Ref: 16/058

14th July 2016

Fern Bay No. 1 Pty Ltd
C/- Monteath & Powys
PO Box 726
NEWCASTLE NSW 2300

Attention: Chad Beecham

Dear Chad,

RE: Intersection Analysis – Nelson Bay Road / Fullerton Cove Road / Seaside Boulevard roundabout, Fern Bay.

Further to my letter dated 8th April 2016 I have revised the intersection analysis undertaken at the Nelson Bay Road / Fullerton Cove Road / Seaside Boulevard roundabout at Fern Bay in line with NSW Roads and Maritime Services (RMS) preliminary advice dated 8th June 2016 (e-mail advice from Marty Jenkins). In revising the analysis the following changes were made;

- Analysis is now based on new traffic surveys undertaken by Northern Transport Planning and Engineering on Thursday 28th June 2016 between 6 am and 10 am and 3 pm and 7 pm. The peak periods were found to be 7.15 am – 8.15 am and 3.15 pm and 4.15 pm. Modelling was then undertaken for these two peak periods.
- In assessing future traffic volumes generated on Seaside Boulevard traffic generation rates in accordance with the average regional trips for low density residential contained in RMS Technical Direction TDT 2013/04 have been used i.e. 0.71 vtph (AM) and 0.78 vtph (PM).

As requested I have carried out an intersection analysis of the Nelson Bay Road / Fullerton Cove Road / Seaside Boulevard roundabout at Fern Bay to determine if the intersection has the capacity to cater for the full development of the Fern Bay residential estate without the need to construct the approved second access to the estate off Nelson Bay Road north of the subject roundabout.

In undertaking this analysis I have utilised the Sidra 6.1 intersection modelling micro-simulation model and advice from you regarding the current level of development in the Fern Bay residential estate.

Following this analysis the following advice is provided for your consideration.

Existing Traffic Volumes and Generation

The existing traffic data used in this assessment was recorded by Northern Transport Planning and Engineering on Thursday 28th June 2016. The summary sheets for this count are provided in ***Attachment 1***.

This data indicated that the current traffic generation from the Fern Bay residential estate is as follows;

- 255 vtph in the AM peak (80 % outbound); and
- 253 vtph in the PM peak (66 % inbound)

On the basis of your advice that there is currently 449 dwellings in the Fern Bay residential estate the traffic generation is approximately;

- 0.57 vtph per dwelling in the AM peak; and
- 0.56 vtph per dwelling in the PM peak.

These rates are lower than the average rates for regional areas recommended in the RMS Technical Direction TDT 2013/04 (May 2013) i.e. 0.71 vtph (AM) and 0.78 vtph (PM), indicating that there may be a higher than normal proportion of retirees living in the estate.

Future Traffic Volumes

In undertaking the Sidra modelling for future traffic the following assumptions were made.

- Background traffic growth on all legs of the intersection except Seaside Boulevard was 1.5 % per annum as it is my understanding this is the average rate adopted by the RMS in all its lower Hunter strategic modelling. It is noted that historical traffic counts undertaken by Intersect Traffic in 2007 and 2016 at the Nelson Bay Road / Janet Parade intersection (count sheets provided in ***Attachment 1*** for reference) for the Salt Ash sand quarry indicates a current background traffic growth rate of 1 % per annum on Nelson Bay Road. Therefore adoption of a 1.5 % per annum background traffic growth rate is considered appropriate.

The additional traffic generated by the future growth of the Fern Bay residential estate is calculated as;

AM peak = 0.71 vtph x (850 lots – 449 lots) = 285 vtph; and
PM peak = 0.78 vtph x (850 lots – 449 lots) = 313 vtph.

Total traffic generation from the full development of the site is therefore expected to be;

AM peak = 255 vtph + 285 vtph = 540 vtph; and
PM peak = 253 vtph + 313 vtph = 566 vtph.

The trip distribution for the future Seaside Boulevard traffic is shown in ***Figure 1*** below and is based on the existing trip distribution recorded in the counts undertaken in June 2016.

