

The 2018 Regional Parking Study

Technical Report

Prepared by TransLink and Metro Vancouver
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Executive Summary

The 2018 Regional Parking Study is the second regional-scale apartment parking study to be undertaken in the Metro Vancouver region. In a metropolitan area where six out of 10 new housing units built are in apartment buildings, the availability of timely data to inform appropriate apartment parking requirements is likely to continue. An excessive supply of parking represents an inefficient use of land and capital resources, especially in Urban Centres and areas along the Frequent Transit Network, and a missed opportunity to reflect evolving transportation choices and to reduce the cost of housing construction. The Regional Parking Study, a collaborative effort between TransLink and Metro Vancouver, draws out patterns to expand the knowledge base of practitioners and policymakers in member jurisdictions and the development community.

Many of the patterns are consistent with expectations and reflect the success that the region has had in coordinating land use and transportation decisions. The findings also reveal opportunities to ‘right size’ the amount of parking in apartment buildings for both motorized vehicles and bicycles, and highlight the opportunity to treat on-site and on-street parking as a system.

The findings of the 2018 Regional Parking Study largely corroborate those in the 2012 Apartment Parking Study, and includes new insights about street parking supply and utilization. Apartment parking supply remains excessive relative to observed utilization. Apartment buildings close to frequent transit, whether or bus or SkyTrain, have lower parking supply and utilization. The lower rates of parking utilization are associated with higher transit use as measured by the number of bus boardings near the buildings, and this relationship is stronger for rental apartment sites.

Street parking is inherently complex in mixed-use neighbourhoods. Some of the factors contributing to street parking use include visitors to non-residential land uses, such as restaurants, shops, and parks; apartment visitors on weekends, holidays, and special occasions; and some apartment residents parking on the street. Even with these factors, only a handful of surveyed street networks experienced persistently high street parking utilization.

Finally, the 2018 Regional Parking Study highlights a challenge that remains unchanged from the 2012 Study. The design and capacity of current bicycle parking facilities in apartment buildings are discouraging their use by many residents.

Looking ahead, practitioners and policymakers should be mindful of evolving mobility choices, technology, and consumer preferences, and the potential implications for vehicle ownership, parking demand, and parking requirements in apartment buildings, on streets, and in other building structures. TransLink and Metro Vancouver will continue to look for opportunities to undertake and support research related to parking in accordance to regional policies, and to support the efforts of member jurisdictions to coordinate land use and transportation decisions.

Acknowledgements

TransLink and Metro Vancouver would like to thank the Project Advisory Group for providing expert perspectives and feedback. The Project Advisory Group's sustained interest in the study supports future regional research and the planning needs of member jurisdictions in the Metro Vancouver region on land use and transportation matters.

The 2018 study could not have been completed without the cooperation of the apartment property managers and condominium strata organizations for granting access to the parkades.

Acuere Consulting provided survey services for the parking facility, street parking, and household surveys. Special thanks go to BC Hydro for providing estimates of low electricity-usage apartment units.

All analyses and key findings presented in this technical report were prepared by the project staff at TransLink and Metro Vancouver.

Table of Contents

Executive Summary.....	i
Acknowledgements.....	ii
1. Introduction	1
2. Study Context.....	2
2.1 Regional Planning and Policy Context.....	2
2.2 Key Findings from the 2012 Apartment Parking Study.....	3
2.3 Fall 2012 Supplemental Surveys	5
2.4 Updating the Apartment Parking Study.....	5
3. Key Findings	6
4. Study Methodology.....	8
4.1 Project Advisory Group	8
4.2 Apartment Site Selection	8
4.3 Parking Facility Survey Design and Conduct	11
4.4 Street Parking Survey Design and Conduct.....	11
4.5 Household Survey Design and Conduct	13
5. Apartment Residential Parking Supply and Utilization Analysis.....	17
5.1 Apartment Residential Parking Supply and Utilization	17
5.2 Relationship with Apartment Unit Size.....	18
5.3 Relationship with Year Built.....	19
5.4 Relationship with Transit Proximity	20
5.5 Relationship with Transit Proximity and Unit Size	20
5.6 Relationship with Transit Boardings	23
6. Street Parking Analysis.....	26
6.1 Street Parking Utilization Patterns.....	26
6.2 High Street Parking Utilization (85% or Higher).....	27
6.3 Street Parking and Apartment Parking Utilization.....	29
6.4 Apartment Residents and Visitors Parking on the Street	29
6.5 Street Parking and Optional Parking in Rental Apartment Sites.....	30
7. Other Analysis	34
7.1 Bicycle Parking	34
7.2 Presence of Electric Vehicle Charging Infrastructure	35
7.3 Willingness to Forgo a Parking Stall	36

8.	Looking Ahead.....	37
8.1	Shared Use Parking Opportunities.....	37
8.2	Mobility Trends, Consumer Preferences, and an Aging Population.....	37
8.3	Monitoring and Managing Street Parking Supply and Utilization	38
8.4	Commercial and Institutional Parking.....	38
9.	Conclusions	39
	Appendix 1: Apartment Sites	40
	Appendix 2: Household Survey Form.....	44
	Appendix 3: Current Municipal Apartment Parking Requirements.....	46
	Appendix 4: Key Informant Interviews on Treating On-Site and Street Parking as a System.....	49
	Appendix 5: Additional Household Survey Analysis	51

1. Introduction

Parking is a community issue that time and again evokes strong opinions from residents and businesses alike. When considering new residential development applications, parking is frequently a top concern.

The first region-wide apartment parking study was completed by Metro Vancouver in 2012 and examined the apartment parking supply and utilization in 80 apartment sites distributed throughout the region. While those study findings continue to be referenced, there have been renewed requests from member jurisdictions¹ for updated information on apartment parking, especially for purpose-built rental apartment sites.

With the support of the MVRD Board, Mayors' Council and relevant advisory committees, such as the Regional Planning Advisory Committee and Regional Transportation Advisory Committee, TransLink and Metro Vancouver jointly undertook a second region-wide apartment parking study, as an update to the 2012 study, in 2017 – 2018. The 2018 Regional Parking Study's objectives are to:

- a) Expand the knowledge base about parking supply and demand for a sample of apartment sites throughout the region;
- b) Document and report out in a user-friendly way that clearly communicates the key findings, potential trends and patterns, and opportunities to inform local practice, in particular for new developments in transit-oriented locations; and,
- c) Use the study dataset and analytics to set the stage for potential additional phases of applied policy research or to support other initiatives in the region.

The 2018 Regional Parking Study comprises the following components:

- Three surveys:
 - Parking Facility Survey of parking supply and utilization at over 70 apartment sites
 - Street Parking Survey of parking supply and utilization on streets near the selected apartment sites
 - Household Survey of 1,500 households residing at the selected apartment sites
- Key informant interviews with municipal staff on street parking strategies and tactics.
- Review of current apartment parking supply requirements in local municipal bylaws.

The three surveys were conducted between October 2017 – January 2018 with the assistance of Acure Consulting Ltd.

¹ In this report, 'member jurisdictions' refer to municipal governments and First Nations jurisdictions.

2. Study Context

This section outlines the policy and planning context for the 2018 Regional Parking Study, and looks back at what was learned in the 2012 Apartment Parking Study.

2.1 Regional Planning and Policy Context

Encouraging compact and complete communities, sustainable transportation choices, and increasing housing affordability are keys to enhancing the economic, environmental, and social sustainability of the region. These objectives are embedded in regional plans and policies. Multi-residential parking is often situated at the intersection of these issues.

Metro 2040: Shaping Our Future

Metro Vancouver 2040: Shaping Our Future (Metro 2040), the regional growth strategy, envisions a transit-oriented region arranged in an interconnected network of Urban Centres and Frequent Transit Development Areas, complemented by viable industrial and agricultural lands, and protected conservation / recreational areas. The majority of the residential growth, a projected additional one million new residents over the next 30 years, will be accommodated primarily in the form of redevelopment within these Urban Centres and Frequent Transit Development Areas.

As the development areas of the region densify, the majority of new residential development will increasingly be in the form of apartments, and less as ground-oriented housing (i.e. single-detached housing forms). Between 2014 and 2018, 59 percent of the housing unit starts in the region were apartments, followed by 20 percent as single-detached dwellings, 13 percent townhouse/ duplex / triplex, and 7 percent as secondary suites.

Metro 2040 encourages municipalities to set out policies in their respective Official Community Plans and Regional Context Statements that establish or maintain reduced residential and commercial parking requirements in Urban Centres and Frequent Transit Development Areas, in coordination with the provision of transit, where appropriate.

Regional Transportation Strategy

TransLink's *Regional Transportation Strategy* identifies parking management as an important way to shift some trips from single-occupancy vehicles and into transit and non-motorized modes. The Strategy also recognizes that parking management is largely a role of local governments. A coordinated effort between local actions and regional objectives is required to achieve the Strategy's targets of having a majority of trips by transit, walking, and cycling, and reducing vehicle kilometres travelled per capita by one-third.

Regional Affordable Housing Strategy

Housing affordability is one of the greatest challenges facing the Metro Vancouver region today. Metro Vancouver's *Regional Affordable Housing Strategy* recognizes that a broader range of housing choices near transit will contribute to more complete, inclusive and healthier communities and expand opportunities for more people to benefit from regional transit investments. A well-housed population is also fundamental to the functioning of the region's economy.

The *Regional Affordable Housing Strategy* identifies parking reduction, in combination with other incentives and policies, as a means of reducing the cost of developing purpose-built rental housing, whether market or non-market, and strata apartments.

2.2 Key Findings from the 2012 Apartment Parking Study

The 2018 Regional Parking Study builds on the 2012 Apartment Parking Study. In the Fall of 2011, Metro Vancouver carried out two regional surveys. In the Parking Facility Survey, the number of parking stalls and parked vehicles in 80 participating apartment sites were counted on weeknights. In the Household Survey component, Metro Vancouver distributed surveys to apartment households to obtain more information about parking habits and preferences. Over 1,500 apartment households responded.

The 2012 key findings were:

- Residential parking supply in strata apartments generally exceed parking demand an average of 18-35 percent across the region.
- Residential parking demand is lower near TransLink's Frequent Transit Network². For apartments near the Frequent Transit Network, the parking demand range was 0.89 – 1.06 vehicles per apartment unit, whereas for apartments further away from the Frequent Transit Network, the parking demand range was 1.10 – 1.25 vehicles per apartment unit.
- Residential parking demand near the Frequent Transit Network bus stops were similar to the demand seen near SkyTrain / SeaBus stations, but the parking supply was higher.
- Vehicle holdings and parking demand for apartment renters were much lower than for owners, consistent with the findings of prior research. In purpose-built market rental sites, the parking demand range was 0.58 - 0.72 vehicles per apartment unit.
- Visitor parking supply may be over supplied. Observed parking demand rates were below 0.1 stall per apartment unit, compared to the typical municipal requirement of 0.2 visitor stall per apartment unit.
- Participation in car share programs was highest in Vancouver (16 percent of surveyed households) and at UBC (15 percent of surveyed households), where car share programs predominantly operate. Households with car share memberships had fewer vehicles than do non-members.
- Proximity to transit was consistently cited by over half of the households surveyed as one of the top three factors when choosing their current home.

The 2012 Study drew out the implications for new apartment development near the Frequent Transit Network. The greatest opportunities for change are new apartment sites near the Frequent Transit Network (generally within 400 metres of a frequent bus stop and/or within 800 metres of a SkyTrain station). High density communities with a robust network of frequent transit services offer the best opportunities to put these findings into practice. For suburban communities lacking the coverage of frequent transit services, these opportunities may be treated as long-term goals.

In the long-run, the benefits of taking action will result in more efficient and livable neighbourhoods in Urban Centres and Frequent Transit Development Areas, improvements to housing affordability and housing choice, and greater use of sustainable transportation choices. The following 'opportunities' were

² The Frequent Transit Network is a network of corridors along which transit service (service could be provided by a single route or a combination of routes) is provided at least every 15 minutes in both directions throughout the day and into the evening, every day of the week.

identified and intended to be practical suggestions for local governments and the development community to consider:

- 1. Treat On-Site and Street Parking as a System:** A more holistic approach toward parking supply and parking demand management for new apartment projects is warranted. Attention should be paid to the availability, type, and relative permanence of street parking (e.g. free, paid, permit-only, and / or time-limited) and surrounded land uses, in association with any reductions in on-site parking requirements.
- 2. Encourage Parking Supply to Match Demand Near the Frequent Transit Network:** Parking requirements should be based on actual or expected demands with further reductions based on transportation demand management measures or other site-specific conditions.
- 3. Encourage Parking Unbundling / Opt-Out:** Selling parking stalls separate from apartments or allowing consumers to opt out of a parking stall will increase choice, and provide the opportunity for consumers without cars to realize some modest improvement in affordability.
- 4. Encourage Rental Apartments Near the Frequent Transit Network:** Apartment renters generally have lower parking demands than do owners, and living close to the Frequent Transit Network provides an opportunity to be less reliant on a private vehicle. For these reasons, it makes sense to encourage the development of more rental apartment units close to the Frequent Transit Network.
- 5. Encourage Expansion of Car Share Programs where Feasible:** Municipalities and developers should encourage car share providers to expand beyond current operating boundaries to such places as emerging Urban Centres and Frequent Transit Development Areas in suburban areas wherever practical and feasible.
- 6. Consider Allowing Amendments to Parking Supply after Pre-Sales:** It is often only after apartment pre-sales that developers have better data to support modifications to residential parking supply. By adapting municipal processes to accommodate amendments before construction, the parking efficiency of new apartment developments can be improved.
- 7. Conduct Regular Post-Occupancy Surveys:** Regular and frequent post-occupancy surveys of apartment projects should be conducted to provide timely information on parking demand in recently built and fully-occupied apartment developments. Industry groups, such as the Urban Development Institute and the Urban Land Institute, should be encouraged to contribute resources to these research efforts and support widespread dissemination of the findings.
- 8. Coordinating Frequent Transit Network Expansion:** Uncertainties in the future stop or station locations of the Frequent Transit Network, and the staging of expansion, can be addressed effectively through enhanced collaboration and information sharing between TransLink and municipal partners.

2.3 Fall 2012 Supplemental Surveys

In the Fall of 2012, Metro Vancouver commissioned supplemental field surveys on about two dozen apartment sites around the region. Parking facility and street surveys were conducted in four different time periods on a weekday and a Saturday. The summary sheets will be posted on the Metro Vancouver website. Where appropriate, the supplemental surveys have been used to inform the 2018 Study's methodology and analysis.

2.4 Updating the Apartment Parking Study

Since the completion of the 2012 Study, a number of new regional policies and milestones have been introduced. Together, these actions support creating a transit-oriented region through the intensification of land uses close to transit. An update to the regional parking study was warranted on the following grounds:

- Starting in 2012, the region saw a surge in new purpose-built rental completions, a large portion of which came in the form of apartments. Local governments identified a gap in parking data on rental apartment sites.
- In 2014, TransLink adopted the *Regional Transportation Strategy* which sets out ambitious targets to increase non-auto mode share and reduce driving per capita. The Strategy also highlights the role of parking management as a means to achieving the regional targets set out in the plan.
- In 2016, Metro Vancouver adopted an update to the *Regional Affordable Housing Strategy*, which also emphasizes the role of parking reductions to improve the financial viability of apartment development in general.
- In 2016, the Evergreen extension of the Millennium SkyTrain Line opened, thus creating new opportunities for transit-oriented development in the Northeast sector of the region.
- In 2017 and 2018, the Mayors' Council on Regional Transportation approved the first two investment plans to implement the Mayors' Vision for transit expansion in the region. The high level of investment in new rapid transit corridors and new frequent bus lines sets the stage for more transit-oriented development across the region.
- In 2018, the Metro Vancouver Board approved the *Climate 2050 Strategic Framework*, which reaffirms the crucial need to reduce greenhouse gas emissions from on-road vehicles. Transitioning to less carbon-intensive transportation choices will require a combination of actions, including changes to land use and parking policies.

