MEMO

DATE: July 23, 2018
PROJECT NO: 04-18-0020
PROJECT: Garibaldi Springs
SUBJECT: Transportation Impact Assessment Addendum

TO: Kevin Shoemaker
Polygon Homes

PREPARED BY: Nicole He, EIT, Matt Taylor, P.Eng.
REVIEWED BY: Peter Joyce, P.Eng.

This memo serves an addendum to the Garibaldi Springs Traffic Impact Assessment report completed by Bunt & Associates (Bunt) dated January 26, 2018. As shown in **Table 1**, the proposed development has reduced the amount of residential units from 395 units to 310 units. Traffic operations have been analyzed in this addendum both with and without the proposed extensions of Newport Ridge Drive to the Garibaldi Highlands and to Highway 99.

The following memo summarizes and compares the traffic forecasts and operational results between January 2018 statistics and the latest project statistics.

Table 1: Comparison of Proposed Garibaldi Springs Land Use Quantities

LAND USE	JANUARY 2018 PROPOSAL	MAY 2018 PROPOSAL	DIFFERENCE
Duplexes and Cottages *	114	78	-36
Rowhomes	281	232	-49
TOTAL	395	310	-85

*Note: In the TIA report these were referred to as single family homes due to the fact that the single family home trip generation rate was used for these building. In both the previous and current site plans, these units are duplexes and a small number of cottages.

Exhibit 1 illustrates the proposed Garibaldi Springs site plan as of May 2018.

N

Scale: NTS



GARIBALDI SPRINGS | MASTERPLAN

Polygon | Squamish, BC | 15 May 2018 | 1:2000

PWL partnership

S:\PROJECTS\MT\04-18-0020 Garibaldi Springs TIA V2\5.0 Deliverables\Memo Graphics

Exhibit 1

Site Plan

Garibaldi Springs Transportation Impact Assessment V2

04-18-0020 June 2018

bunt & associates

1. TRAFFIC FORECASTS

The Friday and Sunday peak hour vehicle trips are forecasted based on average vehicle trip rates provided in the ITE Trip Generation Manual (10th Edition). Single Family detached housing trip rates applied to the proposed individual homes and duplexes, and low-rise multifamily housing trip rates were applied to the proposed townhomes.

Table 2 presents the anticipated Friday future site generated vehicle trips for the proposed development based on the previous and latest statistics. During the Friday PM peak hour, the anticipated site traffic is estimated to reduce from 270 to 207 vehicle trips (63 trips less).

Table 2: Comparison of Friday Peak Hour Vehicle Trips

LAND USE	JANUARY 2018 PROPOSAL			MAY 2018 PROPOSAL		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Duplexes and Cottages	71	42	113	49	29	77
Rowhomes	99	58	157	82	48	130
TOTAL	170	100	270	130	77	207

Table 3 presents the anticipated Sunday future site generated vehicle trips for the proposed development based on the previous and latest statistics. As shown, the vehicle trips are estimated to reduce from 232 to 178 trips (54 trips less) during Sunday peak hour.

Table 3: Comparison of Sunday Peak Hour Vehicle Trips

LAND USE	JANUARY 2018 PROPOSAL			MAY 2018 PROPOSAL		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Duplexes and Cottages	51	46	97	35	31	66
Rowhomes	71	63	135	59	52	111
TOTAL	123	109	232	94	84	178

Based on the traffic patterns in the area, the majority of the traffic generated by the future developments in the area will use the section of Garibaldi Way between Highway 99 and Tantalus Road under existing road network conditions. Garibaldi Springs is anticipated to increase the traffic volumes on this segment of road by 9%/11% (112/97 vehicles) in the Friday/Sunday PM peak hours assuming no changes to the existing road network.

Apart from Polygon's proposed Garibaldi Springs development, other contemplated developments within the study area are anticipated to generate approximately 2,000/1,600 vehicle trips during the Friday/Sunday peak hours. The developments included in this forecast are Thunderbird Creek, the Cheema Lands, Skyridge Phase 2, 1870 Dowad Drive, and 40480 Tantalus Road. Without additional mitigation measures, the majority of these trips will use the section of Garibaldi Way between Highway 99 and Tantalus Road. These developments have not been accounted for in the analysis reported in this memo.

2. TRAFFIC OPERATIONS

The previous traffic analysis examined the traffic operations with an additional right-in / right-out connection from Highway 99 to a westward extension of the existing Newport ridge Drive as well as an eastward extension of Newport Ridge Drive up to the Garibaldi Highlands. The current analysis is carried out both with and without the proposed extensions of Newport Ridge Drive. In summary, three scenarios of traffic operations are compared:

(1) January 2018: Proposed development of 390 residential units; with Newport Ridge Dr. extensions.
(2) May 2018: Proposed development of 310 residential units; with existing road network.
(3) May 2018: Proposed development of 310 residential units; with Newport Ridge Dr. extensions.

