
Technical Memorandum

To: David Ehrhardt, c/o 28165 Yukon Inc.

From: Donna Howes, P.Eng., PTOE, FEC, Howes Technical Advantage Ltd.

Date: October 11, 2021

Re: **Wedgewood Development
– High Level Transportation Review - Updated**

1. Introduction

This memorandum provides a high level transportation review of the expansion of the Wedgewood Development. Howes Technical Advantage Ltd. has been retained to provide this review as part of the discussions for a rezoning application for this site.

This memorandum provides an overview of the estimated traffic impact for additional single-family units as part of an expansion of the Wedgewood Development on the east side of Highway 99. This memorandum is an update to, and supersedes, the previously submitted memorandum of March 24, 2020.

2. Location and Study Area

The existing Wedgewood Development is located approximately 13km north of Whistler Village and 22km south of Pemberton within the Squamish Lillooet Regional District (SLRD). Highway 99 traverses the west side of the current development which connects via a T-intersection at Riverside Drive. There is a limited bus service with two trips in both peak periods.

3. Scope of work

It is understood that the existing Wedgewood Development of 108 single family units has been approved. The current application under consideration with SLRD is for the expansion of the current development east of Highway 99 with 12 single family houses as part of Phase 7, and an additional smaller 10 single family units on Stata Lot 12. The proposed development layout is shown in **Attachment 1**.

This review is focussed on the new development and the associated transportation impacts. As part of this review, reference has been made to the original traffic study by Bunt & Associates (Wedgemount Subdivision, December 20, 2004).

4. Assumptions

The following assumptions were made for the analysis:

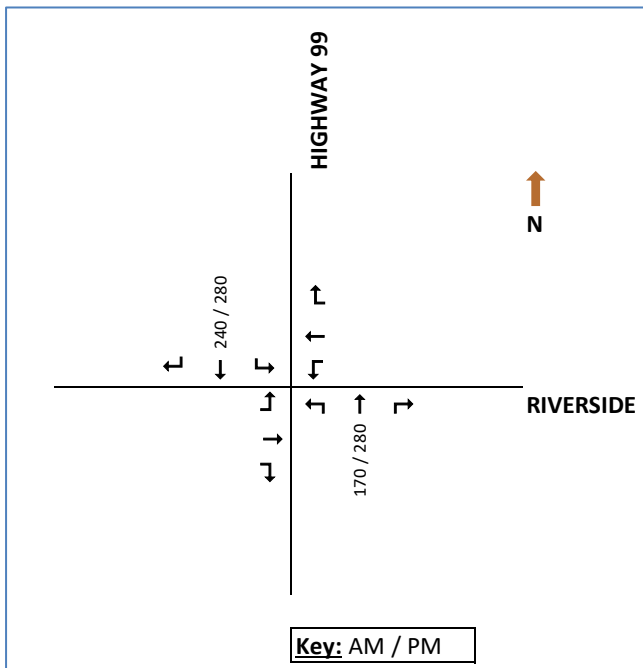
- **Reference:** The Wedgemount Subdivision Traffic Assessment by Bunt & Associates, December 2004 (Bunt Report) will be used as the base reference for this work.
- **Opening day:** The proposed development is assumed to be complete in 2024.
- **Trip Generation:** Trip generation rates were determined using data provided by the latest version of the ITE Trip Generation Manual.
- **Development:** 22 single family residences
- **Data:** This review does not include new data collection.
- **Time horizons:** 2019 Existing; 2024 Future build out

5. Existing Traffic

The BC MoTI permanent counter south of the site was referenced. The Average Annual Daily Traffic (AADT) was referenced for this review. This is shown in **Attachment 2**. There has been an increase in traffic on Highway 99 over the last few years. The average 5 year annual growth rate between 2011 and 2016 was 7% per year. This likely reflects the growth in development in this area.

