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Kurt Bowen
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Dunedin 9058

TDG Ref: 13416
16 December 2015

Issued via email: **kurt.bowen@ppgroup.co.nz**

Dear Kurt

Westacott Heights Subdivision – Taieri Road Access

Following your request, we are pleased to provide this desktop review of the proposed access to Taieri Road to serve the Westacott Heights subdivision, Dunedin. Our review has been based on the drawings prepared by Patterson Pitts Group (PPG) and attached to this report.

1. Existing Transport Environment

1.1 Infrastructure

The proposed subdivision is located at the northern end of Dalziel Road on land that extends from Dalziel Road at its western limit to Taieri Road at its eastern limit.

Dalziel Road is classified as a Collector Road under the Dunedin District Plan, and provides a connection between the suburbs of Brockville and Halfway Bush. Although the road has a rural formation, it operates with a sign-posted speed limit of 70km/h, which is a speed limit typically used for an urban environment. There is an existing right of way that provides access to the existing residential development on the site.

Taieri Road is classified as a Regional Road and provides a link from the western suburbs of Dunedin with the town of Mosgiel and Outram. Taieri Road has a sign posted speed limit of 50km/h. Along the subdivision site frontage, the road has a large radius curve that runs between the north-west and east. The road has been configured with a single traffic lane in each direction separated by a wide central flush median. There are also wide sealed shoulders and footpaths on both sides of the road.

Based on the information provided, Taieri Road carries about 3,400 vehicles per day (vpd) and has a peak hour volume of about 380 vehicles per hour (vph).

1.2 Road Safety

The NZTA Crash Analysis system has been used to investigate the safety record of Taieri Road / three Mile Hill Road between Dalziel Road and Ashmore Road. Three crashes were reported in the five year period 2010-2014 with no crashes being reported in 2015. All three crashes caused minor injuries and involved single vehicles only. Two crashes were attributed to excess

alcohol while the third occurred early in the morning in icy conditions. Overall, the crashes do not raise any concerns with the road environment

2. Subdivision Access Safety Assessment

2.1 Subdivision Proposal and Traffic Generation

The outline development plan for the Westacott Heights subdivision anticipates up to 28 new lots being created in addition to the existing residential development. Access to these lots is proposed via a new road connecting to Taieri Road midway along the subdivision road frontage, broadly opposite the properties at 482 and 484 Taieri Road. The new road has a maximum gradient of 10% and will be partially formed on a raised bank crossing the gully south of Taieri Road and will meet Taieri Road at right angles.

The typical traffic generation rate of rural residential activity is 8-10vpd per household. To provide a conservative assessment, a rate of 10vpd per household has been adopted. The hourly traffic generation rate of residential activity varies widely across the day and typically exhibits a morning and evening peak. *Figure 1* shows the hourly variation in traffic volumes as a percentage of the total daily traffic generation for a suburban hillside residential subdivision in Christchurch that would be expected to have a similar traffic generation pattern to the proposed subdivision.

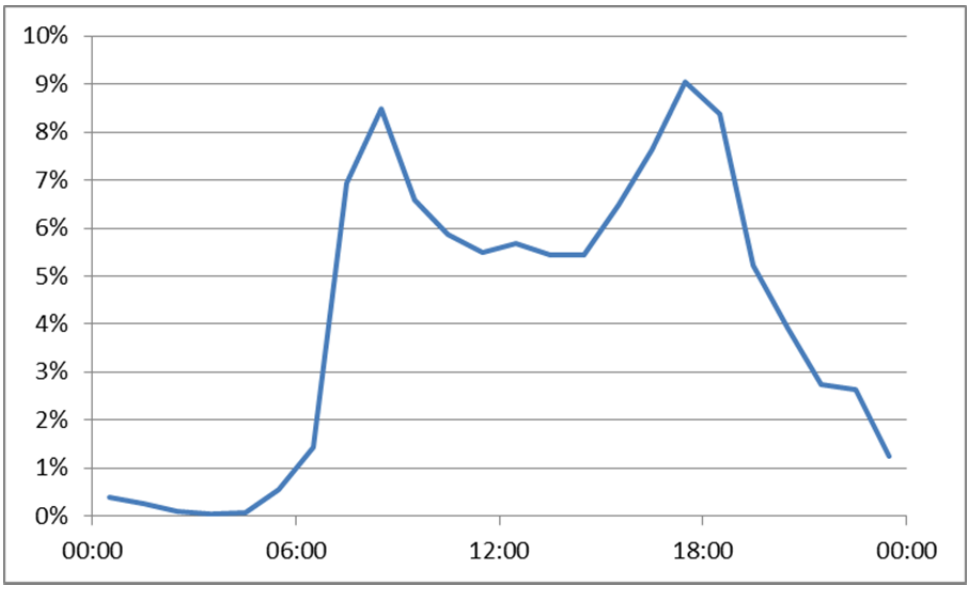


Figure 1: Hourly Variation in Traffic Volumes as a Percentage of Total Daily Generation

The traffic count data indicates that the morning peak hour occurred between 8:00am and 9:00am and comprised 8-9% of the daily traffic generation. The evening peak traffic generation was marginally higher and occurred between 5:00pm and 6:00pm. On this basis, the proposed subdivision would be expected to have a peak hour traffic generation of about 25vph.