The following mitigation measures were assumed in the Synchro models during each study period at the signalized intersections within the study area (Note: a weighting factor was applied in order to favour Highway 99 through movements in the traffic signal timing optimization process):

2022 & 2032 Friday:

- Optimize the cycle length on Sea-to-Sky Highway & Garibaldi Way and Sea-to-Sky Highway & Mamquam Road from 100 seconds to 110 seconds;
- Optimize offsets and intersection splits for Sea-to-Sky Highway & Garibaldi Way and Sea-to-Sky Highway & Mamquam Road.

2022 & 2032 Sunday:

- Optimize the cycle length on Sea-to-Sky Highway & Garibaldi Way and Sea-to-Sky Highway & Mamquam Road from 118 seconds to 85 seconds;
- Optimize offsets and intersection splits for Sea-to-Sky Highway & Garibaldi Way and Sea-to-Sky Highway & Mamquam Road.

To keep this addendum reasonably brief, only those intersections found to be of importance (for highlighting the impacts of different design options or illustrating traffic operations challenges) have been included in this analysis. **Table 4** indicates those intersections included in this analysis. **Tables 5** and **6** provide the results of the traffic operations analysis under both the January 2018 and May 2018 site plans.

Table 4: Intersection Included in Analysis Addendum

KEY INTERSECTIONS (INCLUDED IN ADDENDUM)	OTHER INTERSECTIONS (SEE FULL TIA FOR COMPARIBLE RESULTS)
Sea-to-Sky Highway / Garibaldi Way	Government Road & Garibaldi Way
Sea-to-Sky Highway / Mamquam Road	Garibaldi Way & Gas Station Accesses
Garibaldi Way / Tantalus Road	Garibaldi Way & Tantalus Road
Garbaldi Way / Shopping Centre Access	Tantalus Road & Executive Suites Hotel Access
Tantalus Road / Dowad Drive	Sea-to-Sky Highway & Dowad Drive
Tantalus Road / Newport Ridge Drive	Sea-to-Sky Highway & Newport Ridge Drive