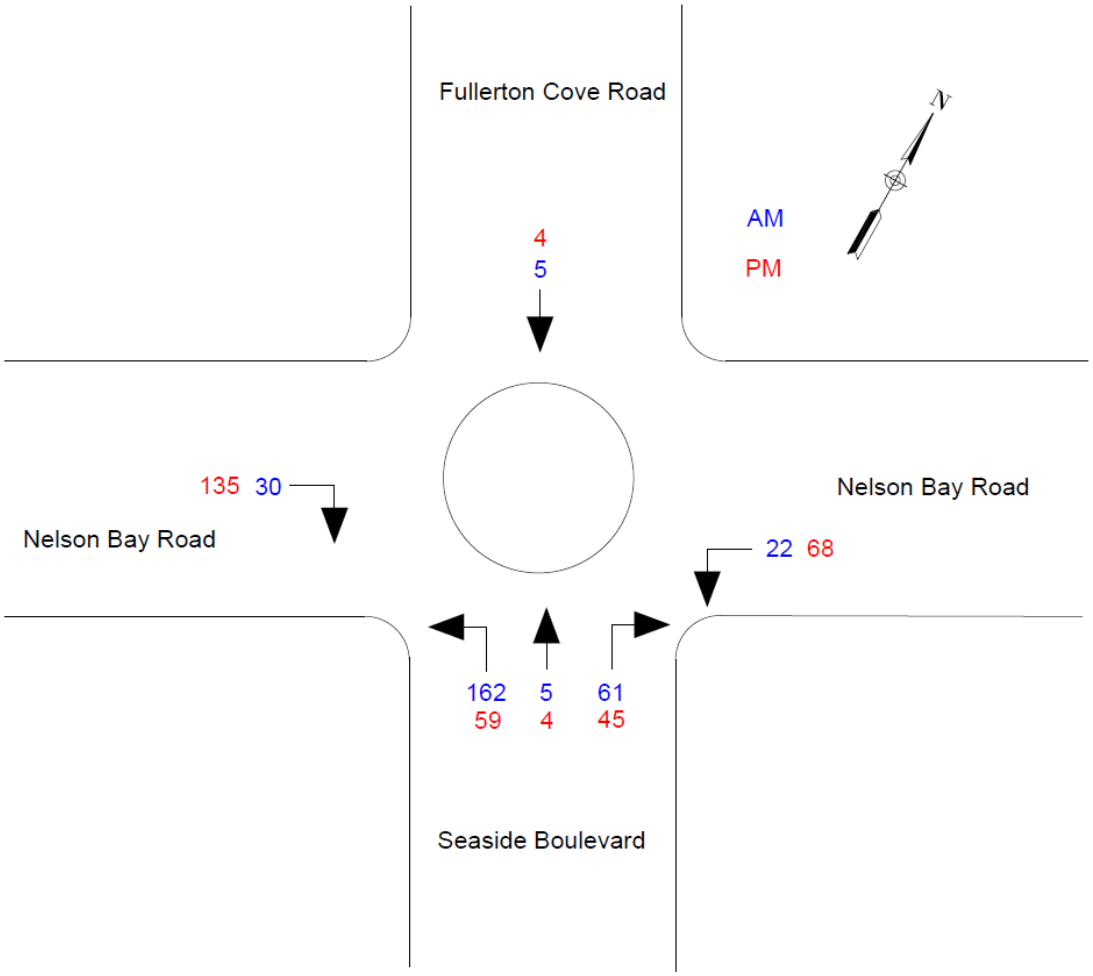


Figure 1 – Future Traffic – Trip Distribution

Sidra Modelling

The Nelson Bay Road / Fullerton Cove Road / Seaside Boulevard roundabout was modelled for the following scenarios;

- 2016 AM and PM existing traffic (NTPE count June 2016)
- 2026 traffic AM and PM (1.5 % p.a. background traffic growth) plus full development Fern Bay residential estate; and
- 2030 traffic AM and PM (1.5 % p.a. background traffic growth) plus full development Fern Bay residential estate.

The results of the Sidra modelling for the *All Vehicles* case are shown in ***Table 1*** below. The Movement Summary sheets are provided in ***Attachment 2*** and the Sidra input file is provided for RMS review.

Table 1 – Sidra results – Nelson Bay Road / Fullerton Cove Road / Seaside Boulevard roundabout.

Scenario	Deg. Satn (v/c)	Average Delay (sec)	Level of Service	95 % Back of Queue distance (vehicles)
Existing 2016 AM	0.515	5.1	A	4.5
Existing 2016 PM	0.444	3.7	A	2.7
Full development 2026 AM	0.717	12.7	A	13.1
Full development 2026 PM	0.600	5.6	A	5.6
Full development 2030AM	0.894	19.8	B	20.2
Full development 2030 PM	0.629	5.7	A	6.0

By 2030 the delays for left turn movements out of Seaside Boulevard are reaching an unacceptable level of service as delays are increased as a result of the increase in traffic volumes on Nelson Bay Road. At this stage practical capacity is probably reached. Therefore the Sidra modelling has indicated the existing roundabout has sufficient capacity through to 2030 to cater for background traffic growth including the full development of the Fern Bay residential estate

It is also noted that in 2030 the mid-block traffic volumes on Nelson Bay Road will be of the order of 2,600 vtph (AM and PM). This indicates Nelson Bay Road is close to its mid-block capacity (LoS D) and widening to four lanes (two lanes in each direction) will be required. This work would be likely to require additional left turn slip lanes into both Seaside Boulevard and Fullerton Cove Road that would improve the intersection performance and provide additional capacity in the intersection or even conversion of the intersection to traffic signals. Importantly it is considered that it is the traffic volumes on Nelson Bay Road that would drive the intersection upgrade and not traffic volumes out of or into Seaside Boulevard.

