1 November 2019

Our ref: 3218906
Your ref: PU019357

Begonia Street Traffic Calming
Origin Destination Survey

1 Introduction

GHD was engaged by Clarence City Council to analyse the extent to which traffic is using Begonia Street as an alternative route ('rat run') to the Tasman Highway. This letter presents the results of an origin destination survey undertaken to review the use of Begonia Street.

2 Origin Destination Survey

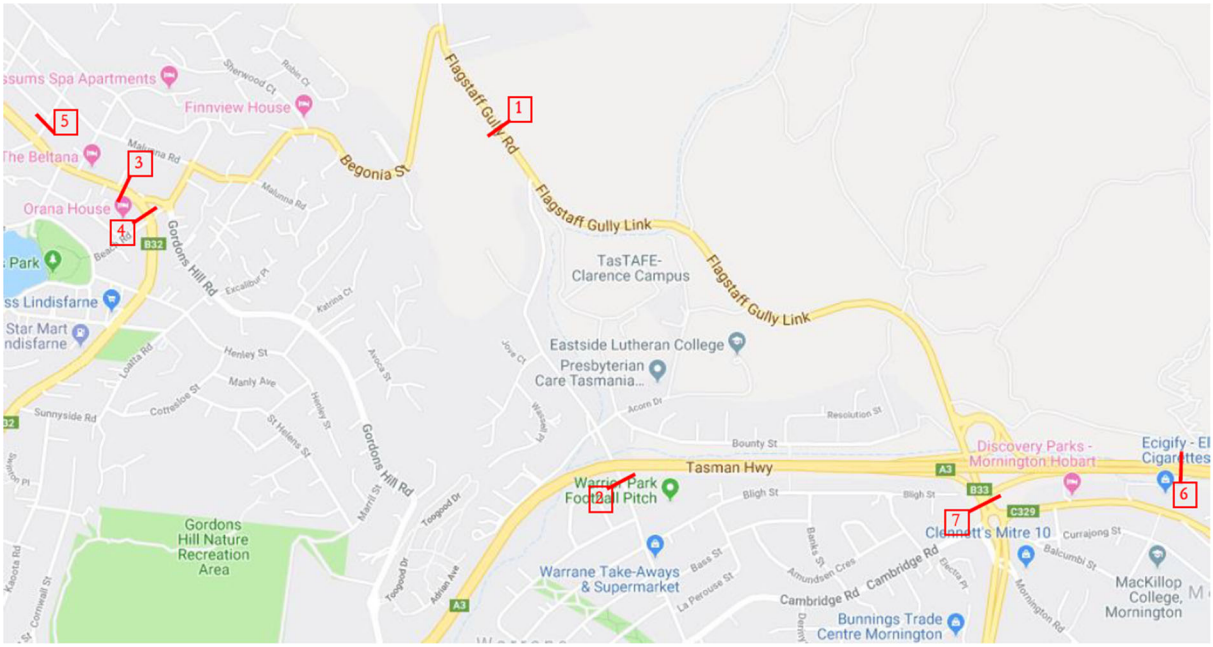
An origin destination survey was undertaken on Thursday 22 August 2019 in the peak periods from 07:30 to 09:30 and 16:00 to 18:00. Seven survey stations were included in the survey, as illustrated in Figure 1, and detailed below:

1. Flagstaff Gully Link
2. Dampier Street at the Tasman Highway
3. East Derwent Highway, north of Gordons Hill Road
4. East Derwent Highway, south of Gordons Hill Road
5. Lincoln Street, north of the East Derwent Highway intersection
6. Tasman Highway, east of South Arm Highway
7. South Arm Highway, north of Cambridge Road roundabout

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Figure 1 Survey stations



3 Results

The results of the origin destination survey, and the resultant number of vehicles using Begonia Street as an alternative to the route via the East Derwent Highway and Tasman Highway, are summarised in the following sections. Average travel times recorded during the survey, between origin and destination (OD) pairs, were reviewed to ensure the data captured vehicles travelling directly between the OD pairs. A vehicle stopping within the survey area is considered a local trip (i.e. has a genuine destination along Begonia Street) and therefore not a 'rat run'.