Table 5a: Comparison of Opening (2022) Friday Peak Hour Traffic Operations

INTERSECTION/ TRAFFIC CONTROL	MOVE-MENT	JAN 2018 - 395 UNITS; WITH WESTWARD AND EASTWARD EXTENSIONS OF NEPORT RIDGE DRIVE			MAY 2018 - 310 UNITS; EXISTING ROAD NETWORK (WITHOUT NEWPORT EXTENSIONS)			MAY 2018 - 310 UNITS; WITH WESTWARD AND EASTWARD EXTENSIONS OF NEPORT RIDGE DRIVE		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
Sea-to-Sky Highway / Garibaldi Way (Signalized)	*OVERALL*	*C*	*0.78*	-	*C*	*0.76*	-	*C*	*0.76*	-
	EBL	E	0.75	51	D	0.26	20	D	0.68	41
	EBT	D	0.65	58	E	0.80	84	D	0.65	57
	EBR	D	0.10	11	D	0.10	10	D	0.10	10
	WBL	D	0.69	**58**	D	0.72	**60**	D	0.66	**51**
	WBT	C	0.46	65	C	0.42	61	C	0.44	61
	WBR	C	0.20	24	C	0.22	25	C	0.19	22
	NBL	E	0.83	45	D	0.83	35	D	0.81	35
	NBT	A	0.76	49	A	0.71	9	A	0.76	10
	NBR	A	0.13	0	A	0.20	0	A	0.13	0
	SBL	E	0.85	85	E	0.81	78	E	0.82	78
	SBT	C	0.57	84	C	0.60	86	C	0.57	86
	SBR	C	0.07	9	C	0.07	8	C	0.07	8
Sea-to-Sky Highway / Mamquam Road (Signalized)	*OVERALL*	*C*	***0.91***	-	*C*	***0.90***	-	*C*	***0.90***	-
	EBL	D	0.30	19	D	0.26	18	D	0.26	18
	EBT	D	0.64	47	D	0.55	44	D	0.55	44
	EBR	D	0.02	0	D	0.02	0	D	0.02	0
	WBL	D	**0.91**	**117**	D	0.85	**104**	D	0.85	**104**
	WBT	C	0.23	38	C	0.22	34	C	0.22	34
	WBR	C	0.06	11	C	0.06	9	C	0.06	9
	NBL	E	0.75	39	E	0.60	33	E	0.60	33
	NBT	C	0.86	184	D	**0.92**	213	D	**0.92**	213
	NBR	C	0.49	55	C	0.56	80	C	0.56	80
	SBL	E	0.66	24	E	0.55	21	E	0.55	22
	SBT	B	0.64	121	C	0.69	127	C	0.69	129
	SBR	B	0.02	1	C	0.02	2	C	0.02	1
Garibaldi Way / Tantalus Road (Unsignalized)	EBLT	A	0.15	21	A	0.22	22	A	0.14	22
	WBTR	A	0.15	11	A	0.18	13	A	0.15	11
	SBL	A	0.27	20	C	0.47	22	B	0.25	18
	SBR	A	0.27	24	C	0.47	26	A	0.25	25
Shopping Centre Access / Garbaldi Way (Unsignalized)	EBLTR	A	0.03	40	A	0.03	58	A	0.03	66
	WBLTR	A	0.04	21	A	0.05	23	A	0.04	20
	NBLT	E	**1.16**	**75**	E	**1.15**	**104**	E	**1.11**	**76**
	NBR	B	0.13	35	C	0.14	46	C	0.13	36
	SBLTR	B	0.08	15	C	0.10	18	C	0.08	16
Tantalus Road / Dowad Drive (Unsignalized)	EBLTR	A	0.09	3	A	0.09	15	A	0.08	2
	WBLTR	B	0.13	4	B	0.12	14	B	0.12	3
	NBLTR	A	0.01	1	A	0.01	2	A	0.01	0.3
	SBL	A	0.00	0	A	0.00	0	A	0.00	0
	SBLT	A	0.01	0	A	0.01	0	A	0.01	0
Tantalus Road / Newport Ridge Drive (Unsignalized)	EBLTR	B	0.35	12	-	-	-	B	0.30	9
	WBLTR	B	0.15	4	B	0.08	15	B	0.15	4
	NBTR	A	0.00	0	A	0.16	0	A	0.00	0
	SBLTR	A	0.00	1	A	0.00	0	A	0.00	0

Table 5b: Comparison of Opening (2022) Sunday Peak Hour Traffic Operation

INTERSECTION/ TRAFFIC CONTROL	MOVE-MENT	JAN 2018 - 395 UNITS; WITH WESTWARD AND EASTWARD EXTENSIONS OF NEPORT RIDGE DRIVE			MAY 2018 - 310 UNITS; EXISTING ROAD NETWORK (WITHOUT NEWPORT EXTENSIONS)			MAY 2018 - 310 UNITS; WITH WESTWARD AND EASTWARD EXTENSIONS OF NEPORT RIDGE DRIVE		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
Sea-to-Sky Highway / Garibaldi Way (Signalized)	*OVERALL*	*C*	*0.75*	-	*C*	*0.75*	-	*C*	*0.73*	-
	EBL	C	0.48	24	C	0.17	11	C	0.44	23
	EBT	C	0.47	33	C	0.58	43	C	0.48	33
	EBR	C	0.13	9	C	0.13	10	C	0.13	10
	WBL	C	0.61	37	C	0.62	35	C	0.60	36
	WBT	C	0.34	34	C	0.31	33	C	0.33	34
	WBR	C	0.06	0	C	0.07	3	C	0.06	0
	NBL	C	0.58	44	E	0.78	53	E	0.77	53
	NBT	B	0.55	50	B	0.54	34	B	0.55	42
	NBR	D	0.06	3	D	0.11	7	C	0.06	2
	SBL	D	0.69	70	C	0.61	68	C	0.64	68
	SBT	C	0.80	115	C	0.76	110	C	0.72	101
	SBR	B	0.09	8	B	0.09	8	B	0.09	7
Sea-to-Sky Highway / Mamquam Road (Signalized)	*OVERALL*	*B*	***0.86***	-	*B*	*0.85*	-	*B*	*0.85*	-
	EBL	D	0.18	10	D	0.18	10	D	0.18	10
	EBT	D	0.38	21	D	0.38	21	D	0.38	21
	EBR	D	0.02	0	D	0.02	0	D	0.02	0
	WBL	D	0.87	**89**	D	0.85	**88**	D	0.85	**88**
	WBT	C	0.18	23	C	0.18	23	C	0.18	22
	WBR	C	0.04	3	C	0.04	0	C	0.04	0
	NBL	D	0.48	17	D	0.61	18	D	0.61	18
	NBT	B	0.49	67	B	0.49	66	B	0.49	66
	NBR	B	0.21	16	B	0.21	16	B	0.21	16
	SBL	D	0.45	17	D	0.45	16	D	0.45	16
	SBT	B	0.79	42	A	0.77	37	A	0.77	37
	SBR	B	0.02	0	B	0.02	0	B	0.02	0
Garibaldi Way / Tantalus Road (Unsignalized)	EBLT	A	0.09	17	A	0.13	20	A	0.08	15
	WBTR	A	0.09	7	A	0.11	4	A	0.09	3
	SBL	A	0.18	17	B	0.20	17	A	0.16	16
	SBR	A	0.18	21	B	0.20	17	A	0.16	18
Shopping Centre Access / Garbaldi Way (Unsignalized)	EBLTR	A	0.03	44	A	0.03	48	A	0.03	27
	WBLTR	A	0.03	18	A	0.03	12	A	0.03	13
	NBLT	C	0.67	51	B	0.84	34	B	0.65	39
	NBR	A	0.11	26	A	0.09	22	A	0.09	22
	SBLTR	C	0.08	16	A	0.09	15	B	0.08	15
Tantalus Road / Dowad Drive (Unsignalized)	EBLTR	A	0.06	1	A	0.07	16	A	0.05	1
	WBLTR	A	0.10	2	A	0.09	15	A	0.09	2
	NBLTR	A	0.01	0	A	0.01	1	A	0.01	0
	SBL	A	0.00	0	A	0	0	A	0.00	0
	SBLT	A	0.01	0	A	0.01	0	A	0.01	0
Tantalus Road / Newport Ridge Drive (Unsignalized)	EBLTR	B	0.23	7	-	-	-	B	0.19	5
	WBLTR	B	0.11	3	B	0.07	8	B	0.11	3
	NBTR	A	0.00	0	A	0.11	0	A	0.00	0
	SBLTR	A	0.01	0	A	0	0	A	0.00	0

