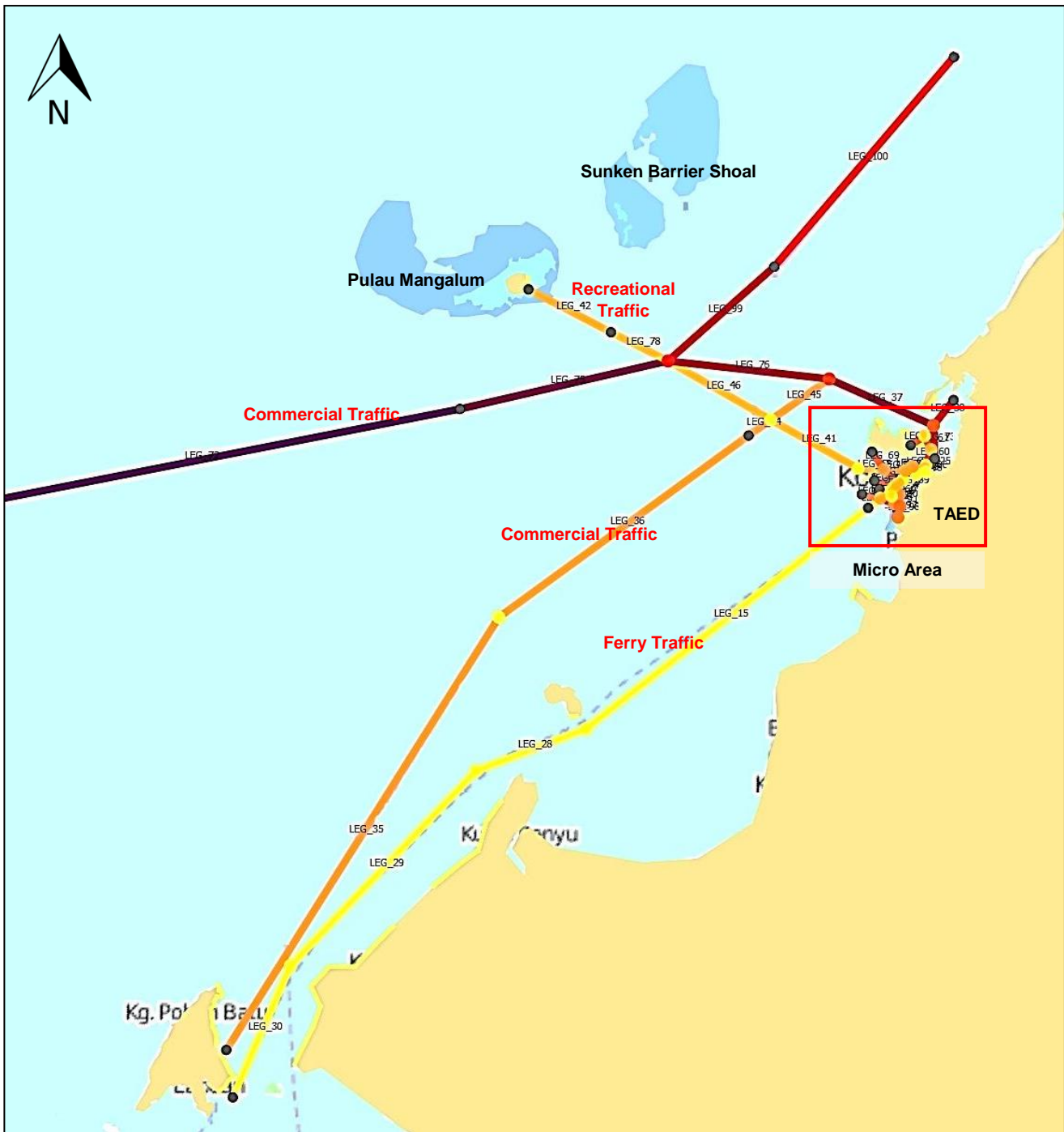


Traffic Risk Model 2 – Existing Marine Traffic + TAED Construction Phase Traffic (Micro View)



Type of Incidents	Unit (Year between incidents)
Overtaking	90.75
Head On	3,403.00
Crossing	631.10
Merging	890.30
Bend	316.80
Area	9,050.00
Total Collisions	57.84

Traffic Risk Model 3 – Existing Marine Traffic + TAED Operational Phase Traffic (Macro View)



Traffic Risk Model 3 – Existing Marine Traffic + TAED Operational Phase Traffic (Micro View)



Type of Incidents	Unit (Year between incidents)
Overtaking	89.86
Head On	3,202.00
Crossing	1,227.00
Merging	1,177.00
Bend	299.50
Area	113.6
Total Collisions	39.61

APPENDIX D
SHIPHANDLING SIMULATOR FACILITIES AT
KASI'S CENTRE FOR MARITIME SIMULATION

KASI's shiphandling simulator facilities are located in its Centre of Maritime Simulation (CMS) at its headquarters in Kota Kinabalu, Sabah. The centre is outfitted with three (3) real time shiphandling simulators as follows:

- 1) Main Bridge Simulator
- 2) Secondary Bridge Simulator
- 3) Auxiliary Simulator

The simulators are operated by the latest Navi-trainer Professional v5.30 system that has the ability to simulate the effects of met-ocean conditions and interaction effects such as bank, squat and ship-ship interaction. The input of hydraulic data in the simulation process gives it the added value of replicating the actual fluid dynamics for the study area. Running on the Seagull 6000 Visualisation System, the simulators are able to simulate 360° field of vision (FOV).

The simulator is able to simulate 6 degrees of freedom (6DoF) for all ships in any particular shiphandling simulation runs. 6DoF enable ships to react hydro-dynamically and mechanically between the environment and other ships within the simulation area. Wind, wave and current play a major role in the behaviour of the ship's pitch, yaw and roll; as well as the movement of the ship in all 6 directions.

Plate 1, 2 and 3 show the simulator facilities at KASI's CMS.



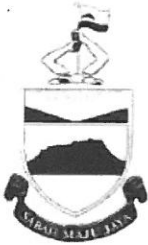
Plate 1: Main Bridge Simulator



Plate 2: Secondary Bridge Simulator



Plate 3: Auxiliary Simulator



JABATAN PELABUHAN DAN DERMAGA SABAH
(PORTS & HARBOURS DEPARTMENT)

Ibu Pejabat

Peti Surat 80164

87011 W.P. LABUAN

No. Tel : 087-412966/412453/413536

No. Faks : 087-417531 E-mel : phdepts@sabah.gov.my

<http://www.sabah.gov.my/jpds>

(Sila catatkan Rujukan fail Jabatan ini apabila menjawab)



Rujukan :

JPD.600-6/2 Jld.9 (8)

Tarikh :

29 Januari 2016

Pengarah Urusan,
KASI (Malaysia) Sdn. Bhd,
Suite 8, 10th Floor, Wisma Perindustrian,
Jalan Istiadat, Likas,
88400 KOTA KINABALU.

Tuan,

**PROJECT : Proposed Construction Of A Marina For The Tanjung
Aru Eco Development, Kota Kinabalu**
SERVICES : Marine Traffic Risk Assessment (MTRA)
SUBJECT : Draft Terms of Reference (TOR)

Dengan hormatnya saya diarah merujuk surat tuan Ruj: 01.MCO2.16.SIC
bertarikh 14 Januari 2016 mengenai perkara di atas.

2. Sukacita dimaklumkan bahawa, selaras dengan fungsi dan peranan
Jabatan ini dalam perihal Pelabuhan-pelabuhan di Negeri Sabah, Perlesenan
Kapal Kecil di bawah 15 NRT dan Kawalan Trafik Lalulintas Air dalam Had-had
Pelabuhan, Sungai-sungai dan dalam perairan Negeri Sabah, pada dasarnya
Jabatan ini tiada halangan terhadap cadangan terma-terma rujukan (TOR) bagi
penyediaan kajian MTRA untuk cadangan pelaksanaan projek tersebut.

3. Walaubagaimana pun, cadangan pelaksanaan projek yang dimaksudkan
adalah tertakluk kepada hasil kajian MTRA itu kelak.

Sekian, terima kasih.

"BERKHIDMAT UNTUK NEGARA DENGAN BERSIH, CEKAP DAN AMANAH"

Saya yang menurut perintah,

(ROSLEE SUMIN)