3.1 Morning peak

Westbound

The number of vehicles using Begonia Street as a 'rat run' in the westbound direction in the two-hour morning peak is summarised in Table 1. A total of 226 vehicles used Begonia Street during this period. The majority of these vehicles travelled from the South Arm Highway (213), with only a small number diverting from the Tasman Highway (3), or travelling from Dampier Street (10). The peak use of Begonia Street occurred between 7:45 and 8:45.

A comparison of the destination stations for vehicles using Begonia Street in the westbound direction is provided in Table 2, for the two-hour morning peak. Most vehicles turned right onto the East Derwent Highway from Gordons Hill Road (51%) or travelled further along Malunna Road and exited the survey area on Lincoln Street (38%). Some vehicles turned left onto the East Derwent Highway from Gordons Hill Road (11%).

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MetroCount data, obtained from Council, was collected at 65 Begonia Street (just south of the gravel section) for one week in July 2016. This data shows a peak hour volume between 8:00-9:00 of 222 vehicles in the westbound direction. Based on this volume, the number of vehicles using Begonia Street as a 'rat run' accounts for approximately 70% of westbound traffic on Begonia Street during the peak hour. However, it is noted that most westbound traffic originating in the residential streets connecting to Begonia Street would not be recorded in this location and the percentage is expected to be lower further west on Begonia Street.

Table 1 Begonia Street, westbound AM peak

Origin	Destination	0730-0745	0745-0800	0800-0815	0815-0830	0830-0845	0845-0900	0900-0915	0915-0930	Total
Tasman Hwy	East Derwent Hwy / Lincoln St	2	1	0	0	0	0	0	0	**3**
South Arm Hwy	East Derwent Hwy / Lincoln St	12	31	46	49	42	16	14	3	**213**
Dampier St	East Derwent Hwy / Lincoln St	0	0	1	1	2	0	6	0	**10**
Total		**14**	**32**	**47**	**50**	**44**	**16**	**20**	**3**	**226**

Table 2 Begonia Street, westbound AM peak (7:30-9:30), comparison of destination stations

Destination station	Total Vehicles	% Vehicles
3. East Derwent Hwy north	116	51%
4. East Derwent Hwy south	24	11%
5. Lincoln Street	86	38%
Total	226	

Eastbound

The number of vehicles using Begonia Street as a 'rat run' in the eastbound direction during the two-hour morning peak is summarised in Table 3. A total of 100 vehicles were recorded, less than half the number travelling westbound. The majority of these vehicles travelled to the South Arm Highway (58), or the Tasman Highway (34), with only a small number travelling to Dampier Street (8).

A comparison of the origin stations for vehicles using Begonia Street in the eastbound direction is provided in Table 4, for the two-hour morning peak. Most vehicles travelled from the East Derwent Highway, north of Gordons Hill Road (70%), while some entered the survey area on Lincoln Street (30%). No vehicles travelled from the East Derwent Highway south of Gordons Hill Road.

The MetroCount data from adjacent to 65 Begonia Street shows a peak hour volume between 8:00-9:00 of 124 vehicles in the eastbound direction. Based on this volume, the number of vehicles using Begonia

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Street as a 'rat run' accounts for approximately 50% of eastbound traffic on Begonia Street during the peak hour.

Table 3 Begonia Street, eastbound AM peak

Origin	Destination	0730-0745	0745-0800	0800-0815	0815-0830	0830-0845	0845-0900	0900-0915	0915-0930	Total
East Derwent Hwy / Lincoln St	Tasman Hwy	0	4	2	10	8	6	3	1	**34**
East Derwent Hwy / Lincoln St	South Arm Hwy	7	6	6	8	8	9	9	5	**58**
East Derwent Hwy / Lincoln St	Dampier St	1	2	1	0	2	2	0	0	**8**
Total		**8**	**12**	**9**	**18**	**18**	**17**	**12**	**6**	**100**

Table 4 Begonia Street, eastbound AM peak (7:30-9:30), comparison of origin stations

Origin station	Total Vehicles	% Vehicles
3. East Derwent Hwy north	70	70%
4. East Derwent Hwy south	0	0%
5. Lincoln Street	30	30%
Total	100	

Route comparison

In comparison, a total of 301 vehicles used the Tasman Highway / East Derwent Highway route in the westbound direction and a total of 510 vehicles used the Highway in the eastbound direction during the two-hour morning peak. A summary is provided in Table 6 for the westbound direction and Table 9 for the eastbound direction.