3. Key Findings

Based on the body of analysis in this report, the following key findings have been identified. The key findings are intended to highlight patterns that show a relatively high degree of consistency with expectations, with the 2012 Study, and are generalizable regardless of geography or neighbourhood characteristics. At the same time, there may be other information presented in previous sections that may be useful to practitioners and policymakers, such as information about the few mixed-tenure, mixed rental, or non-market rental sites. Where appropriate, users of this report should supplement the findings with other local data, observations, and experience.

Key Finding #1: For both rental and strata buildings, apartment parking supply exceeds use across the region.

Supporting information:

Based on the Parking Facility Survey:

- For strata apartment buildings, parking supply exceeds utilization by 42 percent;
- For market rental apartment buildings, parking supply exceeds utilization by 35 percent;
- For mixed tenure and mixed rental apartment buildings, parking supply exceeds utilization by 41 percent;
- Parking supply exceeds utilization in strata and rental apartment buildings across the region.
- Parking supply appears to be declining for newer strata and market rental apartment buildings.

Based on the Household Survey:

- Small strata or market rental units (0 or 1 bedroom units, or unit less than 800 sq.ft.) tend to have at most 1 parked vehicle per unit;
- The smallest market rental units (0-bedroom units or units less than 600 sq.ft.) have the largest oversupply of parking.

Key Finding #2: Apartment parking supply and use is lower for buildings closer to frequent transit.

Supporting information:

Based on the Parking Facility Survey:

- For strata apartment buildings, parking utilization near frequent transit (bus or SkyTrain) ranges 0.86 – 0.97 vehicles per unit, compared to 1.09 for buildings further away.
- For market rental sites, parking utilization near transit (bus or SkyTrain) ranges 0.35 – 0.72, compared to 0.99 for sites further away from the FTN.
- Parking supply is lower in buildings close to frequent transit.

Based on the Household Survey:

- Small strata or rental units (0 or 1 bedroom units) tend to be most responsive to proximity to frequent transit, followed by 2 bedroom units.

Key Finding #3: Transit use is generally higher where apartment parking use is lower, especially for rental buildings.

Supporting information:

Based on the Parking Facility Survey and transit ridership data:

- Transit boardings (bus boardings within 400 metres of the apartments; SkyTrain/SeaBus boardings within 800 metres of the apartments) are higher when apartment residential parking utilization is lower.
- The relationship is stronger for rental apartment sites, than for strata sites.

Key Finding #4: Street parking is complex in mixed-use neighbourhoods. Some of the factors contributing to street parking use in mixed-use neighbourhoods include: visitors to non-residential land uses in the evenings; apartment visitors on weekends, holidays, and special occasions; and some apartment residents parking on a nearby street.

Supporting information:

Based on the Street Parking Survey:

- Generally, street parking utilization is higher in the evenings (weekday or Saturday) than on a weekday late night.
- Out of 65 surveyed street networks, 7 networks experienced high street parking utilization in at least two of the three surveyed time periods. The exceedances typically occur in the evenings. Nearby non-residential trip generators, such as parks, restaurants, and other commercial uses appear to be one factor.
- Apartment visitors typically encounter greater difficulty finding a parking space in the apartment parking facility or nearby street on weekends, holidays, and special occasions.
- Where households reported parking on a nearby street, they typically park within a five-minute of their apartment building.
- For rental sites where residential parking is not included in the rent, both apartment residential parking supply and utilization are lower compared to sites where parking is included in the rent. For the former, nearby street parking utilization is also higher, but does not exceed the 85 percent threshold.

Key Finding #5: The design and capacity of current bicycle parking facilities in apartment sites appear to discourage use by many residents.

Supporting information:

Based on the Household Survey:

- About one-third of bicycle-owning households do not use their building's secured bicycle parking facility. The rate of usage is consistent across different building ages. The most frequently cited concerns were risk of damage to or loss of the bicycles, crowded facilities, and adverse perceptions of safety and convenience.

4. Study Methodology

4.1 Project Advisory Group

A Project Advisory Group was established as a means for planning and engineering staff from member jurisdictions to provide detailed input on the study scope, and to review the data analysis and findings. Since it is the role of member jurisdictions to review, implement and update development standards and requirements, it was deemed important to ensure that the final product was framed in a way that is meaningful and useful for practitioners. The Project Advisory Group comprised a mix of planners and transportation engineers representing nine member jurisdictions (a request was originally made to the Regional Planning Advisory Committee and Regional Transportation Advisory Committee for volunteers to participate on the advisory group). The multidisciplinary composition of the Project Advisory Group was aligned with the parking being a cross-cutting land use and transportation issue. The Project Advisory Group reviewed and provided feedback in the preparation of this technical report.

4.2 Apartment Site Selection

The survey sites were selected based on several criteria: representation from across the region; building age; building tenure; and, proximity to TransLink's Frequent Transit Network. While about 200 apartment sites were contacted by project staff, 73 sites ultimately agreed to participate in the 2018 Study.

A concerted effort was made to increase the share and number of sites in the southern and eastern parts of the region in the Study in response to the fast pace of higher density development and improvements to the Frequent Transit Network in those areas. The South of Fraser had the most number of sites, doubling the number in the 2012 Study. The Northeast Sector and Pitt Meadows / Maple Ridge also saw an increase in the number of sites surveyed.

On account of building tenure, the majority of sites are strata ownership. However, many more non-strata buildings participated in the Study, including 12 market rental sites, 7 mixed tenure (strata and rental) sites, 3 mixed rental (market and non-market rental) sites, and 1 non-market rental site. In comparison, the 2012 Study consisted of only 13 non-strata sites. Please note that the three mixed rental sites surveyed in the Study are owned and managed by the Metro Vancouver Housing Corporation.

A balance was struck between studying sites built since the 2012 Study and older sites. Over one-half of the sites were built in 2010 or later. Some sites that are in the older vintage are: three Metro Vancouver Housing Corporation sites built in the 1970/80s, and one market rental site in downtown Vancouver built in the early 1990s (which was also included in the 2012 Study).

Table 1. Apartment Sites by Subregion, Local Jurisdiction, and Tenure

Subregion	Local Jurisdiction	Number of Sites	Strata	Market Rental	Mixed Tenure	Mixed Rental	Non-Market Rental
South of Fraser	Delta	1	1	-	-	-	-
	Langley City	1	-	1	-	-	-
	Langley Township	4	1	3	-	-	-
	Surrey	11	10	-	-	-	-
	White Rock	2	2	-	-	-	-
Vancouver/UBC	UBC Point Grey	1	1	-	-	-	-
	Vancouver	14	1	4	7	1	1
Northeast Sector+	Coquitlam	6	6	-	-	-	-
	Maple Ridge	1	1	-	-	-	-
	Pitt Meadows	1	1	-	-	-	-
	Port Coquitlam	3	2	-	-	1	-
	Port Moody	3	3	-	-	-	-
Burnaby/New Westminster	Burnaby	7	7	-	-	-	-
	New Westminster	3	3	-	-	-	-
North Shore	North Vancouver City	4	4	-	-	-	-
	North Vancouver District	4	2	2	-	-	-
Richmond	Richmond	7	5	2	-	-	-
Total		73	50	12	7	3	1

Table 2. Distribution of Apartment Sites by Year Built

Year Built	Number of Sites	Strata	Market Rental	Mixed Tenure	Mixed Rental	Non-Market Rental
1976-1993	4	-	1	-	3	-
2005-2009	22	19	3	-	-	-
2010-2013	19	14	3	1	-	1
2014-2017	28	17	5	6	-	-

In keeping with the land use and transportation nexus, the vast majority of sites are located within walking distance to the Frequent Transit Network, whether rapid transit or frequent bus. For comparative analysis purposes, 15 sites were chosen further away from current frequent transit service.

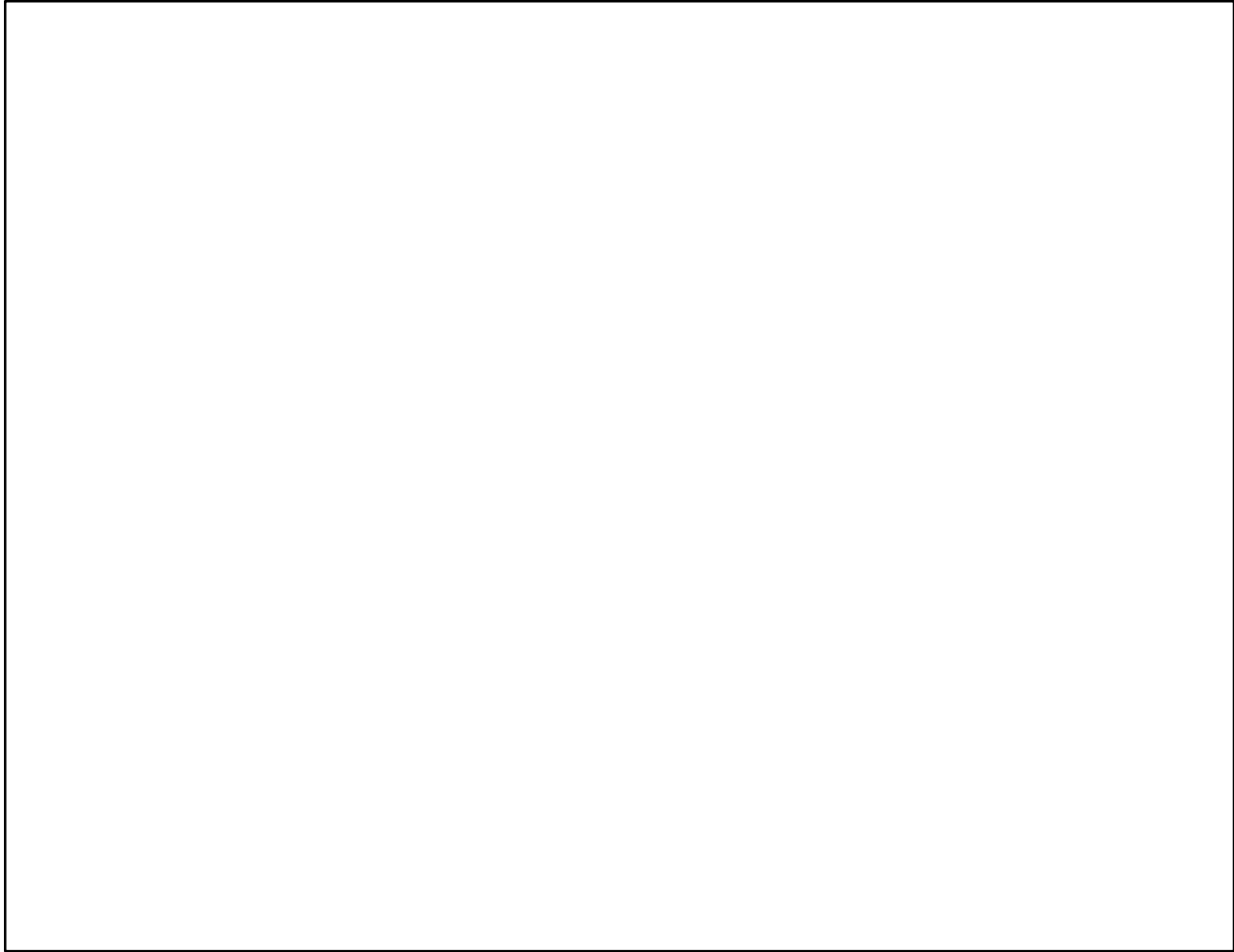


Figure 1. Map of Surveyed Apartment Sites

Table 3. Distribution of Apartment Sites by Proximity to the Frequent Transit Network

Proximity to Frequent Transit Network	Number of Sites	Strata	Market Rental	Mixed Tenure	Mixed Rental	Non-Market Rental
Within 800m of a rapid transit station	30	22	3	4	1	-
Within 400m of a frequent bus corridor only	28	20	3	3	1	1
Away from FTN	15	8	6	-	1	-

4.3 Parking Facility Survey Design and Conduct

The Parking Facility Survey component of the Study was conducted between October 2017 and January 2018 by Acuere Consulting Ltd. The purpose of the Survey was to measure the apartment parking supply and utilization at the selected sites. The surveyors initiated the surveys generally after 11:00PM on a weeknight, Monday through Thursday. Project staff provided Acuere with the appropriate contact person at each site, whether a strata council member, property manager, or on-site caretaker. Acuere was responsible for scheduling and assigning the surveyors. The survey data was transmitted to Metro Vancouver in the Spring of 2018. The data collected included:

Table 4. Parking Facility Survey Data Type

Data	Values
Parking Facility Type	<ul style="list-style-type: none"> • Residential (enclosed parking or surface parking) • Visitor (enclosed parking or surface parking) • Commercial (enclosed parking or surface parking); commercial parking stalls and utilization were not counted.
Parking Stall Type	<ul style="list-style-type: none"> • Regular vehicle stall • Tandem stall • Electric vehicle stall • Car Share vehicle stall • Accessible stall • Motorcycle stall • Loading stall • Unmarked space • Other space

It should be noted that commercial parking stalls and utilization were not counted (and would not have been meaningful given the time period of the surveys). In a similar vein, apartment visitor parking is less meaningful given that ‘peak’ visitor demand is typically in the evenings.

In order to account for potentially unoccupied units during the period of the survey (and minimize the underestimation of parking utilization ratios), data from BC Hydro was obtained on the number of units at each site that consumed 100 kWh or less of electricity per month on average between September 1 – November 30, 2017; for comparative purposes, the threshold of 10 kWh is generally the amount of electricity consumed by a refrigerator. Unoccupied units may be empty for a number of reasons, such as newer buildings where residents have yet to move in, units that are bought as investments but not yet occupied out, or units undergoing renovations. Where data gaps remained, a generalized ‘vacancy’ factor was assumed.

4.4 Street Parking Survey Design and Conduct

The Street Parking Survey is a new component for the Study. One of the key opportunities identified in the 2012 Study was that a more holistic and systems-based approach toward apartment parking and street parking was warranted. While it may be reasonable to presume an interplay between the two, without survey data, our understanding of the relationship and other neighbourhood factors is limited.