Table 6a: Comparison of Opening + 10 (2032) Friday Peak Hour Traffic Operation

INTERSECTION/ TRAFFIC CONTROL	MOVE-MENT	JAN 2018 - 395 UNITS; WITH WESTWARD AND EASTWARD EXTENSIONS OF NEPORT RIDGE DRIVE			MAY 2018 - 310 UNITS; EXISTING ROAD NETWORK (WITHOUT NEWPORT EXTENSIONS)			MAY 2018 - 310 UNITS; WITH WESTWARD AND EASTWARD EXTENSIONS OF NEPORT RIDGE DRIVE		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
Sea-to-Sky Highway / Garibaldi Way (Signalized)	*OVERALL*	*C*	***0.89***	-	*C*	*0.85*	-	*C*	*0.85*	-
	EBL	E	0.77	54	D	0.27	21	D	0.65	39
	EBT	D	0.65	60	E	0.85	94	D	0.68	59
	EBR	D	0.11	14	D	0.11	14	D	0.11	14
	WBL	E	0.86	**81**	D	0.81	59	D	0.76	62
	WBT	C	0.52	71	C	0.45	65	C	0.50	67
	WBR	C	0.23	28	C	0.24	28	C	0.22	25
	NBL	B	0.66	45	D	0.85	38	D	0.83	39
	NBT	B	0.85	39	A	0.81	45	A	0.83	65
	NBR	A	0.14	0	A	0.21	3	A	0.14	2
	SBL	E	0.89	91	E	0.88	91	E	0.87	85
	SBT	D	0.73	96	C	0.71	105	C	0.68	105
	SBR	C	0.08	9	C	0.08	10	C	0.08	10
Sea-to-Sky Highway / Mamquam Road (Signalized)	*OVERALL*	*D*	***1.04***	-	*D*	***1.02***	-	*D*	***1.01***	-
	EBL	D	0.38	21	D	0.33	20	D	0.33	20
	EBT	E	0.79	62	E	0.68	53	E	0.68	53
	EBR	D	0.02	0	D	0.02	0	D	0.02	0
	WBL	E	**0.99**	**158**	E	**0.98**	138	E	**0.98**	138
	WBT	C	0.25	43	C	0.24	40	C	0.24	40
	WBR	C	0.07	8	C	0.07	11	C	0.07	11
	NBL	E	0.68	43	D	0.54	48	D	0.55	48
	NBT	D	**1.00**	222	E	**1.02**	229	E	**1.01**	224
	NBR	C	0.58	70	C	0.6	79	C	0.6	77
	SBL	E	0.82	26	E	0.74	28	E	0.75	30
	SBT	C	0.78	99	C	0.84	141	C	0.84	143
	SBR	B	0.03	1	C	0.03	1	C	0.03	0
Garibaldi Way / Tantalus Road (Unsignalized)	EBLT	A	0.16	22	A	0.24	23	A	0.14	21
	WBTR	A	0.17	13	A	0.20	13	A	0.17	13
	SBL	A	0.32	24	A	0.59	27	B	0.34	21
	SBR	B	0.32	29	D	0.59	26	A	0.34	23
Shopping Centre Access / Garbaldi Way (Unsignalized)	EBLTR	A	0.03	43	A	0.03	63	A	0.03	44
	WBLTR	A	0.04	23	A	0.05	22	A	0.04	21
	NBLT	**F**	**1.29**	**116**	**F**	**1.32**	**122**	**F**	**1.25**	**87**
	NBR	E	0.13	44	E	0.15	48	C	0.13	42
	SBLTR	D	0.09	17	C	0.12	17	C	0.04	15
Tantalus Road / Dowad Drive (Unsignalized)	EBLTR	B	0.09	3	A	0.09	15	A	0.05	1
	WBLTR	B	0.14	4	B	0.13	13	B	0.15	4
	NBLTR	A	0.02	1	A	0.02	1	A	0.02	0
	SBL	A	0.00	0	A	0.00	0	A	0.00	0
	SBLT	A	0.01	0	A	0.01	0	A	0.01	0
Tantalus Road / Newport Ridge Drive (Unsignalized)	EBLTR	C	0.39	14	-	-	-	B	0.30	9
	WBLTR	B	0.17	5	B	0.08	16	B	0.16	4
	NBTR	A	0.00	0	A	0.17	0	A	0.00	0
	SBLTR	A	0.00	1	A	0.00	0	A	0.00	0