Conclusions

The following conclusions can be made from this analysis of the Nelson Bay Road / Fullerton Cove Road / Seaside Boulevard roundabout.

1. The Fern Bay residential estate is currently generating less traffic than the average regional residential subdivision. This may indicate a higher than normal proportion of retirees living in the estate.
2. The AM peak is the critical peak for analysis of the capacity and operation of the roundabout.
3. The roundabout has sufficient capacity to cater for background traffic growth and full development of the Fern Bay residential estate through to 2030 i.e. another 14 years.
4. Given existing traffic generation from the completed sections of the subdivision is less than the average regional values provided within the RMS Technical Direction TDT2013/04 which have been used in this assessment it is likely this assessment is conservative and the roundabout is likely to operate satisfactorily beyond 2030.

5. In 2030 the mid-block traffic volumes on Nelson Bay Road will be of the order of 2,600 vtph (AM and PM). This indicates Nelson Bay Road is close to its mid-block capacity (LoS D) and widening to four lanes (two lanes in each direction) will be required. This work would be likely to require additional left turn slip lanes into both Seaside Boulevard and Fullerton Cove Road that would improve the intersection performance and provide additional capacity in the intersection or even conversion of the intersection to traffic signals. Importantly it is considered that it is the traffic volumes on Nelson Bay Road that would drive the intersection upgrade and not traffic volumes out of or into Seaside Boulevard.

Recommendation

Having undertaken this intersection analysis of the Nelson Bay Road / Fullerton Cove Road / Seaside Boulevard roundabout at Fern Bay I would recommend that the proposed second access to the Fern Bay residential estate is not required from a traffic operations perspective as the existing Nelson Bay Road / Fullerton Cove Road / Seaside Boulevard roundabout has the capacity to cater for the full development of the Fern Bay residential estate. Future upgrading of the intersection would be as a result of traffic volumes and growth on Nelson Bay Road rather than from the traffic generated by the Fern Bay residential estate.

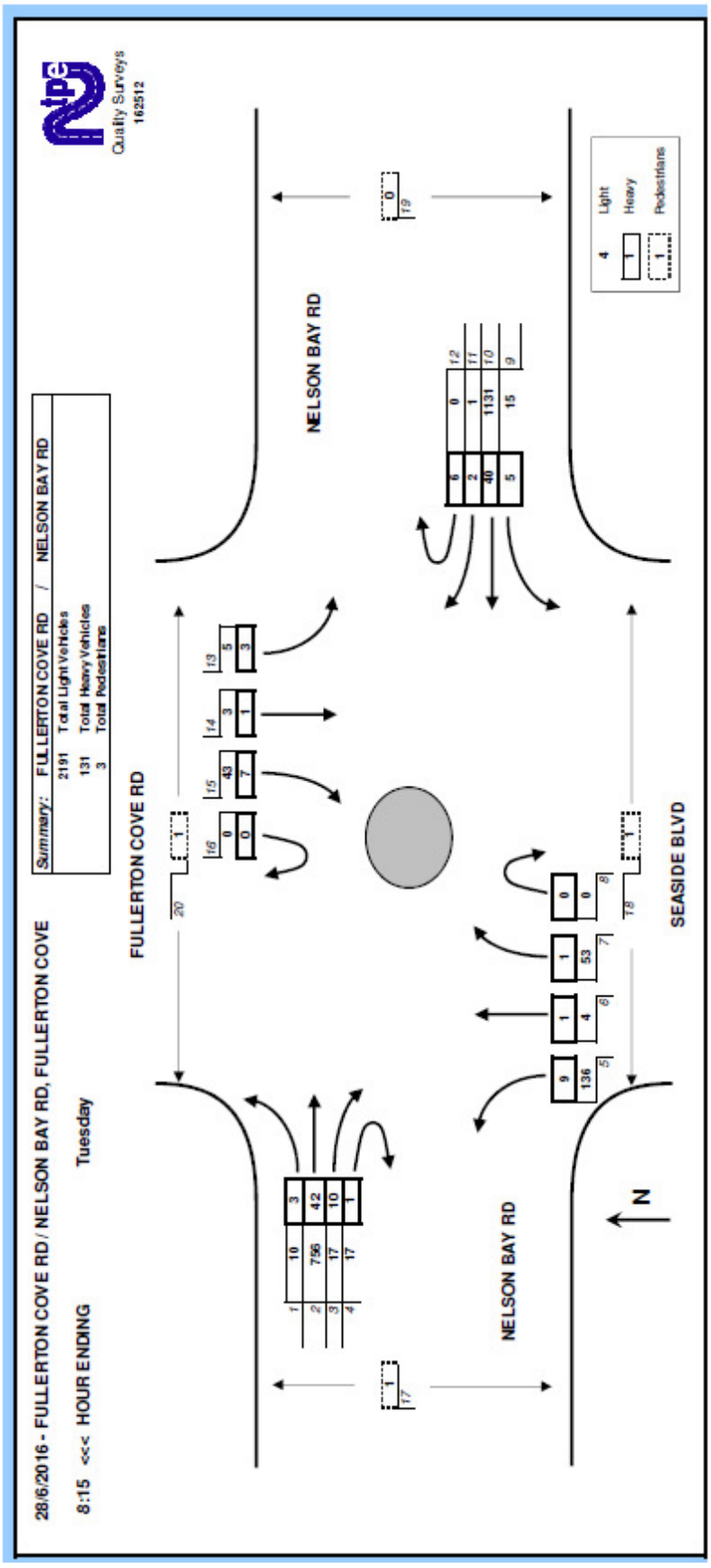
Hoping this information is to your satisfaction. For further information or clarification please do not hesitate to contact me on 02 4936 6200 or 0423 324 188.

