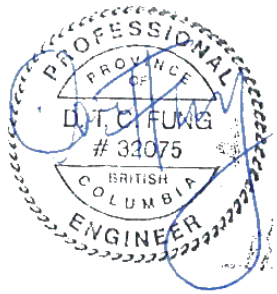
MEMO

2023-03-28



Permit No. 1000468

DATE:	March 28, 2023
PROJECT NO:	04-22-0272
PROJECT:	**Cape Roger Curtis Park / Campsite – Bowen Island**
SUBJECT:	**Trip Generation Review (Preliminary Memo)**
TO:	Lydia Mynott, Landscape Architect MetroVancouver
PREPARED BY:	Hugo Johnston, B. Sc, Transportation Planner Joseph Chow, P. Eng, Transportation Engineer
REVIEWED BY:	Daniel Fung, M. Sc, P. Eng, Principal

1. INTRODUCTION

Metro Vancouver has retained Bunt & Associates Engineering Ltd. to provide transportation planning advice regarding a proposed park/campground at Cape Roger Curtis (CRC), Bowen Island, BC. Metro Vancouver has an agreement to purchase 24 parcels of land on the southwest tip of Bowen Island at Cape Roger Curtis, totalling 97 hectares that Metro Vancouver proposes to a new regional park that will incorporate both day-use and overnight camping areas.

1.1 Background

The land use is currently zoned as rural residential, or RR1 (Rural Residential 1), with a minimum lot size of 4.0 hectares. The rezoning and Official Community Plan (OCP) amendment propose a park, with a variance to allow for supervised tent camping. This land use designation will allow for the creation of a regional park complete with conservation areas, and day-use amenities such as trails, picnic areas, viewpoints, and tent camping.

The proposed regional park would preserve a significant area of ecological importance and sensitive ecosystems; and also provide opportunities for residents of the region, including the Bowen Island community, to connect with nature. Metro Vancouver has submitted a rezoning and (OCP) amendment application to Bowen Island Municipality for the proposed regional park.

Metro Vancouver will prioritize non-vehicular access to the park. Strategies include a seasonal park shuttle, improved trail and greenway connections to the park, and a focus on providing

walk/cycle/shuttle access tent camping opportunities. Some vehicular access will be provided to support accessibility and day-use.

1.2 Purpose and Methodology

The purpose of this preliminary analysis focuses on estimating and comparing the potential number of vehicle trips generated from the existing and proposed land use on the 24 undeveloped lots purchased by Metro Vancouver. These scenarios include:

- Potential Build-out (Low): 24 Single Detached House
- Potential Build-out (High): 15 Single Detached Houses, 6 Single detached homes with 6 additional suites, and 3 five bed Airbnb's
- Campground Trip Generation (incl. 50 Walk-in, 5 Group Sites, 10 Tent Cabins, and 35 vehicle-accessible camps)

Two scenarios have been assumed for the existing rural residential land use as the specificity is not known at the time of this analysis which would impact the number of vehicles generated. These two scenarios represent the high and low range of the anticipated vehicle trip generations. In addition, it is acknowledged that some of the detached single family might have additional land uses attached, such kennels or stables, however, there is a lack of data available to calculate these land uses. Therefore, the high range will be more conservative than the potential build out could result in.

This memorandum summarises the methodology and findings of a trip generation comparison analysis between the allocated/zoned future development at CRC and the trips generated by the CRC proposal taking into account:

- Land uses effected;
- Trip generation information from Metro Vancouver;
- Trip generation information from the Institute of Transportation Engineers (ITE) 11th Edition trip generation database; and
- High-level BC Ferries capacity impact was also reviewed.

This preliminary trip generation estimate for the park/campground does not consider the characteristics for the proposed park/campground such as the ferry access and proximity to the City of Vancouver. Furthermore, the analysis does not account for mitigating factors such as modal splits or highway connections. This analysis has been undertaken to represent the peak day and peak hours for the busiest day of the year, likely impacted by tourism, for example, a weekend in August.