b.p. Pengarah,

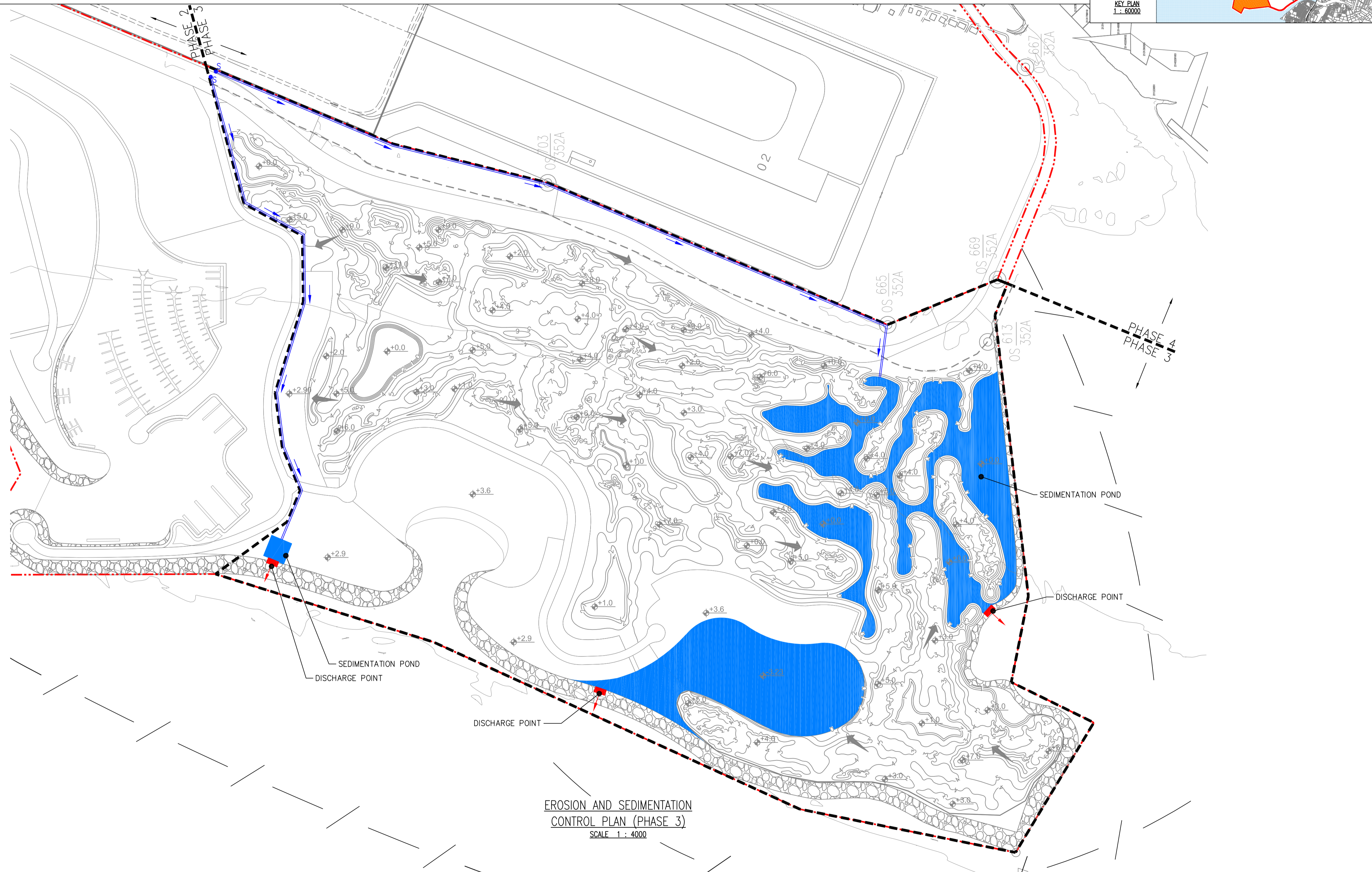
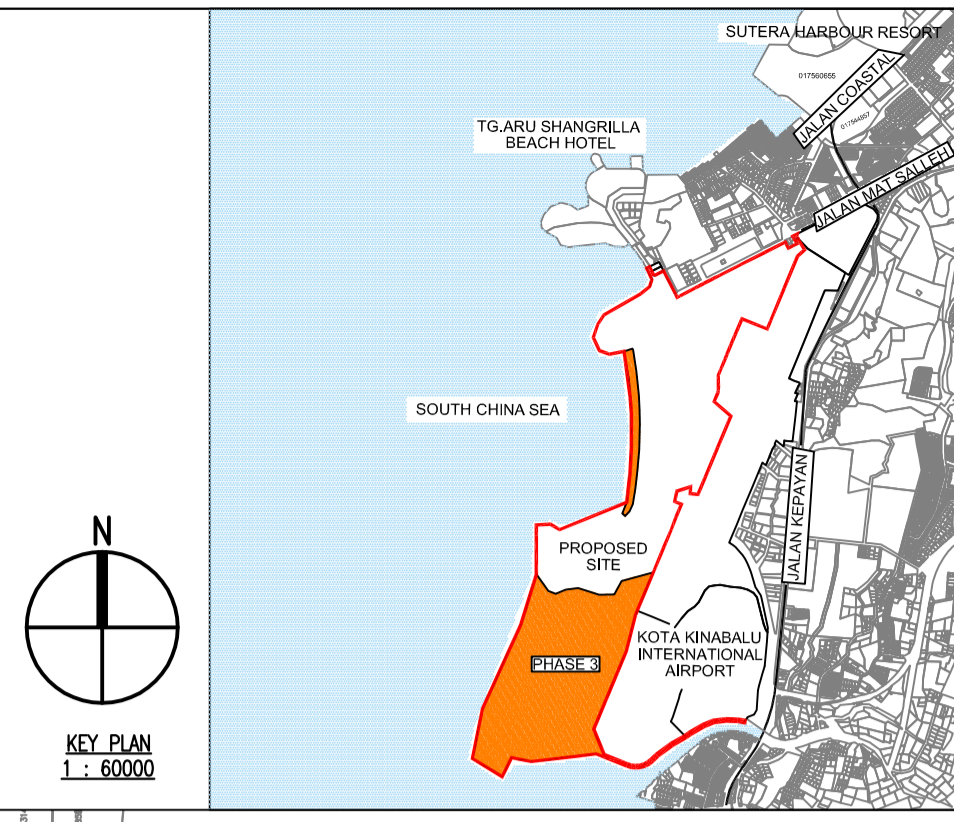
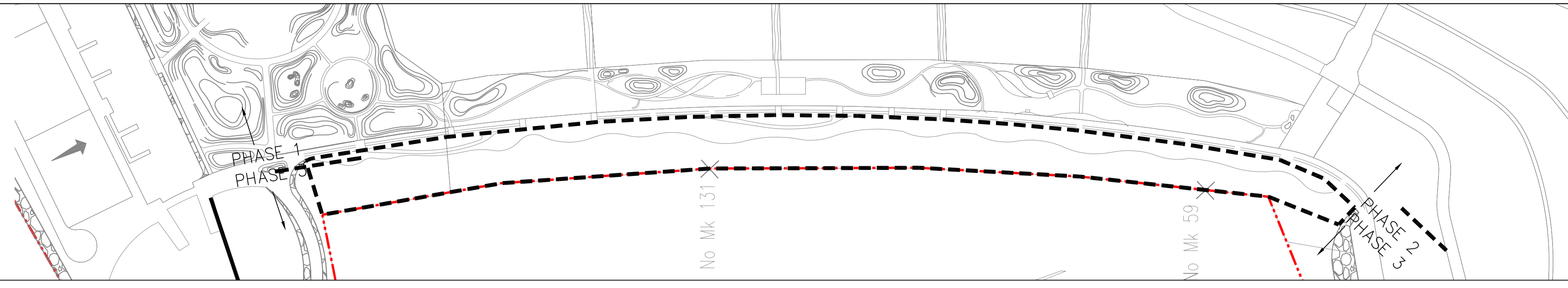
Jabatan Pelabuhan Dan Dermaga Sabah

s k Pegawai Pelabuhan,
Pelabuhan Dan Dermaga Sabah,
Bangunan Menara MAA,
Tingkat 6, Permis Suite 6-6-15,
Dan 6-6-7 Hingga 6-6-8A,
Beg Berkunci 2009,
88200 KOTA KINABALU.



APPENDIX H

Erosion and Sedimentation Control Plan

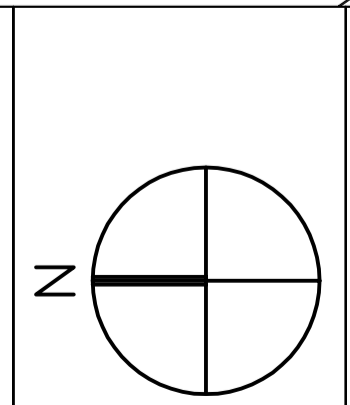


EROSION AND SEDIMENTATION CONTROL PLAN (PHASE 3)
SCALE 1 : 4000

- NOTES:**
- 1) ALL UNITS SHOWN ARE IN METERS OR OTHERWISE STATED.
 - 2) THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND SPECIFICATIONS.
 - 3) THE INSTALLATION AND ARRANGEMENT OF SILT CURTAIN ARE SUBJECT TO THE REQUIREMENT OF ENVIRONMENTAL MONITORING AND MANAGEMENT PROGRAMME CONDUCTED DURING THE CONSTRUCTION STAGE.

- LEGEND:**
- - - LOT BOUNDARY
 - SEDIMENTATION POND
 - TEMPORARY BUND
 - PHASE LINE
 - PHASE 1
 - PHASE 2
 - PHASE 3
 - PHASE 4
 - TYPICAL DRAIN
 - MAJOR DRAIN
 - FLOW DIRECTION
 - ±2.90 - PROPOSED FINISHED FLOOR LEVEL
 - S - SUMMIT
 - DISCHARGE POINT

- NOTE(S):**
1. THE CONTRACTOR MUST CHECK ALL DIMENSIONS ON SITE. ANY DISCREPANCIES IN THE FIGURED DIMENSIONS ARE TO BE REPORTED IMMEDIATELY TO THE SUPERINTENDING OFFICER. ON NO ACCOUNT MUST THIS DRAWING BE SCALED.



AMENDMENT	DATE	DRAWN & CHECKED BY	DESIGN ENGINEER	QUALIFIED PERSON



CLIENT
TANJUNG ARU ECO DEVELOPMENT SDN. BHD.
H-0-10, LOT 10, BLOCK H, METRO TOWN
JALAN BUNGA ULAM RAJA, OFF. JALAN TUARAN
88100 KOTA KINABALU, SABAH, MALAYSIA.
P.O. BOX 13115, 88835 KOTA KINABALU,
TEL: +6088-428666 FAX: +6088-434773
E-mail: admin@taed.com.my

TANDANGAN PEMAJU/DEVELOPER SIGNATURE

FOR SUBMISSION TO CLIENT

CLIENT DRAWING NO. TAED-SJ-8502 REVISION : 0

PROJECT TITLE
PROPOSED TANJUNG ARU ECO DEVELOPMENT, KOTA KINABALU, SABAH, MALAYSIA

LOT NO. : XX MUKIM NO. : XX

JOB TITLE
CIVIL AND STRUCTURAL ENGINEERING CONSULTANCY WORKS FOR TANJUNG ARU ECO DEVELOPMENT

DRAWING TITLE
EROSION AND SEDIMENTATION CONTROL PLAN (PHASE 3)