The streets, generally within 200 metres of the selected apartment sites, were surveyed for their parking utilization and the available parking spaces estimated and inventoried. Street parking regulations were also recorded. The surveys were conducted during three time periods: i.e. weekday evening (6:30-8:30PM), weekday late night (11:00PM), and Saturday evening (6:30-8:30PM). These time periods were chosen based in part based on resource availability, the expectation that the evening periods were times when street parking utilization is high, and that the data would generate a clear picture of the interplay between apartment parking and street parking utilization.³ Approximately 94 percent of the nearly 16,400 parked vehicles were passenger vehicles. The data collected included:

Table 5. Street Parking Survey Data Type

Data	Values
Vehicle Type	<ul style="list-style-type: none"> • Passenger auto/truck/van (94% of observed parked vehicles) • Motorcycle/scooter, oversized truck/van too large to enter the parking facility, commercial trucks (cube truck, heavy trucks), car share vehicles, RV campers, taxi, police vehicle, ambulance, construction vehicle or equipment, other
Parking Regulation Type	<ul style="list-style-type: none"> • No restriction • Time-restricted no parking: Red circle crossed P (time/day specific) • Time-restricted parking: Green circle P (time/day specific) • Meter • Resident Only • Resident Permit • Miscellaneous: <ul style="list-style-type: none"> ○ Loading/passenger only ○ Commercial zone ○ School zone ○ Car share parking only ○ Accessible vehicles only ○ Taxi only ○ Police only ○ Motorcycles only ○ Electric vehicles only
Illegal Parking Type	<ul style="list-style-type: none"> • Parked in no stopping zone • Parked at bus stop or fire hydrant • Parked too close to stop sign • Parked vehicle extends into driveway/alley • Other

The supply of parking spaces on each street segment was estimated using online aerial photos and validated with select field visits. In total, about 9,300 street parking spaces were estimated, of which 4,300 spaces were designated with some form of parking restriction, and about 5,000 without any parking

³ In Fall 2012, Metro Vancouver completed supplemental surveys of streets around two dozen apartment sites. Surveys were completed on a weekday and Saturday in four time periods: late morning (11:00AM), afternoon (3:00PM), evening (6:00PM), and late night (11:00PM). Generally, the evening periods saw the highest street parking utilization. The survey consultant was Opus International Consultants.

restrictions. Approximately, 160 kilometres of curbside street segments were surveyed in each of the three time periods.

4.5 Household Survey Design and Conduct

The Household Survey provides supplemental information about the residents who live in the participating apartment sites, such as vehicle ownership, whether they own or rent their unit and parking stall(s), apartment visitor parking patterns, basic demographic information, and other attributes (see Appendix X for the complete survey form). The surveys were mailed out in mid-December 2017 and closed in February 2018.

The survey questions closely mirrored those in the 2012 Study, with several modifications based on input from the Project Advisory Group and others. Invitation letters were individually mailed to all apartment units in the participating buildings. In total, 1,567 responses were received and deemed sufficiently complete to use for data analysis. Respondents were provided with the option of completing the survey online, or completing the paper survey and returning it using an included postage-paid envelope. Nearly two out of three responses originated from residents of Vancouver, Burnaby, Surrey, Coquitlam, and Port Moody.

Table 6. Geographic Distribution of Household Survey Responses

Member Jurisdiction	Completed Responses
Vancouver	368
Burnaby	211
Surrey	202
Coquitlam	147
Port Moody	102
North Vancouver City	99
Richmond	89
North Vancouver District	77
New Westminister	54
White Rock	49
Langley Township	46
Port Coquitlam	44
Delta	31
Maple Ridge	24
Pitt Meadows	9
Total	1,567

The mailing addresses used to distribute the survey were assembled through the BC Assessment Authority’s website and from property managers, as appropriate. To limit responses to one per apartment unit, each mail-out contained a unique code that was required to submit the survey form. The consultant was responsible for administering the survey and providing an anonymized dataset to project staff.

As with the 2012 Study, the Household Survey dataset was not weighted to match the demographics of the region. As with all surveys, a self-selection bias is a factor that must be considered when interpreting

the data (e.g. residents with a particular interest in parking may be more inclined to complete the survey). The value of the household survey is in supplementing the broad regional or subregional patterns that emerge from the other two survey datasets. The following tables are useful to understand the characteristics of the survey respondent households. Where appropriate, comparative values from the 2012 Study are shown.

Apartment Unit Size Distribution

Households residing in apartment units with two or fewer bedrooms made up 93 percent of the respondents. This proportion is consistent with apartment development trends: between 2001 and 2016, 90 percent of apartment units built had two or fewer bedrooms. In terms of floor area, there is a more even distribution for units at least 600 sq.ft. of floor area. This implies that one-bedroom units come in a variety of sizes, as do two-bedroom units.

Table 7. Apartment Unit Size (Bedrooms) Distribution

Unit Size (Bedrooms)	Responses	2012 Study
0-bedroom units	39 (2%)	4%
1-bedroom units	493 (32%)	30%
2-bedroom units	924 (59%)	57%
3 plus-bedroom units	111 (7%)	8%
Total	1,567	100%

Table 8. Apartment Unit Size Distribution

Unit Size (in Square Feet)	Responses
Less than 600 sq.ft.	256 (16%)
600 – 799 sq.ft.	428 (29%)
800 – 999 sq.ft.	489 (31%)
1000+ sq.ft.	358 (23%)
Unsure	36 (2%)
Total	1,567

Household Size Distribution

The average household size of the survey sample is about 2 persons. According to the 2016 Census, the average household size in apartments of five storeys or higher was 1.7 persons, and in other apartment buildings the household size was 1.9 persons.

Table 9. Household Size Distribution

Household Size	Responses	2012 Study
1 person	492 (31%)	32%
2 persons	751 (48%)	46%
3 persons	214 (14%)	16%
4 or more persons	103 (7%)	7%
No Data	7 (0%)	-
Total	1,567	100%

Tenure Distribution

Owner-occupied households made up two out of three survey responses. This ratio is consistent with the vast majority of apartment sites in the Study being condominiums. For comparison, the 2016 Census counted that 56 percent of apartment dwellers (in buildings built 2011-2016) were owners and 44 percent were renters.

Table 10. Household Tenure Distribution

Household Tenure	Responses	2012 Study
Owner	1,071 (68%)	68%
Renter	464 (30%)	32%
No Data	32 (2%)	-
Total	1,567	100%

Table 11. Building Tenure Distribution

Building Tenure	Responses
Strata	1,185 (76%)
Market Rental	133 (9%)
Mixed Tenure	186 (12%)
Mixed Rental	35 (2%)
Non-Market Rental	28 (1%)
Total	1,567

Proximity to Transit Distribution

The survey sample provides coverage of households residing near the Frequent Transit Network and households who live further away.

Table 12. Frequent Transit Network Proximity Distribution

FTN Proximity	Responses	2012 Study
Within 800m of rapid transit	827 (52%)	51%
Within 400m of frequent bus only	535 (35%)	30%
Away from FTN	205 (13%)	20%
Total	1,567	100%

Vehicles per Household

Generally, the average number of vehicles per household increases with household size and apartment unit size. In addition, vehicle ownership is higher for owners and households residing in strata sites.⁴

Table 13. Vehicle Holdings by Household Size

Household Size	Vehicles
1 person	0.88
2 persons	1.36
3 persons	1.49
4 or more persons	1.49

Table 14. Vehicle Holdings by Unit Size (Bedrooms)

Unit Size (Bedrooms)	Vehicles
0-bedroom units	0.64
1-bedroom units	0.98
2-bedroom units	1.35
3 plus-bedroom units	1.66

Table 15. Vehicle Holdings by Unit Size (Floor Area)

Unit Type	Vehicles
Less than 600 sq.ft.	0.79
600 – 799 sq.ft.	0.98
800 – 999 sq.ft.	1.18
1000+ sq.ft.	1.39

Table 16. Vehicle Holdings by Household Tenure

Household Tenure	Vehicles
Owner	1.32
Renter	1.10

Table 17. Vehicle Holdings by Building Tenure

Building Tenure	Vehicles
Strata	1.30
Market Rental	1.07
Mixed Tenure	1.07
Mixed Rental	1.23
Non-Market Rental	0.54

⁴ The lone outlier is the average vehicle holdings in the three mixed rental sites. The three sites are older Metro Vancouver Housing Corporation sites with long-term tenants.

5. Apartment Residential Parking Supply and Utilization Analysis

The following analysis combines the Parking Facility Survey and Household Survey where appropriate. Sample sizes should be taken into consideration when reviewing the information.

5.1 Apartment Residential Parking Supply and Utilization

Broadly, the estimates of apartment parking supply and utilization ratios are consistent with those found in the 2012 Apartment Parking Study. Residential parking supply ratios exceed observed and reported utilization by a measurable amount. For strata sites, the oversupply of parking ranges from 19 percent to 42 percent depending on the survey. For market rental sites, the oversupply ranges from 23 percent to 35 percent. It should be noted that the timing of the parking facility survey may not have captured residents who may be shift workers or temporarily absent from the building. Please see Appendix 5 for supplemental information derived from the Household Survey.

Table 18. Resident Parking by Tenure

Building Tenure (# sites in PFS)	Parking Facility Survey		
	Stalls per DU (PFS)	Parked Vehicles per DU (PFS)	Parking Oversupply Estimate
Strata (n=50)	1.31	0.92	+42%
Market Rental (n=12)	0.97	0.72	+35%
Mixed Tenure (n=7)	0.89	0.63	+41%
Mixed Rental (n=3)	1.47	1.04	+41%
Non-Market Rental (n=1)	0.33	0.14	+136%

Looking at strata sites only, the level of residential parking oversupply is fairly consistent across the region. According to the Parking Facility Survey, the oversupply of parking ranges from 32 percent in the North Shore sites to 58 percent in the Richmond sites.

Table 19. Resident Parking in Strata Sites by Subregion

Strata Sites by Subregion (# sites in PFS)	Parking Facility Survey		
	Stalls per DU (PFS)	Parked Vehicles per DU (PFS)	Parking Oversupply Estimate
Burnaby/NW (n=10)	1.18	0.82	+45%
North Shore (n=6)	1.28	0.97	+32%
Northeast Sector+ (n=13)	1.33	0.98	+36%
Richmond (n=5)	1.29	0.82	+58%
South of Fraser (n=14)	1.46	1.00	+45%
Vancouver/UBC (n=2)	1.15	0.83	+40%

For the combined rental sites, the residential parking is oversupplied across the region.

Table 20. Resident Parking in Rental Sites by Subregion

Rental Sites by Subregion (# sites in PFS)	Parking Facility Survey		
	Stalls per DU (PFS)	Parked Vehicles per DU (PFS)	Parking Oversupply Estimate
North Shore (n=2)	0.87	0.70	+24%
Northeast Sector+ (n=1)	1.47	1.12	+30%
Richmond (n=2)	1.07	0.77	+39%
South of Fraser (n=5)	1.51	1.10	+38%
Vancouver/UBC (n=13)	0.85	0.59	+44%

5.2 Relationship with Apartment Unit Size

At the apartment unit level, using data from the Household Survey, households in strata units and market rental units with 0 or 1 bedroom, or units less than 800 sq.ft., have at most one vehicle to park.

Table 21. Resident Parking in Strata Sites by Unit Size (bedrooms)

Strata Sites (HHS responses)	Stalls per DU (HS)	Parked Vehicles per DU (HS)	Vehicles per DU (HS)	Parking Oversupply Estimate
0-bedroom (n=17)	1.00	0.88	0.88	+14%
1-bedroom (n=320)	1.16	0.94	1.05	+23%
2-bedroom (n=761)	1.44	1.24	1.37	+16%
3 plus-bedroom (n=86)	1.90	1.55	1.69	+23%

Table 22. Resident Parking in Strata Sites by Unit Size (floorspace)

Strata Sites (HHS responses)	Stalls per DU (HS)	Parked Vehicles per DU (HS)	Vehicles per DU (HS)	Parking Oversupply Estimate
Less than 600 sqft (n=126)	1.18	0.96	1.02	+23%
600-799 sqft (n=318)	1.23	1.03	1.16	+19%
800-900 sqft (n=409)	1.37	1.19	1.34	+15%
1000+ sqft (n=314)	1.67	1.39	1.51	+20%

Table 23. Resident Parking in Market Rental Sites by Unit Size (bedrooms)

Market Rental Sites (HHS responses)	Stalls per DU (HS)	Parked Vehicles per DU (HS)	Vehicles per DU (HS)	Parking Oversupply Estimate
0-bedroom (n=15)	0.85	0.47	0.47	+81%
1-bedroom (n=66)	1.02	0.79	1.02	+29%
2-bedroom (n=50)	1.23	1.12	1.26	+10%

Table 24. Resident Parking in Market Rental Sites by Unit Size (floorspace)

Market Rental Sites (HHS responses)	Stalls per DU (HS)	Parked Vehicles per DU (HS)	Vehicles per DU (HS)	Parking Oversupply Estimate
Less than 600 sq.ft. (n=45)	0.95	0.64	0.78	+48%
600-799 sq.ft. (n=35)	0.93	0.77	1.03	+21%
800-999 sq.ft. (n=38)	1.31	1.16	1.32	+13%

5.3 Relationship with Year Built

Parking supply in strata and rental apartment buildings appear to be declining for newer buildings.

Table 25. Resident Parking in Strata Sites by Year Built

Strata Sites (n=50)	Stalls per DU (PFS)	Parked Vehicles per DU (PFS)	Parking Oversupply Estimate
2005-2009 (n=19)	1.31	0.92	+42%
2010-2013 (n=14)	1.43	1.04	+37%
2014-2017 (n=17)	1.26	0.87	+45%

Table 26. Resident Parking in Rental Sites by Year Built

All Rental Sites (n=23)	Stalls per DU (PFS)	Parked Vehicles per DU (PFS)	Parking Oversupply Estimate
2005-2009 (n=3)	1.18	0.82	+44%
2010-2013 (n=5)	0.91	0.64	+42%
2014-2017 (n=11)	0.91	0.66	+38%

Table 27. Resident Parking in Market Rental Sites by Year Built

Market Rental Sites (n=11)	Stalls per DU (PFS)	Parked Vehicles per DU (PFS)	Parking Oversupply Estimate
2005-2009 (n=3)	1.18	0.82	+44%
2010-2013 (n=3)	0.80	0.55	+46%
2014-2017 (n=5)	1.07	0.84	+27%

Table 28. Resident Parking in Market Rental Sites by Year Built (Excluding Vancouver)

Market Rental Sites, Excluding Vancouver (n=8)	Stalls per DU (PFS)	Parked Vehicles per DU (PFS)	Parking Oversupply Estimate
2005-2009 (n=1)	1.54	1.10	+40%
2010-2013 (n=2)	1.27	0.90	+40%
2014-2017 (n=5)	1.07	0.84	+27%

5.4 Relationship with Transit Proximity

Apartment residential parking supply and utilization ratios are inversely related to the level of transit service. As transit service level declines, parking supply and utilization increase (however, parking utilization is at most 1 vehicle per unit as per the Parking Facility Survey).

Table 29. Resident Parking in Strata Sites by Transit

Strata Sites by Proximity to FTN	Parking Facility Survey		
	Stalls per DU (PFS)	Parked Vehicles per DU (PFS)	Parking Oversupply Estimate
Within 800m of rapid transit (n=22)	1.21	0.86	+42%
Within 400m of frequent bus only (n=20)	1.40	0.97	+45%
Away from FTN (n=8)	1.54	1.09	+41%

Table 30. Resident Parking in Market Rental sites by Transit

Market Rental Sites by Proximity to FTN	Parking Facility Survey		
	Stalls per DU (PFS)	Parked Vehicles per DU (PFS)	Parking Oversupply Estimate
Within 800m of rapid transit (n=3)	0.62	0.35	+77%
Within 400m of frequent bus only (n=3)	0.90	0.72	+25%
Away from FTN (n=6)	1.31	0.99	+32%

Table 31. Resident Parking in Mixed Tenure Sites by Transit

Mixed Tenure Sites by Proximity to FTN	Parking Facility Survey		
	Stalls per DU (PFS)	Parked Vehicles per DU (PFS)	Parking Oversupply Estimate
Within 800m of rapid transit (n=4)	0.80	0.60	+33%
Within 400m of frequent bus only (n=3)	1.09	0.70	+56%

5.5 Relationship with Transit Proximity and Unit Size

The results of the Household Survey allow for an analysis of the relationship between parking utilization and proximity to the Frequent Transit Network as a function of apartment unit size. Generally, whether for strata or rental apartment sites, the ratio of parked vehicles to dwelling unit is the lowest for 0 or 1 bedroom units and the largest incremental increase in parking utilization occurs when these apartment units are located further away from the Frequent Transit Network. Strata units with more than two bedrooms appear to be less influenced by proximity to frequent transit. Rental units appear to be more influenced by proximity to rapid transit than to frequent bus. Due to small sample sizes, households in 3-bedroom rental units were excluded from the analysis.

