WATT Consulting Group

820 ESQUIMALT ROAD / 833 & 837 OLD ESQUIMALT ROAD DEVELOPMENT

Traffic Impact Assessment

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1.0 INTRODUCTION

Watt Consulting Group was retained by Denciti Esquimalt LP. to conduct a traffic impact assessment for the proposed development at 820 Esquimalt Road / 833 & 837 Old Esquimalt Road, in the Township of Esquimalt. This study assesses the traffic impacts of the proposed land use, reviews traffic conditions at key intersections, and assesses the need for any mitigation measures. The study reviews the existing traffic operations along with the post development and long-term conditions for all modes of transportation.

1.1 STUDY AREA

See **Figure 1** for the study area and location. The study area includes the proposed site access and the following intersections:

- Old Esquimalt Rd / Lampson St / Head St (two intersections)
- Old Esquimalt Rd / Wilson St / Dominion Rd / Viewfield Rd
- Esquimalt Rd / Dunsmuir Rd / Dominion Rd (two intersections)

Figure 1: Study Area and Site Location

2.0 EXISTING CONDITIONS

2.1 LAND USE

The site is located to the west of Dominion Road between Esquimalt Road and Old Esquimalt Road. The proposed site is currently one commercial lot (C-2: 820 Esquimalt Road) plus two residential lots (RD-3: 833 / 837 Old Esquimalt Road). The surrounding land use is a mix of residential, commercial, and light industrial. There are several multi-family residences near the development site along Esquimalt Road. Along the north side of Esquimalt Road to the west, there are a variety of commercial land uses including Shoppers Drug Mart and fast-food restaurants. There is a light industrial area along Viewfield Road including Wholesale Club within walking distance (300m) from the site.

2.2 ROAD NETWORK

Esquimalt Road is a major road running east-west with a three-lane cross section (centre medians / two-way left turn lane). There are bike lanes on both sides Esquimalt Road. Lampson Street is a two-lane major road running north-south which connects to Craigflower Road to the north. Old Esquimalt Road and Head Street are two-lane collector roads. Dominion Road, Viewfield Road and Dunsmuir Road are residential local roads which in proximity to the site.

The posted speed limit on Esquimalt Road is 30km/h up to approximately 75m west of Dunsmuir Road and then changes to 40km/h. A 40km/h speed limit sign is posted on Lampson Street in the study area and a 30km/h speed limit sign is posted on Old Esquimalt Road.

The intersection of Lampson Street / Old Esquimalt Road is signalized with permitted left turn phasing except the westbound movement (protected/permitted), and has two lanes on Lampson Street with a left turn lane and through-right lane. The signalized intersection of Old Esquimalt Road / Head Street closely spaced (30m spacing) to the Lampson Street signal with the two intersections functioning as one signal. The other three study intersections are all stop-controlled. On Esquimalt Road, exiting movements from Dominion Road and Dunsmuir Road are right out only.

2.3 TRAFFIC VOLUMES

Due to the pandemic (Omicron wave), base volumes for the study intersections were taken from the 2018 *Township of Esquimalt City-Wide Network Study*. At Old Esquimalt Road / Head Street (no previous count data available), a new traffic count was undertaken on January 13 and 14, 2022 to identify the directional splits during the AM and PM peak hours. Measured volumes at Old Esquimalt Road / Head Street were balanced to 2018 volumes at Lampson Street / Old Esquimalt Road. 2022 background volumes for the opening day were obtained using an annual 2.0% growth rate from 2018 measured volumes. See **Figure 2** for opening day background volumes.