As mentioned, the park will include day-use activities. For this exercise, it is proposed that the park will be ancillary to the campgrounds. The rezoning application will not consider day-use parking and will focus on the provision of camping activities.

1.3 Report Structure

The structure of the report will be as follows:

- Section 2 – Site Description – a brief overview of the site location
- Section 3 – Existing Ferry Capacity – Initial review of the BC Ferry usage data
- Section 4 – Potential Build-out (non-Park/Campground) Vehicle Trip Generation – A calculation of the potential trip generation based on the zoning land use category that the site is allowed to be developed.
- Section 5 – Proposed Park / Campground Vehicle Trip Generation – Proposed campground vehicle trip generation.
- Section 6 – Transportation Demand Management (TDM) – Potential TDM Shuttle Bus Service
- Section 7 – Summary

2. SITE DESCRIPTION

2.1 Cape Roger Curtis Masterplan Area

The Cape Roger Curtis Comprehensive Development Area is in the southwest corner of Bowen Island. The full Cape Roger Curtis masterplan area is comprised of 59 lots, a breakdown of the lot ownership is set out in **Table 2.1**.

As the below table demonstrates, Metro Vancouver has a purchase agreement for 24 of the 59 lots. The remaining 35 lots, not included within Metro Vancouver purchase agreement, but within CRC RR1 Zoning Bylaw are made up of 14 developed lots, 3 lots are used as a nature park and 18 privately sold but undeveloped. The subject proposal will only have an impact on the 24 lots within Metro Vancouver's control.

Table 2.1: Masterplan Lot Breakdown

OWNERSHIP	NUMBER OF LOTS
Developed Lots	14 lots
Sold Lots (as yet undeveloped or underdevelopment)	18 lots
Wildcoast Nature Refuge (nature park and sanctuary)	3 lots
Proposed Metro Vancouver Regional Park	24 lots
TOTAL CRC RR1 ZONE	**59 LOTS**

Day-use amenities including trails, open space and interpretation areas will also be included in the park. These amenities are not part of the rezoning and OCP amendment application and will be proposed following the rezoning process. Metro Vancouver will focus on day-use access through the proposed park shuttle, trail, and greenway connections, with some limited car parking areas.

2.2 Bowen Island Accessibility

Bowen Island is a small coastal island within the Strait of Georgia, in the northwest of the Metro Vancouver area. Currently, the island is only accessible by water transport; primarily provided by BC Ferries via the ferry, between the Snug Cove (Bowen Island) and Horseshoe Bay (West Vancouver) Terminals, which depart approximately every hour from 05:00 to 23:00.

There is only one route to CRC from the Snug Cove Ferry Terminal. Grafton Road travels southeast from Snug Cove from the Ferry Terminal before merging into Adams Road halfway along the route. Adams Road continues southeast towards Tunstall Bay and provides connections to several local roads within the vicinity of the site, including Whitesails Drive. Whitesails Drive is a residential road that connects Tunstall Blvd and Cape Drive to the south. Cape Drive travels around the interior of CRC and will provide primary access to the site. All roads within the vicinity of the site are two-way municipal roads.

Currently, there are no transit options to CRC. The nearest route is the #280 bus which runs approximately every hour from the Snug Cove Terminal to the northwest corner of the Island via Grafton Road and Adams Road but does not continue onto Whitesails Road and towards CRC.

2.3 Proposed Campsite Breakdown

CRC is proposing a rezoning and OCP amendment application for approximately 100 campsites, as outlined in **Table 2.1**. The overall park footprint is proposed to be approximately 250 Acres and will be located within the 24 lots with a purchase agreement from Metro Vancouver.