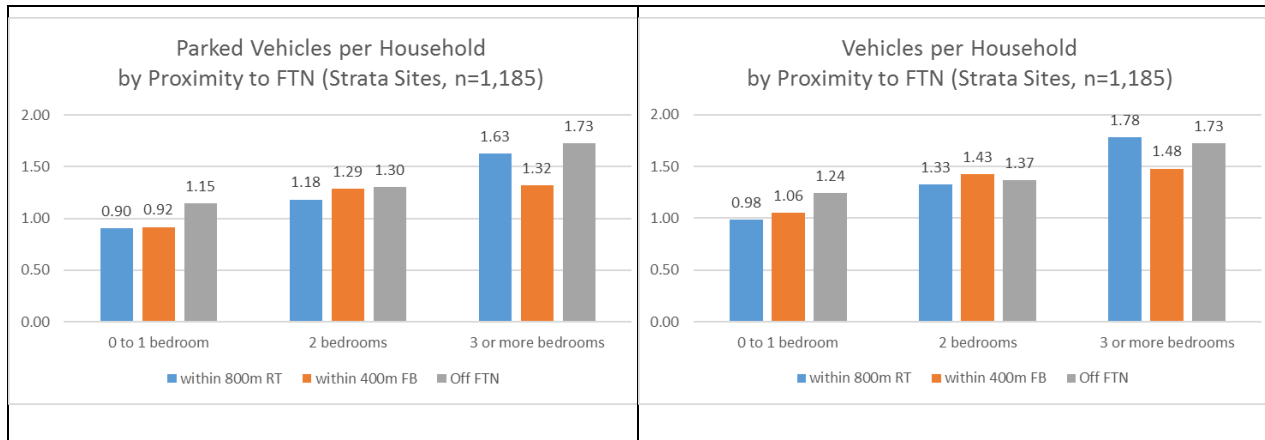


Figure 2. Parking and Vehicle Holdings for Strata Sites by Proximity to the FTN and Unit Size

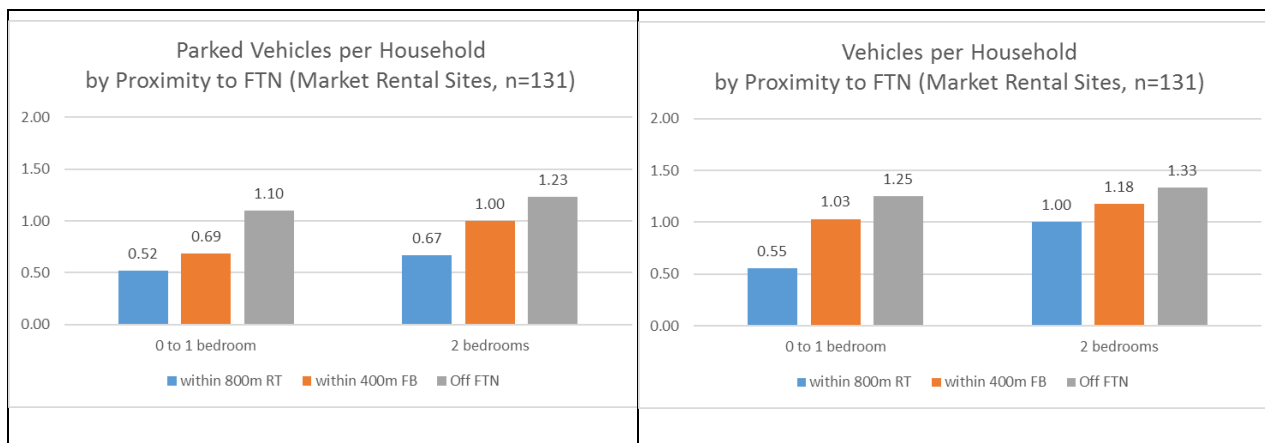


Figure 3. Parking and Vehicle Holdings for Market Rental Sites by Proximity to the FTN and Unit Size



Figure 4. Parking and Vehicle Holdings for Rental Sites by Proximity to the FTN and Unit Size

A recurring interest is the potential impact that sites in the City of Vancouver may have on these patterns. The following charts replicate the charts above but exclude sites in Vancouver and UBC. The charts below indicate that the patterns observed earlier remain intact. Please note that due to small sample sizes,

households in rental units near rapid transit stations, and households in 3-bedroom rental units were excluded from the charts.

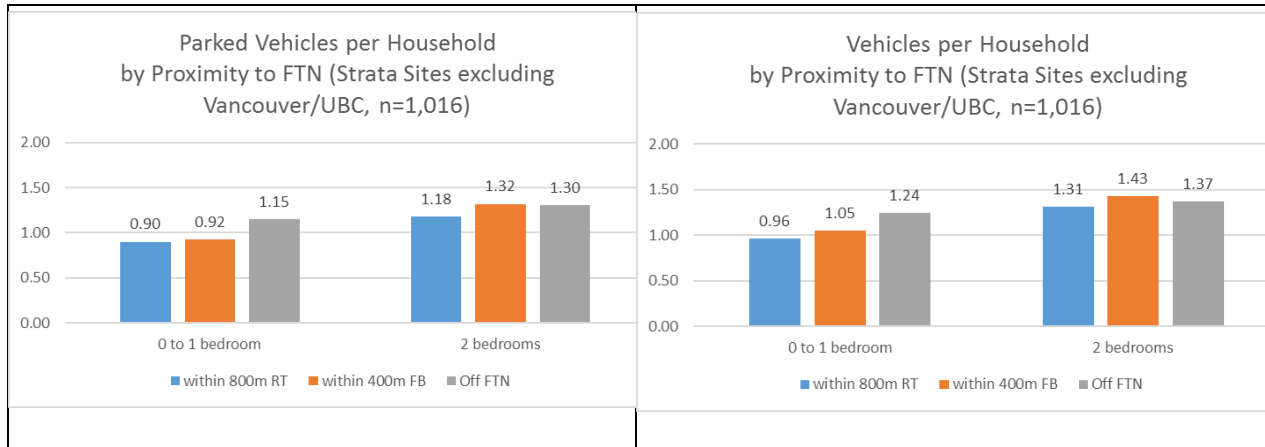


Figure 5. Parking and Vehicle Holdings for Strata Sites (Excluding Vancouver/UBC)

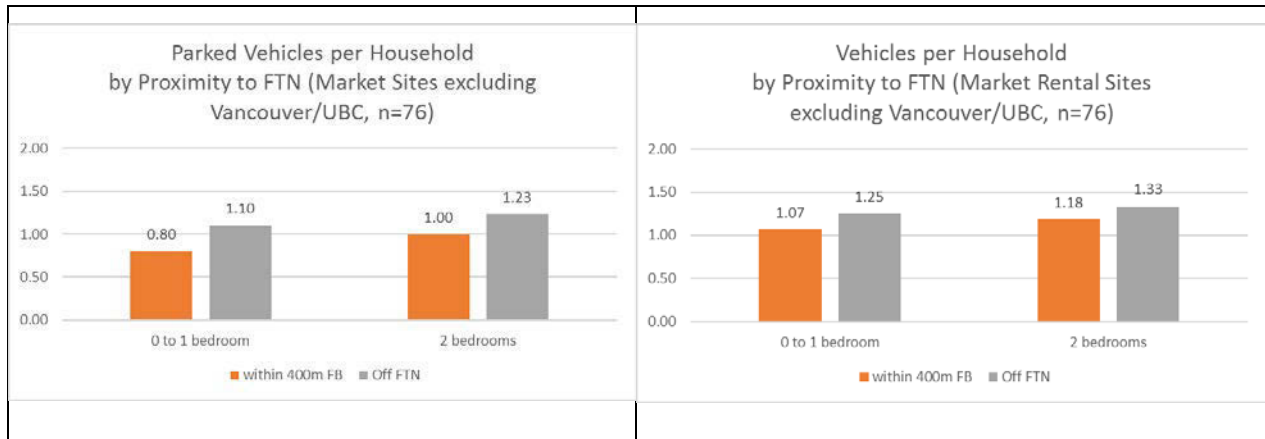


Figure 6. Parking and Vehicle Holdings for Market Rental Sites (Excluding Vancouver)

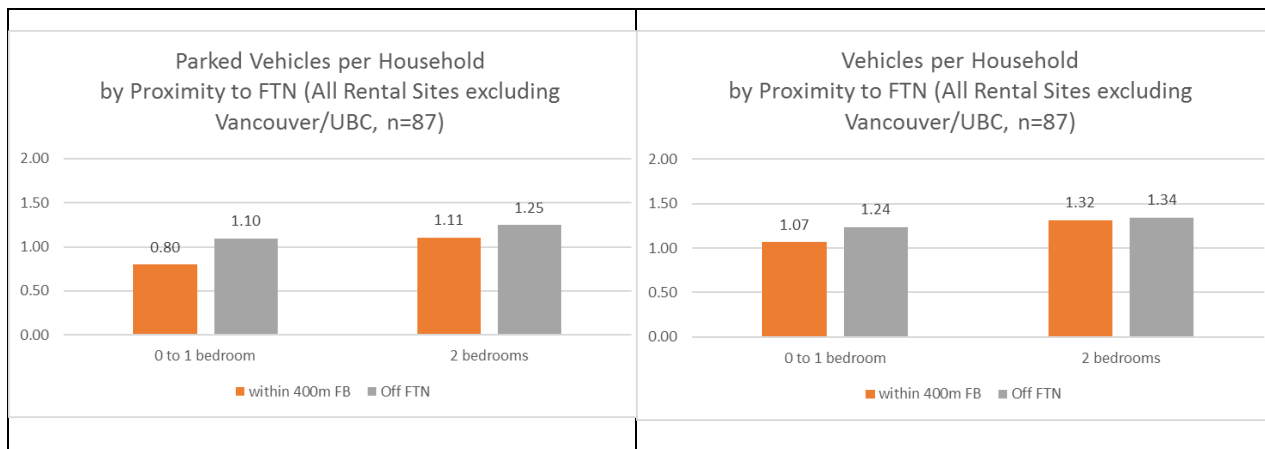


Figure 7. Parking and Vehicle Holdings for Rental Sites (Excluding Vancouver)

5.6 Relationship with Transit Boardings

Lower observed rates of resident parking utilization are generally correlated with higher rates of transit usage as measured by the number of bus boardings within 400 metres and number of SkyTrain and SeaBus boardings within 800 metres of the surveyed apartment sites⁵. The R² value of 0.25 suggests that 25 percent of the variance in transit boardings can be explained by apartment parking utilization (the correlation R is 0.50). The strength of the correlation is notable given that other land use and socio-economic variables have not been factored into this analysis.

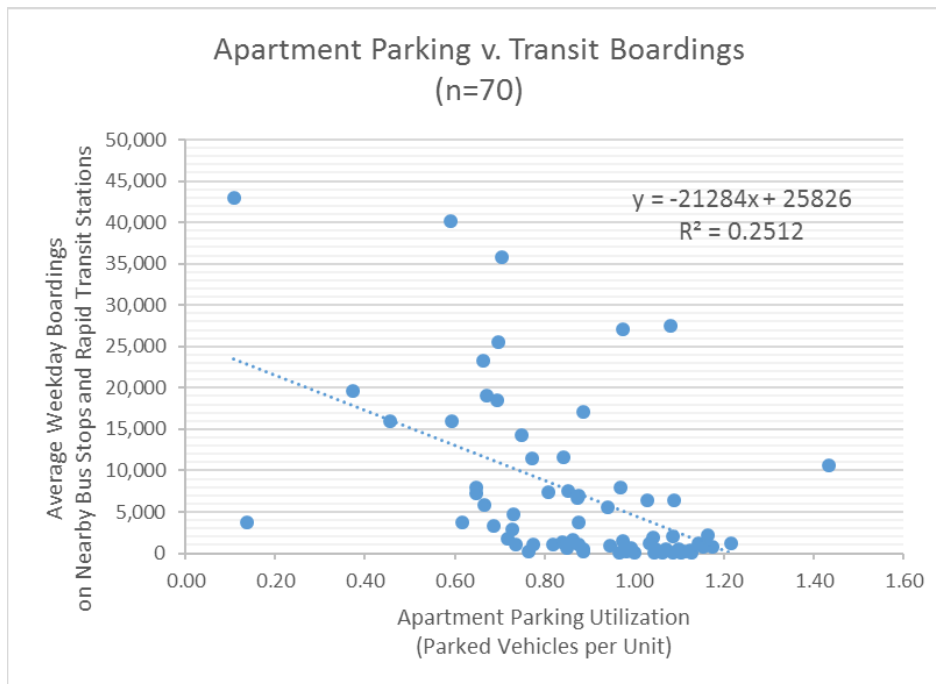


Figure 8. Apartment Parking Utilization and Nearby Transit Boardings

The ‘inverse’ relationship is much stronger for rental sites compared to strata sites (Figures 9 and 10). In this case, the correlation of apartment utilization and transit boardings for the rental sites is three times stronger than for the strata sites.⁶ The patterns complement the transit ridership analysis in the [Transit-Oriented Affordable Housing Study](#) which showed renters have higher transit usage rates than do homeowners even after accounting for household income.

To examine the rental sites further, the dataset was split into sites located outside of Vancouver and sites within Vancouver (Figures 11 and 12). While the sample sizes are small, three patterns can be observed. Transit ridership is measurably higher amongst the Vancouver sites and that reflects the greater availability of transit service within the city. Parking utilization is higher outside of Vancouver. And, the

⁵ Transit boardings data were not available for bus stops within 400 metres of two strata apartment sites in White Rock; there were no bus stops within 400 metres of one strata site in Richmond.

⁶ If the lone non-market rental site in Vancouver was removed from the dataset, then the R² value increased to 0.53, indicating that 53 percent of the variance in transit ridership relative to the trendline could be attributed to the parking utilization in the rental sites in the dataset.

charts suggest that the Vancouver sites are likely not inflating the strength of the correlation seen in Figure 9 (rental sites).