Table 6b: Comparison of Opening + 10 (2032) Sunday Peak Hour Traffic Operation

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	JAN 2018 - 395 UNITS; WITH WESTWARD AND EASTWARD EXTENSIONS OF NEPORT RIDGE DRIVE			MAY 2018 - 310 UNITS; EXISTING ROAD NETWORK (WITHOUT NEWPORT EXTENSIONS)			MAY 2018 - 310 UNITS; WITH WESTWARD AND EASTWARD EXTENSIONS OF NEPORT RIDGE DRIVE		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
Sea-to-Sky Highway / Garibaldi Way (Signalized)	*OVERALL*	*C*	***0.86***	-	*C*	***0.87***	-	*C*	*0.87*	-
	EBL	C	0.50	26	C	0.17	12	C	0.51	26
	EBT	C	0.47	33	C	0.59	45	C	0.47	34
	EBR	C	0.14	12	C	0.14	12	C	0.14	12
	WBL	C	0.66	38	C	0.68	37	C	0.67	39
	WBT	C	0.36	35	C	0.32	34	C	0.36	36
	WBR	C	0.06	1	C	0.07	4	C	0.06	1
	NBL	C	0.59	52	C	0.66	53	C	0.61	53
	NBT	B	0.61	62	B	0.62	55	B	0.65	76
	NBR	D	0.06	4	B	0.11	14	E	0.06	5
	SBL	D	0.79	86	C	0.66	71	D	0.70	72
	SBT	D	0.96	148	D	0.97	144	D	0.94	143
	SBR	B	0.10	10	B	0.1	9	B	0.10	9
Sea-to-Sky Highway / Mamquam Road (Signalized)	*OVERALL*	*C*	***0.97***	-	*C*	***0.94***	-	*C*	***0.94***	-
	EBL	D	0.19	10	D	0.19	10	D	0.19	10
	EBT	D	0.40	23	D	0.4	23	D	0.40	23
	EBR	C	0.02	0	C	0.02	0	C	0.02	0
	WBL	D	0.88	**83**	D	**0.91**	111	D	**0.91**	111
	WBT	C	0.19	23	C	0.19	25	C	0.19	25
	WBR	C	0.04	4	C	0.04	5	C	0.04	4
	NBL	D	0.54	19	E	0.67	18	E	0.67	19
	NBT	C	0.60	88	C	0.62	78	C	0.62	79
	NBR	B	0.23	18	B	0.23	16	B	0.23	16
	SBL	D	0.48	16	C	0.38	15	C	0.39	16
	SBT	C	**0.96**	169	B	**0.92**	150	B	**0.93**	156
	SBR	B	0.02	0	B	0.02	0	B	0.02	0
Garibaldi Way / Tantalus Road (Unsignalized)	EBLT	A	0.09	16	A	0.14	20	A	0.09	18
	WBTR	A	0.10	6	A	0.12	4	A	0.10	8
	SBL	A	0.19	17	A	0.22	17	A	0.19	19
	SBR	A	0.19	21	B	0.22	19	A	0.19	20
Shopping Centre Access / Garbaldi Way (Unsignalized)	EBLTR	A	0.03	40	A	0.03	57	A	0.03	27
	WBLTR	A	0.03	14	A	0.03	14	A	0.03	15
	NBLT	B	0.72	40	C	**0.93**	47	C	0.72	42
	NBR	A	0.11	24	A	0.13	26	A	0.11	26
	SBLTR	B	0.09	15	A	0.10	15	A	0.08	16
Tantalus Road / Dowad Drive (Unsignalized)	EBLTR	A	0.06	2	A	0.07	15	A	0.06	2
	WBLTR	A	0.10	3	A	0.09	15	A	0.10	3
	NBLTR	A	0.01	0	A	0.01	2	A	0.01	0
	SBL	A	0.00	0	A	0.00	0	A	0.00	0
	SBLT	A	0.01	0	A	0.01	0	A	0.01	0
Tantalus Road / Newport Ridge Drive (Unsignalized)	EBLTR	B	0.25	8	-	-	-	B	0.25	8
	WBLTR	B	0.12	3	B	0.08	15	B	0.12	3
	NBTR	A	0.00	0	A	0.12	0	A	0.00	0
	SBLTR	A	0.01	0	A	0	0	A	0.01	0