SCALE: 1:4000 A1 DATE: 29 Jun 2016

DRAWN & CHECKED BY: Diane Bulos

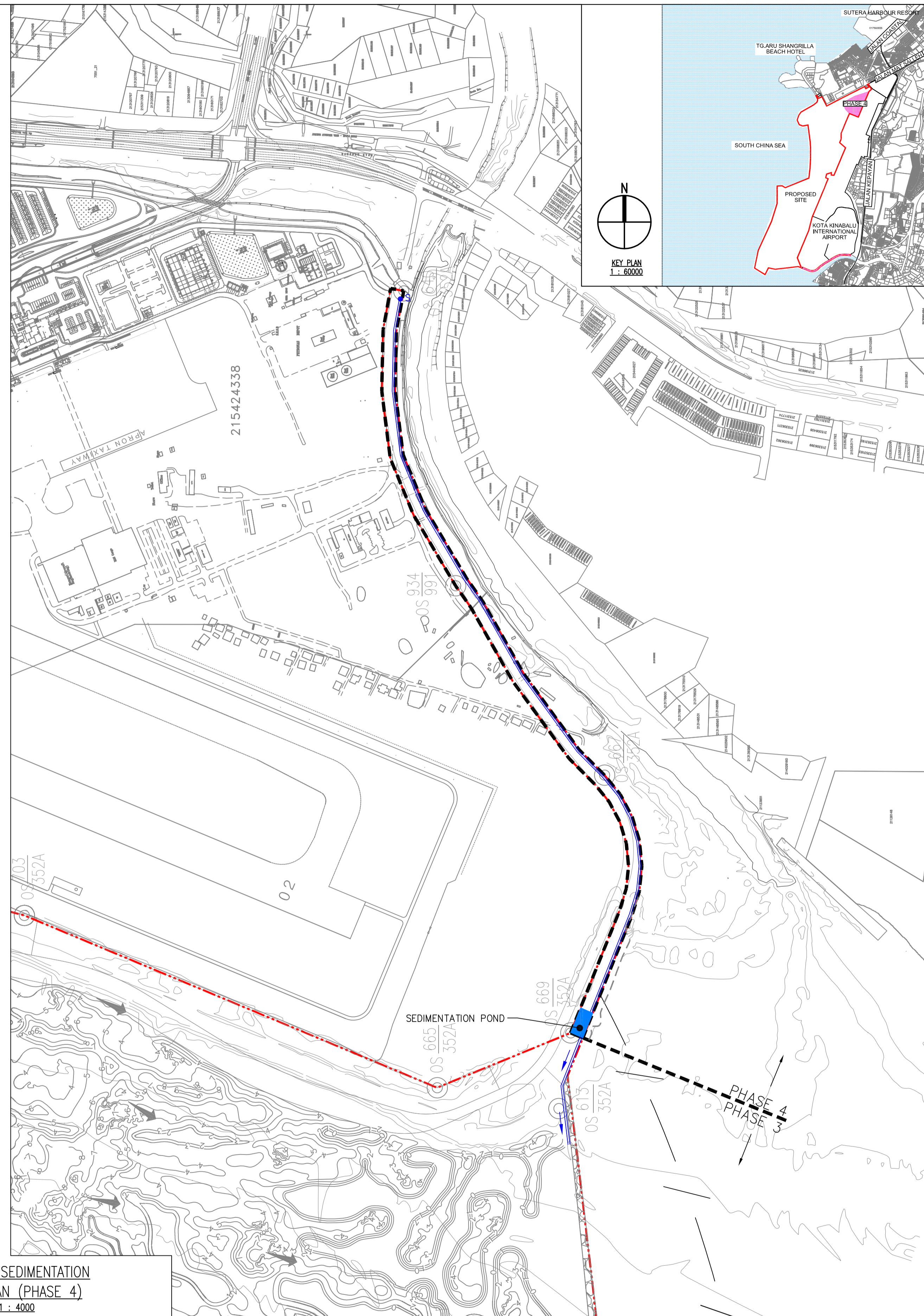
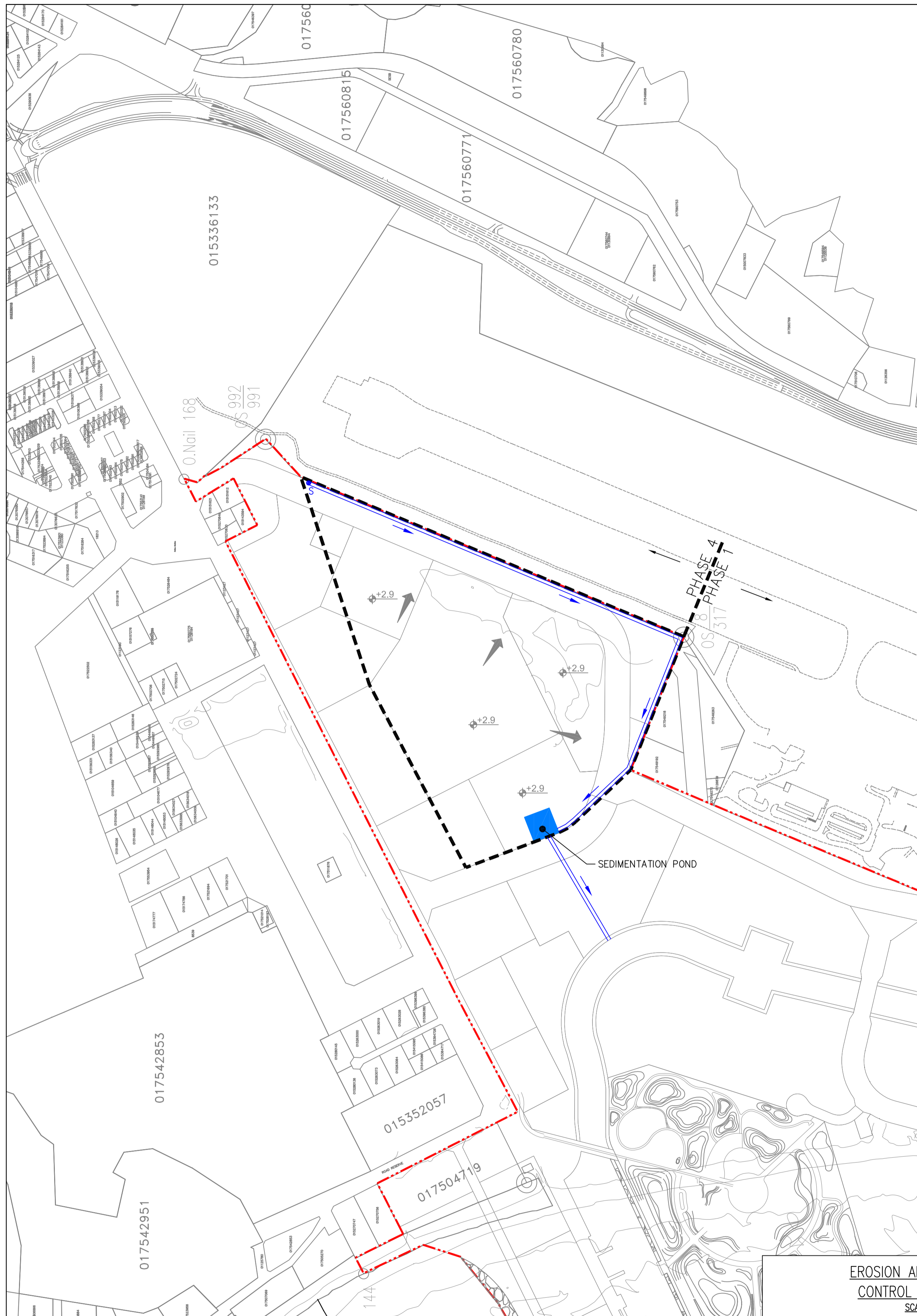
INTERNATIONAL CONSULTANT
Sj
Surbana Jurong Consultants Pte. Ltd.
168 Jalan Bukit Merah
#01-01 Connection One
Singapore 150168
Tel: +65 62481288 Fax: +65 62739090
www.surbanajurong.com
Company Regn No: 200304951Z

LOCAL / SUBMITTING CONSULTANT
JURUTERA PERUNDING CAMPO SDN. BHD.
LOT 9-5, P. 10-2, TORONG LINTAS FLAZA 1,
KEMAS PLAZA, JALAN GUNUNG
MERU, KOTA KINABALU, SABAH, MALAYSIA.
P.O. BOX 13082, 88835 KOTA KINABALU,
TEL: 088-521171, 206810
FAX: 088-520810
E-mail: sj@campos.com

SJ DRAWING NO. SJ-IF1-OSSB-E1602-CE-8500 REVISION : 0

Ir. Nicky Satyodharma Aziz DESIGN ENGINEER
Ir. Lee Lit Ming QUALIFIED PERSON

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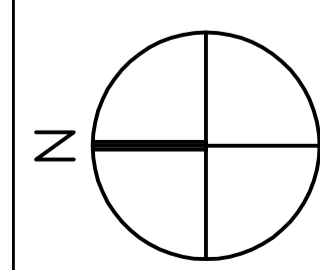
EROSION AND SEDIMENTATION CONTROL PLAN (PHASE 4)
SCALE 1 : 4000

NOTES:
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2) THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND SPECIFICATIONS.
3) THE INSTALLATION AND ARRANGEMENT OF SILT CURTAIN ARE SUBJECT TO THE REQUIREMENT OF ENVIRONMENTAL MONITORING AND MANAGEMENT PROGRAMME CONDUCTED DURING THE CONSTRUCTION STAGE.

LEGEND:

	- LOT BOUNDARY		- SEDIMENTATION POND
	- TEMPORARY BUND		- DISCHARGE POINT
	- PHASE LINE		- SUMMIT
	- PHASE 1		
	- PHASE 2		
	- PHASE 3		
	- PHASE 4		
	- TYPICAL DRAIN		
	- MAJOR DRAIN		
	- FLOW DIRECTION		
	- PROPOSED FINISHED FLOOR LEVEL		

NOTE(S):
1. THE CONTRACTOR MUST CHECK ALL DIMENSIONS ON SITE. ANY DISCREPANCIES IN THE FIGURED DIMENSIONS ARE TO BE REPORTED IMMEDIATELY TO THE SUPERINTENDING OFFICER. ON NO ACCOUNT MUST THIS DRAWING BE SCALED.



AMENDMENT	DATE	DRAWN & CHECKED BY	DESIGN ENGINEER	QUALIFIED PERSON

CLIENT

TANJUNG ARU ECO DEVELOPMENT SDN BHD
(Company No. 271806)

TANJUNG ARU ECO DEVELOPMENT SDN BHD.
H-0-10, LOT 10, BLOCK H, METRO TOWN
JALAN BUNGA ULAM RAJA, OFF JALAN TUARAN
88100 KOTA KINABALU, SABAH, MALAYSIA.
P.O. BOX 13115, 88835 KOTA KINABALU,
TEL: +6088-428666 FAX: +6088-434773
E-mail: adm@taed.com.my

LANDYANGAN PEMAU/DEVELOPER SIGNATURE

FOR SUBMISSION TO CLIENT

CLIENT DRAWING NO. TAED-SJ-8503 REVISION : 0

PROJECT TITLE
PROPOSED TANJUNG ARU ECO DEVELOPMENT, KOTA KINABALU, SABAH, MALAYSIA

LOT NO. : XX MUKIM NO. : XX

JOB TITLE
CIVIL AND STRUCTURAL ENGINEERING CONSULTANCY WORKS FOR TANJUNG ARU ECO DEVELOPMENT

DRAWING TITLE
EROSION AND SEDIMENTATION CONTROL PLAN (PHASE 4)

SCALE: 1:4000 A1 DATE: 29 Jun 2016

DRAWN & CHECKED BY: Diane Bulos

INTERNATIONAL CONSULTANT

Sj
Surbana Jurong Consultants Pte. Ltd.
168 Jalan Bukit Merah
#01-01 Connection One
Singapore 150168
Tel: +65 62481288 Fax: +65 62739090
www.surbanajurong.com
Company Regn No: 200304951Z

LOCAL / SUBMITTING CONSULTANT

JURUTERA PERUNING CAMPO SDN. BHD.
LOT 9-5, P. 10-2, TORONG LINTAS FLAFA 1,
KIVAN PLAZA, JALAN GUNUNG
MURAH KOTA KINABALU, SABAH, MALAYSIA.
P.O. BOX 13082, 88835 KOTA KINABALU,
TEL: 088-521171, 206810
FAX: 088-520810
E-mail: cpj@yaho.com

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Ir. Nicky Satyadharma Aziz DESIGN ENGINEER
Ir. Lee Lit Ming QUALIFIED PERSON

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APPENDIX I

Noise Modelling Report

Special Environmental Impact Assessment (SEIA) for the Proposed Tg Aru Eco Development, Kota Kinabalu, Sabah

Noise Exposure Assessment during the Construction Phase

1.0 CONSTRUCTION PHASE

1.1 Introduction

During the construction phase, the bulk of the noise is expected from construction activities involving demolition, reclamation, dredging and vertical construction. The noise levels will be predicted to assess their disturbance onto the sensitive receptors. For assessment purposes, the construction phase is further divided into three (3) sub-phases as follows:

- Sub-phase 1: Demolition and site clearing
- Sub-phase 2: Reclamation and dredging
- Sub-phase3: Vertical construction

1.2 Noise Sources

Table 1 presents typical noise levels from equipment and machinery likely to be used at the construction site for the three sub-phases.