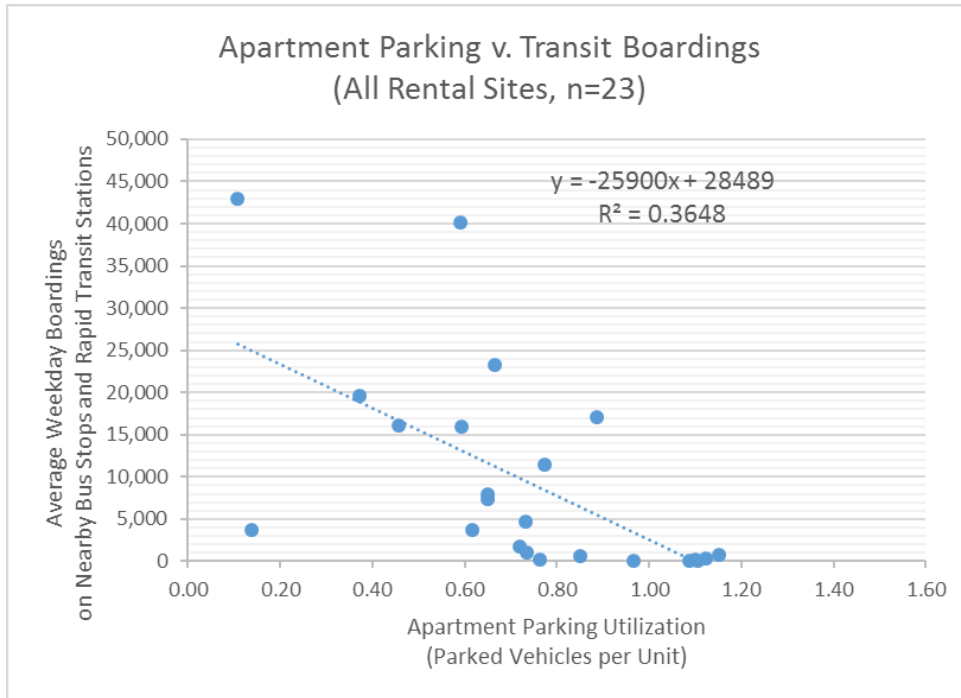


Figure 9. Apartment Parking Utilization for Rental Sites and Nearby Transit Boardings

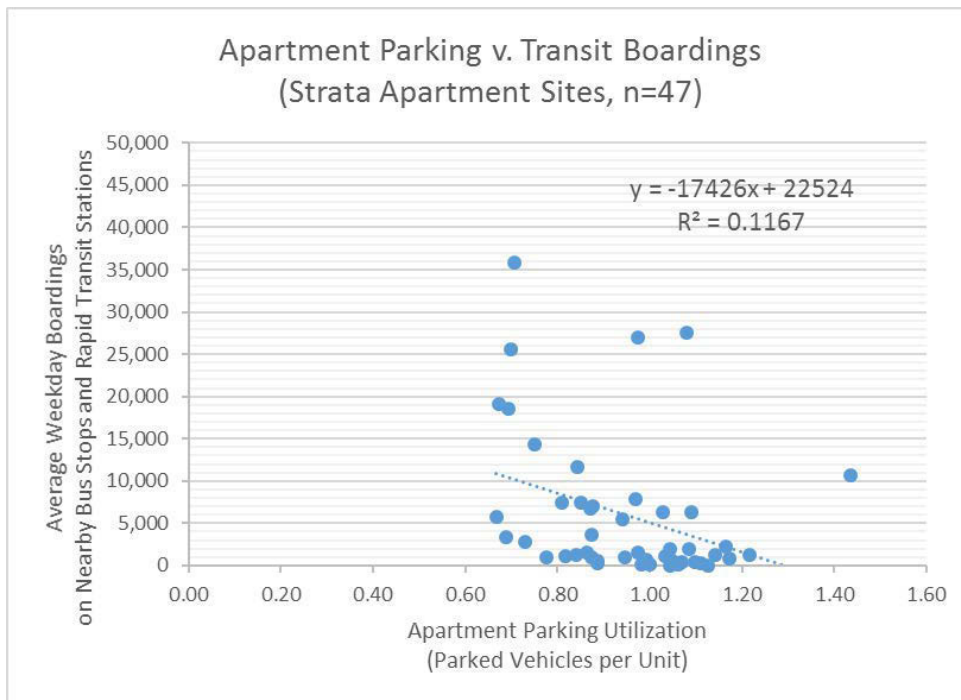


Figure 10. Apartment Parking Utilization for Strata Sites and Nearby Transit Boardings

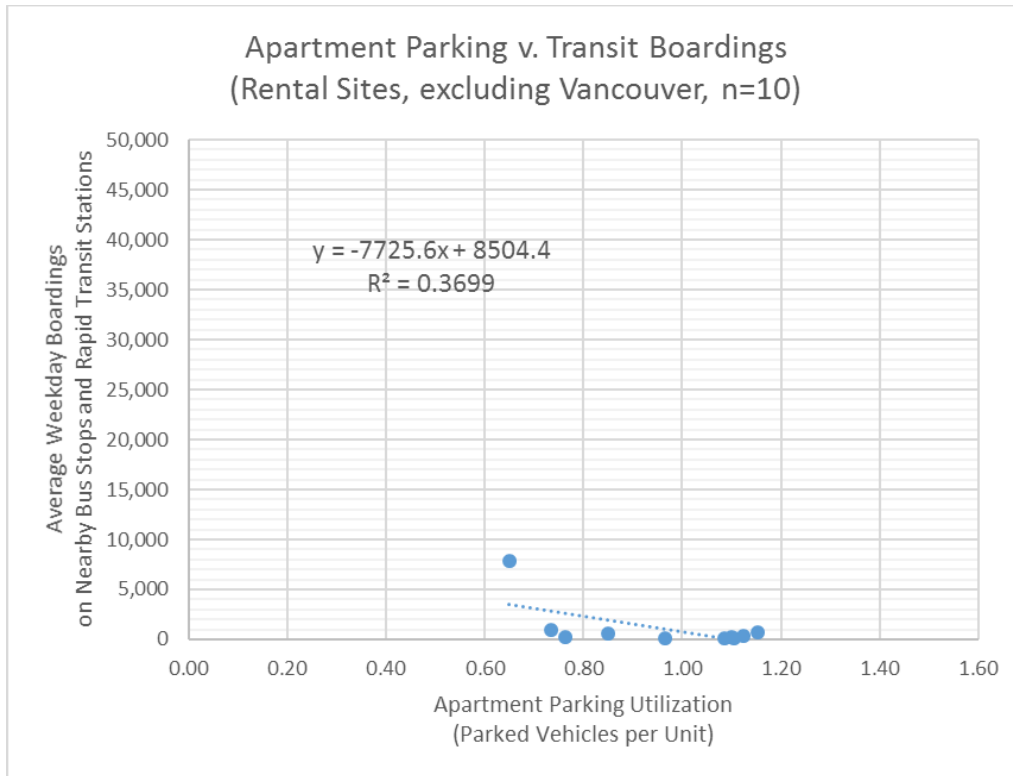


Figure 11. Apartment Parking for Rental Sites (Excluding Vancouver) and Nearby Transit Boardings



Figure 12. Apartment Parking Utilization for Rental Sites (Vancouver) and Nearby Transit Boardings

6. Street Parking Analysis

The analysis of the Street Parking Survey data was framed around the following questions:

- How does street parking utilization vary by time period?
- What is the relationship between street parking utilization and regulations?
- When do the surveyed street networks experience high street parking utilization?
- What are the potential factors affecting or associated with high street parking utilization?
- What is the relationship between street parking utilization and apartment parking utilization associated with the surveyed street networks?
- What is the relationship between rental apartment sites with optional resident parking and street parking utilization?

It should be noted that the analysis pertains to data collected on 65 street networks associated with the surveyed apartment sites. The patterns that emerged should not be extrapolated to neighbourhoods that are predominantly single-detached neighbourhoods, for example.

6.1 Street Parking Utilization Patterns

Overall, street parking utilization is higher on Saturday evenings than on weekday evenings. This finding is consistent with the expectation that during these time periods, there would typically be more visitors to apartment residents and nearby non-residential land uses. Street parking utilization on weekday late nights was the lowest at 52 percent. This finding is consistent with the expectation that visitors generally vacate these parking spaces to go home as late night approaches.

Table 32. Aggregate Street Parking Utilization by Time Period

Time Period	Total Street Parking Utilization
Weekday Evening	59%
Weekday Late Night	52%
Saturday Evening	65%

The effect of street parking regulations is seen when comparing utilization on weekday evenings and Saturday evenings⁷. Utilization increases the most for parking spaces with no restrictions (for the classification of street parking restrictions, please refer to Section 4.4, Table 5). The higher utilization on streets with restrictions is consistent with municipal practice to respond to relatively high observed parking demand with appropriate street parking restrictions to manage the demand.

Table 33. Aggregate Street Parking Utilization by Presence of Parking Restrictions and Time Period

Street Parking	Weekday Evening	Saturday Evening	Change
No restrictions	56%	63%	+7%
Restrictions	63%	67%	+4%

⁷ Because some street parking restrictions are not applicable in the late night period, only the weekday evening and Saturday evening periods were compared.

6.2 High Street Parking Utilization (85% or Higher)

An oft-cited threshold for determining whether street parking spaces are being used optimally is 85 percent. Donald Shoup, a planning professor at UCLA, popularized this threshold in his 2005 book, aptly named, “The High Cost of Free Parking”⁸. The premise is that parking, like any scarce resource, should be regulated and / or priced to ensure that 15 percent of the total parking spaces in a given area are available for parking at any given time. By controlling for the level of parking, excessive congestion and frustration (on the part of drivers looking for parking) can be mitigated.⁹ In the Study, street parking utilization was considered ‘high’ when utilization is at least 85 percent.

In each time period surveyed (i.e. weekday evening, weekday late night, and Saturday evening), the vast majority of street networks experienced less than 85 percent utilization. In fact, Saturday evening saw the largest number of high street parking networks (i.e. 11 out of 65 street networks), followed by the weekday evening (at 7), and weekday late night (at 2).

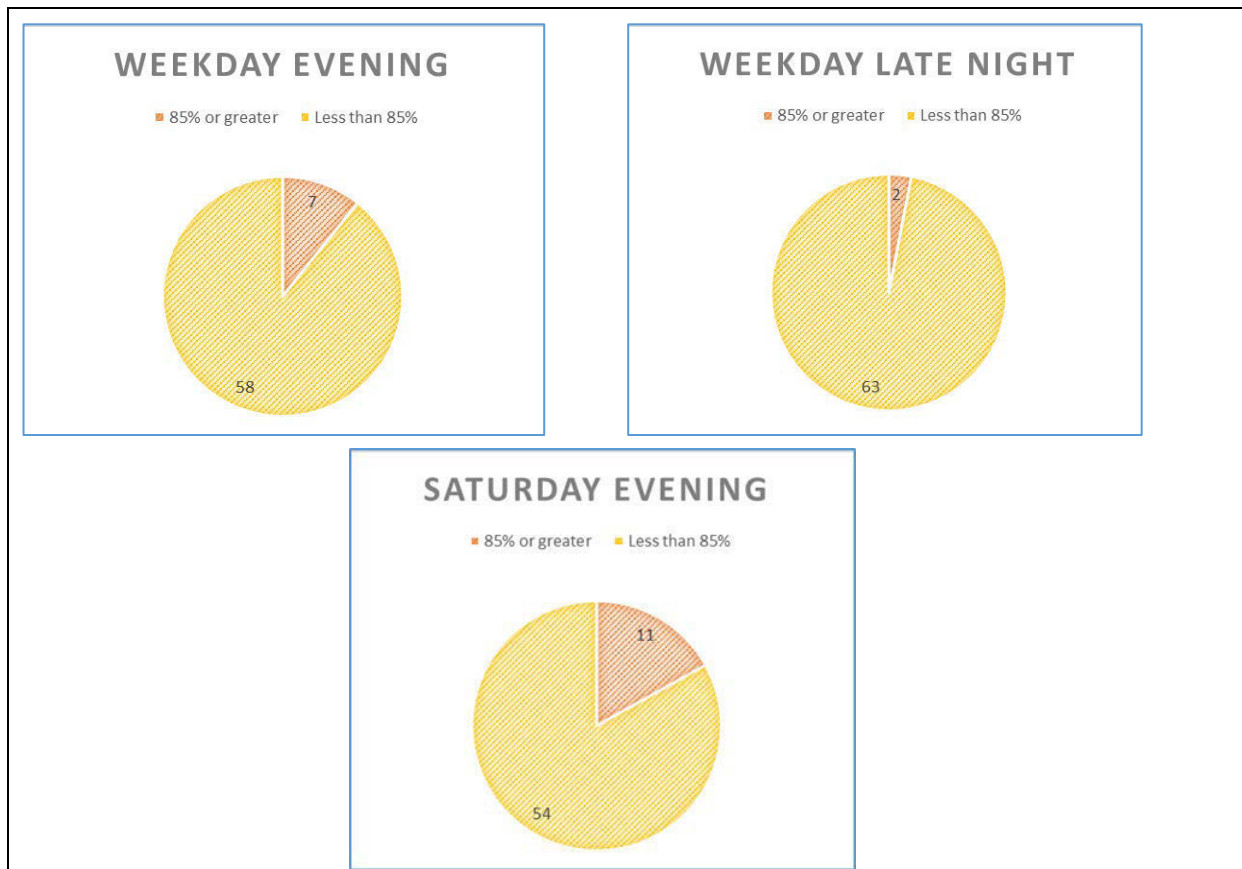


Figure 13. Occurrences and Degree of High Street Parking Utilization

⁸ Shoup, D. C., & American Planning Association. (2005). *The high cost of free parking*. Chicago: Planners Press, American Planning Association.

⁹ As another example of the use of the 85 percent threshold, the Port of Vancouver uses the threshold when monitoring container throughput and terminal capacity. When throughput exceeds 85 percent, then system efficiency deteriorates exponentially. When throughput approaches 85 percent, capacity expansion of a marine terminal may be warranted.

Looking deeper at the 12 street networks that exceeded 85 percent utilization once only, four street networks saw exceedances on Saturdays only, and one network saw an exceedance on a weekday evening only. Seven street networks experienced high parking utilization on two or three surveyed periods with six exceedances on a weekday evening, two exceedances on a weekday late night, and seven exceedances on a Saturday evening.

These 7 outliers, contrary to initial expectations, are located throughout the region. Based on a high-level qualitative analysis (using orthophotos) of the neighbourhood characteristics of these outliers, non-residential trip generators (e.g. restaurants, retail, parks) appear to be a common land use in these neighbourhoods; and, the overall supply of street parking may be another contributing factor. Further neighbourhood-scale analysis is warranted to develop a detailed understanding of the land use ‘drivers’ of street parking utilization in these affected areas, the origins of these vehicles, the trip purposes, and the parking duration.

Table 34. Street Networks Parking Exceedances

Exceedance Criteria (85% or higher)	Total Street Networks	Weekday Evening	Weekday Late Night	Saturday Evening
Exceedance in at least one surveyed time period	12	7	2	11
<ul style="list-style-type: none"> Exceedance in 2 or 3 surveyed time periods 	7	6	2	7
<ul style="list-style-type: none"> Exceedance in 1 surveyed time period only 	5	1	0	4
Less than 85% in all 3 surveyed time periods	53	58	63	54

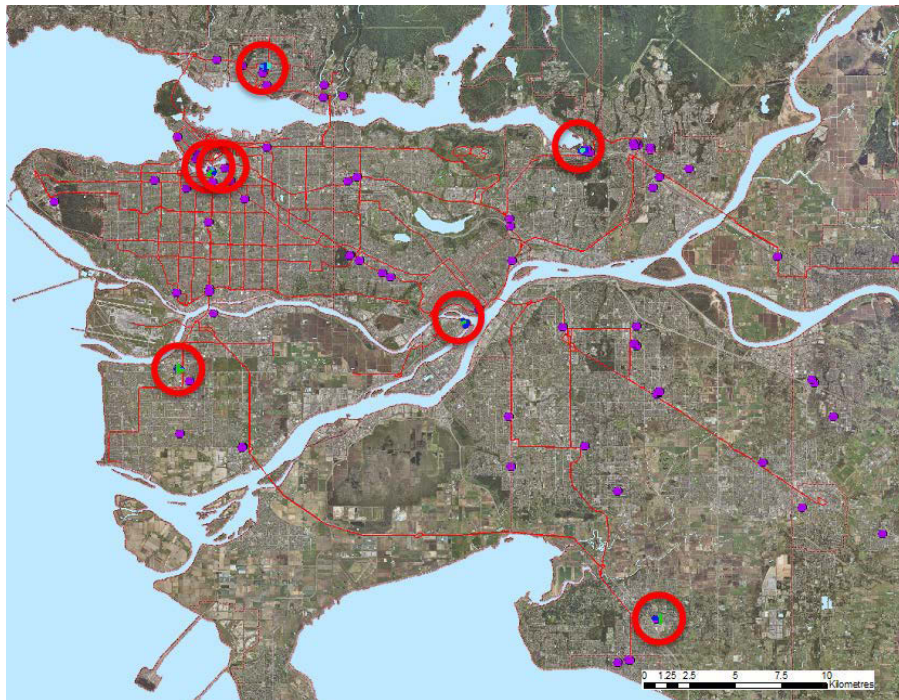


Figure 14. Street Networks with High Parking Use in Two or Three Surveyed Periods

6.3 Street Parking and Apartment Parking Utilization

The surveys did not present any clear patterns between street parking utilization and apartment parking utilization. The majority of surveyed street networks did not exceed 85 percent in any of the three surveyed time periods. For the associated apartment sites, the apartment parking utilization ranged from 39 percent to 84 percent. Five street networks exceeded 85 percent once only, and the associated apartment parking utilization ranged from 51 percent to 79 percent. Finally, seven street networks experienced persistently high utilization, and the associated apartment parking utilization ranged from 60 percent to 81 percent.