The results of this traffic analysis show a general improvement in traffic operations at the key intersections in the area over the January 2018 proposal, due to the reduced unit count. Acceptable traffic operations can be maintained within the majority of the study area without these connections, although the northbound queuing at the shopping centre access along Garibaldi Way is somewhat alleviated by the addition of extensions of Newport Ridge Drive to the west (with a right-in right out connection to highway 99) and to the east (connecting to Pia Road in the Garibaldi Highlands). The anticipated 95th percentile queue length in the Friday PM Total 2032 traffic scenario is reduced from 122 meters to 87 meters with the addition of these connections. Under existing traffic conditions (during the 2017 Friday PM peak period) the 95th percentile queue from the traffic simulation was found to be 82 meters.

The right-in/right-out connection to Highway 99 at Newport Ridge drive was previously recommended to divert a portion of the existing (and future) traffic passing in front of the north access to the shopping centre along Garibaldi Way. (*Note: to minimize the footprint of this extension it could be limited to accommodating northbound to eastbound right turns from the highway, as accommodating westbound to northbound right-turns onto the highway provides only limited additional benefit*). This was proposed as a short term solution to improve the operations at the shopping centre access point, and was found to reduce the queuing and delay for the northbound movements. This proposed measure was considered together with the eastward extension of Newport Ridge Drive up to the Garibaldi Highlands, as without the eastward extension of Newport Ridge Drive the westward extension would be of more limited use as no vehicles travelling to the Garibaldi highlands would likely be diverted to it.

For the 2022 horizon year, the shopping centre access on Garibaldi Way was assessed to operate at a Level of Service E with or without the eastward and westward extensions of Newport Ridge Drive, which is generally considered acceptable for unsignalized movements. During the 2032 horizon year, left turns from the shopping centre onto Garibaldi Way was assessed operate at a Level of Service F with or without the Newport Ridge Drive extensions, as general background traffic growth overwhelmed the capacity of the access point.

In the shorter term, although the additional traffic can be accommodated without the Newport Ridge Drive extensions, the capacity of the north access to the shopping centre will be pressured during peak traffic periods. If the Newport Ridge drive extensions are not pursued, then other short term traffic solutions should be considered, which could include:

- A traffic signal at Dowad Drive & Highway 99. This would allow vehicles to make left-in and left-out movements at this location. This access would become better used if an additional connection to the Garibadi highlands were built (at either Dowad Drive or Newport Ridge Drive). Although this introduces an additional traffic signal on the Highway, it will help to improve the efficiency of the Highway 99 & Garibaldi Way intersection by diverting southbound and westbound left turns to a location where they can be more efficiently served. This will allow additional green time to be allocated to through movements along Highway 99. An unsignalized "protected left turn" intersection (similar to Highway 99 & Mill Road) could also be considered.

- A roundabout at the intersection of Garibaldi Way & Tantalus Road / Tantalus Way. This would allow vehicles to avoid making a left-out from the shopping centre to instead make a right turn and circulate around the roundabout in order to get to Highway 99, which would alleviate the queuing and delay issues at this location. This could be combined with a median to enforce right-turn movements only.