Table 2.1: Proposed Campground Park Program

CAMP PITCH TYPE	NUMBER OF SITES
Group Camping	5
Vehicle-accessible camping	35
Walk-In / Bike In	50
Tent Cabins	10
Total	**100**

3. EXISTING FERRY CAPACITY

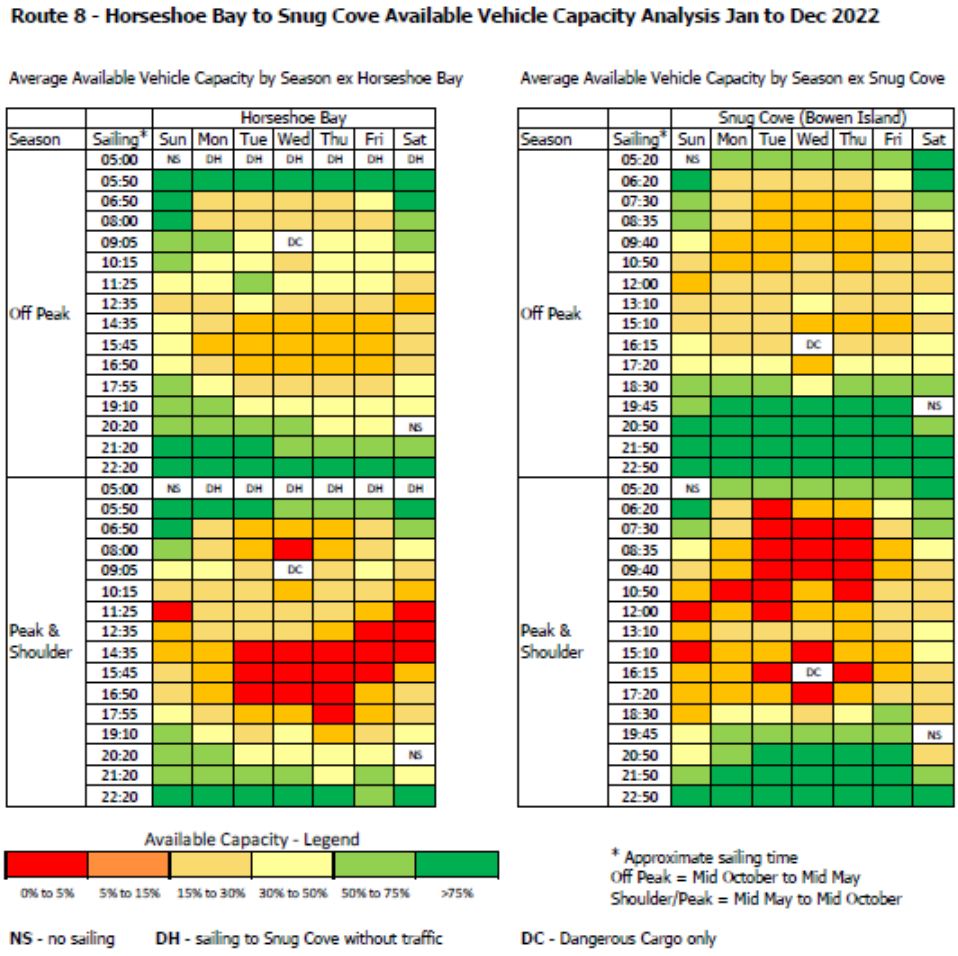
As Bowen Island is served via ferry externally, it is important to understand Ferry operations to consider the potential effects of the trip generation on the island regardless of existing or future conditions. This section reviews the existing ferry service.

The BC Ferries's average capacity tables for 2022 were provided to Metro Vancouver, dated February 28th, and as seen in **Figure 3.1**, demonstrate the existing vehicle capacity on BC Ferries across the year in 2022. It is assumed that the 14 developed lots (Table 1.1) have been included within that

dataset. The remaining 47 lots, 18 sold / undeveloped lots, 3 lots used a nature refuge and the 24 Metro Vancouver lots are not considered to be included in the 2022 data.

Route 8 between Horseshoe Bay and Snug Cove is operated by BC Ferries. The ferry that travels the route is called 'Queen of Capilano', with a capacity of 85 vehicles and approximately 451 people (including staff).