Table 5 Tasman Highway, westbound AM peak

Origin	Destination	0730-0745	0745-0800	0800-0815	0815-0830	0830-0845	0845-0900	0900-0915	0915-0930	Total
Tasman Hwy	East Derwent Hwy / Lincoln St	34	18	21	24	30	29	19	12	**187**
South Arm Hwy	East Derwent Hwy / Lincoln St	14	18	10	11	15	16	14	16	**114**
Total		**48**	**36**	**31**	**35**	**45**	**45**	**33**	**28**	**301**

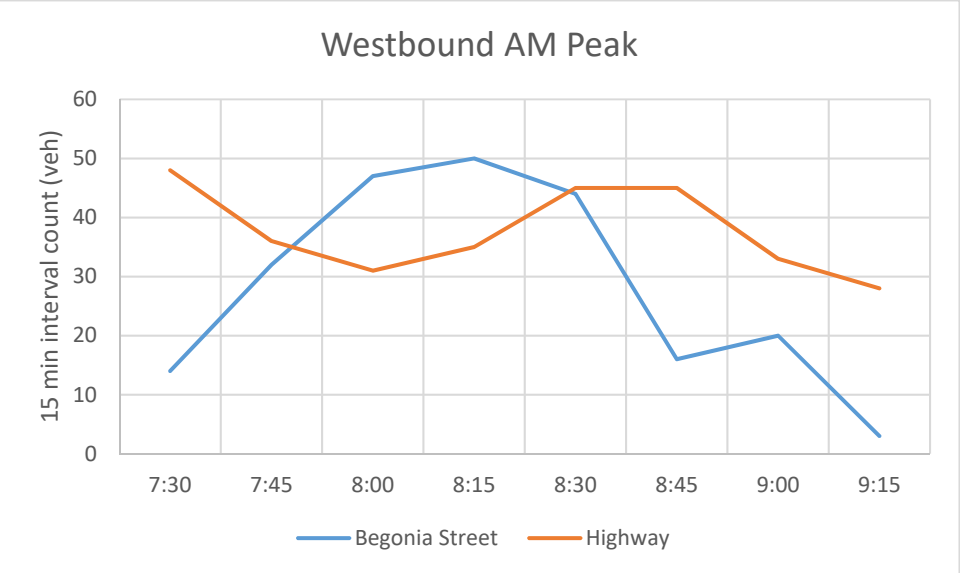
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Table 6 Tasman Highway, eastbound AM peak

Origin	Destination	0730-0745	0745-0800	0800-0815	0815-0830	0830-0845	0845-0900	0900-0915	0915-0930	Total
East Derwent Hwy / Lincoln St	Tasman Hwy	47	29	32	42	58	41	23	7	**279**
East Derwent Hwy / Lincoln St	South Arm Hwy	37	32	29	35	34	32	17	15	**231**
Total		**84**	**61**	**61**	**77**	**92**	**73**	**40**	**22**	**510**