In order to establish the 2019 existing volumes on Highway 99, the 7% growth rate was applied to the 2018 latest count to develop an AADT of 5,680 vehicles per day for Highway 99. The split for northbound and southbound movements is 49% and 51% respectively (referenced from the historical data). The % of peak hour traffic of the AADT was estimated at 10%. This is a rule of thumb and this was cross checked with the actual daily and hourly volumes in May 2018. Applying this split, plus an assumption of 10% peak hour traffic, the peak hour through volumes were developed for northbound and southbound. It was assumed that the PM peak hour is the worst case. To develop the AM peak hour, the volumes in the 2004 report were used and the ratio of growth was applied to the AM traffic. The resulting existing traffic volumes are shown in **Figure 1**.

Figure 1: Existing Traffic Volumes (Calculated for 2019)



6. Site Traffic

Trip generation

The latest 10th edition of the Institute of Transportation Engineers (ITE) Trip Generation Handbook has been used. The general urban suburban rate was used for all categories. This represents a more conservative approach as this is the highest rate for this category. No trip reduction factors have been used based on the location and that there is limited transit service at this time. The Trip Generation Rates for Single Family (#210) was used. In this edition of ITE, the trip rate is the same for rentals versus ownership. A summary of the trip rates follows in **Table 1** below.

Table 1: ITE Trip Rates

DESCRIPTION	ITE REF #	ITE Description			AM PEAK HOUR			PM PEAK HOUR		
					RATE IN	RATE IN	TOTAL RATE	RATE IN	RATE IN	TOTAL RATE
Single family	10th 210	Gen Urban Suburban	Detached		0.19	0.56	0.74	0.62	0.37	0.99
				Directional dist.	25%	75%		63%	37%	

Site Trips:

The site trips for the AM and PM peak hour were developed by applying the trip generation rates to the number of units. It is important to note that the demographic for the single family dwellings is likely to have 30% retirees who would not be commuting during peak hours. However, no trip reductions were included and as a result the site trips for single family are conservative.

Using these rates, the trips generated were developed as follows:

- **Approved site vehicle trips** - the existing Wedgewood development of 108 single family units - **Table 2**
- **New site vehicle trips** – new site trips for 22 single family houses - **Table 3**

Table 2: Approved Site Trips

DESCRIPTION	UNITS	AM PEAK HOUR			PM PEAK HOUR		
		TRIPS IN	TRIPS OUT	TRIPS	TRIPS IN	TRIPS OUT	TRIPS
Single family	108	20	60	80	67	40	107

Table 3: New Site Trips

DESCRIPTION	UNITS	AM PEAK HOUR			PM PEAK HOUR		
		TRIPS IN	TRIPS OUT	TRIPS	TRIPS IN	TRIPS OUT	TRIPS
Single family	22	4	12	16	14	8	22

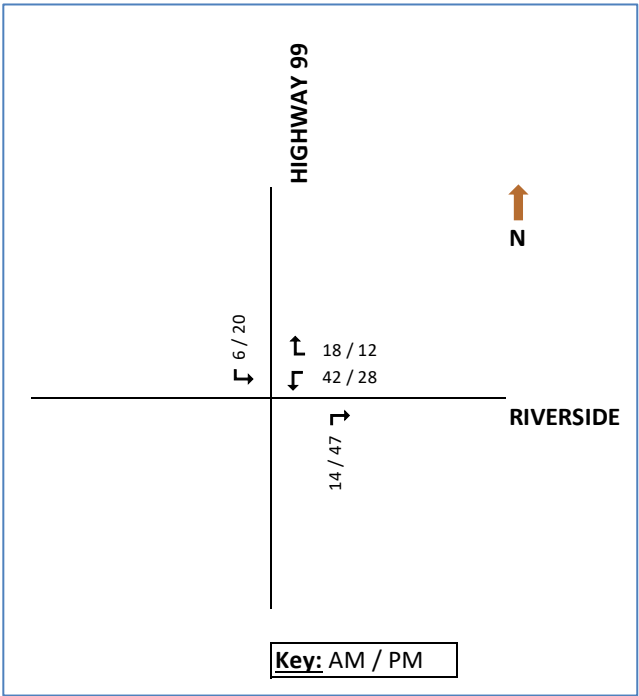
The estimated new site two-way vehicle trips are **16** trips in the AM peak hour and **22** trips in the PM peak hour.