Table 1 – Typical Noise Level from Construction Equipment

Sub-phase	Equipment	No.	Typical Sound Level*
Sub-phase 1: Demolition & Site Clearing	Breaker mounted on wheeled backhoe	1	95
	Pulverizer mounted on excavator	1	95
	Handheld pneumatic breaker	1	95
	Hydraulic breaker power pack	1	95
	Breaker mounted on excavator	1	95
	Dump Truck	2	96
	Excavator	4	87
	Crusher	2	95
	Lump hammer	2	88
	Dozer	1	96
Sub-phase 1: Site Clearing	Wheeled backhoe loader	2	88
	Dump Truck	2	96
	Excavator	4	87
	Crusher	2	95
	Lump hammer	2	88
Dozer	1	96	

Sub-phase	Equipment	No.	Typical Sound Level*
	Wheeled backhoe loader	2	88
Sub-phase 2: Reclamation & dredging	Trailer Suction Hopper Dredger (TSHD)	1	106
	Tug Boat	4	81
	Anchor Handling Tug Boat	2	81
	Clamshell	1	100
	Passenger Launch	5	81
	Bull dozer	4	96
	Wheel loader	4	88
	Flat Top Barge	4	88
	Excavator	4	87
	Barge	1	85
	Backhoe Dredger	2	106
Sub-phase 3: Vertical Construction – Civil & Structural Works	Hydraulic Hammer Rig	2	98
	Drop Hammer Rig	1	98
	Excavator	5	87
	Crane	3	100
	Concrete Pump	2	85
	Welding	2	102
	Dump Truck	2	89
	Backhoe loader	1	88
	Fuel tanker lorry	1	96
	Cement mixer truck	2	96
	Concrete mixer truck	3	96
	Concrete mixer	2	85
	Concrete vibrator	1	76
	Lifting platform	1	85
	Electric Driller	2	90
	Tractor	1	73
	Diesel generator	2	85
	Water pump	1	85
Water truck	1	96	

Note: *Sound level at 15m from source.

In the assessment of noise, a common statistical descriptor is L_{Aeq} . L_{Aeq} is the constant, average noise level, which over a period of time, contains the same amount of energy as the

varying levels of the background or traffic noise. The total equivalent sound level for a typical workday during a particular construction phase can be computed as follows:

$$L_{Aeq} = 10 \times \log_{10} \sum [10^{(L_{Aeq\ i} / 10)}] \text{ (dB)}$$

Where,

- $L_{Aeq, \text{ total}}$ = the total equivalent noise level for a typical workday during a given period;
- k = the number of different types of equipment; and
- $L_{Aeq, i}$ = the equivalent noise level for equipment type, i .

With the above equation, the total equivalent noise level for each sub-phase is computed and the results (to the sound level at 1m from source) are listed as follows;

- Sub-phase 1: Demolition & site clearing – 129.4 dBA
- Sub-phase 1: Site clearing – 127.1 dBA
- Sub-phase 2: Reclamation and dredging – 135.4 dBA
- Sub-phase 3: Vertical construction – 134.2 dBA

1.3 Methodology

As the construction equipment is mobile on site, conservative approach is adopted to estimate to the highest noise level on-site. The following assumptions were made in considering the worst case scenario:

- All construction equipment are operating simultaneously and they will be treated as one single point source. Noise source emission level for the single point source is estimated in the preceding section.
- A total of three single point sources are allocated for each relevant sub-phase and are located nearer to the sensitive receptors i.e Tg Aru Town, Waikiki and Kg Contoh.

The study on noise level propagation will be carried out using the CUSTIC 2.0 model where noise contours will be generated to study the impact onto the surrounding populations. The mathematical model software used, CUSTIC 2.0 provides options to model noise emissions from a wide range of sources that might be present at industrial areas and urban areas. The basis of the model is the linear sound propagation equation, which is used to model simple point source emissions from vehicles or industries. The algorithms used for the model are described as:

$$L_{p2} = L_{p1} - 20 \log r_2 / r_1 - A_e$$

Where

- L_{p1} = the measured sound pressure level at r_1 from the source (dB).
- L_{p2} = the calculated sound pressure level at r_2 , m distance from the source.
- r_1, r_2 = distance from source to measurement L_{p1} and L_{p2} , respectively
- A_e = attenuation for the distance $r_1 - r_2$, dB

1.4 Assessment Results

Result of the modeling is the noise contours generated from the noise source emission as shown in **Figure 1** to **Figure 3**. Predicted noise source emission level at the sensitive receptors due to the construction activities is also given in **Table 2**.

Table 2 : Predicted Noise Source Emission Level at the Sensitive Receptors during the Construction Phase

Sensitive Receptor	Predicted Noise Source Emission Level (approx. dBA)		
	Sub-Phase 1	Sub-Phase 2	Sub-Phase 3
Tg Aru Resort	43.9	51.0	50.2
Tg Aru Town	73.4	60.9	81.9
Waikiki	72.1	79.1	76.9
Kg Contoh / Taman Jumbo	69.8	58.1	43.4

Among the sensitive receptors, Tg Aru Town is expected to experience the highest noise source emission level, up to 82 dBA. Followed by Waikiki (up to 79 dBA) and Kg Contoh / Taman Jumbo (up to 70 dBA). Noise source emission level at Tg Aru Resort, which is located farer from the project site, is estimated up to 51 dBA.

Figure 1: Predicted Noise Source Emission Contours (10 dBA interval) during Sub-Phase 1: Demolition & Site Clearing



Figure 2: Predicted Noise Source Emission Contours (10 dBA interval) during Sub-Phase 2: Reclamation & Dredging



Figure 3: Predicted Noise Source Emission Contours (10 dBA interval) during Sub-Phase 3: Vertical Construction



It should be noted that the predicted noise source emission level is solely from the construction activities. With the baseline noise monitoring results as background noise, the cumulative ambient noise level due to the construction noise as well as the background noise is computed by the equation as follows:

$$L_{Aeq\ k} = 10 \sum_{i=1}^k (L_{Aeq\ i} / 10)$$

Where,

$L_{Aeq, total}$ = the total equivalent noise level for a typical workday during a given period;

k = the number of different types of equipment; and

$L_{Aeq, i}$ = the equivalent noise level for equipment type, i .

The equation is to add noise levels from more than one source. Hence, $i = 1, 2, 3 \dots k$. In this case, only two sources to be added together; one is noise source emission level and second is background noise level.

Sensitive receptors adjacent to the project site have been identified and baseline noise monitoring at the sensitive receptors was conducted in conjunction with the EIA study. With the baseline results as background noise, the predicted ambient noise level due to the construction noise is computed. **Table 3** shows the results of the maximum ambient noise level at the sensitive receptors.

Table 3: Predicted Maximum Ambient Noise Level at Sensitive Receptors during the Construction Phase

Sensitive Receptor	Daytime Baseline – Lmax (dBA)	Sub-Phase 1		Sub-Phase 2		Sub-Phase 3	
		Predicted Noise Source Emission Level (dBA)	Predicted Max Ambient Noise Level (dBA)	Predicted Noise Source Emission Level (dBA)	Predicted Max Ambient Noise Level (dBA)	Predicted Noise Source Emission Level (dBA)	Predicted Max Ambient Noise Level (dBA)
Tg Aru Resort	65.5	43.9	65.53	51.0	65.65	50.2	65.63
Tg Aru Town	84.2	73.4	84.55	60.9	84.22	81.9	86.21
Waikiki	73.4	72.1	75.81	79.1	80.14	76.9	78.50
Kg Contoh / Taman Jumbo	79.5	69.8	79.94	58.1	79.53	43.4	79.50

Based on the estimated results, maximum ambient noise levels at the receptors ranged from 65.53 to 86.21 dBA. Compared to the baseline condition, the noise increment is up to 2.0 dBA and it could hardly be detected by human hearing. It should be noted that the estimated values are based on worst case scenario without any control measures. Lower noise level is expected with mitigating measures take place. During the construction phase, noise level guideline limits are referred to Schedule 6 of the Planning Guidelines for Environmental Noise Limits and Control, DOE 2007 as shown in **Table 4**. The estimated noise levels are indeed below the daytime L_{max} – 90 dBA. Compliance to L_{90} and L_{10} during the construction phase could be achieved via mitigating measures and noise control management as highlighted in the following section. Close monitoring should be implemented in this regard.

Table 4: Maximum Permissible Sound Level (Percentile L_N and L_{MAX}) of Construction, Maintenance and Demolition Work by Receiving Land Use

Receiving Landuse Category	Noise Parameter	Day Time 7.00 am – 7.00 pm	Evening 7.00 pm – 10.00 pm	Night Time 10.00 pm – 7.00 am
Residential (Note 2 **)	L_{90}	60 dBA	55 dBA	*(Note 1)
	L_{10}	75 dBA	70 dBA	*
	L_{max}	90 dBA	85 dBA	*
Commercial (Note 2**)	L_{90}	65 dBA	60 dBA	NA
	L_{10}	75 dBA	70 dBA	NA
Industrial	L_{90}	70 dBA	NA	NA
	L_{10}	80 dBA	NA	NA

Source: The Planning Guidelines for Environmental Noise Limits and Control, 2007.

Notes:

- *1 At these times the maximum permissible levels are stipulated in the Schedule 1 for the respective residential density type shall apply. This may mean that no noisy construction work can take place during these hours.
- **2 A reduction of these levels in the vicinity of certain institutions such as schools, hospitals, mosque and noise sensitive premises (apartments, residential dwellings, hotel) may be exercised by the local authority or Department of Environment. Where the affected premises are noise sensitive, the limits of the schedule I shall apply.
- 3. In the event that the existing sound level (L_{90}) without construction, maintenance and demolition works is higher than the L_{90} limit of the above schedule, the higher measured ambient L_{90} sound level shall prevail. In this case, the maximum permissible L_{10} sound level shall not exceed the Ambient L_{90} level + 10 dBA, or the above Schedule L_{10} whichever is the higher.
- 4. NA = Non Applicable.

In conclusion, the proposed project is not expected to cause significant noise disturbance to the nearest receptor during the construction phase. However, the following control measures should be strictly adhered to.

1.5 Mitigating Measures

Mitigating measures below are recommended to carry out during the construction phase.

- Working hour is limited to daytime;
- All vehicles and machinery will be properly serviced and maintained to ensure good working condition, thereby reducing the possible noise emission;
- Establish hoarding and maintain vegetation belt along the terminal boundary.
- Suitable noise absorbent materials should be installed on machinery that produces high noise levels. Machinery emitting high noise shall be sited within an enclosure to reduce the noise impact; and
- Speed limit for heavy vehicles is imposed on site.