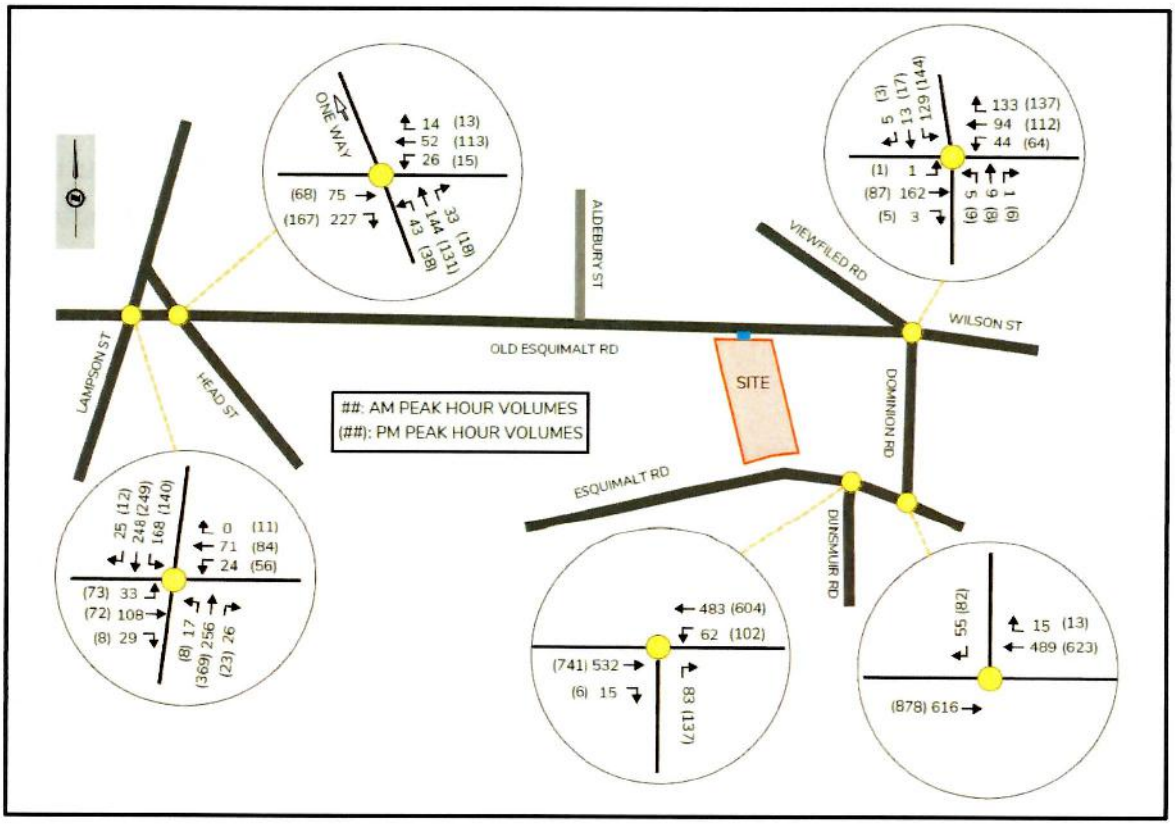

Figure 2: Opening Day Background Volumes

2.4 TRAFFIC MODELLING – BACKGROUND INFORMATION

Analysis of the traffic conditions at the intersections within the study area were undertaken using Synchro software (for signalized and stop-controlled intersections).

Synchro / SimTraffic is a two-part traffic modelling software that provides analysis of traffic conditions based on traffic control, geometry, volumes, and traffic operations. Synchro software is used because of its ability to provide analysis using the Highway Capacity Manual (2010) methodology, while SimTraffic integrates established driver behaviours and characteristics to simulate actual conditions by randomly "seeding" or positioning vehicles travelling throughout the network. These measures of effectiveness include Level of Service (LOS), delay and 95th percentile queue length.

For modeling results the delays and type of traffic control are used to determine the LOS. LOS is broken down into six letter grades with LOS A being excellent operations and LOS F being unstable / failure operations. LOS C is generally considered to be an acceptable LOS by most municipalities. LOS D is generally considered to be on the threshold between acceptable and unacceptable operations. A description of LOS and Synchro is provided in **Appendix A**.

2.5 OPENING DAY BACKGROUND CONDITIONS

Background conditions for the opening day were analyzed based on the adjusted 2022 volumes and existing roadway network laning. At the signalized intersection of Lampson Street / Old Esquimalt Road, all movements operate at LOS D or better during the AM and PM peak hours, except the eastbound movement which operates at LOS E during the PM peak hour. The signalized intersection of Old Esquimalt Road / Head Street operates at LOS C or better for all movements during the AM / PM peak hour, except the westbound movement which operates at LOS D during the PM peak hour.

At Old Esquimalt Road / Dominion Road / Viewfield Road, all movements operate at LOS C or better during the AM and PM peak hours. The intersection of Esquimalt Road / Dominion Road will also operate at LOS C or better for all movements during the peak

hours. At Esquimalt Road / Dunsmuir Road, the northbound right with stop control will operate at LOS D during the PM peak hour and LOS B during the AM peak.

3.0 POST DEVELOPMENT

3.1 PROPOSED LAND USE

The proposed development is to be a multi-family residential building (mid-rise) with approximately 136 dwelling units. Note that the number of dwelling units was increased from 129 (the amount used in this TIA) to 136. The additional 7 units will not alter the findings of this TIA.

3.2 SITE ACCESS

A preliminary site plan has been prepared by the architect which proposes the site access from Old Esquimalt Road, with no access expected on Esquimalt Road. This study assumes one site access be located on Old Esquimalt Road. See **Figure 3** for the potential access location.

For potential site access placement, the existing driveway locations of 833 or 837 Old Esquimalt Road should be considered since a power pole is located in the middle of the Old Esquimalt Road frontage. The existing driveway of 833 Old Esquimalt Road is located 90m west of the Dominion-Viewfield Road intersection. The placement of the potential access meets the Transportation Association of Canada's (TAC) suggested minimum corner clearance (25m) for collector roads at major intersections with stop control. At the potential access location, measured sight distance looking to west is 200m+ and looking to east (Wilson Street) 150m+. The provided sight distances at the access exceed the TAC's required intersection sight distances (105m for left turn; 95m for right turn) for a 50 km/h (posted speed = 30 km/h). Therefore, no safety issues are expected with placing a full movement access on Old Esquimalt Road.

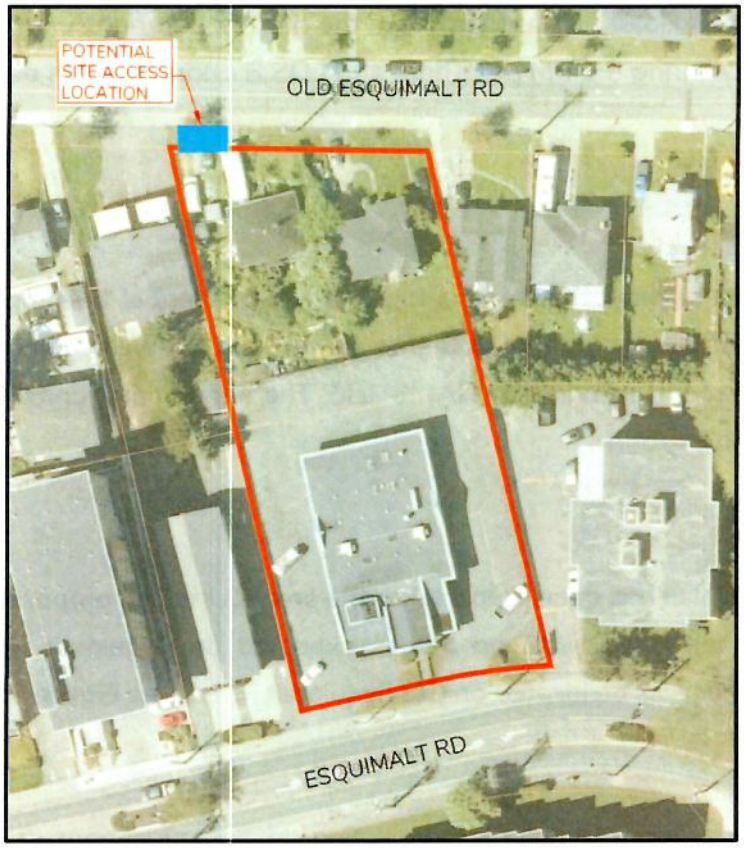

Figure 3: Potential Access Location

3.3 TRIP GENERATION

Trip generation rates were estimated using the 11th Edition of the *ITE Trip Generation Manual*. Trip generation rates for the weekday AM / PM peak hours are shown in **Table 1**. **Table 2** shows the estimated trips generated by the proposed land use.