Table 35. Street Parking Utilization and Apartment Parking Utilization

Street Parking Utilization	Affected Street Networks	Apartment Parking Utilization Range
High Utilization 85% or higher in two or three surveyed periods	7	60% - 81%
Medium Utilization 85% or higher in one surveyed time period only	5	51% - 79%
Low Utilization Less than 85% in three surveyed time periods	53	39% - 84%

Three street networks had full restrictions; no parking was allowed and no parked vehicles were observed. The three associated apartment sites are located in Langley Township (strata), Port Coquitlam (strata), and Vancouver (market rental). The apartment parking utilization for these sites ranged from 73 percent to 80 percent, situating them towards the upper range of parking utilization relative to the apartment sites surveyed. Further research is warranted.

6.4 Apartment Residents and Visitors Parking on the Street

The potential impact of apartment buildings on nearby street parking is a frequently cited concern. The Household Survey provides some insights. Out of the 1,400 households that reported owning at least one vehicle, just under 300 households indicated that they usually parked on a nearby street, with the vast majority reporting they parked within a five-minute walk from their apartment building (it should be noted once again that the Household Survey does not purport to be a statistical representation of all apartment households in the region).

Table 36. Apartment Residents Parking on the Street

If you usually park on the street, typically how far do you park from your apartment building?	Number of Responses (%)
Less than a 5 minute walk	198 (13%)
Between 5 and 10 minute walk	73 (5%)
More than 10 minute walk	9 (<1%)
N/A	1,149 (81%)
Total	1,429

Apartment visitors typically encounter difficulty finding a parking space in the building’s parking facility on weekends, holidays, and special occasions (Figure 15). On these days, there is much more activity in terms of people visiting friends and family living in apartment buildings and people visiting in the vicinity of these apartment sites to patronize restaurants, parks, or other activities. As shown in Figure 16, some apartment visitors end up parking on a nearby street. Further work is warranted to survey apartment visitor parking utilization on weekends and holidays.

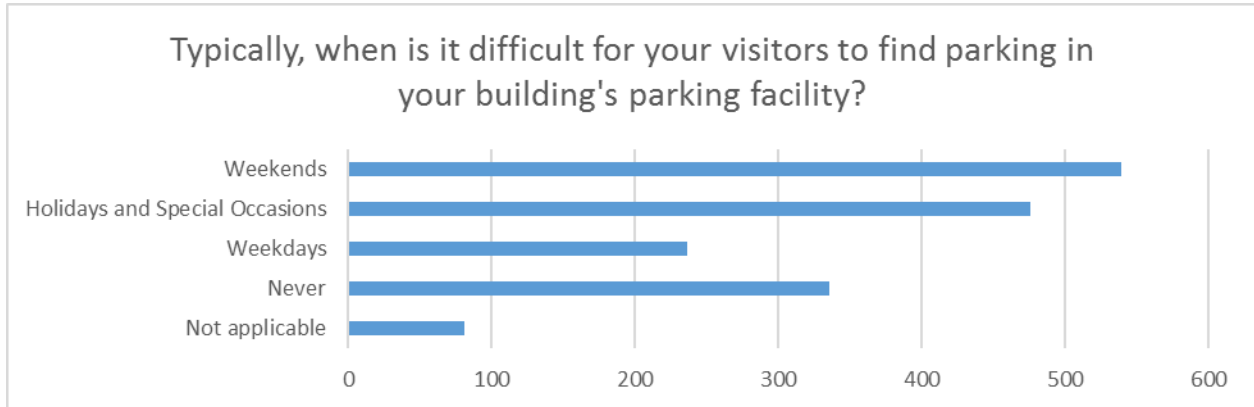


Figure 15. Difficulty Finding Visitor Parking in the Building’s Parking Facility¹⁰



Figure 16. Typical Parking Locations for Apartment Visitors

6.5 Street Parking and Optional Parking in Rental Apartment Sites

The findings of the 2012 Study, and the analysis from the 2018 Study, consistently showed that lower residential parking utilization and vehicle ownership are associated with rental apartment sites and smaller apartment unit sizes. However, an oft-cited interest is understanding the actual behaviour should a parking stall be available for an additional charge only. Do the residents end up parking on nearby streets?

¹⁰ The visitor parking questions were multiple-choice questions; respondents could select all the choices that applied.

First, looking at all rental apartment types in the Parking Facility Survey dataset, both residential parking supply and utilization are consistent with expectations. Where a parking stall is not included in the rent, the apartment sites on average have a lower parking supply ratio and utilization ratio. The pattern is the same for market rental sites only.

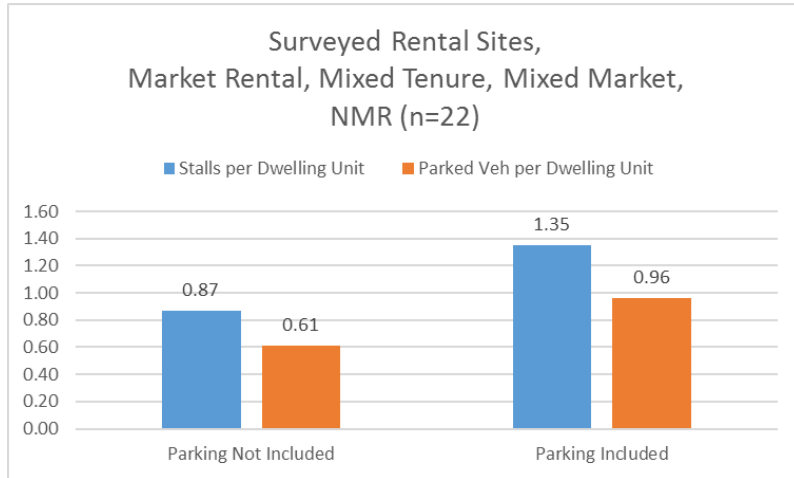


Figure 17. Comparison of Parking Supply and Utilization in Rental Sites

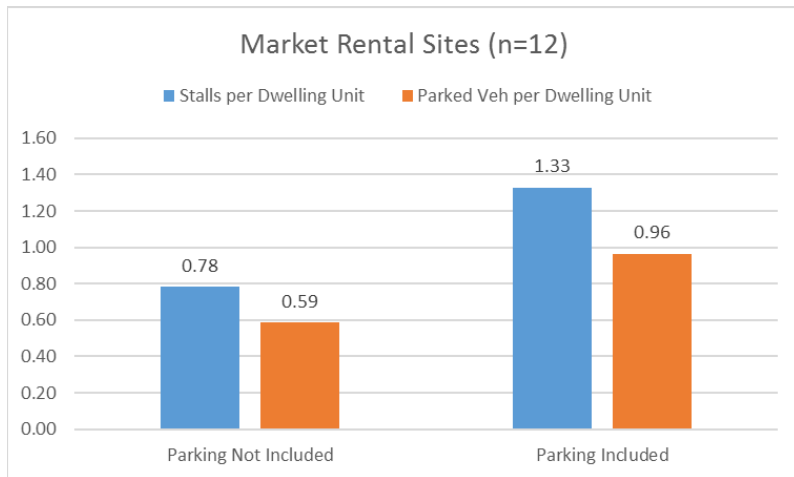


Figure 18. Comparison of Parking Supply and Utilization in Market Rental Sites

The evidence for resident spillover parking is mixed. For non-Vancouver street networks associated with rental sites where resident parking is not included in the rent, the street parking utilization is higher. Regardless, the street parking utilization on average does not approach 85 percent.

For Vancouver street networks associated with rental sites where resident parking is not included in the rent, the street parking utilization differential range is minimal. Interestingly, the relatively higher street parking utilization in Vancouver in the evening is consistent with the relatively higher number of non-residential land uses that generate visitor trips in the city relative to other suburban contexts.

Anecdotal observations from several peer municipal staff in Metro Vancouver suggest that there is a correlation between on-site visitor parking utilization and whether or not the nearby streets have regulations (i.e. where apartment sites tend to have lower facility utilization if the nearby streets are unregulated).

Table 37. Street Parking Utilization Associated with Rental Sites (Excluding Vancouver)

	Non-Vancouver street networks associated with rental apartments where...	
Time Period	Parking is NOT included in rent	Parking is included in rent
Weekday Evening	44%	41%
Weekday Late Night	49%	42%
Saturday Evening	48%	41%

Table 38. Street Parking Utilization Associated with Rental Sites (Vancouver Only)

	Vancouver street networks associated with rental apartments where...	
Time Period	Parking NOT included in rent	Parking included in rent
Weekday Evening	72%	73%
Weekday Late Night	55%	55%
Saturday Evening	68%	76%

The following tables show the same information but disaggregated by municipality and time period.

Table 39. Municipal-Level Street Parking Utilization Associated with Rental Sites (Weekday Evening)

All Rental Types	Weekday Evening, Street Parking Average Utilization	
Municipality (# street networks)	Parking NOT included in rent	Parking included in rent
Langley City (1)	-	52%
Langley Township (2)	-	46%
North Vancouver District (2)	51%	-
Port Coquitlam (1)	-	43%
Richmond (2)	26%	-
Surrey (1)	-	9%
Vancouver (13)	72%	73%
Total (22)	68%	52%

Table 40. Municipal-Level Street Parking Utilization Associated with Rental Sites (Weekday Late Night)

All Rental Types	Weekday Late Night, Street Parking Average Utilization	
Municipality (# street networks)	Parking NOT included in rent	Parking included in rent
Langley City (1)	-	65%
Langley Township (2)	-	41%
North Vancouver District (2)	61%	-
Port Coquitlam (1)	-	41%
Richmond (2)	18%	-
Surrey (1)	-	16%
Vancouver (13)	55%	55%
Total (22)	55%	47%

Table 41. Municipal-Level Street Parking Utilization Associated with Rental Sites (Saturday Evening)

All Rental Types	Saturday Evening, Street Parking Average Utilization	
Municipality (# street networks)	Parking NOT included in rent	Parking included in rent
Langley City (1)	-	67%
Langley Township (2)	-	40%
North Vancouver District (2)	59%	-
Port Coquitlam (1)	-	37%
Richmond (2)	21%	-
Surrey (1)	-	15%
Vancouver (13)	68%	76%
Total (22)	66%	53%

7. Other Analysis

The Household Survey provides additional information about issues pertinent to apartment residents, such as bicycle parking, interest in plug-in electric vehicles, and willingness to forgo a parking stall.

7.1 Bicycle Parking

For households with bicycles, about one-third do not use their building's secured bicycle parking facility. The rate of usage is consistent across different building ages. The top reasons reported were concerns about the potential for the bicycles to be stolen or damaged, that the bicycle parking facility was too crowded, and adverse perceptions of safety and convenience. These sentiments are consistent with those expressed in the 2012 Study.

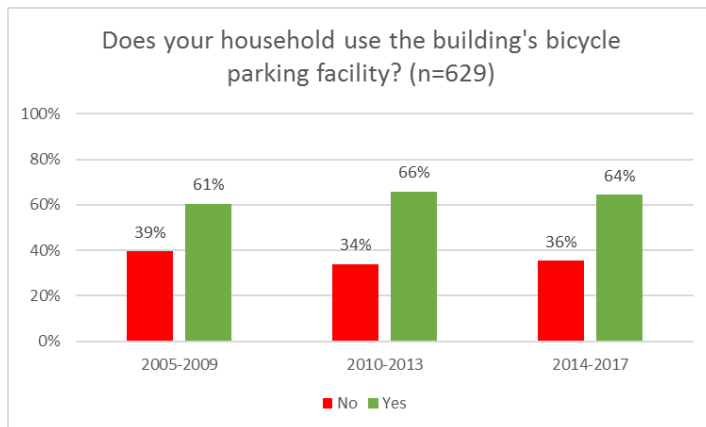


Figure 19. Use the Building's Bicycle Parking Facility by Year Built of Building

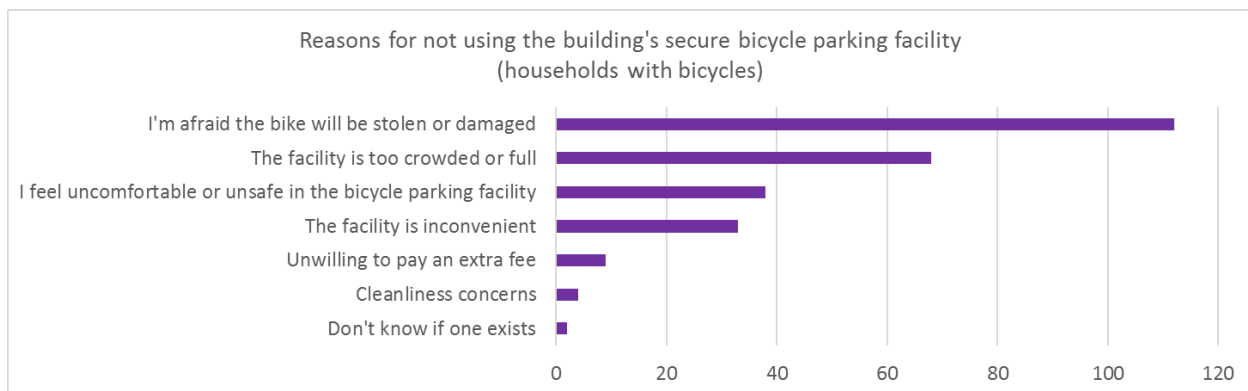


Figure 20. Reasons for Not Using the Building's Bicycle Parking Facility

One way of understanding and appreciating these sentiments is to consider a counterfactual scenario: i.e. what if one in three households in an apartment building chose not to park their car or truck in the building's parking facility for the same reasons. A scenario like this would never become a recurring problem, otherwise the entire apartment development industry would suffer public outrage. These design problems would be mitigated during the planning stage of an apartment project. From a policy and practice perspective, the same care and attention that is paid to accommodating cars and trucks could easily be applied to the provision of convenient, capacious, and secure bicycle parking facilities in new apartment developments.