Yours sincerely

Jeff Garry

Director
Intersect Traffic

Attachment 1

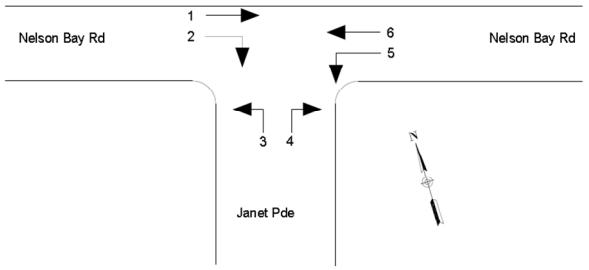


M: 0423 324 188 E: jeff@intersecttraffic.com.au P: 02 4936 6200

Date	3/03/2016
Day	Thursday
Time	7:30am - 9:00am
Weather	Fine
Conducted by:	Peter Avis

MOVEMENT	1	2	3	4	5	6
7:30 - 7:45	147	1	1	0	0	237
7:45 - 8:00	125	0	1	0	0	225
8:00 - 8:15	180	0	0	0	0	225
8:15 - 8:30	115	0	2	0	0	201
8:30 - 8:45	125	3	1	0	0	175
8:45 - 9:00	113	0	1	0	0	147
SUM	805	4	6	0	0	1210
PEAK	567	1	4	0	0	888

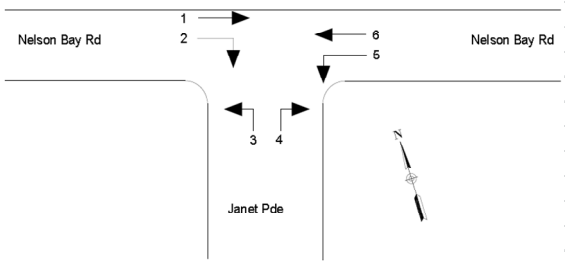
Leg	PHT (vph)
Nelson Bay Road east	1455
Nelson Bay Road west	1460
Janet Parade	5



Date	3/03/2016
Day	Thursday
Time	2:30pm - 4:00pm
Weather	Fine
Conducted by:	Peter Avis

MOVEMENT	1	2	3	4	5	6
2:30 - 2:45	156	3	3	0	0	156
2:45 - 3:00	188	1	1	0	0	148
3:00 - 3:15	198	1	0	0	2	161
3:15 - 3:30	185	1	1	0	0	178
3:30 - 3:45	234	0	0	0	0	171
3:45 - 4:00	225	1	2	0	0	183
SUM	1186	7	7	0	2	997
PEAK	842	3	3	0	2	693

Leg	PHT (vph)
Nelson Bay Road east	1537
Nelson Bay Road west	1541
Janet Parade	8



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Intersect Traffic Counts – Thursday 15th November 2007.