Figure 3.1: BC Ferries's average weekly average capacity



As can be seen, the majority of services within the midday period of the peak & shoulder season are 5% from capacity or fully occupied between Horseshoe Bay to Snug Cove. On Sunday and Monday, there is a 15% or more capacity. Earlier and later services on this leg typically see capacity available, with frequently more than 30% capacity available across the week.

The Snug Cove to Horseshoe Bay sees most of the busiest services towards the end of the weekends or within the early part of the week. Services from 07:30 to 10:50 are frequently at 95% capacity or fully occupied. Services later than 18:30 typically have 30% spare capacity or more.

Further analysis of the BC Ferry services will be undertaken within a full Transportation Impact Assessment (TIA) as part of the next steps of the project scope.

4. POTENTIAL BUILD-OUT VEHICLE TRIP GENERATION

This section summarises the existing land use trip generation (based on non-Park/Campground zoning) for the 24 lots included within the purchase agreement with Metro Vancouver.

4.1 Existing Lot Vehicle Trip Generation

An estimated number of two-way trips (arrival and departures) to be generated by the existing lots with potential zoning built-out lots include as part of the proposed Regional Park by Metro Vancouver was calculated. As previously mentioned, Metro Vancouver has an agreement to purchase a total of 24 lots which are currently zoned as Rural Residential 1 (RR1), as are the remaining lots within CRC.

Rural Residential 1 rezoning allows for the development of the following land uses:

- Dwellings
- Agriculture
- Horticulture
- Domestic Agriculture
- Stable; and
- Kennel.

Accessory uses of land, buildings and structures for RR1 are as follows:

- Home Occupation – Five guest bedrooms on lots 2ha or greater
- Bed and Breakfast use – No separate kitchens
- Portable Saw Mill
- Mini-storage; and
- Dwellings with a secondary suite.

The 24 lots included in the proposed Regional Park by Metro Vancouver are currently vacant. However, any of the above land-use could be developed on these lots should the ownership change. Therefore, to determine the potential trip generation of these lots, two scenarios have been assumed based on direction as provided by Metro Vancouver. These assumptions are:

- Low Range - Single Family / Detached Residential Units – 24 rural residential dwellings have been anticipated, with no secondary units assumed. The residential trip rates will be calculated based on vehicle movements. From the ITE trip generation manual, this review is based on the averages of 3.6 residents per dwelling unit and 1.5 vehicles per dwelling unit from 30 surveys. With a PM two-way vehicle trip rate of 0.94 (veh/unit) and two-way all-day trip rate of 9.43 (veh/unit)

- High Range – Potential - Single Family / Detached Residential Units with accessory uses of land and building. This includes:

    - 12 of the lots will likely have single detached family dwellings. Using the same trip rate as those used in the low range.

    - 6 of the lots will be made up of single family detached homes with an additional unit attached. As no such rates exist for residential units with a secondary unit in ITE, an assumption has been made that the units will be calculated as single detached family dwellings with a multifamily-low rise apartment on the ground floor, this is seen as a conservative estimate.

    - Furthermore, MetroVancouver anticipate that 3 of the lots will be used by single detached family units with additional land uses associated, such as a kennel or stables. Unfortunately, due to a lack of data, these units have been considered as just single-family units. Further to this, the peak hours of the kennels and stables may not be consistent with the peaks of a park/campground.

    - Finally, 3 x 5-bedroom B&B with no individual kitchens will occupy the remaining 3 lots. Each unit with the B&B will not have separate access to communal facilities such as kitchens and some shower facilities. Due to limited data, a motel trip rate is assumed as the representative land use to represent a B&B land use. These sites typically provide sleeping accommodations with few additional facilities. A two-way daily vehicle trip rate of 3.35 (veh/room) was used, with 0.36 (veh/room) two-way vehicle trip rate in the PM peak.

    - Therefore, for vehicle trip generation purposes, a total of 21 family detached homes, 6 secondary suites, and 3 five bedroom B&B is assumed.