In the hour preceding the morning peak, traffic generation of about 20vph could be expected. The evening peak is longer than the morning peak and traffic volumes do not fall below 20vph until after 6:30pm. Traffic volumes of less than 10vph would be expected after 7:30pm.

2.2 Intersection Configuration

Since the proposed development involves more than 12 dwellings and will generate more than 100vpd, the vehicle access designs laid out in the Dunedin City District Plan are not considered appropriate and a new intersection with Taieri Road is proposed with the subdivision road being vested with Council.

The Austroads Guide to Road Design Part 4a, "Unsignalised and Signalised Intersections", includes warrants for the appropriate treatment of turning movements at intersections. The critical movements at the intersection will be the right turn in and right turn out. Given the traffic volumes on Taieri Road and the low traffic generation of the subdivision, a simple treatment that involves shoulder widening of the road would be appropriate. In this instance, the existing cross-section of Taieri Road is already sufficient to meet the requirements of a basic intersection design because of the central flush median and wide shoulders. The flush median provides space for right turning vehicles to stop clear of through traffic which will improve safety at the new intersection.

2.3 Sight Distance

The Austroads Safe Intersection Sight Distance (SISD) requirement for a level road for a design speed of 60km/h is 125m. The available sight distance has been measured by PPG and indicates that this exceeds 150m in both directions.

Since the intersection will be located about 100m west of Turner Street, it is considered that this provides adequate separation to prevent any driver confusion occurring.

2.4 Pedestrians

Although there are footpaths on both sides of Taieri Road, there are no formal crossing facilities provided for pedestrians. We recommend that installation of a pedestrian island on Taieri Road is considered between the new intersection and Turner Street to improve pedestrian network connectivity.

3. Traffic Effects

3.1 Traffic Volumes

The proposed development of up to 28 new dwellings is expected to generate 225-280 additional vehicle movements per day on Taieri Road and about 25 additional movements at peak times. Although this represents about a 10 percent increase in the two-way traffic volume on Taieri Road, it is considered that this will have no noticeable effects on other drivers. The existing traffic volumes are sufficiently low that vehicle movements are largely unconstrained by the presence of other traffic which is considered representative of level of service B.

3.2 Intersection Performance

The AUSTROADS Guide to Traffic Management Part 3 ("Traffic Studies and Analysis") currently recommends that unsignalised intersections are evaluated using SIDRA intersection analysis software or an equivalent tool. This advice supersedes previous recommendations that detailed analysis of low volume driveways was not normally required because capacity was unlikely to be a critical factor.

The following table shows the traffic volume thresholds previously adopted by Austroads where detailed analysis was not considered necessary and also shows the expected traffic volumes at the new intersection.

Intersection	Major Road Flow (vph)	Minor Road Flow (vph)
AUSTROADS Guide to Traffic Management	400	250
Two-lane Road	500	200
Peak Hour Capacity Combinations	650	100
Westacott Subdivision Road	380	25

Table 1: Intersection Capacity – Uninterrupted Flow Conditions

Since the expected traffic volumes on the subdivision road are well below the thresholds previously adopted by Austroads, no further analysis has been undertaken to evaluate levels of service because no capacity issues are anticipated. On this basis, the proposed development is not expected to have any adverse effect on the road network.

3.3 Headlight Glare

Since the new subdivision road approaches Taieri Road from below, there is some potential for headlight glare to affect the properties on the northern side of Taieri Road. There are two critical periods, early in the morning and the evening.

In the early morning, about 80 percent of vehicle movements from the subdivision will be outbound and have the potential to create headlight glare effects on the opposite side of the road. This will be most noticeable before about 8:00am. Before 7:00am, it is expected that the subdivision would generate less than 5vph. The traffic generation is expected to increase to about 20vph over the following hour. On this basis, there could be 15-20 vehicles departing between 6:00am and 8:00am that could give rise to headlight glare effects.

In the evening, the dominant movement pattern will be into the subdivision rather than out. In the evening peak period, typically about 35% of all movements are outbound. This proportion will reduce later into the evening. On this basis there could be 5-10 outbound vehicles per hour between 5:00pm and 7:00pm that could generate glare effects. This would be expected to fall to less than five vehicles per hour later in the evening.