Trip Distribution:

The trips were distributed at the intersection. It was assumed that 70% of the trips would be travelling to and from the south with 30% travelling to and from the north.

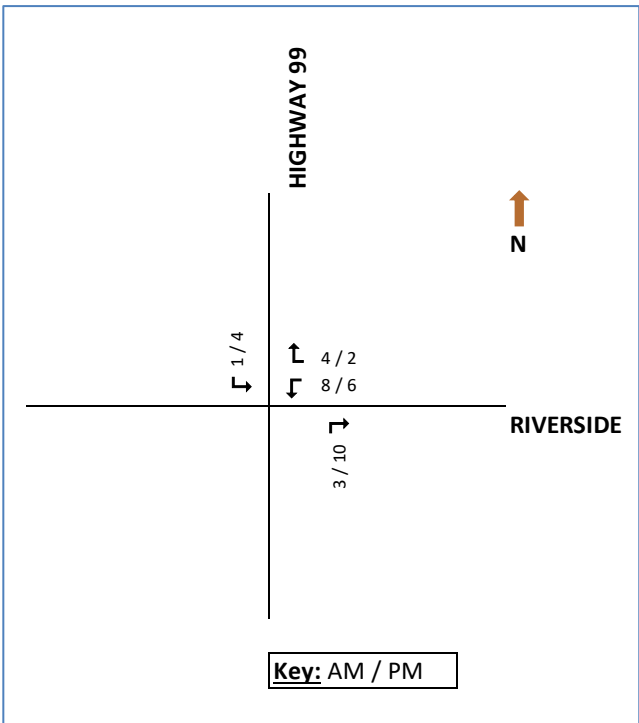
The approved site traffic trips are shown in **Figure 2**.

Figure 2: Approved Site Traffic Volumes



The new site traffic trips are shown in **Figure 3**.

Figure 3: New Site Traffic Volumes

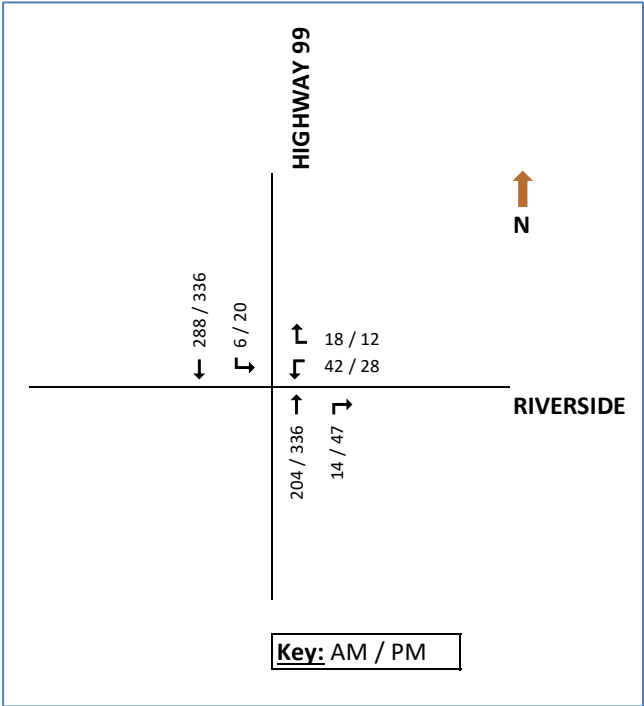


7. Future Background Traffic (2024)

The Background traffic for 2024 was developed using a 4% annual growth rate on the existing traffic from 2019 to 2024. This growth rate was used as a slightly higher rate than the 3% growth rate experienced over the last two years. The total increase is 20% over the five year period. In addition, the approved site traffic that is part of the existing Wedgewood development was added to the Background traffic. These are the site trips associated with the 108 single family development to the east of Highway 99. It is assumed this will be totally built out and occupied at this time. This is a conservative assumption.