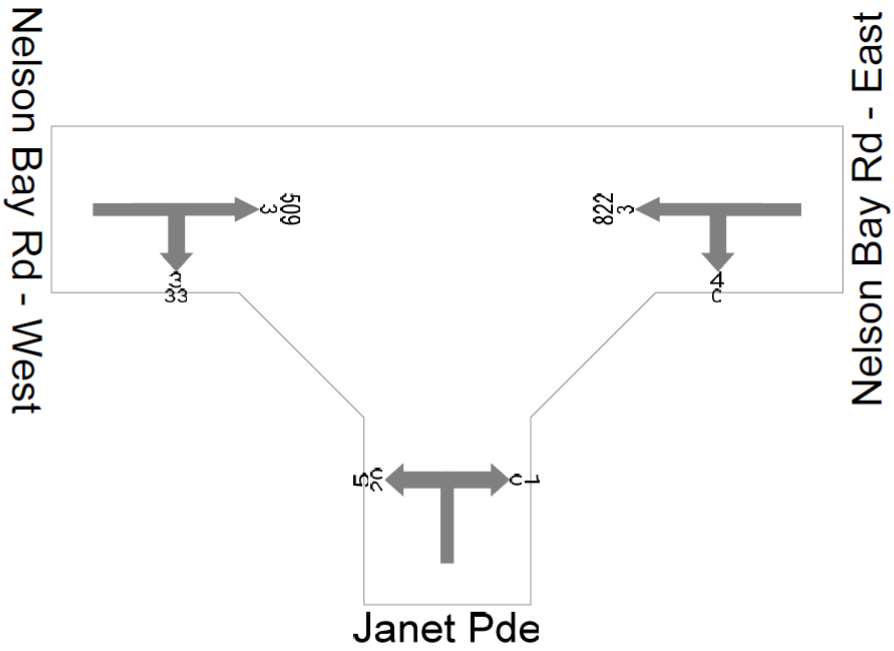

Figure 2.2 - Morning peak hour traffic distribution – existing traffic

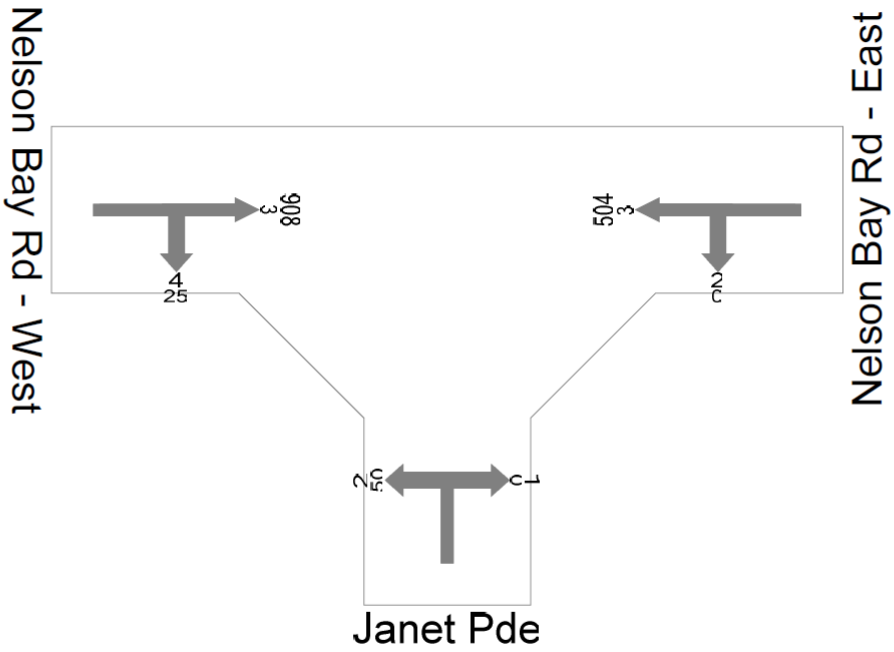

Figure 2.3 - Afternoon peak hour traffic distribution – existing traffic

Attachment 2

MOVEMENT SUMMARY

Site: 2016 AM (7.15 am - 8.15 am)

Nelson Bay Road / Fullerton Cove Road / Seaside Boulevard roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Seaside Boulevard											
21	L2	145	6.2	0.223	15.0	LOS B	2.1	15.2	1.00	0.85	48.3
22	T1	5	20.0	0.126	17.3	LOS B	1.0	6.9	0.98	0.86	45.9
23	R2	54	1.9	0.126	22.6	LOS B	1.0	6.9	0.98	0.86	46.6
23u	U	1	0.0	0.126	25.0	LOS B	1.0	6.9	0.98	0.86	47.7
Approach		205	5.4	0.223	17.1	LOS B	2.1	15.2	0.99	0.85	47.8
NorthEast: Nelson Bay Road											
24	L2	20	25.0	0.276	4.2	LOS A	1.8	12.8	0.33	0.36	54.9
25	T1	1171	3.4	0.515	3.5	LOS A	4.5	32.5	0.37	0.36	57.3
26	R2	3	66.7	0.515	11.0	LOS A	4.5	32.5	0.39	0.36	55.5
26u	U	6	100.0	0.515	13.6	LOS A	4.5	32.5	0.39	0.36	58.0
Approach		1200	4.4	0.515	3.6	LOS A	4.5	32.5	0.37	0.36	57.3
NorthWest: Fullerton Cove Road											
27	L2	8	37.5	0.090	10.1	LOS A	0.6	4.6	0.78	0.77	48.7
28	T1	4	25.0	0.090	9.4	LOS A	0.6	4.6	0.78	0.77	50.4
29	R2	50	14.0	0.090	15.5	LOS B	0.6	4.6	0.78	0.77	50.9
29u	U	1	0.0	0.090	17.4	LOS B	0.6	4.6	0.78	0.77	52.7
Approach		63	17.5	0.090	14.5	LOS A	0.6	4.6	0.78	0.77	50.6
SouthWest: Nelson Bay Road											
30	L2	13	23.1	0.238	3.9	LOS A	1.6	12.0	0.28	0.34	55.2
31	T1	798	5.3	0.322	3.3	LOS A	2.5	18.6	0.29	0.35	57.6
32	R2	27	37.0	0.322	10.1	LOS A	2.5	18.6	0.29	0.36	56.8
32u	U	18	5.6	0.322	12.2	LOS A	2.5	18.6	0.29	0.36	60.0
Approach		856	6.5	0.322	3.7	LOS A	2.5	18.6	0.29	0.35	57.6
All Vehicles		2324	5.6	0.515	5.1	LOS A	4.5	32.5	0.41	0.41	56.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