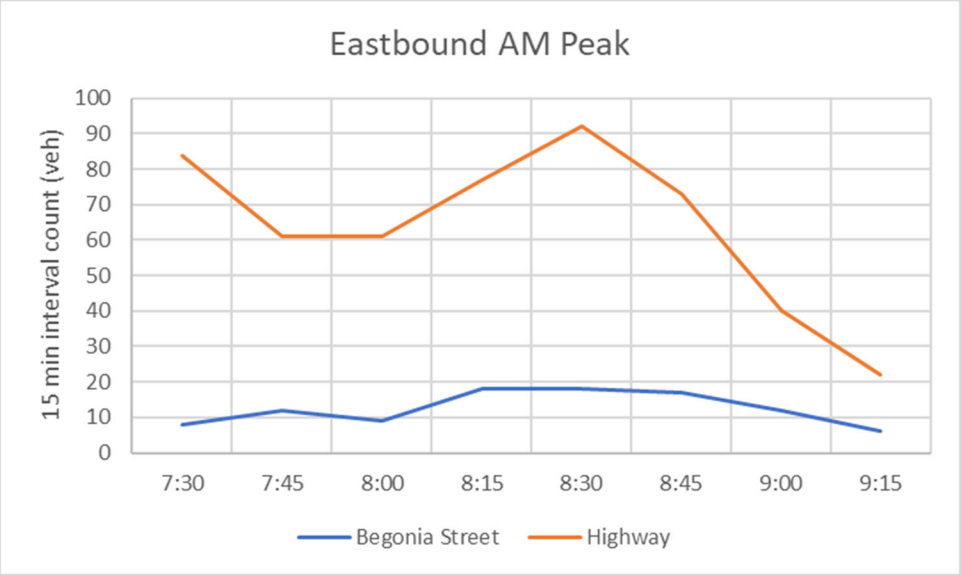
A direct comparison of the respective traffic volumes, over time, between Begonia Street and the Highway is illustrated in Figure 2 for the westbound direction and Figure 3 for the eastbound direction. In the westbound direction, a preference for using Begonia Street is evident between approximately 7:45 and 8:45, while outside of this period the Highway is the preferred route. In the eastbound direction, the use of Begonia Street is substantially lower than the use of the Highway throughout the morning peak.

Figure 2 Route comparison, westbound AM peak



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Figure 3 Route comparison, eastbound AM peak



A comparison of the percentage of vehicles using Begonia Street compared to the Highway for the two-hour peak is provided in Table 7 for westbound traffic and Table 8 for eastbound traffic. In the westbound direction, 65% of traffic travelling from the South Arm Highway uses Begonia Street, while only 2% of traffic diverts from the Tasman Highway. In the eastbound direction, 20% of traffic travelling to the South Arm Highway uses Begonia Street, while 11% uses Begonia Street to travel to the Tasman Highway.

Table 7 Comparison of routes, westbound AM (7:30-9:30)

Origin	Destination	Tasman Highway	Begonia Street	% 'Rat running'
Tasman Hwy	East Derwent Hwy / Lincoln St	187	3	2%
South Arm Hwy	East Derwent Hwy / Lincoln St	144	213	65%

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Table 8 Comparison of routes, eastbound AM (7:30-9:30)

Origin	Destination	Tasman Highway	Begonia Street	% 'Rat running'
East Derwent Hwy / Lincoln St	Tasman Hwy	279	34	11%
East Derwent Hwy / Lincoln St	South Arm Hwy	231	58	20%

3.2 Evening peak

Westbound

The number of vehicles using Begonia Street as a 'rat run' in the westbound direction during the two-hour evening peak is summarised in Table 9. A total of 80 vehicles used Begonia Street during this time. The majority of these vehicles travelled from the South Arm Highway (69), with only a small number travelling from Dampier Street (11) and no vehicles diverting from the Tasman Highway.

A comparison of the destination stations for vehicles using Begonia Street in the westbound direction is provided in Table 10, for the two-hour evening peak. Most vehicles turned right onto the East Derwent Highway from Gordons Hill Road (64%) or travelled further along Malunna Road and exited the survey area on Lincoln Street (29%). Some vehicles turned left onto the East Derwent Highway from Gordons Hill Road (8%).

The MetroCount data from adjacent to 65 Begonia Street shows a peak hour volume between 16:00-17:00 of 127 vehicles in the westbound direction. Based on this volume, the number of vehicles using Begonia Street as a 'rat run' accounts for approximately 40% of westbound traffic on Begonia Street during the peak hour.