The long section information of the new road prepared by PPG indicates that with dipped headlights, the main vehicle beam does not sweep directly across windows of the properties on the opposite side of the road. However, it is possible that there could still be some residual effects from the edges of the beam that could be noticeable to residents because it will represent a transition from a situation with no development. It is understood that planting is proposed along the edge of Taieri Road and the new subdivision road to mitigate this effect. It is also understood that the curves in the subdivision road on its approach to Taieri Road will provide screening that will contribute to reducing the potential for headlight glare effects.

3.4 Noise

The proposed subdivision could increase traffic volumes on Taieri Road at the new intersection by about 25vph at peak times to about 400vph, an increase of less than 10%. We understand that this level of increase would not produce a noticeable change in the background noise level.

Since the proposed subdivision is for residential rather than industrial or commercial activity, it is not expected to involve heavy vehicle movements. Since light vehicles generate lower levels of noise than heavy vehicles, it is understood that vehicle acceleration and braking at the new intersection would be unlikely to contribute to noticeable noise effects.

3.5 Dalziel Road Access

There are nine existing properties within the wider subdivision that have access to Dalziel Road. No changes to their access are proposed and their existing right of way will be formed as a formal cul-de-sac with no vehicular connection to the new subdivision roads. On this basis, the proposed subdivision will have no traffic effects on the existing access to Dalziel Road. However, there will be improved pedestrian and cycle access to Taieri Road through the new subdivision.

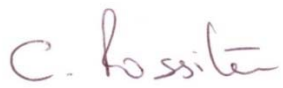
4. Conclusions

This desktop assessment of the proposed new road and intersection to provide access to the Westacott subdivision has concluded that a safe and efficient access can be provided to Taieri Road. A new intersection about 100m west of Turner Street would provide very good sight distances that far exceed the minimum requirements for the speed environment. The existing configuration of Taieri Road includes a wide flush median that will enable right turning vehicles to stop clear of through traffic.

The vertical and horizontal alignment of the new road has been designed to minimise the potential effects of head light glare as vehicles depart from the subdivision. Planting along Taieri Road and the subdivision road is also proposed to provide screening of headlight glare. While these design features will mitigate the potential for headlight glare effects, it is considered possible that some glare effects could still be noticeable because there is no existing development on the subdivision land that would generate any vehicle movements onto this section of Taieri Road.

We trust that this report is clear but we would be happy to discuss any matter raised as necessary.

Yours sincerely
Traffic Design Group Ltd



Chris Rossiter
Principal Transportation Engineer
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KEY

ALL AREAS AND DIMENSIONS ON THIS PLAN ARE SUBJECT TO FINAL SURVEY

Geotech Category Line

Watercourse

17 2620 — Lot Number with Nett. Area in m2

0m 20m 50m

SCALE BAR

N

Overhead Electricity Lines

Underground Electricity Alignment (in easement)

Proposed new fencing and 3.0m planting along boundary

Lot 1 DP 453493

Proposed Private Lane 'A'

Proposed Private Lane 'B'

Proposed Private Lane 'H'

This section of carriageway linking Lanes A & B is optional

Barrier to prevent through access by vehicles

Existing Right of Way Formation

Lot 3 DP 470050

Lot 4 DP 470050

Lot 6 DP 470050

Lot 7 RPR Properties

Lot 8 DP 470050

Public Reserve (Recreation) 103 3960

Private Reserve (Recreation)

Private Reserve (Natural)

Public Reserve (Natural) 101 5.94ha

Extents of Fill Batter

TAIERI ROAD

DALZIEL ROAD

ASHMORE STREET

ROW 'C'

ROW 'D'

ROW 'E'

ROW 'F'

ROW 'G'

Prop. Public Pathway

Planting along boundary

Proposed 8.0m

Window 3

Window 2

Window 1

No 482

No 48

1 2060

2 2000 2300 Gross

3 2020

4 2000

5 2000 2300 Gross

6 2000

7 2040

8 2820 3560 Gross

9 2060

10 2000

11 2400

12 2320 2780 Gross

13 2200

14 2120

15 2000

16 2440

17 2620

18 2120

19 2030

20 2045

21 2140

22 2085

23 2180

24 2030

25 2030

26 2030

27 2390

28 2110

29 2700

30 2010

31 2475

32 3660

33

34

94 3170

95 3715

96 2850

97 3170

98 2960

99 2760

100

102 1260

Client/Location:

WESTACOTT HEIGHTS
DRAFT STRUCTURE PLAN
CONCEPT K
DETAILED LAYOUT PLAN

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Designed by:	K.BOWEN	A3	1:1500
Drawn by:	M.WYLIE		
Checked by:			DO NOT SCALE
Approved by:	K.BOWEN		
Job Ref: D14955		Sheet No: 2 of 5	Version No: 1
			Date Created: 15/12/15