The development will generate 48 vehicle trips during the AM peak and 50 vehicle trips during the PM peak hour. No trip modifications are required since residential trips do not generate pass by trips.

TABLE 1: PEAK HOUR TRIP GENERATION RATES

ITE Land Use		Weekday AM			Weekday PM		
Code	Land Use	Rate	In	Out	Rate	In	Out
221	Multi-Family (Mid-Rise)	0.37	23%	77%	0.39	61%	39%

TABLE 2: ESTIMATED DEVELOPMENT TRIPS

Proposed Land Use	Weekday AM			Weekday PM		
	Total	In	Out	Total	In	Out
Multi-Family 129 Units	48	11	37	50	31	19

3.4 TRIP ASSIGNMENT

The trips generated by the proposed development were distributed and assigned based on existing traffic patterns at the study intersections, and key destinations / origins in the area. The trips were distributed as follows:

Trips-In

- 30% of site trips are from Wilson Street
- 30% of site trips are from Old Esquimalt Road via Lampson Street
- 25% of site trips are from Dominion Road via Esquimalt Road
- 10% of site trips are from Old Esquimalt Road via Head Street
- 5% of site trips are from Aldebury Street-Fairview Road

Trips-Out

- 60% of site trips are to Wilson Street
- 20% of site trips are to Lampson Street via Old Esquimalt Road
- 15% of site trips are to Esquimalt Road west via Dominion Road
- 5% of site trips are to Aldebury Street-Fairview Road

The resulting trip assignments for the AM / PM peak hours are shown in **Figure 4**.

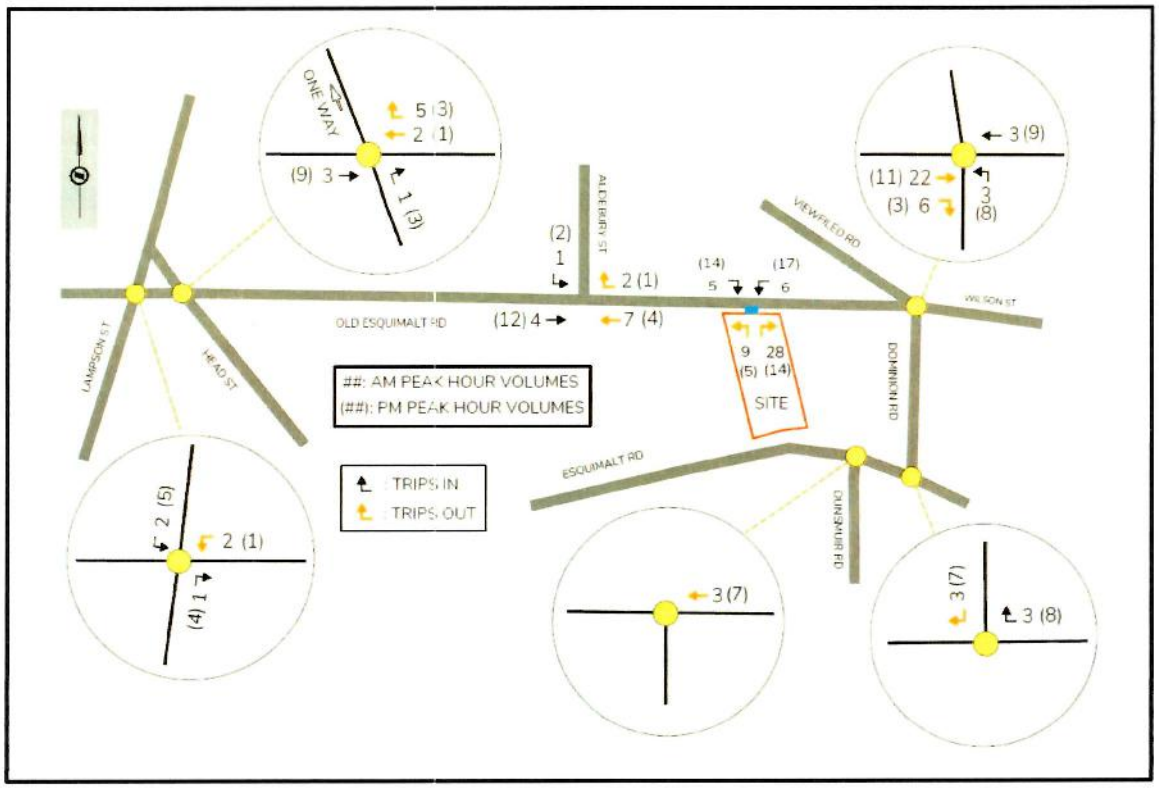

Figure 4: Trip Assignment

3.5 OPENING DAY POST DEVELOPMENT CONDITIONS

The opening day post development conditions were analyzed by adding the development trips to the background traffic volumes. See **Figure 5** for opening day post development volumes.