Table 9 Begonia Street, westbound PM peak

Origin	Destination	1600-1615	1615-1630	1630-1645	1645-1700	1700-1715	1715-1730	1730-1745	1745-1800	Total
Tasman Hwy	East Derwent Hwy / Lincoln St	0	0	0	0	0	0	0	0	**0**
South Arm Hwy	East Derwent Hwy / Lincoln St	3	12	11	18	3	11	11	0	**69**
Dampier St	East Derwent Hwy / Lincoln St	3	3	0	5	0	0	0	0	**11**
Total		**6**	**15**	**11**	**23**	**3**	**11**	**11**	**0**	**80**

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Table 10 Begonia Street, westbound PM peak (16:00-18:00), comparison of destination stations

Destination station	Total Vehicles	% Vehicles
3. East Derwent Hwy north	51	64%
4. East Derwent Hwy south	6	8%
5. Lincoln Street	23	29%
Total	80	

Eastbound

The number of vehicles using Begonia Street as a 'rat run' in the eastbound direction in the two-hour evening peak is summarised in Table 11. A total of 129 vehicles used Begonia Street during this time. The majority of these vehicles travelled to the South Arm Highway (100), with only a small number travelling to the Tasman Highway (22) or Dampier Street (7).

A comparison of the origin stations for vehicles using Begonia Street in the eastbound direction is provided in Table 12, for the two-hour evening peak. Most vehicles travelled from the East Derwent Highway, north of Gordons Hill Road (74%), or entered the survey area on Lincoln Street (23%). A small number of vehicles travelled from the East Derwent Highway south of Gordons Hill Road (3%).

The MetroCount data from adjacent to 65 Begonia Street shows a peak hour volume between 16:00-17:00 of 134 vehicles in the eastbound direction. Based on this volume, the number of vehicles using Begonia Street as a 'rat run' accounts for approximately 60% of eastbound traffic on Begonia Street during the peak hour.

Table 11 Begonia Street, eastbound PM peak

Origin	Destination	1600-1615	1615-1630	1630-1645	1645-1700	1700-1715	1715-1730	1730-1745	1745-1800	Total
East Derwent Hwy / Lincoln St	Tasman Hwy	3	2	7	3	2	2	3	0	**22**
East Derwent Hwy / Lincoln St	South Arm Hwy	12	14	15	16	19	17	7	0	**100**
East Derwent Hwy / Lincoln St	Dampier St	1	2	2	0	1	1	0	0	**7**
Total		**16**	**18**	**24**	**19**	**22**	**20**	**10**	**0**	**129**

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Table 12 Begonia Street, eastbound PM peak (16:00-18:00), comparison of origin stations

Origin station	Total Vehicles	% Vehicles
3. East Derwent Hwy north	95	74%
4. East Derwent Hwy south	4	3%
5. Lincoln Street	30	23%
Total	129	

Route comparison

The number of vehicles using the Tasman Highway / East Derwent Highway during the two-hour evening peak is summarised in Table 13 for the westbound direction and Table 14 for the eastbound direction. A total of 610 vehicles used the Highway route in the westbound direction and a total of 443 vehicles used the Highway in the eastbound direction.

Table 13 Tasman Highway, westbound PM peak

Origin	Destination	1600-1615	1615-1630	1630-1645	1645-1700	1700-1715	1715-1730	1730-1745	1745-1800	Total
Tasman Hwy	East Derwent Hwy / Lincoln St	53	57	44	41	46	44	22	14	**321**
South Arm Hwy	East Derwent Hwy / Lincoln St	50	37	56	33	34	23	26	30	**289**
Total		**103**	**94**	**100**	**74**	**80**	**67**	**48**	**44**	**610**

Table 14 Tasman Highway, eastbound PM peak

Origin	Destination	1600-1615	1615-1630	1630-1645	1645-1700	1700-1715	1715-1730	1730-1745	1745-1800	Total
East Derwent Hwy / Lincoln St	Tasman Hwy	37	33	23	25	26	18	18	0	**180**
East Derwent Hwy / Lincoln St	South Arm Hwy	29	28	21	22	38	36	29	60	**263**
Total		**66**	**61**	**44**	**47**	**64**	**54**	**47**	**60**	**443**

A comparison of the use of Begonia Street and the Highway is illustrated in Figure 4 for the westbound direction and Figure 5 for the eastbound direction. In both directions, the use of Begonia Street is substantially lower than the use of the Highway throughout the evening peak.