M: 0423 324 188 E: jeff@intersecttraffic.com.au P: 02 4936 6200

MOVEMENT SUMMARY

Site: 2016 PM (3.15 pm - 4.15 pm)

Nelson Bay Road / Fullerton Cove Road / Seaside Boulevard roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Seaside Boulevard											
21	L2	48	8.3	0.053	8.7	LOS A	0.4	3.1	0.84	0.67	52.6
22	T1	2	50.0	0.061	12.2	LOS A	0.4	2.9	0.82	0.77	49.1
23	R2	35	2.9	0.061	16.4	LOS B	0.4	2.9	0.82	0.77	50.1
23u	U	1	0.0	0.061	18.8	LOS B	0.4	2.9	0.82	0.77	51.5
Approach		86	7.0	0.061	12.1	LOS A	0.4	3.1	0.83	0.71	51.4
NorthEast: Nelson Bay Road											
24	L2	54	1.9	0.238	4.1	LOS A	1.4	9.7	0.35	0.39	55.3
25	T1	963	2.0	0.444	3.6	LOS A	3.3	23.3	0.37	0.37	57.3
26	R2	5	40.0	0.444	10.7	LOS A	3.3	23.3	0.38	0.37	56.5
26u	U	1	0.0	0.444	12.5	LOS A	3.3	23.3	0.38	0.37	60.0
Approach		1023	2.2	0.444	3.7	LOS A	3.3	23.3	0.37	0.37	57.2
NorthWest: Fullerton Cove Road											
27	L2	2	0.0	0.047	12.3	LOS A	0.3	2.4	0.89	0.75	47.4
28	T1	4	25.0	0.047	13.4	LOS A	0.3	2.4	0.89	0.75	48.5
29	R2	21	0.0	0.047	18.6	LOS B	0.3	2.4	0.89	0.75	49.3
29u	U	1	0.0	0.047	21.1	LOS B	0.3	2.4	0.89	0.75	50.5
Approach		28	3.6	0.047	17.5	LOS B	0.3	2.4	0.89	0.75	49.0
SouthWest: Nelson Bay Road											
30	L2	42	4.8	0.302	3.6	LOS A	2.2	15.7	0.23	0.32	55.9
31	T1	997	2.0	0.408	3.1	LOS A	3.5	25.0	0.23	0.35	57.8
32	R2	110	4.5	0.408	9.6	LOS A	3.5	25.0	0.24	0.37	58.0
32u	U	5	20.0	0.408	12.3	LOS A	3.5	25.0	0.24	0.37	59.4
Approach		1154	2.4	0.408	3.8	LOS A	3.5	25.0	0.23	0.35	57.7
All Vehicles		2291	2.5	0.444	4.2	LOS A	3.5	25.0	0.32	0.38	57.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