The development will not significantly impact the operations at any of the study intersections. At the two signalized intersections on Old Esquimalt Road, there will be no LOS changes for any of movements between background and post development. At Lampson Street / Old Esquimalt Road, additional delays will be less than a one second for all movements during the AM peak hour. During the PM peak hour, the additional delay is negligible with no change in LOS. At Old Esquimalt Road / Head Street, additional delays by the development were estimated at a maximum of 0.2 seconds for all movements. No queuing issues were found at any of the left turn lanes at the two

signalized intersections, although the storage length of the northbound left at Old Esquimalt Road and Head Street was over capacity in the background condition; the short 13m of storage allows for only two cars to queue. Additional queues by the development will be marginal at Lampson Street / Old Esquimalt Road, and at Old Esquimalt Road / Head Street.

At the three stop-controlled intersections, all movements will continue to operate at the same LOS during the peak hours with the development, with delays and queues operating within acceptable measures. Therefore, the development will not trigger any improvements at any study intersections for the short term. See for **Table 3** & **4** for the opening day conditions comparison between background and post development.

TABLE 3: OPENING DAY CONDITIONS – AM PEAK HOUR

INTERSECTION	MOVEMENT	Background			Post Development		
		LOS	Delay (s)	Queue (m)*	LOS	Delay (s)	Queue (m)*
LAMPSON ST / OLD ESQUIMALT RD (SIGNALIZED)	EBLTR	D	51.6	51	D	51.9	48
	WBLT	A	5.7	15	A	6.4	17
	NBL	B	18.8	6 (18)	B	18.8	7 (18)
	NBTR	C	22.8	43	C	22.8	60
	SBL	C	33.8	35 (45)	C	34.2	38 (45)
	SBTR	C	23.4	46	C	23.4	41
OLD ESQUIMALT RD / HEAD ST (SIGNALIZED)	EBTR	A	0.5	23	A	2.0	22
	WBLTR	C	30.6	9	C	30.4	29
	NBL	C	31.9	**16 (13)**	C	31.9	**15 (13)**
	NBTR	C	23.3	40	C	23.5	50
OLD ESQUIMALT RD / VIEWFIELD RD / DOMINION RD	EBLTR	A	7.8	-	A	7.8	-
	WBLTR	A	7.8	6	A	7.8	14
	NBLTR	B	14.2	12	B	14.4	12
	SBLTR	C	22.1	32	C	23.1	22
ESQUIMALT RD / DOMINION RD	EBT	A	0	11	A	0	3
	WBTR	A	0	12	A	0	9

	SBR	B	13.4	4	B	13.5	7
	EBTR	A	0	412	A	0	7
ESQUIMALT RD / DUNSMUIR RD	WBL	A	9.2	14 (25)	A	9.2	15 (25)
	WBT	A	0	9	A	0	5
	NBR	B	14.8	10	B	14.8	13

*Note: 95th Queues based on SimTraffic results; (##) = Existing Storage Length

TABLE 4: OPENING DAY CONDITIONS – PM PEAK HOUR

INTERSECTION	MOVEMENT	Background			Post Development		
		LOS	Delay (s)	Queue (m)*	LOS	Delay (s)	Queue (m)*
LAMPSON ST / OLD ESQUIMALT RD (SIGNALIZED)	EBLTR	**E**	**56.3**	35	**E**	**56.3**	45
	WBLT	A	6.4	15	A	5.9	18
	NBL	B	17.2	3 (18)	B	17.2	3 (18)
	NBTR	C	25.2	66	C	25.5	63
	SBL	D	47.4	30 (45)	D	53.0	34 (45)
	SBTR	C	22.5	42	C	22.5	43
OLD ESQUIMALT RD / HEAD ST (SIGNALIZED)	EBTR	A	2.7	18	A	2.9	20
	WBLTR	D	35.0	29	D	35.0	40
	NBL	C	31.6	**13 (13)**	C	31.6	10 (13)
	NBTR	B	20.0	38	B	20.0	38
OLD ESQUIMALT RD / VIEWFIELD RD / DOMINION RD	EBLTR	A	7.8	1	A	7.8	-
	WBLTR	A	7.6	8	A	7.7	7
	NBLTR	B	11.5	14	B	11.7	14
	SBLTR	C	21.7	21	C	22.9	21
ESQUIMALT RD / DOMINION RD	EBT	A	0	19	A	0	10
	WBTR	A	0	16	A	0	4
	SBR	C	16.6	17	C	17.1	10
ESQUIMALT RD / DUNSMUIR RD	EBTR	A	0	11	A	0	10
	WBL	B	10.9	20 (25)	B	10.9	21 (25)
	WBT	A	0	25	A	0	10
	NBR	D	25.3	23	D	25.3	23