7.2 Presence of Electric Vehicle Charging Infrastructure

The provision of public electric vehicle charging infrastructure around the region has been increasing steadily. Some municipalities in the region are now requiring new apartment projects to have the electrical infrastructure in place to facilitate installation of charging equipment by building occupants. Other apartment sites are retrofitting their buildings with appropriate electricity capacity and the parking stalls with charging equipment.

The Household Survey shows that the presence of electric vehicle charging appears to be associated with a slightly higher share of residents expressing a likelihood to consider buying a plug-in electric vehicle within the next five years.¹¹ This is potential evidence that is consistent with prior research indicating that investments or requirements aimed at increasing the availability of home charging infrastructure could have a greater impact on plug-in electric vehicle adoption than those that focus on public charging infrastructure.¹² It should be noted that the effect of self-selection cannot be ruled out – i.e. residents who may already have an interest in buying a plug-in electric vehicle may have chosen an apartment building because of the presence of charging infrastructure.

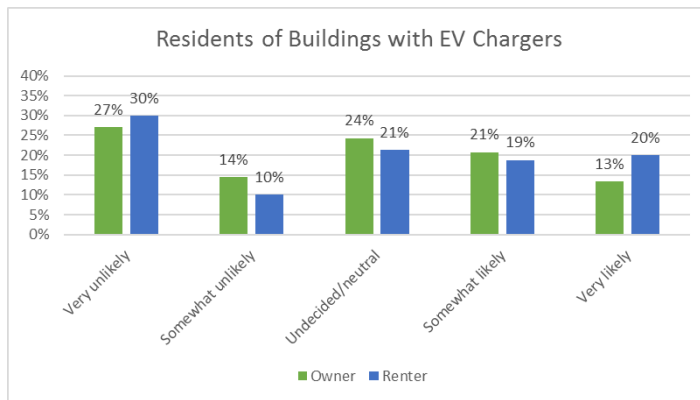


Figure 21. Likelihood to Considering Purchasing a Plug-In Electric Vehicle (Buildings with EV Chargers)

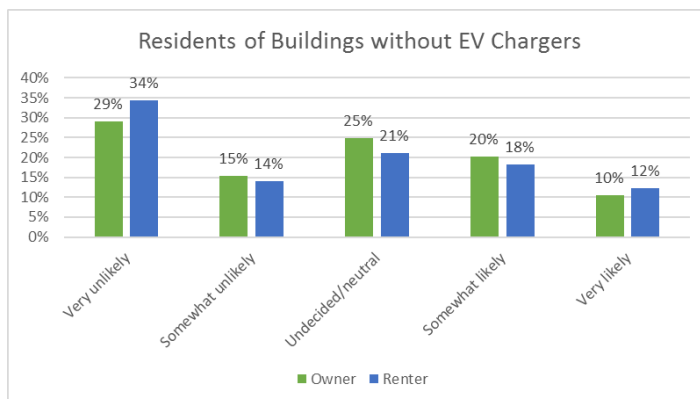


Figure 22. Likelihood to Considering Purchasing a Plug-In Electric Vehicle (Buildings without EV Chargers)

¹¹ Statistical significance was not evaluated.

¹² Bailey, J., Miele, A., & Axsen, J. (2015). Is awareness of public charging associated with consumer interest in plug-in electric vehicles? *Transportation Research Part D*. Volume 36: 1-9.

Retrieved from www.sciencedirect.com/science/article/pii/S1361920915000103

7.3 Willingness to Forego a Parking Stall

The Household Survey asks residents if provided the opportunity, would they have purchased or rented their current apartment without a parking stall, if it meant having a lower purchase price or rent. For zero vehicle households, 34 percent would not be willing to make that trade-off. A sizable portion (42 percent) was unsure and 25 percent responded in the positive. Compared to the 2012 Study, there is a decrease in the affirmative (from 36 percent) and increase in the uncertainty (from 30 percent) in the results of the 2018 Study.

For households having at least one vehicle, the response was consistent with the 2012 Study: i.e. a vast majority (83 percent) would not forego a parking stall.

Table 42. Strata Households and Willingness to Forego Parking Stalls

Household Type (Strata Sites)	Willingness to Forego Parking Stalls		
	No	Maybe/Unsure	Yes
Zero vehicles (n=65)	34%	42%	25%
1 or more vehicles (n=1,120)	83%	14%	3%

For households in other building tenures, the responses were consistent with expectation. Generally, a simple majority of zero vehicle households would be willing to forego a parking stall. For households with vehicles, a majority answered in the negative.

Table 43. Non-Strata Households and Willingness to Forego Parking Stalls

Household Type (Market Rental, Mixed Tenure, Mixed Rental, Non-Market Rental Sites)	Willingness to Forego Parking Stalls		
	No	Maybe/Unsure	Yes
Zero vehicles (n=68)	21%	25%	54%
1 or more vehicles (n=314)	68%	22%	9%

8. Looking Ahead

Through this Study, a number of opportunities have arisen to expand regional efforts to investigate parking-related matters. These and other opportunities can be expanded and refined. TransLink and Metro Vancouver staff can offer research support as appropriate.

8.1 Shared Use Parking Opportunities

While the opportunities to consolidate parking supplies may face near-term security, wayfinding, and legal difficulties, local governments can explore opportunities to encourage the shared-use of parking. Local governments can explore ways to help building managers make sharing easier and address security (like with third-party apps and security audits). Similarly, local governments, in collaboration with professional architecture, development, and parking associations, can explore how to design 'shared-use' access controls into future parking facilities. These access controls can enable nearby parking demands to be accommodated. The value proposition could be the potential revenue-generating potential for an apartment building's strata or property manager, or group of nearby apartment buildings, for example.

8.2 Mobility Trends, Consumer Preferences, and an Aging Population

Mobility trends can be difficult to forecast. At the top of many people's minds is autonomous vehicles and the implications for vehicle ownership, congestion, and parking demand. Since the impact of self-driving passenger and commercial vehicles may not be witnessed for a number of years, it is worth spending time to think about those transportation services and technology on the road today, such as car sharing and bike sharing. A better understanding of broader transportation demand management provisions on parking utilization and vehicle ownership can help improve or validate parking requirements in new residential or commercial developments (see, for example, the [2014 Metro Vancouver Car Share Study](#)).

Also, in the near term, the introduction of ride-hailing as a long-term transportation option will necessitate a different approach to allocating, regulating, and managing curb parking spaces, especially in busy corridors where a compendium of transportation modes may converge and create congestion and safety hotspots.

Consumer preference is equally difficult to forecast. Despite greater attention to fluctuating gasoline prices, larger passenger vehicles (i.e. sport utility vehicles and trucks) are increasingly popular with Canadian consumers. With the acceleration of electric vehicle production in recent years, including e-SUVs and up-and-coming e-trucks, the interest and preference for these larger passenger vehicles may increase. Further investigation towards larger parking standard dimensions for these vehicles may be warranted. Similarly, an aging population will necessitate reviews of how accessibility can be better accommodated in new and existing developments.

Local governments may need to investigate the street parking supply and management implications of not only larger passenger vehicles, but also large commercial vehicles owned or operated by apartment residents that cannot be readily accommodated in parking facilities.

Should vehicle ownership decline in absolute terms, the adaptive reuse of parking facilities could be an opportunity for local governments to explore. For example, the reallocation of space to expand and improve bicycle parking facilities can increase resident usage and satisfaction.

8.3 Monitoring and Managing Street Parking Supply and Utilization

The deployment of automated licence plate reading technology is an emerging tool to inventory street parking utilization. Several local governments in the region have deployed the technology. The data can be useful to support local government understanding of the magnitude of parking utilization, and the nature of utilization – whether vehicles are being parked for excessively long periods of time, and whether parked vehicles originate from a nearby home, within the neighbourhood, or elsewhere. The large-scale deployment of this technology may be warranted in order to create an inventory of on-street utilization, various parking regulations across the region, and origin-destination data of parked vehicles when cross-referenced with ICBC vehicle licensing data.

Associated with street parking monitoring is the management of the demand through dynamic pricing. Dynamic street parking pricing based on congestion levels or other criteria may be an opportunity to shape driving demand, but also to promote fair access to a scarce resource (parking) in popular destinations.

8.4 Commercial and Institutional Parking

Commercial and Institutional parking issues (i.e. hospital precincts, place of worship, etc.) remain a consistent interest of local governments. Given the significant trip-attraction that commercial and institutions (e.g. universities, hospitals) create between staff and visitors, it is appropriate to venture further into the utilization of these non-residential (but often mixed-use) land use contexts.

9. Conclusions

The findings of the 2018 Regional Parking Study largely corroborate those in the 2012 Apartment Parking Study, and includes new insights about street parking supply and utilization. Apartment parking supply remains excessive relative to observed utilization. Apartment buildings close to frequent transit, whether or bus or SkyTrain, appear to have lower parking supply and utilization. The lower rates of parking utilization are associated with higher transit use as measured by the number of transit boardings near the buildings, and this relationship is stronger for rental apartment sites.

Street parking is inherently complex. Some of the factors contributing to street parking use include visitors to non-residential land uses, such as restaurants, shops, and parks; apartment visitors on weekends, holidays, and special occasions; and some apartment residents parking on the street. Even with these factors, only a handful of surveyed street networks experienced persistently high street parking utilization (exceeding 85 percent utilization on two or three of the surveyed time periods).

Finally, the 2018 Regional Parking Study highlights a challenge that remains unchanged from the 2012 Study. The design and capacity of current bicycle parking facilities in apartment buildings are discouraging their use by many residents.

The findings reveal opportunities to 'right size' the amount of parking in apartment buildings for both motorized vehicles and bicycles, and highlight the opportunity to treat on-site and on-street parking as a system.

Looking ahead, practitioners and policymakers should be mindful of evolving mobility choices, technology, and consumer preferences, and the potential implications for vehicle ownership, parking demand, and parking requirements in apartment buildings, on streets, and in other building structures. TransLink and Metro Vancouver will continue to look for opportunities to undertake and support research related to parking in accordance with regional policies, and to support the efforts of member jurisdictions to coordinate land use and transportation decisions.

Appendix 1: Apartment Sites

Local Jurisdiction	Building Name	Building Address	Included in Parking Facility Survey	Included in Household Survey
Burnaby	Jewel I	6188 Wilson Ave	Yes	Yes
Burnaby	Jewel II	6168 Wilson Ave	Yes	Yes
Burnaby	MacPherson Walk North	5788 SIDLEY ST	Yes	Yes
Burnaby	Metroplace	6461 Telford Ave	Yes	Yes
Burnaby	Stratus at Solo District	2008 Rosser Ave	Yes	Yes
Burnaby	Tandem	4182 Dawson St	Yes	Yes
Burnaby	V2	5288 Beresford Street	Yes	Yes
Coquitlam	Celadon	3102 Windsor Gate	Yes	Yes
Coquitlam	Cora Towers - 555 Delestre Ave	555 Delestre Ave	Yes	Yes
Coquitlam	Cora Towers - 575 Delestre Ave	575 Delestre Ave	Yes	Yes
Coquitlam	Encore	511 Rochester Ave	Yes	Yes
Coquitlam	Grand Central 1	2978 Glen Drive	Yes	Yes
Coquitlam	Grand Central 2	2968 Glen Drive	Yes	Yes
Coquitlam	Grand Central 3	2975 Atlantic Ave	Yes	Yes
Coquitlam	M Three	1188 Pinetree Way	Yes	Yes
Coquitlam	Thomas House	1150 Kensal Place	Yes	Yes
Delta	Delta Rise	11967 80th Avenue	Yes	Yes
Langley City	Encore Apartments	19899 55A Ave	Yes	Yes
Langley Township	Hawthorne	8915 202 St	Yes	Yes
Langley Township	Lexington Court Apartments	4871 221 Street	Yes	Yes
Langley Township	The Village at Thunderbird Centre	20159 88 Ave	Yes	Yes
Langley Township	Yorkson Grove Rentals	8026 207 Street	Yes	Yes
Maple Ridge	Urbano - 12238 224 St	12238 224 St	Yes	Yes
Maple Ridge	Urbano - 12248 224 St	12248 224 St	Yes	Yes
New Westminster	Anvil	200 KEARY ST	Yes	Yes
New Westminster	Duo B	215 Brookes St	Yes	Yes
New Westminster	Marinus at Plaza 88	888 Carnarvon St	Yes	Yes
New Westminster	Azure 1 at Plaza 88	898 Carnarvon St	Yes	No
New Westminster	Azure 2 at Plaza 88	892 Carnarvon St	Yes	No
North Vancouver City	Mira in the Park	683 VICTORIA PK W	Yes	Yes
North Vancouver City	NOMA	728 West 14th Street	Yes	Yes
North Vancouver City	Orizon	221 3rd St E	Yes	Yes
North Vancouver City	Vista Place - 1301 Civic Place Mews	1301 Civic Place Mews Blvd	Yes	Yes
North Vancouver City	Vista Place - 1303 Civic Place Mews	1303 Civic Place Mews Blvd	Yes	Yes
North Vancouver City	Vista Place - 1305 Civic Place Mews	1305 Civic Place Mews Blvd	Yes	Yes
North Vancouver City	Vista Place - 1309 Civic Place Mews	1309 Civic Place Mews Blvd	Yes	Yes
North Vancouver City	Vista Place - 1313 Civic Place Mews	1313 Civic Place Mews Blvd	Yes	Yes
North Vancouver City	Vista Place - 1317 Civic Place Mews	1317 Civic Place Mews Blvd	Yes	Yes
North Vancouver City	Vista Place - 1320 Chesterfield	1320 CHESTERFIELD AVE	Yes	Yes
North Vancouver City	Vista Place - 1321 Civic Place Mews	1321 Civic Place Mews Blvd	Yes	Yes
North Vancouver City	Vista Place - 1322 Chesterfield	1322 CHESTERFIELD AVE	Yes	Yes
North Vancouver City	Vista Place - 1324 Chesterfield	1324 CHESTERFIELD AVE	Yes	Yes
North Vancouver City	Vista Place - 1325 Civic Place Mews	1325 Civic Place Mews Blvd	Yes	Yes
North Vancouver City	Vista Place - 1326 Chesterfield	1326 CHESTERFIELD AVE	Yes	Yes
North Vancouver City	Vista Place - 1328 Chesterfield	1328 CHESTERFIELD AVE	Yes	Yes