- An additional right-out access from the shopping centre onto Highway 99, although this was previously considered and not accepted by the MoTI.

The District of Squamish is considering signalizing the Garibaldi and Tantalus Road / Tantalus Way intersection. It is currently contemplated that both the south and north legs of Tantalus will be incorporated into one offset intersection with an appropriate signal timing sequence. Although a signal would create additional gaps in traffic that would benefit the shopping centre access, a concern with this approach is that the resulting eastbound queuing on Garibaldi extending back from the Tantalus traffic signal may at times block the shopping centre access. From a traffic operations perspective, a roundabout may be the more suitable traffic control for this intersection.

Over the long termer, the anticipated residential growth in the area is anticipated to produce an additional 2,000 peak hour vehicle trips within the study area. To accommodate this traffic growth, further traffic mitigation measures will be required beyond those previously listed. A large increase in vehicle capacity will be required for movements to and from Highway 99, and for movements between the areas to the west and east of Highway 99. One potential solution is a full movements grade separated interchange at Dowad Drive that connects over the railroad track to Government Road. This would be combined with a connection to the Garibaldi Highlands either through an extension of Dowad Drive or Newport Ridge Drive. It is recommended that a broader traffic study take place that includes all of the proposed developments in the area. This study will analyze a number of potential road network and traffic control options to address long term traffic operations concerns in the area.

Garibaldi Springs is anticipated to increase traffic at the Tantalus Road & Dowad Drive intersection by 130/111 vehicles (approximately 2-3 vehicles per minute) during the Friday/Sunday PM peak periods, and increase traffic at the Tantalus Road & Newport Ridge Drive intersection by 160/144 vehicles (approximately 3-4 vehicles per minute) during the Friday/Sunday PM peak periods. All movements are anticipated to operate at LOS A under the total traffic scenarios traffic at the Tantalus Road & Dowad Drive intersection, and operate at LOS B or better at the Tantalus Road & Newport Ridge Drive intersection.

3. WEEKDAY AM TRAFFIC OPERATIONS

Although the Weekday AM peak hour was not included in the previous analysis (due to the lower Highway 99 traffic volumes during these times), an analysis of weekday AM traffic volumes and operations is included in this addendum. **Table 7** calculates the AM peak hour trip generation anticipated from the Garibaldi Springs development.

The trip rates used in this analysis were based on those reported in the ITE Trip Generation Manual (10th Edition). Single Family detached housing trip rates applied to the proposed cottages and duplexes, and low-rise multifamily housing trip rates were applied to the proposed rowhomes.

Table 7: AM Peak Hour Site Trip Rates and Trip Generation

LAND USE	QUANTITY	TRIP RATE (PER UNIT)			TRIPS		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Duplexes and Cottages	78 units	0.19	0.56	0.74	14	43	58
Rowhomes	232 units	0.11	0.35	0.46	25	82	107
TOTAL					39	125	164

Exhibit 2 illustrates the existing AM peak hour traffic volumes that were collected by Bunt on June 22, 2016 at the Highway 99 & Garibaldi Way and Tantalus Road & Garibaldi Way intersections. **Exhibit 3** illustrates the anticipated AM peak hour site traffic volumes at these intersections from the Garibaldi Springs development. **Exhibit 4** illustrates the anticipated total traffic volumes at these intersections at the 2022 horizon year. These are based on the existing traffic volumes, background traffic growth, and the forecasted site traffic volumes. This analysis assumes a 2% per year (linear) background traffic growth rate for through movements along Highway 99, a 1% per year (linear) background traffic growth rate for local roads and the turning movements to and from Highway 99, and no background traffic growth to and from the existing Shopping Centre and gas station access points located along Garibaldi Way.



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Exhibit 2

Existing (2016) Weekday AM Peak Hour Traffic Volumes

Garibaldi Springs Transportation Impact Assessment
04-18-0020 June 2018

bunt & associates



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Exhibit 2

Weekday AM Peak Hour Site Traffic Volumes

Garibaldi Springs Transportation Impact Assessment
04-18-0020 June 2018

bunt & associates



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Exhibit 4

Total (2022) Weekday AM Peak Hour Traffic Volumes

Garibaldi Springs Transportation Impact Assessment
04-18-0020 June 2018

bunt & associates

Traffic operations were analyzed at these intersections with existing AM peak hour traffic volumes, and the anticipated total traffic volumes in the 2022 horizon year. **Table 8** provides the results of this analysis.