*Note: 95th Queues based on SimTraffic results; (##) = Existing Storage Length

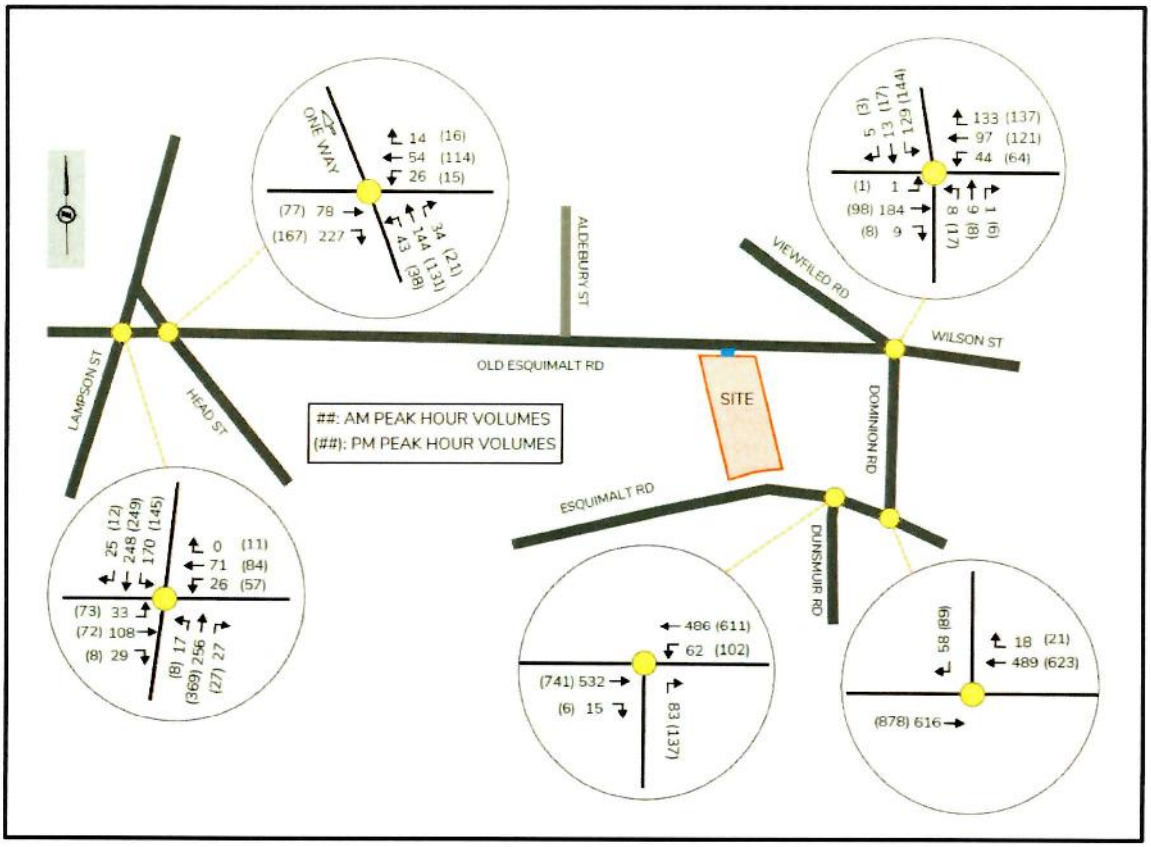

Figure 5: Opening Day Post Development Volumes

4.0 10-YEAR HORIZON CONDITIONS

For the 10-year horizon post development analysis, 2032 10-year horizon background volumes were obtained using an annual growth of 2.0% which was what was used for the City-Wide Traffic Study (2018). See **Figure 6** for 10-Year horizon background volumes.

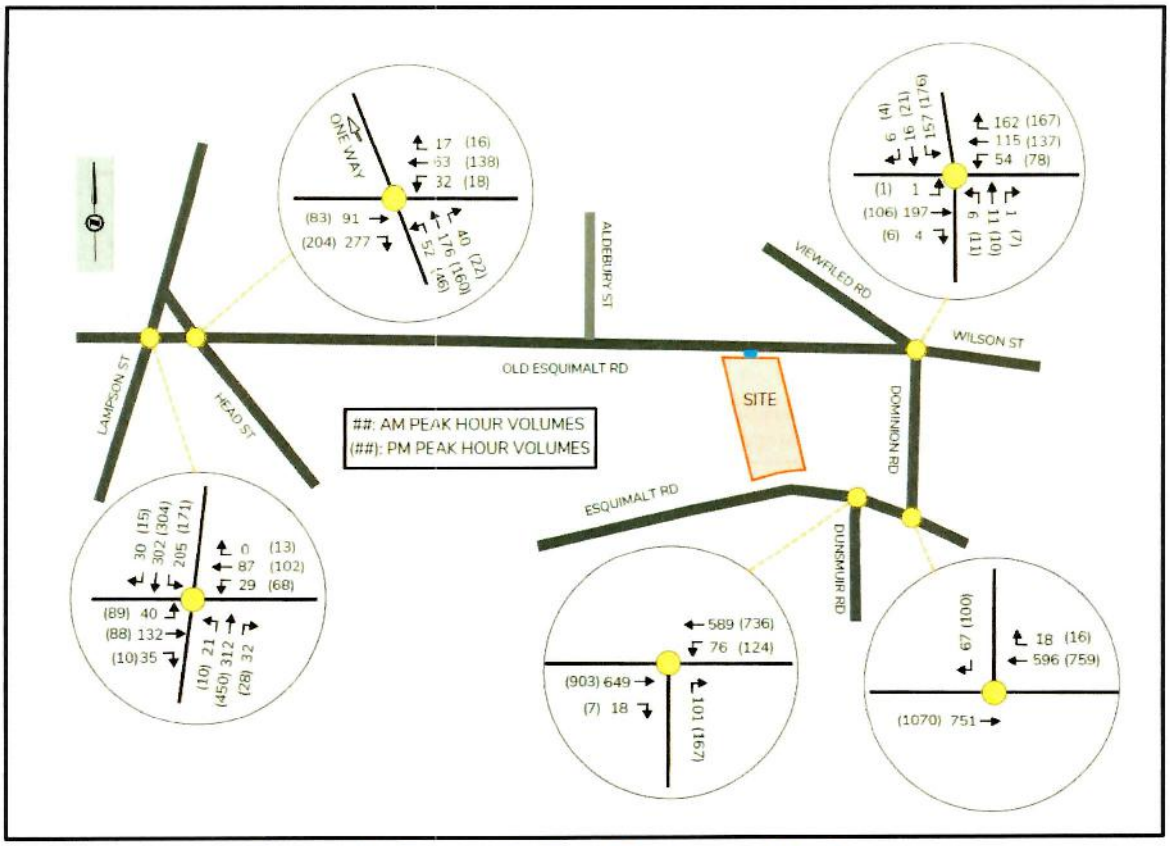

Figure 6: 10-Year Horizon Background Volumes

4.1 10-YEAR HORIZON BACKGROUND CONDITIONS ANALYSIS RESULTS

In 2032 without the development, at the intersection of Lampson Street / Old Esquimalt Road, the southbound left movement will drop to LOS E during the AM peak hour, and all other movements will operate at LOS D or better. The southbound left movement will operate at LOS F and the eastbound movement will operate at LOS E during the PM peak hour. At Old Esquimalt Road / Head Street, all movements will operate at LOS C or better during the AM peak hour, and LOS D or better during the PM peak hour without the development, additionally the NB left movement will exceed its queueing storage capacity. **Tables 5** and **6** show the results.