The resulting Future Background traffic volumes are shown in **Figure 4**.

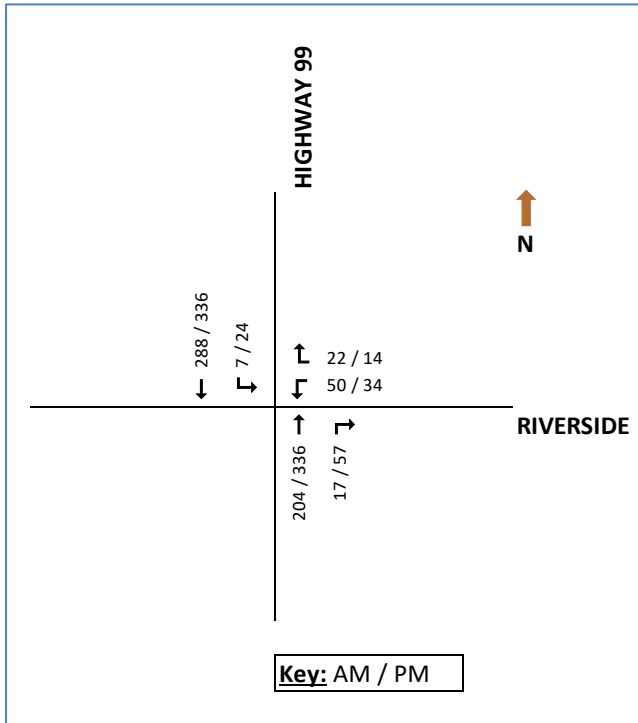
Figure 4: Future Background Traffic (2024)



8. Future Total Traffic (2024)

The Future Total Traffic was developed using the Future Background total traffic for 2024 and adding the new site trips. The resulting Future Total traffic volumes are shown in **Figure 5**.

Figure 5: Future Total Traffic (2024)



The forecast traffic for 2024 at this intersection, which includes the development traffic, is estimated at ~590 two way trips in AM Peak hour and ~800 two way trips in PM peak hour. The new site trips make up 3% of the total peak hour traffic.

9. Traffic Analysis Assumptions and Information

The Synchro software suite¹ was used for the traffic analysis for the existing and the future horizon. This analysis is based on the procedure and methods of the Highway Capacity Manual (HCM) for signalized and unsignalized intersections.

Operations of roadway facilities are described in terms of Level of Service (LOS). LOS is a qualitative description of traffic flow based on factors such as speed, travel time, delay, and freedom to manoeuvre. Six service levels are defined ranging from LOS A, the best operating conditions, to LOS F, the worst operating conditions. LOS E corresponds to “at or near capacity” operations. When volumes exceed capacity, stop-and-go conditions result and operations are designated LOS F. The delay thresholds and corresponding LOS are presented in **Table 4**.

Another method to describe the operation is in terms of the volume to capacity (v/c) ratio. The v/c ratio is defined as the volume for a movement divided by the capacity for that movement. The v/c ratio for an intersection can be calculated by summing the volume for all critical movements and dividing by the sum of the capacity for those critical movements. The v/c ratio can also be described in terms of LOS A-F as well. Generally, a movement or

¹ Synchro Software – Version 10

intersection with a v/c less than 0.85 is operating under capacity, 0.85-0.95 is operating near capacity, 0.95-1.00 flow is becoming unstable (improvements will be required to avoid excessive delays), and greater than 1.00 the demand exceeds the available capacity. The v/c ratio thresholds and the corresponding LOS are presented in **Table 4**.

The calculated 95th percentile queue length has also been reported in terms of length (m) where the space for a car is approximately 7m.