APPENDIX J

Stakeholder and Public Consultations

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1 Introduction

This section documents the consultation carried out with stakeholders and government authorities throughout the SEIA study.

1.1 Consultation

The consultation carried out with stakeholders are as documented in Table 1.1. Further details on the consultation can be found in Annex 1.

Table 1.1 List of stakeholder and date of consultation carried out.

No	Stakeholder	Date	Summary of Consultation
1	Airport	March 2016	Discussion on mainly the following issues: <ul style="list-style-type: none"> • Sewerage • Existing drainage layout • Volume of drainage water • Any other concern regarding project development
2	Jabatan Air	26 Feb 2016	Discussion mainly on concerns of the existing water pipeline system.
3	BOMBA	February and March 2016	Discussion mainly on Sewerage Treatment Plant
4	EPD	11 April 2016	Overall discussion of the environmental impact of the project development to the surrounding area.
5	DBKK – Mayor Office	15 April 2016	Concerns discussed include water quality and the associated pollution.
6	DBKK	May 2016	Discussion concentrates on the following concerns: <ul style="list-style-type: none"> • Water quality at the drainage system • Mitigation Site Plan (MSP) • Any other concern regarding the project development.
7	DBKK	19 July 2016	Discussion concentrates on the issue of KK local plan.
8	Wildlife	22 July 2016	Discussion on the existing birds in Tg. Aru and inputs on mitigation measures.
9	DBKK	26 July 2016	Discussion mainly on the hawkers stall relocation.
10	DBKK	26 July 2016	Discussion mainly on the s summary of the discussion.
11	Forestry	21 – 22 September 2016	Discussion along the mitigation measures and the condition of the existing trees.

2 Public Participation

Per the requirement of the TOR, a public participation meeting is to be held to present the findings and impacts from the study of the of the Special Environmental Impact Assessment (SEIA) Proposed Tg. Aru Eco Development Project.

2.1 Overview

The public participation event was held on the 20th August 2016 with the following objectives:

- Present the key findings and recommendations of the SEIA to the public
- Obtain feedback from the public on these findings and recommendations prior to finalising the report.

2.2 List of Invitees

The list of stakeholders invited is as shown in Table 2.1.

Table 2.1 List of stakeholders invites.

Stakeholder	Approach
General Public	Announcement at local newspaper <ul style="list-style-type: none"> - Daily Express - Chinese
	Announcement / Notices at public notice board at the following location: <ul style="list-style-type: none"> - DBKK - Perdana Park - Waikiki Condominium – Management Office - Kinabalu Yacht Club (KYC) - Kinabalu Golf Club (KGC) - STAR Resort
Professional Institution / Groups	Notices / Announcement / Email / Fax: <ul style="list-style-type: none"> - Malaysian Institute of Architects (PAM), Sabah Branch - The Institution of Engineers Malaysia (IEM) , Sabah Branch - Royal Institution of Surveyors (ISM), Malaysia, Sabah Branch - Malaysian International Chamber of Commerce and Industry (MICCI) - Kota Kinabalu Chinese Chamber of Commerce, Sabah Branch - Malay Chamber of Commerce - Bumiputera Chamber of Commerce - Kadazandusun Chamber of Commerce - Association of Consulting Engineers Malaysia (ACEM) - Sabah Woman Entrepreneur and Professional Association (SWEPA) - Malaysian Association of Tour & Travel Agents (MATTA) - SHARED A - Sabah Hotel Association (SHA) - Sabah Tourist Association (STA)

Stakeholder	Approach
NGOs	Notices / Announcement / Email <ul style="list-style-type: none"> - WWF - Sabah Environmental Protection Association (SEPA) - Environmental Action Centre Sabah (EAC)
Government Representative	Environment Protection Department (EPD) as observer DBKK as observer

2.3 Media Announcement

2.3.1 Advertisement

Advertisement was placed at local newspaper in two major language. The advertisement was placed in English and Chinese medium (See Figure 2.1).



Figure 2.1 Example of advertisement in local Chinese newspaper.

2.4 Notices

Invites in the form of notice was also forwarded to the stakeholders via emails and fax. Follow up telephone communication was also conducted to ensure stakeholders received the notice.

A copy of the notice is attached in Annex 2.

2.5 Programme

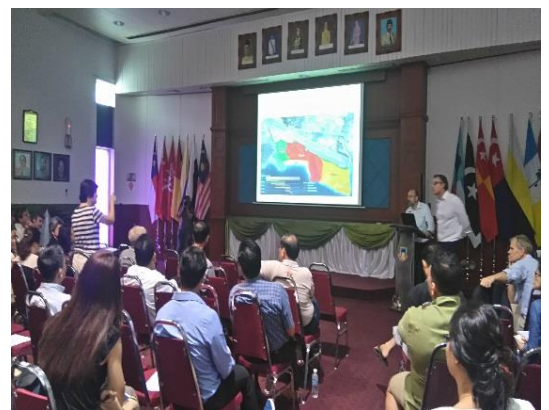
The outline of the programme for the public participation meeting is as shown in Table 2.2.

Table 2.2 Outline of the programme.

Activity	1 st Session	2 nd Session
	Morning	Afternoon
Arrival of public / registration	9:00 am	1.30 pm
Introduction on purpose of the meeting By DHI Water & Environment as the SEIA Consultant	9:30 am	2:00 pm
Description of Tg. Aru Eco Development Project & Masterplan Details <ul style="list-style-type: none"> - Project Masterplan Concept - Project Masterplan Description - Project schedule Q & A	9:40 am	2:10 pm
Rationale of the Masterplan Design Strategy and Alternatives Background on the environmental constraints that have shaped the Masterplan layout (footprint), including the alternatives considered in the process of Masterplan development Q & A	10:20 am	2:50 pm
Break	10:50 am	3:20 pm
Special Environmental Impact Assessment (SEIA) Presentation of findings and impacts on key issues of concern Q & A	11:05 am	3:35 pm
Closing Remarks	11:55 am	4:25 pm

2.6 Session

2.6.1 Morning Presentation





2.6.2 Afternoon Presentation



2.7 Feedback / Comments

A total of 73 people attended the public participation meeting over the two sessions carried on the 20th August 2016. The list of the attendance is attached in Annex 3.

A summary of feedback / comments received over the two sessions is compiled and tabulated in Table 2.3.

Table 2.3 List of feedback / comments received on the public participation meeting.

No	Comment	Action/Feedback by Proponent/ EIA Consultant
1	Further explanation on the origin of the design principles of TAED in detail.	Section 3 Project Description.
2	Explain the masterplan design strategy typically design on allotment of usage What's the rationale of the masterplan development in term of eco development? Public access in the masterplan doesn't show access to the public.	Section 3 Project Description.
3	Can the SEIA be more quantitative and supported by numbers? Who is involved in the SEIA panel for this TAED project? Explain the team and consultant involved and process undertaken for SEIA in this TAED project. In addition, the public did not involve in the meetings before this as well whereby they are the important authorities in this project.	SEIA Panel is appointed by EPD. Results of finding can be found in the report.
4	Explanation on studies which are only up to Kg. Dumpil and not until Lok Kawi coastline. Study shows there will be erosion at the coast along Kg. Dumpil. Petagas is subjected to tidal effect and flooding. Is it possible the project can be ensured no erosion along Petagas coastline and no flooding inland of Petagas? Pollutant water in Sg. Petagas, will it affect the south area since is being deflected to the deeper water? Issue such as canal, how to control water quality, drainage or Sg. Petagas? In between Sg. Dumpil and Sg. Petagas, will this TAED development affect these two (2) rivers in terms of pollution?	Section 5 Impact Assessment and Mitigation Measures
5	Please be precise on the baseline changes before and after the project.	Section 5 Impact Assessment and Mitigation Measures
6	Please quantify the impact of extracting and transporting sand for the reclamation. How many acres of the reclamation? The pumping of the reclamation will affect the marine life. Is the mitigation takes into account the TARP. Where does the sand supply obtain from typically for this project and what type of transportation will be used for transporting the sand supplies? What are the arising consequences from this sand transportation activity? Impact on offshore sand source and point A to point B. What is the prediction to the spills from dredging.	Section 5 Impact Assessment and Mitigation Measures

No	Comment	Action/Feedback by Proponent/ EIA Consultant
7	What is the traffic plan for this development? How will it address traffic congestion problem post by the development and the high traffic volume post the nearby airport passenger? Where are the access road to development? Are they sufficient?	Section 6 Socioeconomic impact Assessment and Mitigation Measures. Land traffic assessment report is also appended in Appendix F.
8	After TAED, the outlet direction will be realigned to the left. Please ensure the bend drain flow direction will not affect upstream catchment drain flow capacity or to cause flooding upstream.	Noted.
9	Clearly show the development phasing plan that is associated with common and basic infrastructures and services facilities. Basic infrastructure services such as road network, drainage system, please address the existing issues.	Section 3 Project Description.
10	In general, the EIA plan is acceptable but subject to detailed mitigation measuring approval by the authorisation concerned the sequence of earthwork reclamations. Clearly indicate the source from the sea bunds or sunken barriers as mentioned in the slides for the mitigation plan on the reports.	Section 3 Project Description.
11	Enquiry on clarification of assessment of earthworks on the air flights, noise impact to the residents.	Section 5 Impact Assessment and Mitigation Measures.
12	What is GBI?	Green building index marks in Malaysia
13	Will the phases be opened successively?	Section 3 Project Description.
14	No show of routes for public access seems all are privately owned?	Section 3 Project Description.
15	Where does the original idea/plan of this project development come from? Sabah State government or TAED themselves who proposed to Sabah State government?	This idea / plan is originated from the Sabah State government.
16	Who will enforce the design guidelines?	This will be included as part of the sales and purchase agreement.
17	Will the project affect or increase the flooding at Kg. Contoh or further south?	Section 5 Impact Assessment and Mitigation Measures.
18	Please provide water flow, water management, water impact, water movements, water pump and water control.	Section 3 Project Description.
19	What is the area or percentage that are proposed for the public area compared with the actual area of this project?	Section 3 Project Description.
20	What is the total size of the project? Why is it different from TOR?	Section 3 Project Description.