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Figure 4 Route comparison, westbound PM peak

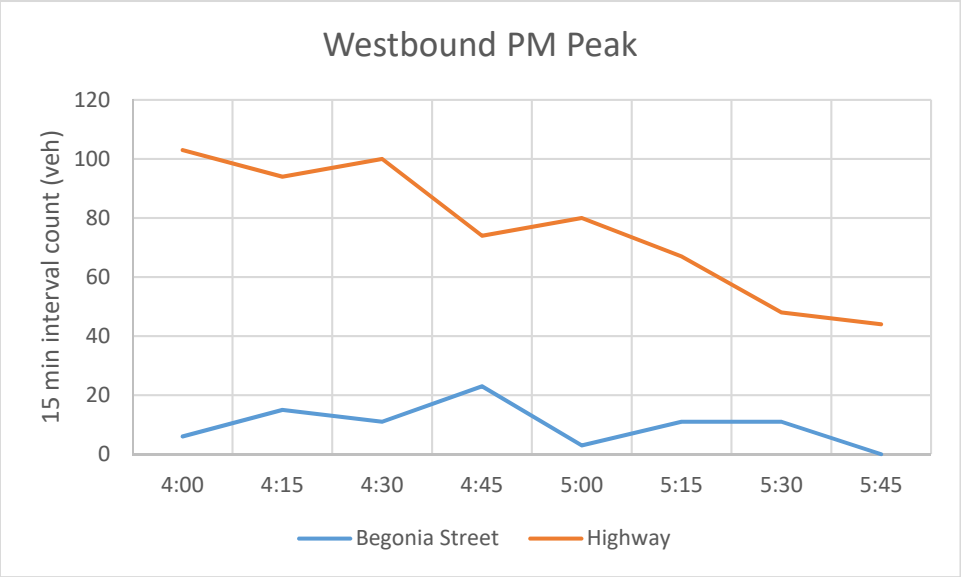
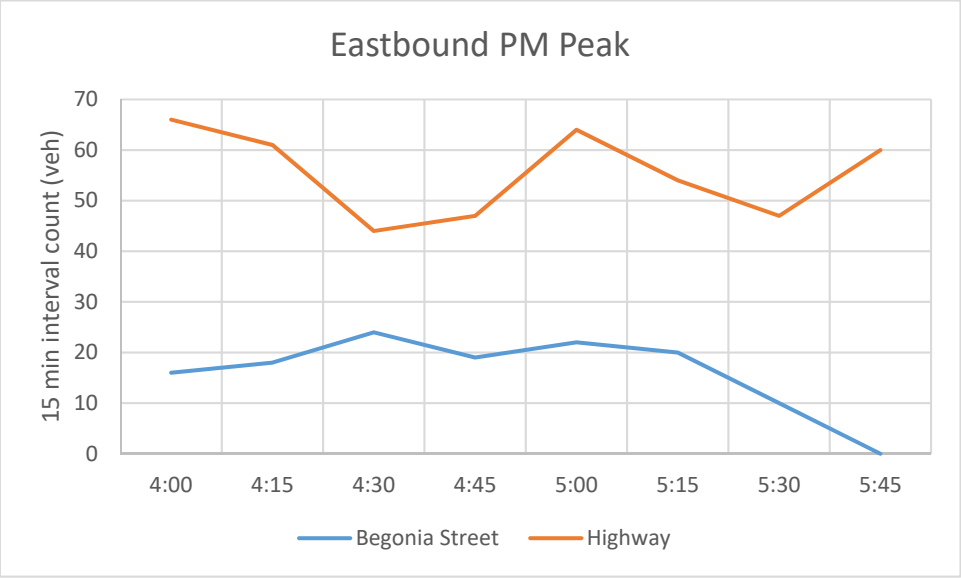


Figure 5 Route comparison, eastbound PM peak



A comparison of the percentage of vehicles using Begonia Street compared to the Highway for the two-hour peak is provided in Table 15 for westbound traffic and Table 16 for eastbound traffic. In the westbound direction, 19% of traffic travelling from the South Arm Highway uses Begonia Street, while no traffic diverts from the Tasman Highway. In the eastbound direction, 28% of traffic travelling to the South Arm Highway uses Begonia Street, while 11% uses Begonia Street to travel to the Tasman Highway.