The highest trip generation scenario that could be observed within the 24 lots would be for all 24 lots to develop multiple room BnB accommodation, this would generate a significant level of traffic during the summer peak but is deemed to be unrealistic.

Presented in **Table 4.1** are the vehicle trip rates applicable to the proposed development based on the 'ITE Trip Generation Manual 11th Edition + Supplement'. For both residential and B&B land uses, 'Rural or General Suburban' settings were applied to extract the vehicle trip rate estimate.

The AM vehicle trip rates and vehicle trip generation was not analysed as it generates a low level of trips in comparison to the PM and daily rates. Furthermore, the proposed use does not have sufficient AM peak generation data available to compare to the potential build-out trip generations.

Table 4.1: Vehicle Trip Generation Rates

ITE CLASS USE	SOURCE	PARAMETER	WEEKDAY PM PEAK			WEEKDAY		
			Average Vehicle Trip Rate	% Entering	% Exiting	Average Vehicle Trip Rate	% Entering	% Exiting
Single Family Scenario - Detached Residential Dwellings	ITE Land Use Code 210	Dwelling Units	0.94	63%	37%	9.43	50%	50%
Secondary Unit - Multifamily House (Low-Rise)	ITE Land Use Code 220	Dwelling Units	0.51	63%	37%	6.72	50%	50%
5-bed B&B - Motel	ITE Land Use Code 320	Dwelling Units	0.36	54%	46%	3.35	50%	50%

Application of these vehicle trip rates to the existing land use zoning is outlined in **Table 4.2** to estimate the potential number of vehicle trips should each of the 24 lots be developed per the current zoning allocation.

Table 4.2: Vehicle Trip Generation

USE	DENSITY	WEEKDAY PM PEAK			WEEKDAY		
		In	Out	Total	In	Out	Total
Low Range Scenario							
Detached Residential dwellings	24 x Single Family Homes	14	8	23	113	113	226
	Low Range Total	*14*	*8*	*23*	*113*	*113*	*226*
High Range Scenario							
Detached Residential dwellings	21 x Single Family Homes	12	7	20	99	99	198
Multifamily House (Low-Rise)	6 x Secondary Suites	2	1	3	20	20	40
Motel	3 x 5 bedrooms B&Bs	3	2	5	25	25	50
	High Range Total	*17*	*11*	*28*	*144*	*144*	*289*

The existing land use zoning could generate around 23 vehicles in the PM peak for the large residential units. The anticipated weekday trips could generate 226 total two-way trips across a

24hr period. In comparison, should the 24 lots be developed as mixed uses including single family homes, secondary suites, and B&B, the existing lots would generate 289-weekday trips two-way trips across a 24hr period and 28 PM Peak hour trips.

5. PROPOSED LAND USE VEHICLE TRIP GENERATION - CAMPGROUND

This section presents the approach to assess the anticipated number of new vehicle movements that the development project could potentially generate.

5.1 Campground Vehicle Trips

Campgrounds typically reach peak occupancy during the PM and evening hours, with a lower turnover than the day-use would see per the Institute of Transportation Engineers (ITE) trip generation guidelines where the weekend peak hour rates are not provided. However, with the locale for this site, we suspect the PM evening hour peak occupancy would translate into weekend use. Checking out for most campsites is typically before 11:00 on the final day of a reservation, while check-in for those arriving is normally after 13:00.

As previously mentioned, a campground containing 100 campsites, including 5 group campsites provided across 11 of the 24 lots purchased by Metro Vancouver. The campsites will be available by reservation only with campground facilities provided, such as toilet blocks and waste collection. 55 (50 Walk-in/Bike-in and 5 Tent cabins) of the proposed sites are to be accessible by sustainable modes only (Walk, Bike or Shuttle Bus). These will have no car trips associated with them. For this study, only 35 standard campsites, 5 Group sites and 5 Tent campsites are proposed to have vehicle access. The following assumptions were provided by Metro Vancouver as input for the group camp pitches and are set out in **Table 5.1**.