At Old Esquimalt Road / Dominion Road / Viewfield Road, the southbound movement will drop to LOS E during the PM peak hour, while all movements will remain at LOS D or

better during the AM peak hour. At Esquimalt Road / Dominion Road, the stop-controlled southbound movement will remain at LOS C during the AM and PM peak hours. At Esquimalt Road / Dunsmuir Road, the stop-controlled northbound movement will operate at LOS E during the PM peak hour and at LOS C during the AM peak hour, additionally the westbound queue storage will be exceeded by 1m in the PM peak.

4.2 10-YEAR HORIZON POST DEVELOPMENT ANALYSIS RESULTS

The development traffic was added to the 10-year horizon background traffic to determine the 10-year horizon post development traffic impacts.

The development will not significantly impact the operations at the two signalized study intersections: (1) Lampson Street / Old Esquimalt Road and (2) Old Esquimalt Road / Head Street. At the two intersections, all movements will continue to operate at the same LOS as during the 10-year horizon background conditions, although the northbound left turn lane will exceed its storage capacity by 2m in the AM and 4m in the PM. At Lampson Street / Old Esquimalt Road, the southbound left movement will operate at LOS E / F during the 2032 AM / PM peak hour without / with the development. The eastbound movement will continue to operate at LOS E during the 2032 PM peak hour without / with the development. These unacceptable LOS E / F are due to background volumes and not the development traffic. At Old Esquimalt Road / Head Street, all movements will continue to operate at acceptable levels of service (LOS D or better) during the 2032 AM / PM peak hour with the development.

The development will not impact the operations at the three stop-controlled study intersections: (1) Old Esquimalt Road / Dominion Road / Viewfield Road, (2) Esquimalt Road / Dominion Road, and (3) Esquimalt Road / Dunsmuir Road. At the three intersections, there will be no LOS changes due to the development between 2032 background and post development peak hours. At Old Esquimalt Road / Dominion Road / Viewfield Road, the southbound movements will drop to LOS E during the 2032 PM peak hour without / with the development. Also, at Esquimalt Road / Dunsmuir Road the northbound movement will drop to LOS E without the development. The LOS E (delay of

40 seconds) could be acceptable as the northbound movement is a right out only movement.

At the site access on Old Esquimalt Road, all movements will operate at LOS A during 2032 post development AM / PM hour. A westbound left turn lane is not required on Old Esquimalt Road at the site access.

See **Table 5** & **6** for 10-year horizon conditions comparison between 2031 background and post development. See **Figure 7** for 10-year horizon post development volumes.

TABLE 5: 10-YEAR HORIZON CONDITIONS - AM PEAK HOUR

INTERSECTION	MOVEMENT	Background			Post Development		
		LOS	Delay (s)	Queue (m)*	LOS	Delay (s)	Queue (m)*
LAMPSON ST / OLD ESQUIMALT RD (SIGNALIZED)	EBLTR	D	51.8	50	D	51.8	50
	WBLT	A	5.8	15	A	5.9	15
	NBL	B	19.2	7 (18)	B	19.2	9 (18)
	NBTR	C	25.0	53	C	25.0	69
	SBL	**E**	**61.1**	37 (45)	**E**	**63.9**	35 (45)
	SBTR	C	24.3	49	C	24.3	48
OLD ESQUIMALT RD / HEAD ST (SIGNALIZED)	EBTR	A	3.2	21	A	3.3	24
	WBLTR	C	33.4	30	C	33.7	45
	NBL	C	32.2	**19 (13)**	C	32.2	**15 (13)**
	NBTR	C	28.0	56	C	28.3	45
OLD ESQUIMALT RD / VIEWFIELD RD / DOMINION RD	EBLTR	A	8.0	1	A	8.0	-
	WBLTR	A	7.9	16	A	7.9	11
	NBLTR	C	15.5	12	C	16.0	9
	SBLTR	D	27.7	34	D	30.5	28
ESQUIMALT RD / DOMINION RD	EBT	A	0	6	A	0	7
	WBTR	A	0	5	A	0	-
	SBR	C	15.1	11	C	15.3	4
	EBTR	A	0	4	A	0	22

ESQUIMALT RD / DUNSMUIR RD	WBL	A	9.7	15 (25)	A	9.7	17 (25)
	WBT	A	0	13	A	0	8
	NBR	C	17.4	11	C	16.2	7

*Note: 95th Queues based on SimTraffic results; (##) = Existing Storage Length

TABLE 6: 10-YEAR HORIZON CONDITIONS – PM PEAK HOUR

INTERSECTION	MOVEMENT	Background			Post Development		
		LOS	Delay (s)	Queue (m)*	LOS	Delay (s)	Queue (m)*
LAMPSON ST / OLD ESQUIMALT RD (SIGNALIZED)	EBLTR	**E**	**78.3**	48	**E**	**78.2**	68
	WBLT	A	7.7	22	A	7.8	20
	NBL	B	16.5	**23 (18)**	B	16.5	5 (18)
	NBTR	C	27.9	81	C	28.3	71
	SBL	**F**	**98.5**	33 (45)	**F**	**114.5**	33 (45)
	SBTR	C	22.6	46	C	22.6	48
OLD ESQUIMALT RD / HEAD ST (SIGNALIZED)	EBTR	A	4.3	923	A	4.8	24
	WBLTR	D	40.1	60	D	40.4	47
	NBL	D	35.5	**15 (13)**	D	35.5	**19 (13)**
	NBTR	C	27.9	50	C	28.3	51
OLD ESQUIMALT RD / VIEWFIELD RD / DOMINION RD	EBLTR	A	7.9	4	A	8.0	-
	WBLTR	A	7.7	11	A	7.8	11
	NBLTR	B	12.9	15	B	13.1	15
	SBLTR	**E**	**37.3**	26	**E**	**41.2**	27
ESQUIMALT RD / DOMINION RD	EBT	A	0	26	A	0	18
	WBTR	A	0	17	A	0	13
	SBR	C	21.5	12	C	22.4	16
ESQUIMALT RD / DUNSMUIR RD	EBTR	A	0	-	A	0	9
	WBL	B	12.2	**26 (25)**	B	12.2	23 (25)
	WBT	A	0	28	A	0	16
	NBR	**E**	**40.3**	27	**E**	**40.3**	25