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Table 15 Comparison of routes, westbound PM

Origin	Destination	Tasman Highway	Begonia Street	% 'Rat running'
Tasman Hwy	East Derwent Hwy / Lincoln St	321	0	0%
South Arm Hwy	East Derwent Hwy / Lincoln St	289	69	19%

Table 16 Comparison of routes, eastbound PM

Origin	Destination	Tasman Highway	Begonia Street	% 'Rat running'
East Derwent Hwy / Lincoln St	Tasman Hwy	180	22	11%
East Derwent Hwy / Lincoln St	South Arm Hwy	263	100	28%

4 Potential for increased use of Begonia Street

As detailed in a previous report completed by GHD, *Begonia Street Traffic Calming, October 2018*, Council is considering upgrading the unsealed section of Begonia Street due to ongoing maintenance costs. There is concern from local residents that this would increase the use of Begonia Street for 'rat running'.

As detailed in the previous report, there is limited opportunity to reduce the volume of vehicles using Begonia Street for 'rat running'. Despite existing traffic calming measures, including speed humps and keeping the northern section unsealed, the OD survey shows Begonia Street is already used by through traffic, particularly between 7:45 and 8:45 AM in the westbound direction. Congestion on the Tasman Highway during this peak period makes Begonia Street attractive to 'rat running' for vehicles travelling from the South Arm Highway.

If Begonia Street were to be sealed, it is expected that any increase in 'rat running' is mostly likely to occur during the morning peak, in the westbound direction.

During the morning peak hour, between 7:45 and 8:45 AM, a total of 173 'rat running' trips were recorded in the westbound direction on Begonia Street. As shown in Table 1, the majority of these vehicles travelled from the South Arm Highway. During this period only one vehicle was recorded travelling from the Tasman Highway (via the Mornington roundabout). It is expected that any additional traffic diverting to Begonia Street would originate from the South Arm Highway, rather than diverting from the Tasman Highway.

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As shown in Table 5, during the morning peak hour, between 7:45 and 8:45 AM, a total of 54 vehicles travelled from the South Arm Highway to the East Derwent Highway / Lincoln Street via the Highway route. This is considered to be the potential maximum increase in vehicles using Begonia Street as a 'rat run' in the westbound direction during the morning peak hour. This represents an increase of 30% over existing 'rat running' volumes on Begonia Street.

5 Conclusions

The number of vehicles using Begonia Street as a 'rat run' is summarised in Table 17 for each time period and direction. A total of 326 'rat running' trips were recorded in the two-hour AM peak, compared to 209 in the two-hour PM peak.

The highest use of Begonia Street occurs in the morning peak in the westbound direction, particularly between 7:45 and 8:45. Congestion on the Tasman Highway appears to be the cause of the increased use of Begonia Street during this period. During the two-hour morning peak, 65% of vehicles travelling from the South Arm Highway use Begonia Street.

Average travel times between Mornington and Lindisfarne via the Tasman Highway route in the westbound direction increased from less than 7 minutes before 7:45 to over 12 minutes after 7:45. After 8:45, travel times decreased to less than 10 minutes. In comparison, average travel times via Begonia Street were more consistent and generally in the order of 6 minutes across the two-hour morning peak.

Table 17 Vehicles using Begonia Street as a 'rat run'

Time	Direction	Number of vehicles using Begonia Street as a 'rat run'
AM (7:30-9:30)	Westbound	226
	Eastbound	100
	Total	**326**
PM (16:00-18:00)	Westbound	80
	Eastbound	129
	Total	**209**

Sincerely
GHD



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