Table 4: Level of Service Criteria

Level of service (LOS)	Average delay for Unsignalized intersection movements (seconds per vehicle)	Average delay for Signalized intersection movements (seconds per vehicle)	v / c Ratio
A	0-10	0-10	< 0.60
B	10-15	10-20	> 0.60 to 0.69
C	15-25	20-35	> 0.70 to 0.79
D	25-35	35-55	> 0.80 to 0.89
E	35-50	55-80	> 0.90 to 0.99
F	> 50	> 80	> 1.00

The following assumptions were used for this analysis:

- Heavy vehicles: 9% was used as per BC MoTI counter on Highway 99.
- Speed limit: 80km/h on Highway 99; 50km/h on all other roads.
- Lane widths: 3.6m

10. Future Total Conditions (2024)

The future total traffic operation for the intersection of Highway 99 and Riverside Drive was analyzed using Synchro. The worst case scenario is the PM Peak hour. The existing unsignalized operation was analyzed. The results are shown in **Table 5**.

Table 5: Future Total Traffic Intersection Operation
– PM Peak Hr - Unsignalized

	PM Pk Hr		
Movement	LOS	95% Q (m)	v/c
WB L	C	3	0.10
WB R	B	1	0.02
SB L	A	1	0.02

The intersection operates well as an unsignalized intersection with some minor delays to the side streets. All movements operate at LOS C or better.

11. Conclusions

This section provides conclusions based on the review undertaken.

- The estimated two-way total site vehicle trips for the new development are 16 trips in the AM peak hour and 22 trips in the PM peak hour.
- The forecast traffic on Highway 99 at this location, which includes the development traffic, is estimated at ~590 two way trips in AM Peak hour and ~800 two way trips in PM peak hour. The new site trips make up 3% of the total peak hour traffic. The increase of new traffic is small and is well within the capacity of the intersection.
- The unsignalized intersection of Riverside Drive and Highway 99 operates well at full build out in 2024. All movements operate at LOS C or better.

12. Recommendations

The proposed development will not unduly affect traffic operation on Highway 99 as the traffic demand is low in relation to the overall traffic volume on Highway 99. It is recommended that no further upgrades to the existing transportation infrastructure as a result of this development are required.

Respectfully submitted,



Donna Howes, P.Eng., PTOE, FEC

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ATTACHMENT 1

Proposed Development Layout

	EXISTING	PROP.	TO BE REMOVED
LEGAL LINE			
EASEMENT			
WATERMAIN			
SANITARY			
STORM			
HYDRO			
TEL			
STREETLIGHT			
GAS			

	EXISTING	PROP.	TO BE REMOVED
FIRE HYDRANT			
GATE VALVE			
AIR VALVE			
REDUCER			
INSPECTION CHAMBER			
CATCHBASIN (STD/SI)			
C&P			
MANHOLE			
POWER POLE			
STREETLIGHT			

approved

client

28165 YUKON INC.

project

WEDGEWOODS - PHASE 7
WEDGEWOODS AT WHISTLER

title

COMMUNITY HOUSING - WEDGEWOODS

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ATTACHMENT 2

BC MoTI Permanent Counter Summary

Traffic Data

10 Year Annual Summary for 2018

TM Site ID: **P-15-11NS**

TM Site Name: **Wedgemount - P-15-11NS, Sea to Sky Highway**

Location: **Route 99, 5.8 km north of Alpine Way, north of Whistler**

Posted Speed: **80 kph**

Report Run on: **Tuesday April 9 2019 07:52 AM**

Traffic Data in this report	
AADT	Annual Average Daily Traffic A calculated daily estimate of the number of vehicles passing this site.
SADT	Summer Average Daily Traffic (for the months of July and August)
Class	Vehicle Length Types of vehicles traveling through this site.

Average Daily Traffic Volumes

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AADT	4,120	4,004	3,714	3,686	3,789	3,941	4,284	4,977		
SADT	5,070	4,989	4,897	4,776	4,898	5,258	5,748	6,812		

10 Year Annual Statistics



10 Years % AADT by Direction