No	Comment	Action/Feedback by Proponent/ EIA Consultant
21	Storm surge is going to be an issue, such as tropical storm? Build artificial reef to help protect the beach, does it ever be considered?	Section 5 Impact Assessment and Mitigation Measures.
22	Where the top soil will be?	Section 3 Project Description.
23	Volume of earthworks, how it will affect the rivermouth, siltation gradient?	Section 3 Project Description and Section 5 Impact Assessment and Mitigation Measures.
24	North side of the project side, will it collect rubbish, traps?	Section 5 Impact Assessment and Mitigation Measures.
25	Closing beach and PPP, completely for 1.5 years? Please confirm the project schedule.	Section 3 Project Description.
26	How much of the land is reclaimed?	Section 3 Project Description.
27	What is the impact on water quality after the project is completed?	Section 5 Impact Assessment and Mitigation Measures.
28	Can it be assured that the current bird species in Tg. Aru will remain or migrate? Will it be successful if program for the conservation of the bird is to be carried out?	Section 8 Environmental Management and Monitoring Programme.
29	Will the pollutant enter the canal?	Section 5 Impact Assessment and Mitigation Measures.
30	Raising the level of the canal, what happen to the level at Prince Philip Wharf to the STAR	Section 5 Impact Assessment and Mitigation Measures.
31	Erosion on existing beach, any modelling on the sediment transportation? Any sands transported to the beach will be undesirable?	Section 5 Impact Assessment and Mitigation Measures.
32	Going to extend to shoreline out? How long and how much the distance, is around 300 m?	Section 3 Project Description.
33	Containment of the sediment pond. Will it contain the sediment?	The ESCP has been submitted and approved by DBKK.
34	How do you construct the bund? Will it be constructed first to contain the sediment	Section 3 Project Description.

ANNEXES

Annex 1

Documentation on the Consultation Session

MINUTES OF MEETING



Project No : 62800657-2
Project Title : SEIA for Proposed Tg Aru Eco Development
Subject : Local Plans

Date and Time : 19 July 2016 (2pm)
Venue : DBKK Office

Present : Stanley Chong (DBKK)
Wong Lie Lie (DHI)
Frante Nugas (SAVILLS)

Absent : -

Agenda

1. Agenda
2. Issues to discuss
3. Miscellaneous

Start of Meeting

Item	Description	Action	Deadline
1	Agenda		
	DHI started the meeting by explaining the reason for the consultation, which is to consult on the local plan status for the proposed development.	FYI	-
2	Issues to discuss		
	<p>DHI inquired on the status of the draft Kota Kinabalu local plan 2020. DBKK stated that this plan is no longer applicable in term of the proposed development.</p> <p>DBKK stated that Proponent has initiated the application for Section 6 and 7 of the Town and Country Planning Ordinance, whereby the proposed development land use status to be recognised as a township. Furthermore, DBKK also explained the process involved public consultation, public hearing, central board and approval by the TYT. It is expected that the public hearing will be carried out in August 2016. DBKK indicated that the application submitted by Proponent is in accordance to the specification required by DBKK. DBKK has advised that for the SEIA, to refer to the masterplan drawing.</p> <p>Therefore, upon approval of the request, this proposed development will then be recognised as Tg. Aru Eco Development Scheme Plan. It will then be updated and included in the draft Kota Kinabalu local plan 2020 to reflect this changes.</p> <p>However, as this application is still underway, the draft Kota Kinabalu local plan will only be updated by end of August or September 2016. Meanwhile, DBKK aims to get the scheme plan approved soonest by next year, 2017.</p>	FYI	-
3	Miscellaneous		
	<p>DHI has mentioned the interest to consult with officers responsible for solid waste management in KK region and concerning the hawkers stall relocation plan by DBKK.</p> <p>DBKK has kindly provided the officers in charge. They are as follow:</p> <p><u>Solid Waste Management</u> Mr. Robert Lipon (Head Department of Cleanliness & Surrounding Welfare) – Jabatan Kebersihan & Kesihatan Persekitaran</p> <p><u>Hawkers Stall Relocation Plan</u> Puan Noorliza Awang Alip (Asset Management Department) – Jabatan Pengurusan Harta.</p>	FYI	-

End of Meeting

Minutes Prepared by : Wong Lie Lie
Date : 19 July 2016

MINUTES OF MEETING



Project No : 62800657-2
Project Title : SEIA for Proposed Tg Aru Eco Development
Subject : Hawkers Relocation Issue

Date and Time : 26 July 2016 (11.30am)
Venue : DBKK Office

Present : Puan Noorliza Awang Alip (Asset Management Department) (DBKK)
Wong Lie Lie (DHI)

Absent : -

Agenda

1. Agenda
2. Issues to discuss
3. Miscellaneous

Start of Meeting

Item	Description	Action	Deadline
1	Agenda		
	DHI started the meeting by explaining the reason for the consultation, which is to consult on the Tanjung Aru Beach hawkers' relocation due to the proposed development.	FYI	-
2	Issues to discuss		
	<p>DHI inquired on the relocation of the Tanjung Aru Beach hawkers as mentioned by the Mayor in the newspaper (Borneo Post) dated 28 March 2016. DBKK verified the article and confirmed that the proposed new location of the Tanjung Aru Beach hawkers will be at the Anjung Selera near Likas Bay. The targeted relocation program will commenced by August / September 2016. Currently, Anjung Selera is undergoing renovation to accommodate the influx of the additional hawkers.</p> <p>DBKK has also added that consultations have been carried out with Tanjung Aru Beach hawkers and association concerning this matter. Hawkers are aware of the effort DBKK has put forward to address their concern of losing business opportunity due to the loss of business space at Tanjung Aru. Hawkers are not interested in other area that has no access to a beach view. Therefore, they were agreeable with the suggested location, Anjung Selera.</p> <p>A total of 71 lots were made available at Anjung Perdana, however not all the lots was taken up by the hawkers. Nevertheless, DBKK has ensured that the renovation of the Anjung Selera will have sufficient facilities and business lots to accommodate the agreed relocated hawkers.</p>	FYI	-
3	Miscellaneous		
	<p>DHI consulted with DBKK on the mitigation measures proposed for the displaced hawkers during construction phase. One of the mitigation measure proposed was to allow the affected hawkers to set up stall at area along the 1st Beach, as they are not interested in other area away from the beach view, other locations proposed are considered moot at this stage.</p> <p>DBKK has voiced their concern on the cleanliness issue if the hawkers are to set up stall at 1st Beach due to the lack of the necessary facilities. Instead, DBKK has confirmed that they are looking into food trucks option to cater to the local beach goers and tourist. Selective hawkers may be allow to set up stall at the car park area between the 1st Beach and STAR resort, however, the selected hawkers may only be allowed to sell packaged foods and drinks.</p> <p>DBKK has stated that they are unable to comment whether the hawkers can set up stall at the open space, an area between Yacht Club and STAR as there might be issue on right of view of the foreshore area owned by the residents beside the Jalan Aru. DBKK suggested further investigation needs to be look into on the land title.</p>	FYI	-

End of Meeting

Minutes Prepared by : Wong Lie Lie
Date : 26 July 2016

MINUTES OF MEETING



Project No : 62800657-2
Project Title : SEIA for Proposed Tg Aru Eco Development
Subject : Solid waste management

Date and Time : 26 July 2016 (2.30pm)
Venue : DBKK Office

Present : Encik Robert Lipon (Head of Solid Waste Management Department) (DBKK)
Wong Lie Lie (DHI)

Absent : -

Agenda

1. Agenda
2. Issues to discuss
3. Miscellaneous

Start of Meeting

Item	Description	Action	Deadline
1	Agenda		
	DHI started the meeting by explaining the reason for the consultation, which is to consult on the solid waste management in general as well as for the proposed development.	FYI	-
2	Issues to discuss		
	DHI inquired on the capacity of Kayu Madang landfill and were told by DBKK that the life span of the landfill has been extended to another 5 years until 2020. In the foreseeable future, DBKK will likely expand the Kayu Madang landfill.	FYI	-
	DHI inquired on the estimated waste receives per month at Kayu Madang landfill, as based on TAED Environmental and Engineering Validation Report, Cundall and SMEC, 2014, it has stated 9,000 tonnes / month. DBKK verified that currently the landfill is receiving up to 800 tonnes / day. Bearing in mind that Kayu Madang receiving wastes not only from KK itself, but also from nearby districts councils.	FYI	-
	DHI inquired on the rate to calculate the domestic household for operation phase. DBKK verified that the rate to be based is 1 kg/capital/day.	FYI	-
	DBKK inquired on whether waste disposal application has been undertaken by Proponent to dispose of the construction waste at Kayu Madang. DHI informed that this will likely be carried out by the appointed contractors. In addition, during construction phase, DBKK informed that the contractors are responsible to provide roll-on, roll-off waste container collection on site and the waste collection and disposal to be carried out by the contractors themselves.	FYI	-
3	Miscellaneous		
	DBKK informed that for operation phase, lot owners or lot operators are responsible to carry out organic waste composter machine/ organic waste recycling machine / food waste treatment solution or similar, in-house.	FYI	-
	DBKK also informed that a central bins for all the lots in the proposed development to be provided for waste collection during operation phase. House to house collection is not recommended.	FYI	-

End of Meeting

Minutes Prepared by : Wong Lie Lie
Date : 26 July 2016

MINUTES OF MEETING



Project No : 62800657-2
 Project Title : SEIA for Proposed Tg Aru Eco Development
 Subject : Wildlife (Bird)

Date and Time : 22 July 2016 (9.30 am)
 Venue : Wildlife Department Office

Present : En. Peter Malim (WILDLIFE)
 Wong Lie Lie (DHI)
 Frante Nugas (SAVILLS)

Absent : -

Aoa sdua

Agenda

1. Agenda
2. Issues to discuss
3. Miscellaneous

Start of Meeting

Item	Description	Action	Deadline
1	Agenda		
1.1	DHI started the meeting by explaining the reason for the consultation, which is to consult on the wildlife specifically bird status and mitigation plans for the proposed development.	FYI	-
2	Issues to discuss		
2.1	DHI presented the Preliminary SEIA EMP specifications for bird management to WILDLIFE and did an overall explanation of what it entailed. WILDLIFE was receptive and agreeable to the mitigation measures outlined. Explanation was done on mitigation measures such as bird nest boxes around the identified location as specified in the specifications as well as monitoring required to be carried out before, during and after construction phase. In addition, WILDLIFE has informed that currently a program building bird nest imitation for hornbill is being carried out at Kinabatangan Centre by NGO HUTAN. The program has been underway for 1 year.	FYI	-
2.2	WILDLIFE requested they be informed by TAED before construction starts. DHI assured WILDLIFE that this will be part of the requirement as outlined in the EMP mitigation measures. Furthermore, consultation with WILDLIFE will also be carried out to collaborate on the bird nest imitation efforts for the project.	FYI	-
2.3	WILDLIFE also indicates that last option beside bird nest imitation could be capture and release method. The birds will be captured and translocated to a similar environment / habitat, likely option being at TARP forest reserve and Crocker Range Forest Reserve. However, WILDLIFE has also stated that they have never captured adult hornbill before. Besides that, the enormity of the task to capture and release the birds in Tg. Aru is too big and might not be feasible without further in-depth study into the movement and routines of the particular birds.	DHI to include capture and release as the last resort in the mitigation plans.	-
3	Miscellaneous		
3.1	DHI has inquired on the fallen juvenile hornbill that was reported in Tg. Aru 2 nd Beach recently. WILDLIFE stated this will be under the jurisdiction of Wildlife Rescue Unit (WRU) and is not able to response on that. DHI has inquired the SOP for captured wildlife in Sabah, and it was stated that the SOP was to transfer the captured wildlife to the nearest wildlife facilities for inspection and care. In this case, as the hornbill is still juvenile, it will likely be transferred to the wildlife centre.	FYI	-