M: 0423 324 188 E: jeff@intersecttraffic.com.au P: 02 4936 6200

MOVEMENT SUMMARY

Site: 2026 AM (7.15 am - 8.15 am) + dev

Nelson Bay Road / Fullerton Cove Road / Seaside Boulevard roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Seaside Boulevard											
21	L2	307	2.9	0.717	69.5	LOS E	13.1	94.1	1.00	1.53	28.2
22	T1	10	10.0	0.406	32.2	LOS C	3.6	25.7	1.00	1.05	39.1
23	R2	115	0.9	0.406	37.8	LOS C	3.6	25.7	1.00	1.05	39.5
23u	U	1	0.0	0.406	40.2	LOS C	3.6	25.7	1.00	1.05	40.3
Approach		433	2.5	0.717	60.1	LOS E	13.1	94.1	1.00	1.39	30.9
NorthEast: Nelson Bay Road											
24	L2	42	11.9	0.333	4.4	LOS A	2.2	16.0	0.41	0.40	54.7
25	T1	1347	3.0	0.621	3.9	LOS A	6.1	44.2	0.49	0.40	56.6
26	R2	3	66.7	0.621	11.6	LOS A	6.1	44.2	0.52	0.40	54.8
26u	U	7	85.7	0.621	14.5	LOS B	6.1	44.2	0.52	0.40	55.9
Approach		1399	3.8	0.621	4.0	LOS A	6.1	44.2	0.49	0.40	56.6
NorthWest: Fullerton Cove Road											
27	L2	9	33.3	0.142	14.3	LOS A	1.0	8.0	0.92	0.85	46.7
28	T1	9	11.1	0.142	12.9	LOS A	1.0	8.0	0.92	0.85	48.3
29	R2	57	12.3	0.142	19.5	LOS B	1.0	8.0	0.92	0.85	48.7
29u	U	1	0.0	0.142	21.3	LOS B	1.0	8.0	0.92	0.85	50.2
Approach		76	14.5	0.142	18.1	LOS B	1.0	8.0	0.92	0.85	48.4
SouthWest: Nelson Bay Road											
30	L2	15	20.0	0.301	4.3	LOS A	2.2	15.9	0.42	0.38	54.5
31	T1	918	4.6	0.406	3.6	LOS A	3.4	25.3	0.43	0.39	56.7
32	R2	57	17.5	0.406	10.2	LOS A	3.4	25.3	0.44	0.40	56.5
32u	U	21	4.8	0.406	12.5	LOS A	3.4	25.3	0.44	0.40	58.9
Approach		1011	5.5	0.406	4.2	LOS A	3.4	25.3	0.43	0.39	56.7
All Vehicles		2919	4.5	0.717	12.7	LOS A	13.1	94.1	0.56	0.56	50.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 2026 PM (3.15 pm - 4.15 pm) + dev

Nelson Bay Road / Fullerton Cove Road / Seaside Boulevard roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Seaside Boulevard											
21	L2	107	3.7	0.149	11.4	LOS A	1.3	9.7	1.00	0.80	50.8
22	T1	4	25.0	0.179	14.9	LOS B	1.3	9.4	0.95	0.89	47.3
23	R2	80	1.3	0.179	19.9	LOS B	1.3	9.4	0.95	0.89	48.0
23u	U	1	0.0	0.179	22.3	LOS B	1.3	9.4	0.95	0.89	49.3
Approach		192	3.1	0.179	15.1	LOS B	1.3	9.7	0.98	0.84	49.5
NorthEast: Nelson Bay Road											
24	L2	122	0.8	0.322	5.0	LOS A	2.1	14.5	0.53	0.50	54.5
25	T1	1107	1.7	0.600	4.6	LOS A	5.4	38.3	0.62	0.47	55.9
26	R2	6	33.3	0.600	11.8	LOS A	5.4	38.3	0.64	0.47	55.2
26u	U	1	0.0	0.600	13.5	LOS A	5.4	38.3	0.64	0.47	58.3
Approach		1236	1.8	0.600	4.7	LOS A	5.4	38.3	0.61	0.48	55.8
NorthWest: Fullerton Cove Road											
27	L2	2	0.0	0.120	26.2	LOS B	0.9	6.4	1.00	0.91	40.7
28	T1	8	12.5	0.120	27.3	LOS B	0.9	6.4	1.00	0.91	41.5
29	R2	24	0.0	0.120	32.5	LOS C	0.9	6.4	1.00	0.91	42.1
29u	U	1	0.0	0.120	35.0	LOS C	0.9	6.4	1.00	0.91	43.0
Approach		35	2.9	0.120	31.0	LOS C	0.9	6.4	1.00	0.91	41.9
SouthWest: Nelson Bay Road											
30	L2	48	4.2	0.400	3.9	LOS A	3.3	23.5	0.38	0.36	55.1
31	T1	1147	1.7	0.540	3.4	LOS A	5.6	39.6	0.40	0.40	56.6
32	R2	245	2.0	0.540	9.9	LOS A	5.6	39.6	0.42	0.43	56.6
32u	U	6	16.7	0.540	12.6	LOS A	5.6	39.6	0.42	0.43	58.0
Approach		1446	1.9	0.540	4.6	LOS A	5.6	39.6	0.40	0.41	56.5
All Vehicles		2909	2.0	0.600	5.6	LOS A	5.6	39.6	0.54	0.47	55.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 2030 AM (7.15 am - 8.15 am) + dev