*Note: 95th Queues based on SimTraffic results; (##) = Existing Storage Length

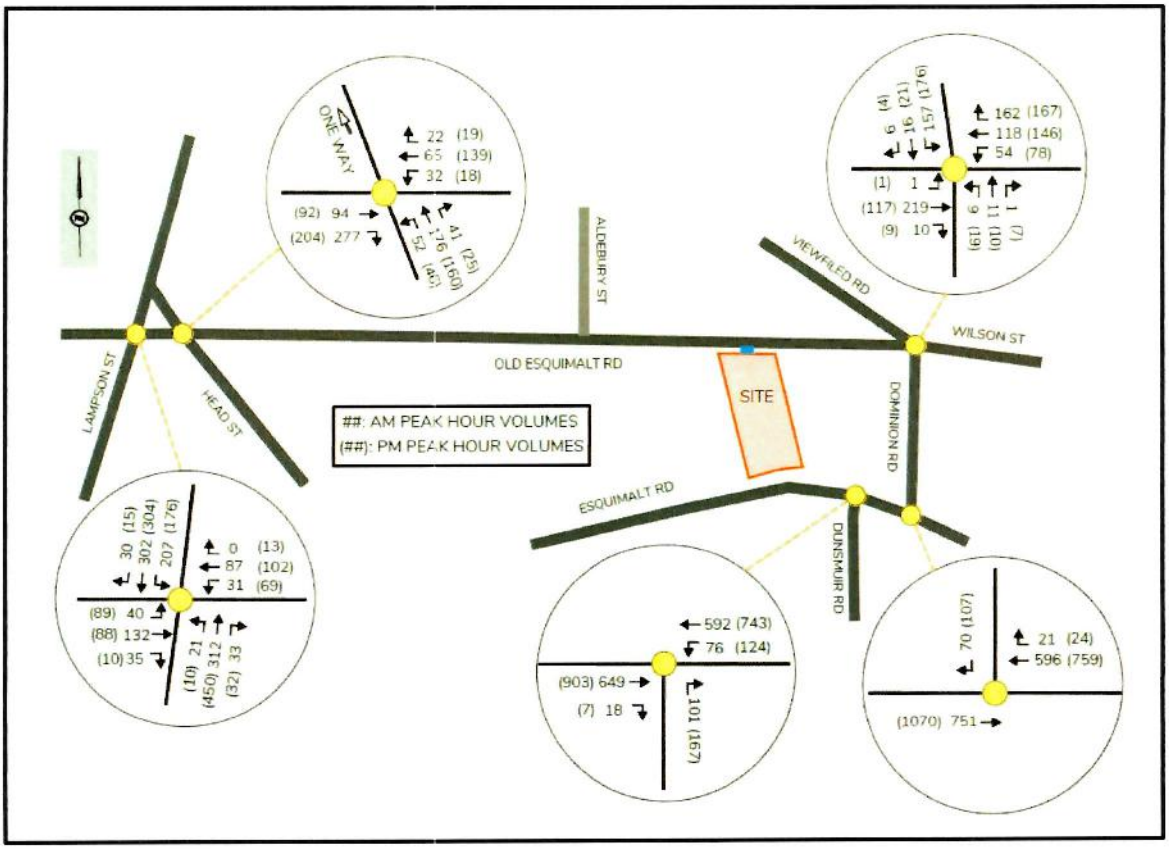

Figure 7: 10-Year Horizon Post Development Volumes

4.3 MITIGATION MEASURES FOR LONG TERM

Based on the 2032 long term analysis results, it was identified that the development will not trigger the need for any capacity improvements at any of the study intersections. However, regardless of the proposed development, mitigation measures could be required at two of the study intersections should unacceptable traffic conditions occur in the long term.

4.3.1 LAMPSON STREET / OLD ESQUIMALT ROAD

At the intersection of Lampson Street / Old Esquimalt Road, the southbound left and eastbound movements will experience unacceptable traffic conditions (LOS E / F) without the development.

The configuration of the Lampson Street / Old Esquimalt Road, Head Street / Old Esquimalt Road, and Lampson Street / Head Street intersections creates a complex situation where three intersections, two signalized and one Yield control, are within close proximity. Unfortunately, there appear to be few good options to address the issue.

Effectively there are three options: make the road bigger, change the intersections configuration, or change the signal timing. Intersection capacity improvements are one obvious option, however adding additional lanes is not desirable as there is limited room to expand. Alternatively, the intersection could be converted to a roundabout, but alignment and performance issues make this a less than ideal choice. Finally signal timing changes could be made; a modern signal controller could be installed and advanced loops / video detection could be added, and with those two in place traffic responsive features such as dynamic cycle lengths and volume-density functions can be enabled. Total performance gains for those changes require more study but efficiency improvements are likely.