MINUTES OF MEETING



Item	Description	Action	Deadline
3.2	DHI also inquires any known bird specialists that are not attached with Wildlife Department. WILDLIFE was not able to recommend any at this stage, however, emphasis that we look into contacting HUTAN (NGO) through WILDLIFE for a collaboration efforts when implementing the EMP for the project.	FYI	-

End of Meeting

Minutes Prepared by : Wong Lie Lie

Date : 22 July 2016

MINUTES OF MEETING



Project No : 62800657-2
Project Title : SEIA for Proposed Tg Aru Eco Development
Subject : Meeting with Airport Authorities

Date and Time : March 2016

Agenda

1. Issues to discuss
2. Miscellaneous

Start of Meeting

Item	Description	Action	Deadline
1	Issues to discuss		
	Sewerage: (a) STP adjacent to the BOMBA site is not connected to the JKR line as yet. It is still in use; (b) MAB provided that the existing drainage is working as intended. However, back-flush was on one occasion experienced at a high-tide during a wet season. (c) MAB provided there are no anticipated increase to the volumes of drainage water.	FYI	-
2	Miscellaneous		
	To the question as to whether the airport had any comments with respect to earth mounds (up to 3 m high) along the airport's perimeter, consultant commented that the airport has concerns with respect to attraction of birds.	FYI	-

MINUTES OF MEETING



Project No : 62800657-2
Project Title : SEIA for Proposed Tg Aru Eco Development
Subject : Meeting with BOMBA Authorities

Date and Time : February and March 2016

Agenda

1. Issues to discuss

Start of Meeting

Item	Description	Action	Deadline
1	Issues to discuss		
	Sewerage Treatment Plant: (a) That part of the site was affected by the airport's existing sewerage treatment facility. (b) The Manager of Engineering from the airport indicated they, into the future, were considering decommissioning the facility and tapping into the new sewer line being constructed and we briefly talked about the timing of same. (c) KKIA has built a STP which appears to be encroaching into the site.	FYI	-

MINUTES OF MEETING



Project No : 62800657-2
Project Title : SEIA for Proposed Tg Aru Eco Development
Subject : Meeting with DBKK Authorities

Date and Time : May 2016

Agenda

1. Issues to discuss

Start of Meeting

Item	Description	Action	Deadline
1	Issues to discuss		
1.1	Drainage at network 1 has a record of having the highest contaminated water with <i>E. coli</i> exceeded the permissible level. Consultant is advised to incorporate a system that can allow the seawater to mix and flush into the drainage system effectively.	FYI	-
1.2	Operations and maintenance of infrastructure, including public utilities, i.e. water and sewer. DBKK explained the Authorities require clarification on this, preferably prior to the lodgement of the MDP – i.e. this matter is to be resolved prior to the finalisation of the MDP;	FYI	-
1.3	DBKK wish for the MDP to be as complete as possible upon lodgement and they do not wish to see multiple iterations associated with the submission; Soil Investigation Reports are to be submitted to DBKK. DBKK asked to the levels and whether the individual lots potentially were to be topped up later.	FYI	-
1.4	DBKK raised concern regarding potential basement parking, e.g. associated with hotels and the parking building, due to the high ground water levels [average mean water table levels of 1.4 m] and due to the vicinity to the sea;	FYI	-
1.5	DBKK requested clarity regarding land ownership and possession to be established prior to early-works.	FYI	-
1.6	DBKK stated that the Mitigation Site Plan (MSP) should include temporary hoarding, demolition of existing buildings at the site, wash bay, engineering slope protection measures such as retaining structures along the cut and fill embankments or at the site boundary.	FYI	-

MINUTES OF MEETING



Project No : 62800657-2
 Project Title : SEIA for Proposed Tg Aru Eco Development
 Subject : Presentation on the potential environmental impact of the proposed development.

Date and Time : 11 April 2016

Agenda

1. Issues to discuss

Start of Meeting

Item	Description	Action	Deadline
1	Issues to discuss		
1.1	The Chair raised the question about transport of soil / earth material, DHI replied there would be transport of material via sea from the off-shore Sand Source site, within the site and to and from the site during the construction of the project.	FYI	-
1.2	To the question as to whether the levels would be raised, DHI replied that due to the allowance for sea level rise, the levels of the site had to be raised to counter the risk of future flooding – noting that the present site is very low-lying and hence will be prone to future flooding.	FYI	-
1.3	Poon Chee Kong, the Director of Engineering Department, DBKK suggested the levels were relatively high. DHI indicated this was a balance between designing for flood risks and not wanting the levels too high for aesthetic and cost considerations. The drainage will be designed to recycle the water for irrigation with only overflows to accommodate larger rainfall events. The canal will act as drain and the re-direction of the main drain from the airport would be accommodated for.	FYI	-
1.4	The issue of Avi Fauna and the importance of the area being a bird habitat was raised by the Chair, including the comment of potentially feeding the birds during the construction of the project and the importance of working closely with the Sabah Wildlife Department. DHI commented that one of the key pre-construction mitigation measures is the establishment of nesting boxes for some of the key bird species found on site. There is further a requirement for feeding and monitoring during construction.	FYI	-
1.5	DHI further recommended engaging a specialist and coordinating with locally based ornithologists, based on recommendations from the Wildlife Department.	FYI	-
1.6	DHI also expressed the importance of screening of suitable sites, in consultation with the Wildlife Department and the undertaking of a survey to determine suitable trees, numbers of nesting boxes required for each site, design, testing and fabrication of nesting boxes and monitoring of the nesting boxes across the sites.	FYI	-
1.7	DHI confirmed that baseline monitoring prior to construction, during construction and post-construction monitoring would be undertaken.	FYI	-
1.8	DHI further elaborated on some of the mitigation measures that can be undertaken during construction, such as the control of the dredging spill rates and the installation of silt curtains – noting that silt curtains may not be effective at site and a better option is likely to be control and adaptive management of the runoff and dispersion of fines from the site.	FYI	-
1.9	Carefully plan and control the pumping of dredged material to site and engage in mitigation measures, such as the installation and maintenance of siltation basins.	FYI	-
1.10	With respect to coastal morphology; the Director of EPD raised the issue of potential flooding of the Sg. Patagas River; to which DHI replied that modelling had shown that there are no direct impacts to flood release, and they did not consider there would be a longer term issue related to back-water effects from potential build-up of sediment in the river mouth. The KKIA's runway extension already blocked the northward path of the sediment, and the further extension seaward of the project would hence only have a secondary effect in terms of limited additional wave sheltering. It was further noted that the flood release channel from the Moyog River to Sg. Putatan had a positive effect on flood release,	FYI	-

MINUTES OF MEETING



Item	Description	Action	Deadline
	and the TAED scheme could be incorporated with a river mouth training scheme by DID if this should be moved forward for implementation.		
1.11	The Manager of the Malaysia Airports raised the query of setting aside an area adjacent to the airport for a private jets; to which DHI replied it had been discussed during an earlier phase of the project, but that it was not part of the present SEIA considerations.	FYI	-
1.12	The DCA Manager further raised concern about the airport drainage and the potential for flooding; to which DHI replied the works will have to be designed to ensure drainage is maintained both during construction and in the final layout which is covered as part of the earthworks plan during construction and the final drainage plan.	FYI	-
1.13	Mr. Johnli, DCA Deputy Director, DCA stated that TAED should come to DCA if they had any issues during the project pertaining to the airport.	FYI	-
1.14	A question was further raised about the ground water and the potential impact the dredged channel may have on the existing ground water level and the risk of saline intrusion to the ground water. A further risk is the risk of flooding at the southern end of the development. DHI replied these potential impacts and associated risks will be considered in the final SEIA pending the completion of the Master Plan and the detailed design. The study of and potential effect on the riverine outflow would be incorporated in the final SEIA.	FYI	-
1.15	The Master Planner further commented the master plan design was to capture as much water as possible and recycle it as part of the development.	FYI	-
1.16	A question was raised about the potential erosion of the beach and potential impact on nearby areas. DHI replied that the impacts would be limited to the adjacent beaches. The new beach is designed to be morphologically stable, while monitoring and mitigation was proposed in the SEIA for the adjacent beaches to Tg. Dumpil and Tg. Aru.	FYI	-
1.17	The Director of EPD asked to review the final master plan, in particular the configuration of the coastline and he commented on the curvature of the coastline; to which DHI replied that the original layout was designed with the curvature to capture part of the potential rubbish and fine sediments from the Sg. Patagas River and create the possibility of a mangrove habitat. The configuration is now being changed to allow for more mangrove habitats within the golf course, and the new configuration would be tested in the hydraulic models.	FYI	-
1.18	<p>The Director further commented on concerns that dredging plumes had the potential for moving to the north of the site; to which DHI replied that monitoring and adaptive management of the release of fine sediments from the reclamation site during construction would be the key to minimise any impacts. It was further mentioned that the use of silt curtains may be a favoured approach in some areas, but may not work well under the climatic conditions experienced at site.</p> <p>The Director further queried on the beach nourishment at First Beach and the mitigation measures at Sg. Patagas River and recommended other measures be considered for the River Mouth; DHI stated that limited beach nourishment is recommended at First beach between the site and STAR hotel at the completion of the project while it was recommended that the river mouth and Kg. Contoh beach are monitored but that no express mitigation measures were presently proposed to be implemented as beach nourishment could negatively affect the river discharges, and no erosion was predicted to be caused by the TAED development.</p>	FYI	-
1.19	The Director further commented on the public facilities during construction to which DHI replied, some facilities and shores should be provided at the 1 st Beach during construction.	FYI	-
1.20	EPD further commented on the importance of lighting being precision lighting, to prevent obstruction to navigation of planes.	FYI	-

MINUTES OF MEETING



Project No : 62800657-2
Project Title : SEIA for Proposed Tg Aru Eco Development
Subject : Discussion on potential mitigation measures and the existing trees condition at Tg. Aru..

Date and Time : 21-22 September 2016

Agenda

1. Issues to discuss

Start of Meeting

Item	Description	Action	Deadline
1	Issues to discuss		
	<p>In the 1st Phase, the beach and park are proposed to be completed by 2017, with the beach on reclaimed land, while the park area (Prince Phillip Park) to be raised to 3 m above the present level (to mitigate the impact from tidal waves).</p> <p>If feasible, the present trees are to be uprooted and replanted. At the same time, new instant trees to be planted as well. High cost is anticipated, and it may raise concern from the public on the impact to the environment. Sabah Forest Department (SFD), however, does not have the expertise in translocating the trees, nor dealing with instant trees. SFD can recommend some contractors who have translocated instant trees. Alternatively, TAED may seek advice from professional landscaping experts.</p> <p>In the area to be reclaimed, sites or points selected for tree establishment/planting should be topped or filled with good/fertile soil at adequate depth depending on the size and type of the trees to be planted. The biggest possible planting holes to be filled with fertile soil are recommended.</p> <p>Suggested FRIM to possibly advise on urban forest trees.</p>	FYI	-

MINUTES OF MEETING



Project No : 62800657-2
Project Title : SEIA for Proposed Tg Aru Eco Development
Subject : Discussions on the overall water system in the area.