Table 5.1: Metro Vancouver's Proposed Camping Program

TYPE	# SITES	ACCESS TYPE
Walk-In/Bike-In	50	Bike/hike/shuttle
Group	**5**	**Shuttle/Van**
Tent Cabin	10	5 vehicles, 5 bike/hike/shuttle
Vehicle-Accessible Camp	35	1 vehicle per site
Total	**100**	

And as with the previous campground trip generation calculations, the following assumptions have been assumed, with the trip rates set out within **Table 5.2**.:

- All campsites are reserved and/or occupied during the peak periods.
- Vehicles per standard campsite is 1 vehicle and 2 vehicles per group campsite. (Group campsites are booked as one but can accommodate up to 5 tents/vehicles).

- Trip rates for the vehicle campsites have been obtained from the ITE manual for occupied sites. The PM peak (or assumed weekend peak) arrival rate was 0.40 vehicle trips per occupied site.
- Whilst day-use parking is being provided, it is not being considered as part of this memorandum.

Table 5.2: Vehicle Trip Generation Rates

USE	SOURCE	PARAMETER	PM VEHICLE TRIP RATES			DAILY VEHICLE TRIP RATES		
			In	Out	Total	In	Out	Total
Standard Campsites	ITE LUC 416	Camp pitches	0.75	-	0.75	0.75	0.50	1.25
Group Site	Metro Vancouver Data	# of group sites	1.60	-	1.60	1.60	1.0	2.60

Application of these vehicle trip rates to the proposed camping provision is outlined in **Table 5.3** to estimate the anticipated number of vehicle trips generated by the proposed campgrounds.

Table 5.3: Vehicle Trip Generation

USE	DENSITY	PM VEHICLE TRIPS			DAILY VEHICLE TRIPS		
		In	Out	Total	In	Out	Total
Campground (Vehicle Accessible)	40-vehicle accessible - campsites	30	0	30	30	20	50
Campground (Group Site)	5 Group Sites	8	0	8	8	5	13
TOTAL CAMPGROUND		38	0	38	38	25	63

As can be seen, the proposed site will generate around 38 vehicle trips in the PM peak for the full site. The anticipated peak day trips would generate 63 total two-way vehicle trips across a 24hr period.

5.2 Day Use

The focus of this study is traffic associated with the proposed campground park use. Which is the subject of the Bowen Island Municipality rezoning and OCP amendment process. Future park day-use access will be focused on sustainable modes such as the proposed park shuttle, trail, and greenway connections. It is anticipated that some day-use parking will be required for accessibility and to support local resident access. Day use parking supply will be determined and managed to avoid impacts to local residents and will be included in the complete Transportation Impact Assessment that is underway for the project but is not considered for the land use comparison.

5.3 Net Trip Generation

As the campground will replace the existing zoning bylaw on the 24 lots purchased by Metro Vancouver, a comparison in the number of trips generated by the existing land use allocation

against the proposed campgrounds has been undertaken. The comparison is demonstrated in **Table 5.4.** Both land uses set out in Table 4.2 have been compared against the proposed campground to demonstrate the worst-case and the most realistic situation.

The net trip rates demonstrate the level of the difference the proposed campground will have compared to the zoning bylaw.

Table 5.4: Net Vehicle Trip Generation

USE	DENSITY	PM VEHICLE TRIPS			DAILY VEHICLE TRIPS		
		In	Out	Total	In	Out	Total
Low range scenario (detached housing)	24 homes	14	8	23	113	113	226
High range scenario (mixed of detached homes, secondary suites, secondary uses, and B&B)	12 homes 6 secondary suits 3 secondary uses 3 x 5 room B&B	17	11	28	144	144	289
Park / Campground	40 vehicle accessible campsites + 5 Group Sites	38	0	38	38	25	63
Net – low range scenario		**24**	**-9**	**15**	**-75**	**-88**	**-163**
Net – high range scenario		**21**	**-11**	**10**	**-106**	**-119**	**-226**

As is demonstrated, the net impact of the proposed campground against the potential detached residential units will result in a reduction of 163 vehicle trips during the peak day but an increase of 15 vehicle trips in the PM peak. As mentioned, the proposed day use has not been considered within the trip generation exercise above, however, it will form part of the rezoning application.