Nelson Bay Road / Fullerton Cove Road / Seaside Boulevard roundabout
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Seaside Boulevard											
21	L2	307	2.9	0.894	135.6	LOS F	20.2	145.1	1.00	2.12	18.7
22	T1	10	10.0	0.523	49.1	LOS D	4.3	30.7	1.00	1.18	33.5
23	R2	115	0.9	0.523	54.3	LOS D	4.3	30.7	1.00	1.18	33.8
23u	U	1	0.0	0.523	56.7	LOS E	4.3	30.7	1.00	1.18	34.4
Approach		433	2.5	0.894	111.8	LOS F	20.2	145.1	1.00	1.84	21.7
NorthEast: Nelson Bay Road											
24	L2	42	11.9	0.352	4.4	LOS A	2.4	17.2	0.43	0.41	54.7
25	T1	1417	2.8	0.655	4.0	LOS A	6.8	49.1	0.52	0.41	56.5
26	R2	4	50.0	0.655	11.4	LOS A	6.8	49.1	0.56	0.41	55.2
26u	U	7	85.7	0.655	14.7	LOS B	6.8	49.1	0.56	0.41	55.7
Approach		1470	3.6	0.655	4.0	LOS A	6.8	49.1	0.52	0.41	56.4
NorthWest: Fullerton Cove Road											
27	L2	10	30.0	0.162	15.5	LOS B	1.2	9.3	0.94	0.88	46.0
28	T1	9	11.1	0.162	14.2	LOS A	1.2	9.3	0.94	0.88	47.5
29	R2	61	11.5	0.162	20.8	LOS B	1.2	9.3	0.94	0.88	47.9
29u	U	1	0.0	0.162	22.6	LOS B	1.2	9.3	0.94	0.88	49.4
Approach		81	13.6	0.162	19.4	LOS B	1.2	9.3	0.94	0.88	47.6
SouthWest: Nelson Bay Road											
30	L2	16	18.8	0.315	4.3	LOS A	2.3	16.8	0.43	0.38	54.5
31	T1	966	4.3	0.426	3.6	LOS A	3.7	27.0	0.44	0.39	56.6
32	R2	57	17.5	0.426	10.2	LOS A	3.7	27.0	0.45	0.40	56.5
32u	U	22	4.5	0.426	12.6	LOS A	3.7	27.0	0.45	0.40	58.9
Approach		1061	5.3	0.426	4.2	LOS A	3.7	27.0	0.44	0.39	56.6
All Vehicles		3045	4.3	0.894	19.8	LOS B	20.2	145.1	0.57	0.62	45.9

Level of Service (LOS) Method: Delay (RTA NSW).
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MOVEMENT SUMMARY

Site: 2030 PM (3.15 pm - 4.15 pm) + dev

Nelson Bay Road / Fullerton Cove Road / Seaside Boulevard roundabout
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Seaside Boulevard											
21	L2	107	3.7	0.164	12.8	LOS A	1.5	11.0	1.00	0.82	49.8
22	T1	4	25.0	0.199	16.8	LOS B	1.5	10.6	0.98	0.92	46.3
23	R2	80	1.3	0.199	21.7	LOS B	1.5	10.6	0.98	0.92	47.0
23u	U	1	0.0	0.199	24.1	LOS B	1.5	10.6	0.98	0.92	48.2
Approach		192	3.1	0.199	16.6	LOS B	1.5	11.0	0.99	0.86	48.5
NorthEast: Nelson Bay Road											
24	L2	122	0.8	0.337	5.0	LOS A	2.2	15.5	0.54	0.51	54.4
25	T1	1165	1.6	0.629	4.6	LOS A	5.8	41.5	0.64	0.48	55.8
26	R2	6	33.3	0.629	11.9	LOS A	5.8	41.5	0.66	0.47	55.1
26u	U	1	0.0	0.629	13.6	LOS A	5.8	41.5	0.66	0.47	58.2
Approach		1294	1.7	0.629	4.7	LOS A	5.8	41.5	0.63	0.48	55.7
NorthWest: Fullerton Cove Road											
27	L2	2	0.0	0.152	28.1	LOS B	1.0	6.9	0.99	0.99	39.8
28	T1	8	12.5	0.152	29.7	LOS C	1.0	6.9	0.99	0.99	40.7
29	R2	25	0.0	0.152	34.4	LOS C	1.0	6.9	0.99	0.99	41.1
29u	U	1	0.0	0.152	36.9	LOS C	1.0	6.9	0.99	0.99	42.0
Approach		36	2.8	0.152	33.1	LOS C	1.0	6.9	0.99	0.99	41.0
SouthWest: Nelson Bay Road											
30	L2	51	3.9	0.417	3.9	LOS A	3.5	25.1	0.39	0.36	55.0
31	T1	1206	1.7	0.563	3.5	LOS A	6.0	42.9	0.42	0.40	56.5
32	R2	245	2.0	0.563	9.9	LOS A	6.0	42.9	0.43	0.43	56.6
32u	U	6	16.7	0.563	12.6	LOS A	6.0	42.9	0.43	0.43	57.9
Approach		1508	1.9	0.563	4.6	LOS A	6.0	42.9	0.42	0.40	56.5
All Vehicles		3030	1.9	0.629	5.7	LOS A	6.0	42.9	0.55	0.47	55.3

Level of Service (LOS) Method: Delay (RTA NSW).
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Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
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