4.3.2 OLD ESQUIMALT ROAD / DOMINION ROAD / VIEWFIELD ROAD

In 2032, the southbound movement (Viewfield Road) drops to LOS E during the PM peak hour. Based on the delays on the side streets being greater than 30 seconds and the flows per direction being generally balanced except the northbound, all-way stop control could be implemented at this intersection in the long term. With the change in traffic control, the Old Esquimalt Road / Viewfield Road / Dominion Road intersection would operate at LOS C or better in the 2032 AM / PM peak hour.

5.0 PARKING

The development has proposed a 1:1 parking ratio, which is similar to other recently approved developments.

6.0 ACTIVE TRANSPORTATION

6.1 PEDESTRIANS

There are existing sidewalks along the south side of Old Esquimalt Road but no sidewalks along the north side. The existing sidewalk section along the frontage of Old Esquimalt Road looks old and narrow. With the development the existing sidewalk should be upgraded to a new 1.8m concrete sidewalk when a new site access is constructed. Along the south frontage of Esquimalt Road, the existing driveways should be replaced by new sidewalk with curb.

6.2 CYCLISTS

There are bike lanes established on both sides of Esquimalt Road. There are no dedicated bicycle facilities on Old Esquimalt Road in proximity to the development site. The Esquimalt Active Transportation Network Plan (2022) includes Old Esquimalt Road as a future cycling network route. On Old Esquimalt Road, the eastbound lane width is just 3.3m along the frontage. Cyclists should share the road with motorists on Old Esquimalt Road. No additional bicycle facilities will be required along the frontage roads.

6.3 TRANSIT

The #24 bus route passes along Old Esquimalt Road two times in peak hours and connects the Admirals Walk Shopping Centre to Garnet Road at Cedar Hill Road (south of McKenzie Ave) via Johnson/Yates and Cook Street. The closest bus stop for the #24 route is on Old Esquimalt Road near Viewfield Road, 60m east of the proposed site.

The #15 bus route travels along Esquimalt Road every 15 minutes and connects the Esquimalt Town Centre to UVic via Downtown Victoria / Oak Bay. The closest bus stop for the #15 route is on Esquimalt Road 60m west of the proposed site.

7.0 CONCLUSIONS

The proposed development will generate 48 trips during the AM peak hour and 50 trips during the PM peak hour. In terms of operational impacts, the proposed development will

not impact the five key intersections in the study area. At the five study intersections, all movements will operate at the same LOS as background conditions in the short and long terms with the development. The development does not trigger any traffic capacity or storage length mitigation requirements at the five study intersections.

However, at the signalized intersection of Lampson Street / Old Esquimalt Road, the eastbound and southbound left movements will operate at LOS E / F during the 2032 PM peak hour without the development. Mitigation options are limited.

At the stop-controlled Old Esquimalt Road / Dominion Road / Viewfield Road intersection, all-way stop control could be implemented at this intersection if the southbound movement drops to LOS E / F in the long term. At Esquimalt Road / Dunsmuir Road, the northbound movement drops to LOS E without the development in the long term, but the LOS E would be acceptable with no safety issue as a right out only.

A potential site access would be located at an existing driveway location of 833 or 837 Old Esquimalt Road. The potential site access (one of two existing driveway locations) meets the TAC's access spacing and sight distance requirements.

Along the development frontage of Old Esquimalt Road, new sidewalk would be required to replace the existing sidewalk which is old and narrow. Along the development frontage of Esquimalt Road, the existing driveways (let-down) would be replaced by new sidewalk with curb. No additional bike facility is required along the frontage roads. The area is well served by BC Transit with stops within 60m.

8.0 RECOMMENDATIONS

The following recommendations are made for the proposed development:

- New concrete sidewalk along the Old Esquimalt Road frontage to replace the existing sidewalk.

- New concrete sidewalk adjustments with curb to replace existing driveways (let down) along the Esquimalt Road frontage.

The following intersection improvements should be considered by the Town in the long term.

- At Lampson Street / Old Esquimalt Road and Head Street / Old Esquimalt Road, mitigation options are limited due to right of way constrains and current road alignment. Traffic signal changes are possible.
- At Old Esquimalt Road / Dominion Road / Viewfield Road, consider all-way stop-control if the southbound movement drops to unacceptable levels.

APPENDIX A: SYNCHRO INFORMATION

SYNCHRO MODELLING SOFTWARE DESCRIPTION

The traffic analysis was completed using Synchro and SimTraffic traffic modeling software. Results were measured in delay, level of service (LOS) and 95th percentile queue length. Synchro is based on the Highway Capacity Manual (HCM) methodology. SimTraffic integrates established driver behaviours and characteristics to simulate actual conditions by randomly "seeding" or positioning vehicles travelling throughout the network. The simulation is run five times (five different random seedings of vehicle types, behaviours and arrivals) to obtain statistical significance of the results.

Levels of Service

Traffic operations are typically described in terms of levels of service, which rates the amount of delay per vehicle for each movement and the entire intersection. Levels of service range from LOS A (representing best operations) to LOS E/F (LOS E being poor operations and LOS F being unpredictable / disruptive operations). LOS E/F are generally unacceptable levels of service under normal everyday conditions.

The hierarchy of criteria for grading an intersection or movement not only includes delay times, but also takes into account traffic control type (stop signs or traffic signal). For example, if a vehicle is delayed for 19 seconds at an unsignalized intersection, it is considered to have an average operation, and would therefore be graded as an LOS C. However, at a signalized intersection, a 19 second delay would be considered a good operation and therefore it would be given an LOS B. The table below indicates the range of delay for LOS for signalized and unsignalized intersections.

Table A1: LOS Criteria, by Intersection Traffic Control

Level of Service	Unsignalized Intersection Average Vehicle Delay (sec/veh)	Signalized Intersection Average Vehicle Delay (sec/veh)
A	Less than 10	Less than 10
B	10 to 15	11 to 20
C	15 to 25	20 to 35
D	25 to 35	35 to 55
E	35 to 50	55 to 80
F	More than 50	More than 80