Table 8: AM Peak Hour Traffic Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	EXISTING (2016) AM PEAK HOUR			TOTAL (2022) AM PEAK HOUR		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
Sea-to-Sky Highway / Garibaldi Way (Signalized)	*OVERALL*	*B*	*0.44*	-	*B*	*0.53*	-
	EBL	C	0.22	13	C	0.26	15
	EBT	C	0.53	38	C	0.56	41
	EBR	C	0.10	13	C	0.11	13
	WBL	B	0.51	26	B	0.60	33
	WBT	B	0.27	26	B	0.33	33
	WBR	B	0.07	8	B	0.07	8
	NBL	D	0.67	21	C	0.52	22
	NBT	B	0.27	27	B	0.35	32
	NBR	B	0.07	8	B	0.08	9
	SBL	C	0.57	25	C	0.62	28
	SBT	B	0.28	32	B	0.36	36
	SBR	B	0.03	0	B	0.03	0
Tantalus Road / Dowad Drive (Unsignalized)	EBLT	A	0.08	19	A	0.10	46
	WBTR	A	0.13	4	A	0.14	7
	SBL	B	0.22	14	B	0.33	18
	SBR	A	0.22	16	A	0.33	22

Although a complete analysis of AM peak hour traffic operations was not part of the original scope of our traffic study, some conclusions can be drawn from analysis results presented in Table 8.

- During the weekday AM peak hour, the Garibaldi Springs development is anticipated to add approximately 75 westbound vehicles to the Garibaldi Way & Highway 99 intersection, or roughly one additional vehicle every 50 seconds. This is based on a blended trip rate of 0.53 AM peak hour trips per residential unit, with 76% of these trips travelling outbound and 60% of those vehicles travelling westbound at Highway 99.

- During the existing AM peak hour, existing traffic operations are at acceptable levels within the study area will all movements operating at LOS C or better. The addition of Garibaldi Springs traffic is not anticipated to result in any AM peak hour traffic operations issues in this area, although some additional queuing is anticipated for the southbound movements at Garibaldi Way & Tantalus Road and the westbound movements at Highway 99 & Garibaldi Way; and,

- During the AM peak hour, the Garibaldi Springs development is not anticipated to add any westbound vehicles to the Mamquam Road & Highway 99 Intersection. The location of the development and the road network pattern in this area do not lend themselves to using this route.

4. CONCLUSIONS

- The proposed Garibaldi Springs development has reduced the amount of residential units from 395 units to 310 units;
- During Friday PM peak hour, the anticipated site traffic is estimated to reduce from 270 to 207 vehicle trips (63 trips less). As shown, the vehicle trips are estimated to reduce from 232 to 178 trips (54 trips less) during Sunday peak hour;
- Garibaldi Springs is anticipated to increase the traffic volumes on Garibaldi Way between Highway 99 and Tantalus Road by 9%/11% (112/97 vehicles) in the Friday/Sunday PM peak hours without additional mitigation measures;
- At the shopping centre access point along Garibaldi Way, the anticipated 95th percentile queue length in the Friday PM Total 2032 traffic scenario is reduced from 122 meters to 87 meters with the additional of the eastward and westward extensions of Newport Ridge Drive.
- If the Newport Ridge drive extensions not pursued, then other short term traffic solutions should be considered, which could include a traffic signal at Dowad Drive & Highway 99, a roundabout at the intersection of Garibaldi Way & Tantalus Road / Tantalus Way, or an additional right-out access from the shopping centre onto Highway 99.
- All movements are anticipated to operate at LOS A under the total traffic scenarios traffic at the Tantalus Road & Dowad Drive intersection. All movements are anticipated to operate at LOS B or better under the total traffic scenarios traffic at the Tantalus Road & Newport Ridge Drive intersection;
- During the AM peak hour, this development is anticipated to add 75 westbound vehicles at Garibaldi Way & Highway 99 (roughly one vehicle every 50 seconds), and no additional westbound vehicles at Mamquam Road & Highway 99;
- During the existing AM peak hour, traffic operations are found to be acceptable within the study area will all movements operating at LOS C or better. The addition of Garibaldi Springs traffic is not anticipated to result in any AM peak hour traffic operations issues in this area;
- The additional proposed developments within the study area are anticipated to generate approximately 2,000/1,600 vehicle trips during the Friday/Sunday peak hours. The developments included in this forecast are Thunderbird Creek, the Cheema Lands, Skyridge Phase 2, 1870 Dowad Drive, 40480 Tantalus Road.
- Over the long term, as additional planned developments are constructed in the study area, further traffic mitigation measures will be required. Garibaldi Springs is proposing to contribute funding towards these long term solutions.