Date and Time : 26 February 2016 (9.00am)
Venue : Jabatan Air office, Gaya Park

Agenda

1. Issues to discuss

Start of Meeting

Item	Description	Action	Deadline
1	Issues to discuss		
	<p>As mentioned by Ms. Zuria, the available water supply to Tanjung Aru area are as follows:</p> <ul style="list-style-type: none">- current year to year 2018, 0.5 ML/day-by year 2020, additional 2.5 ML/day-by year 2021 to 2025, additional 8 ML/day <p>Ms. Zuria, commented that water storage tank should have the capacity for 1.5 day storage and a minimum water level at 35m above finished platform level.</p> <p>In view of the size of TAED development, Ms. Zuria commented that the existing water pipe line serving Tanjung Aru should be upgraded. Ms. Zuria presented the new proposed water loop surrounding KKIA area. Please refer to attachment. Currently there is no funding for this proposed upgrading.</p> <p>Ms. Zuria mentioned that JA should have no objection for TAED to manage water pipelines within TAED boundary. Bulk meter to be installed at main incoming.</p>	FYI	-

MINUTES OF MEETING



Project No : 62800657-2
Project Title : SEIA for Proposed Tg Aru Eco Development
Subject : Discussion on the proposed project development

Date and Time : 15 April 2016

Agenda

1. Agenda
2. Issues to discuss

Start of Meeting

Item	Description	Action	Deadline
1	Agenda		
	Introduction of project team and presentation by representative of Project Proponent.	FYI	-
2	Issues to discuss		
	<ol style="list-style-type: none">1. Mayor talked about the importance of tourism and development of Kota Kinabalu and that he wished for the project to raise the bar and projects a 'green, clean and liveable' city.2. Mayor was aware on the intention of the project back in 1985, when it was put forward.3. Queries were raised by Health department about potential use of pesticides and fertilisers, to which DHI replied the proposed project and the golf course was an eco development. The Health Department further raised concern about the potential risk of tuberculosis associated with bringing in construction workers.4. Water quality and the pollution associated with the 8 drains were raised and DHI talked about mitigation measures to apply in ensuring the water quality is improved.5. The proposed future management of the project area was further raised and briefly discussed.	FYI	-

Annex 2

Example of Notice

NOTICE

PUBLIC MEETING

SPECIAL ENVIRONMENTAL IMPACT ASSESSMENT (SEIA) ON PROPOSED TANJUNG ARU ECO DEVELOPMENT



Presentation of SEIA key findings

by

DHI Water & Environment (M) Sdn Bhd (SEIA Consultant)

Date: 20th August 2016 (Saturday)

Venue: Meeting Hall, 1st Floor, Dewan Bandaraya Kota Kinabalu Headquarters

Sessions: Morning: 9.00 am – 12:00 pm

Afternoon: 1.30 pm to 4.30 pm (Repeat)

PROGRAMME

Activity	1 st Session	2 nd Session
	Morning	Afternoon
Arrival of public / registration	9:00 am	1.30 pm
Introduction on purpose of the meeting By DHI Water & Environment as the SEIA Consultant	9:30 am	2:00 pm
Description of Tg. Aru Eco Development Project & Masterplan Details - Project Masterplan Concept - Project Masterplan Description - Project schedule Q & A	9:40 am	2:10 pm
Rationale of the Masterplan Design Strategy and Alternatives Background on the environmental constraints that have shaped the Masterplan layout (footprint), including the alternatives considered in the process of Masterplan development Q & A	10:20 am	2:50 pm
Break	10:50 am	3:20 pm
Special Environmental Impact Assessment (SEIA) Presentation of findings and impacts on key issues of concern Q & A	11:05 am	3:35 pm
Closing Remarks	11:55 am	4:25 pm

For more information, you may contact us: **Email:** taed_SEIA@dhigroup.com / **Tel:** 088 – 260 780

Thank You

Annex 3
List of Attendance

PUBLIC MEETING

SPECIAL ENVIRONMENTAL IMPACT ASSESSMENT (SEIA) ON PROPOSED TANJUNG ARU ECO DEVELOPMENT

Date: 20th August 2016 (Saturday)

Venue: Meeting Hall, 1st Floor, Dewan Bandaraya Kota Kinabalu Headquarters

Sessions: Morning: 9.00 am – 12:00 pm *

Afternoon: 1.30 pm to 4.30 pm (Repeat)

No	Name	Organisation / Association / Public	Contact (Tel no. / email)	
1	Tony Chuffings	Public	0133 475 166	✓
2	JACK LEE VUN ZAI	Public	016 897 3057	✓
3	Edwin FO	Public	0168383908	
4	Edgar Peter Dabbi	Public	016-8013022	
5	John Tay	WWF-my	0168493998	✓
6	TAN KOH YON	IEM (Sabah)	0198208783	
7	MICHAEL R. HASTIE	P.	019-8609654	
8	Peter Oberne	Public	011-25338113	✓
9	JANET AUGUSTINE	Public	016-8050130	
10	CHERYL YE	Public	-	
11	Dakaria Besar	Centre Samudera	019-2366720	
12	Jeffrey Chay	Environment	016 8491997	
13	Nicky Aziz	Public	0816011986	✓
14	Tan Hui Shim.	WWF-Malaysia	019-8818385	
15	Tan Hao Jin	u	012-4822250	

No	Name	Organisation / Association / Public	Contact (Tel no. / email)
15	MaryAnn Willie	Public	016-8358909
16	Roland Ling	Public	016 8301387
17	THIEN SHING VUI	"	016-8363300
18	Ir. Paul Jap	ACEM	016-8133261
19	Dr. Nancy J. Soomin	Public.	014-8678480. ✓
20	Ho Jia Li E	PAM Sabah	016-8030798
21	Donald Ng	Public	016-8030773
22	Ir. Lee Tet Fon	ACEM	019 850 9818 ✓
23	Mary Yau	Public	0146 587098
24	Sanj Kuan Yau	See Hine Daily	079 8815080.
25	DONALD PATRICK	PUBLIC	012-8214206
26	Lou Chi Nam	ICM	019 813 2699
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PUBLIC MEETING

SPECIAL ENVIRONMENTAL IMPACT ASSESSMENT (SEIA) ON PROPOSED TANJUNG ARU ECO DEVELOPMENT

Date: 20th August 2016 (Saturday)

Venue: Meeting Hall, 1st Floor, Dewan Bandaraya Kota Kinabalu Headquarters

Sessions: Morning: 9.00 am – 12:00 pm*

Afternoon: 1.30 pm to 4.30 pm (Repeat)

No	Name	Organisation / Association / Public	Contact (Tel no. / email)
1	Datuk Datu Tony Lemis	C/o FRC - Sepilok	088 231 842
2	Datin Anthea Lamb	"	"
3	Avtar Singh Sandhu		016 2190757
4	Judy O'Byrne	Public	011 25338098
5	Eric Ye	Public	0198506706
6	LEE WAH BAN	Dankiki Condo	016-5852145
7	ESTHER LANG	Public	206-8883580
8	Sheela Sheena Damian	WWF-Malaysia	019-2296733
9	Kartini Anif.	Public	0168119167
10	Yap Yen Kee Jeshura	Public	0168329507
11	Voo PHIN SANS	Public	019-8807720
12	Petrus Phui	JPC	013 834 5510
^{2nd} 13	Joshua YC Kong	SEPA / KPSB / MIA	012 8380897
^{2nd} 14	Mary Sy Chin	New Biogreen Corp	013 8394513
^{2nd} 15	HORI HIROSHI	Public	019 8203139

2nd.
*

PUBLIC MEETING

SPECIAL ENVIRONMENTAL IMPACT ASSESSMENT (SEIA) ON PROPOSED TANJUNG ARU ECO DEVELOPMENT

Date: 20th August 2016 (Saturday)

Venue: Meeting Hall, 1st Floor, Dewan Bandaraya Kota Kinabalu Headquarters

Sessions: Morning: 9.00 am – 12:00 pm

*Afternoon: 1.30 pm to 4.30 pm (Repeat)

No	Name	Organisation / Association / Public	Contact (Tel no. / email)
1	Sadhana M. Borhan		019 8521888
2	Betsy Sylvester	Public	019-8600 300
3	Mak Chee Chong	Mak Arkitek Konsult	019-8812630
4	Rachel Fung	Public	☎ —
5	Favian Liu	Public	—
6	Louisa Yapp	Public	—
7	Nannette Henderson-Steak	Public	
8	ERMYZA HILLARY	PUBLIC	—
9	Ejnia Saleh	"	—
10	John Stephen	Public	019-8816446
11	Jamain Sanchic	Public	019-5360844
12	Apple Wong	Media	016-8406612.
13	WONG LI PIN	#Sabah Heritage society	077-8950652
14	Norazrine Ag. Ahmad	Public	014-3576323
15	DR. C. Y. Yu.		

PUBLIC MEETING

SPECIAL ENVIRONMENTAL IMPACT ASSESSMENT (SEIA) ON PROPOSED TANJUNG ARU ECO DEVELOPMENT

Date: 20th August 2016 (Saturday)

Venue: Meeting Hall, 1st Floor, Dewan Bandaraya Kota Kinabalu Headquarters

Sessions: Morning: 9.00 am – 12:00 pm

*Afternoon: 1.30 pm to 4.30 pm (Repeat)

No	Name	Organisation / Association / Public	Contact (Tel no. / email)
1	SM Mathu	MNS	012-8281919
2	Wong Hui Fe	Pembaju	010 265 2101
3	Wong. W. Tshy	UOS	(056) 831 8712
4	Raphaële DEAU	Independent	012-863-4726
5	Syrah	CSAP	088-27705
6	OH TING YAN	PUBLIC	088-499698
7	DAVID FUNG	Public.	088-218100
8	Joshua Fung	Public	010-2288290
9	Annabelle Funk	Public	0168427488
10	Melanie Chia	SAPP	012-8026328
11	Yong Yit Yung	SAPP	012-8669955
12	Margal Le	Pblz	016 320-3535
13	Richard Yong	SAPP	013 8606996
14	Chia Min Lee	SAPP	019-8569022.
15	MARIASTER HAM	PUBLIC	0138734600

No	Name	Organisation / Association / Public	Contact (Tel no. / email)
15	Angela Tan	sm chew daily	016-8201901 tangio@sch@gmail.com
16	Stephan Rainier	Soiuditi hua fahh	016 666 824 fion-81@yehw.com
17	Datum Teo Boon Hai	DBM / Mayor	db 0128283922
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