When the proposed campground is compared to the potential high range mixed-use scenario, it will result in a decrease in a total of 226 two-way vehicles during the peak day and an increase of 10 two-way vehicle trip in the PM peak.

Overall, the campground would result in a reduced trip rate in the Peak day two-way trips when compared to both the potential land uses accepted within the bylaw.

Therefore, any campsite developed will result in a reduction in trips when compared to the land use currently accepted within the zoning bylaw.

5.4 Potential Ferry Impact

The 63 peak-day two-way campground vehicle trips represent a 72% reduction when compared to the potential impact generated by the single-family units and 78% in comparison to the high range potential build-out. A significant reduction on the capacity demands of the potential build-out impact of the ferry services.

The daily outbound trips for the proposed campsite would be 25-30 trips, 29-35% of the ferry capacity and 35-40 inbound trips, approximately 35 - 47% of the capacity. In each direction, 3-5 services are indicating they have above 30% spare capacity outside of the peak crossing times.

When visitors to the campground book their campsite, they will be directed to sailing on off-peak ferries, outside of 10:00-18:00 as part of their travel to Bowen Island.

As previously mentioned, a detailed review of the BC Ferry capacities will be produced within the TIA report.

6. TRANSPORTATION DEMAND MEASURES

As part of the rezoning application, a Transportation Demand Management Plan (TDM) is to be included. Within, a detailed list of the measure will be set out with additional details about how the TDM will be implemented and maintained. The purpose of the TDM plan will be to reduce the number of vehicle trips generated by the site and ensure that sustainable transportation options are widely accessible.

One such TDM measure that has already been proposed by Metro Vancouver is the provision of a shuttle bus. The ferry service pick-up location has yet to be confirmed, whether this will take place at Snug Cove or Horseshoe Bay. These details will be finalised through conversations with stakeholders, Metro Vancouver and BC Ferries.

The shuttle bus service will encourage campers to arrive on the island by sustainable non-private motorised vehicles. Pedestrians can use travel on the ferry as foot passengers before travelling to CRC.

7. SUMMARY

The following summarizes the potential and anticipated vehicle trip generated based on various land use options for the 24 undeveloped CRC lots.

- The masterplan area of CRC is made up of 53 lots, Metro Vancouver has a purchase agreement on 24 of these lots, all currently zoned as RR1 – Rural Residential 1 bylaw. The anticipated vehicle trip generated based on the current zoning bylaw for the 24 lots in the purchase agreement with by Metro Vancouver has been evaluated as two potential scenarios:

  i. Low range scenario: 24 single family homes or

  ii. High range scenario: mixed uses including 12 single family homes, 6 single family homes with secondary suite, 3 single-family homes with secondary uses (stable/kennel), and 3 five room B&B.

- The potential development assumed under the current zoning of the low range scenario is estimated to generate 23 two-way vehicle trips in the PM peak hour and 226 two-way vehicle trips on a weekday. The anticipated trip generation for the high range scenario is estimated to generate approximately 28 to-way vehicle trips in the PM peak hour and 289 two-way vehicle trips on the weekday.

- The vehicle trip generation for the proposed campground is 38 vehicle trips in the PM peak hour and 63 weekday vehicle trips. The net impact of the campsite results in a reduction of 163 and 226 total two-way trips when compared to the potential low range and high range scenarios, respectively.

- The net impact trips generated by the proposed campsite can be spread across the ferry as current data has shown ferry capacity outside of the peak periods. Further traffic and capacity analysis will be completed as part of the next steps of the project.

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