KEY

ALL AREAS AND DIMENSIONS ON THIS PLAN ARE SUBJECT TO FINAL SURVEY

Geotech Category Line

Watercourse

17
2620
Lot Number
with Nett. Area in m2

0m 20m 50m

SCALE BAR

N

No 486

No 484

Window 3

Window 2

Window 1

No 482

No 480

Edge of Existing Carriageway

Planting to screen development effects

Extents of Fill Batter

0

20

40

60

80

100

120

140

160

180

TAIERI ROAD

103
Public
Reserve
(Recreation)

26

25

Planting to screen headlight glare

100
Public
Road
1580

New culvert

Provision for turning and parking

102
Public
Reserve
(Natural)

Planting to screen development effects

10m

34
1160

ROW 'E'

1400
Gross

27

29

28

101
Public
Reserve
(Natural)

ROW 'F'

33
1560

Client/Location:

WESTACOTT HEIGHTS
DRAFT STRUCTURE PLAN
CONCEPT K
DETAILED LAYOUT PLAN - ENLARGEMENT

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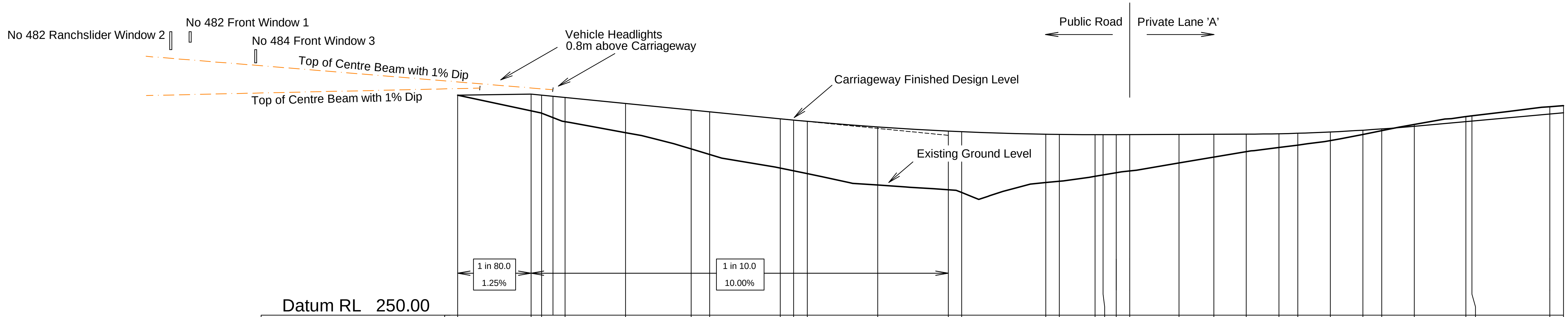
PLOT DATE: 15 December, 2015 - 11:30 PM BY: Kurt Bowen



Datum RL 250.00

Chainage	0.00	8.75	10.00	12.80	20.00	27.80	30.00	38.40	40.00	41.62	50.00
Road Design Lev.	276.19	276.30	276.18	275.90	275.19	274.42	274.20	273.37	273.22	273.07	272.40
Original Ground Lev.	276.19	274.33	274.05	273.03	271.71	269.79	269.13	267.50	267.17	266.84	265.49
CUT/FILL	0.00	-1.97	-2.13	-2.87	-3.48	-4.63	-5.08	-5.87	-6.05	-6.23	-6.91

Chainage	58.40	60.00	70.00	71.62	75.87	76.83	78.40	80.00	85.87	90.00
Road Design Lev.	271.91	271.84	271.54	271.51	271.48	271.48	271.48	271.49	271.51	271.53
Original Ground Lev.	264.93	264.61	265.79	265.94	266.53	266.69	266.96	267.16	268.12	268.81
CUT/FILL	-6.98	-7.24	-5.75	-5.57	-4.95	-4.79	-4.52	-4.32	-3.39	-2.71

Chainage	93.87	97.76	100.00	103.87	107.76	110.00	113.87	120.00	120.72	130.00
Road Design Lev.	271.54	271.59	271.65	271.80	272.01	272.17	272.49	273.04	273.10	273.94
Original Ground Lev.	269.47	269.95	270.24	270.76	271.51	271.97	272.70	273.64	273.72	274.81
CUT/FILL	-2.07	-1.64	-1.41	-1.03	-0.50	-0.20	0.22	0.60	0.62	0.87

VERTICAL ALIGNMENT OF PROPOSED PUBLIC ROAD

Client/Location:

WESTACOTT HEIGHTS
DRAFT STRUCTURE PLAN
CONCEPT K
PUBLIC ROAD / LANE A LONGSECTION

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