Local Jurisdiction	Building Name	Building Address	Included in Parking Facility Survey	Included in Household Survey
North Vancouver City	Vista Place - 1329 Civic Place Mews	1329 Civic Place Mews Blvd	Yes	Yes
North Vancouver City	Vista Place - 158 13th	158 13TH ST W	Yes	Yes
North Vancouver City	Vista Place - 160 13th	160 13th ST W	Yes	Yes
North Vancouver City	Vista Place - 162 13th	162 13th ST W	Yes	Yes
North Vancouver City	Vista Place - 164 13th	164 13th ST W	Yes	Yes
North Vancouver City	Vista Place - 166 13th	166 13th ST W	Yes	Yes
North Vancouver City	Vista Place - 168 13th	168 13th ST W	Yes	Yes
North Vancouver City	Vista Place - 170 13th	170 13th ST W	Yes	Yes
North Vancouver City	Vista Place - 172 13th	172 13th ST W	Yes	Yes
North Vancouver City	Vista Place - 174 13th	174 13th ST W	Yes	Yes
North Vancouver Dist	Beacon Tower, Seylynn Village	1550 Fern St	Yes	Yes
North Vancouver Dist	Lynn Creek Apartments	1561 Oxford Street	Yes	Yes
North Vancouver Dist	Northwoods Village	2151 Front Street	Yes	Yes
North Vancouver Dist	The Drive	1330 Marine Drive	Yes	Yes
Pitt Meadows	Keystone	12350 Harris Road	Yes	Yes
Port Coquitlam	Meridian Village	3156 Coast Meridian	Yes	Yes
Port Coquitlam	Shaughnessy East	2478 Shaughnessy St	Yes	Yes
Port Coquitlam	Shaughnessy West	2330 Wilson Ave	Yes	Yes
Port Coquitlam	The Shaughnessy	2789 Shaughnessy Street	Yes	Yes
Port Moody	Inglenook	801 Klahanie Drive	Yes	Yes
Port Moody	The Residences at Suter Brook	301 Capilano Rd	Yes	Yes
Port Moody	Tides - 300 Klahanie	300 KLAHANIE DR	Yes	Yes
Port Moody	Tides - 400 Klahanie	400 KLAHANIE DR	Yes	Yes
Port Moody	Tides - 500 Klahanie	500 KLAHANIE DR	Yes	Yes
Richmond	Azalea at the Gardens	10880 No. 5 Rd	Yes	Yes
Richmond	Camellia at the Gardens	10820 No. 5 Road	Yes	Yes
Richmond	Circa Residences	10020 Dunoon Dr	Yes	Yes
Richmond	Magnolia at the Gardens	12339 Steveston Hwy	Yes	Yes
Richmond	Modena - 6600 Cooney	6600 COONEY RD	Yes	Yes
Richmond	Modena - 6611 Eckersley	6611 ECKERSLEY RD	Yes	Yes
Richmond	Parc Riviera - 10033 River Drive	10033 River Drive	Yes	No
Richmond	Parc Riviera - 10155 River Drive	10155 River Drive	Yes	No
Richmond	Parc Riviera - 10119/10133 River Dr	10119/10133 River Drive	Yes	No
Richmond	Parc Riviera - 10011 River Drive	10011 River Drive	Yes	Yes
Richmond	Quintet Tower A	7988 Ackroyd Rd	Yes	No
Richmond	Quintet Tower B	7979 Firbridge Way	Yes	No
Richmond	Quintet Tower C	7733 Firbridge Way	Yes	No
Richmond	Quintet Tower D	7788 Ackroyd Rd	Yes	Yes
Richmond	Quintet Tower E	7888 Ackroyd Rd	Yes	No
Surrey	Ascend	15956 86A Ave	Yes	Yes
Surrey	Calera - 18818 68th	18818 68th Ave	Yes	Yes
Surrey	Calera - 6758 188th	6758 188 St	Yes	Yes
Surrey	Compass - 6815 188 St	6815 188 Street	Yes	Yes
Surrey	Compass - 18755 68 Ave	18755 68 Avenue	Yes	Yes
Surrey	D'Cor B	10455 University Dr	Yes	Yes
Surrey	G3 Residences - 10455 154 St	10455 154 St	Yes	Yes
Surrey	G3 Residences - 10477 154 St	10477 154 St	Yes	Yes

Local Jurisdiction	Building Name	Building Address	Included in Parking Facility Survey	Included in Household Survey
Surrey	G3 Residences - 15388 105 Ave	15388 105 Ave	Yes	Yes
Surrey	Greenwood Townhouses	7247 140 St	Yes	Yes
Surrey	Kingston Gardens I	15243 99 Ave	Yes	Yes
Surrey	Kingston Gardens II	15315 99 Ave	Yes	Yes
Surrey	Kingston Gardens III	9977 154 St	Yes	Yes
Surrey	Kingston Gardens IV	15328 100 Ave	Yes	Yes
Surrey	Lumina	14885 60 Ave	Yes	Yes
Surrey	Monterosso	8695 160 St	Yes	Yes
Surrey	Park Central	14333 104 Ave	Yes	Yes
Surrey	Salus - 6628 120 St	6628 120 Street	Yes	Yes
Surrey	Salus - 6688 120 St	6688 120 Street	Yes	Yes
Surrey	Summit House, Morgan Crossing	15850 26 Ave	Yes	Yes
Surrey	Vernazza	8717 160 St	Yes	Yes
UBC	Keenleyside	5788 Birney Ave	Yes	Yes
Vancouver	600 Drake	600 Drake Street	Yes	Yes
Vancouver	Alexandra	1221 Bidwell St	Yes	Yes
Vancouver	Aria	488 41st Avenue	Yes	Yes
Vancouver	Boheme - 1588 Hastings	1588 Hastings St E	Yes	Yes
Vancouver	Boheme - 411 Woodland	411 Woodland Drive	Yes	Yes
Vancouver	Boheme - 413 Woodland	413 Woodland Drive	Yes	Yes
Vancouver	Boheme - 415 Woodland	415 Woodland Drive	Yes	Yes
Vancouver	Boheme - 417 Woodland	417 Woodland Drive	Yes	Yes
Vancouver	Boheme - 419 Woodland	419 Woodland Drive	Yes	Yes
Vancouver	Boheme - 421 Woodland	421 Woodland Drive	Yes	Yes
Vancouver	Boheme - 423 Woodland	423 Woodland Drive	Yes	Yes
Vancouver	Boheme - 425 Woodland	425 Woodland Drive	Yes	Yes
Vancouver	Bosa False Creek	180 Switchmen Street	Yes	Yes
Vancouver	Compass	123 West 1st Avenue	Yes	Yes
Vancouver	Empire at QE - 4539 Cambie	4539 Cambie St	Yes	Yes
Vancouver	Empire at QE - 505 30th Ave	505 30th Ave W	Yes	Yes
Vancouver	Empire at QE - 508 29th Ave	508 29th Ave W	Yes	No
Vancouver	False Creek Residences	75 West 1st Ave	Yes	Yes
Vancouver	Granville & 70th - 8488 Cornish	8488 Cornish St	Yes	Yes
Vancouver	Granville & 70th - 8555 Granville	8555 Granville St	Yes	Yes
Vancouver	Granville & 70th - 8588 Cornish	8588 Cornish St	Yes	Yes
Vancouver	Lido	110 Switchmen St	Yes	Yes
Vancouver	Linden Tree Place	2304 8 Avenue West	Yes	Yes
Vancouver	Marine Gateway - 488 Marine Dr	488 Marine Dr SW	Yes	Yes
Vancouver	Marine Gateway - 489 Interurban	489 Interurban Way	Yes	Yes
Vancouver	MC2 Apartments - 8103 Nunavut Ln	8103 Nunavut Lane	Yes	Yes
Vancouver	MC2 Apartments - 8105 Nunavut Ln	8105 Nunavut Lane	Yes	Yes
Vancouver	MC2 Apartments - 8107 Nunavut Ln	8107 Nunavut Lane	Yes	Yes
Vancouver	MC2 Apartments - 8109 Nunavut Ln	8109 Nunavut Lane	Yes	Yes
Vancouver	MC2 Apartments - 8111 Nunavut Ln	8111 Nunavut Lane	Yes	Yes
Vancouver	MC2 Apartments - 8115 Nunavut Ln	8115 Nunavut Lane	Yes	Yes
Vancouver	MC2 Apartments - 8117 Nunavut Ln	8117 Nunavut Lane	Yes	Yes
Vancouver	MC2 Apartments - 8119 Nunavut Ln	8119 Nunavut Lane	Yes	Yes

Local Jurisdiction	Building Name	Building Address	Included in Parking Facility Survey	Included in Household Survey
Vancouver	MC2 Apartments	8101 Nunavut Lane	Yes	Yes
Vancouver	MC2 South	8131 Nunavut Lane	Yes	Yes
Vancouver	Mondella	688 17th Ave E	No	Yes
Vancouver	Parcel 5	122 Walter Hardwick Ave	No	Yes
Vancouver	Parcel 9	80 Walter Hardwick Ave	No	Yes
Vancouver	Residences on Seventh	228 East 7th Avenue	Yes	Yes
Vancouver	Sails	1661 Ontario St	Yes	Yes
Vancouver	Strathearn Court - 1873 Spyglass	1873 Spyglass Place	Yes	Yes
Vancouver	Strathearn Court - 1893 Spyglass	1893 Spyglass Place	Yes	Yes
Vancouver	The Rise	485 8th Avenue West	Yes	Yes
Vancouver	The Skyline	1305 West 12th Avenue	Yes	Yes
Vancouver	The Standard	1142 Granville Street	Yes	Yes
White Rock	Miramar Tower A	15152 Russell Ave	Yes	Yes
White Rock	Miramar Tower B	1473 Johnston Road	Yes	Yes
White Rock	Royce	14855 Thrift Ave	Yes	Yes

Appendix 2: Household Survey Form

Metro Vancouver 2017 Regional Parking Study

Metro Vancouver (the Metro Vancouver Regional District) in partnership with TransLink are conducting a study of multi-unit residential buildings regarding vehicle and bike parking usage. Your household has been selected to be part of this important study. The study will provide

information to municipalities and developers on the appropriate amount of vehicle and bike parking supply for new multi-unit residential developments. We appreciate your participation, and all responses will be kept confidential. **Please complete by January 31, 2018.**

We recommend completing this questionnaire online at: www.MVParking.ca/survey

If you wish to complete the paper questionnaire, please mail the questionnaire to:

Acuere Consulting
Suite 301 – 4475 Wayburne Drive
Burnaby, BC, V5G 4X4
Attention: "Parking Study"



metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION



i. **ACCESS CODE** (see introductory letter)

-

ii. **Building Name & Address:** _____

Unit #: _____

RESIDENT VEHICLE PARKING

1. **How many vehicles does your household own or lease (not including car share program)?**

(Please include all cars, vans or light trucks that are brought home and parked overnight, but not motorcycles, scooters, or bicycles.)

2. **Where do you usually park your vehicle(s) overnight? Please note number of vehicles:**

Vehicles in my building's parking facility (parking lot or garage).

Vehicles in a nearby off-street parking facility (parking lot or garage).

Number of vehicles I park on the street near my building.

If you usually park on the street, typically how far do you park from your building?

Less than a
5 min walk

Between
5 and 10 min walk

More than
10 min walk

3. **If you OWN your apartment/townhouse, how many of your parking space(s) in the building are:**

Included in the unit
purchase price

Purchased for an extra fee
Purchase cost? \$ _____

Rented for an
extra fee
Cost per month? \$ _____

I don't have any parking

4. **If you RENT your apartment/townhouse, how many of your parking space(s) in the building are:**

Included in
the unit rent

Rented for an extra fee.
Cost per month? \$ _____

I don't have any parking

5. **How many of your parking spaces in the building do you rent out to other people?**

How much do you charge per month? \$ _____

6. **If provided the opportunity, would you have purchased/rented your current apartment/townhouse without a parking stall, if it meant having a lower purchase/rental price for your unit?**

Yes Maybe/unsure No

Page 1 of 2

Metro Vancouver Regional Parking Study – continued

VISITOR VEHICLE PARKING

7. A. Typically, **where** do your visitors park?
(Select all that apply)

- In my building's designated visitor parking area
- In one of the stalls I own/rent in my building
- On the street near building (paid)
- On the street near building (free)
- Nearby parking facility
- Not applicable – I don't have visitors who need to park at my building (skip to question 8)

B. Typically, **when is it difficult** for your visitors to find parking in your building's parking facility? (Check all that apply)

- Weekdays
- Weekends
- Holidays and Special Occasions
- Never
- Not applicable

BICYCLE PARKING

8. Does your building have secure bike parking? (ie: bike racks in a locked room/cage or bike racks in a designated parking stall)

- Yes No I don't know

9. A. How many bicycles does your household own? _____ If you do not have any bicycles skip to question 10.

B. Does your household use the building's bicycle parking facility?

- | | |
|--|--|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No (select all that apply) |
| <input type="checkbox"/> Because it's a good facility | <input type="checkbox"/> It's too crowded or full |
| <input type="checkbox"/> Because the strata requires me to | <input type="checkbox"/> I'm afraid the bike will be stolen or damaged |
| | <input type="checkbox"/> I feel uncomfortable or unsafe in the build's bike parking facility |
| | <input type="checkbox"/> It's inconvenient |
| | <input type="checkbox"/> Other, please specify <input type="text"/> |

HOUSEHOLD INFORMATION

10. How many bedrooms are in your apartment/townhouse?

- 0 (bachelor/studio) 1 2 3 4 or more

11. How large is your apartment/townhouse (excluding balcony/patio)?

- | | | |
|--|--|---|
| <input type="checkbox"/> Under 400 sq ft | <input type="checkbox"/> 700-799 sq ft | <input type="checkbox"/> 1,100-1,199 sq ft |
| <input type="checkbox"/> 400-499 sq ft | <input type="checkbox"/> 800-899 sq ft | <input type="checkbox"/> 1,200-1,299 sq ft |
| <input type="checkbox"/> 500-599 sq ft | <input type="checkbox"/> 900-999 sq ft | <input type="checkbox"/> 1,300 and higher sq ft |
| <input type="checkbox"/> 600-699 sq ft | <input type="checkbox"/> 1,000-1,099 sq ft | <input type="checkbox"/> Unsure |

12. How many people in your household are within the following groups (note numbers)?

- Ages 0-5 years _____ Ages 6-18 _____ Ages 19-64 _____ Ages 65+ _____

13. Metro Vancouver and TransLink are conducting research to better understand the demand for electric vehicles. How likely are you to consider buying a plug-in electric vehicle within the next five years?

- Very Unlikely Somewhat unlikely Undecided/neutral Somewhat likely Very likely

14. Any additional comments:

THANK YOU FOR COMPLETING THE QUESTIONNAIRE!

Page 2 of 2

Appendix 3: Current Municipal Apartment Parking Requirements

Updated September 2018

Municipality	Notes	Residential Parking Requirements (Stalls per Dwelling Unit)					Visitor	Link
		OBR	1BR	2BR	3+BR			
Burnaby	Apartments in C8 and C8A Districts (Urban Village Commercial)	1.0					N/A	Bylaw Page 4
	Apartments - Multi family dwellings w/ access via common corridor	1.6					0.25	
	Apartments in RM2s, RM4s, RM5s (Multiple Family Residential Districts)	1.6. Potentially reduced down to 1.1 after application of density bonus					0.25	
	Apartments not for profit housing or gov't assistance	1.5					0.2	
Coquitlam	Apartments (Except purpose-built rental)	1.0 (studio)	1.0	1.5	1.5		0.2	Bylaw Page 7-6
	Apartments with Evergreen Line Core and Shoulder Station Areas	1.0 (studio)	1.0	1.35	1.35			
	0.5 per unit containing a lock-off unit							
	Apartments in non-market housing and below-market rental	1.0						
Delta	Apartments	1.5					0.2	Bylaw Page 306
Langley City	Multi-Unit Residential RM1	N/A	1.5	2.0			0.2	Bylaw Page 21 of Part 1 Admin and Enforcement (page 41/211)
	Multi-Unit Residential RM2	1.2		1.4	2.0			
	Multi-Unit Residential RM3			1.3				
	Multi-Unit Residential C1			1.2				
Langley Township	Apartments	1.0	1.5				10% of total parking	Bylaw Page 100-28
Maple Ridge	Multi-Unit Residential RM1	2.0					0.2	Bylaw Page 7
	Multi-Unit Residential RM2 and RM3	1.5						
	Multi-Unit Residential RM4 and RM5	2.0						

Municipality	Notes	Residential Parking Requirements (Stalls per Dwelling Unit)					Visitor	Link
		OBR	1BR	2BR	3+BR			
New Westminster	Multi-Unit buildings	1.0	1.2	1.4	1.5	0.2	Bylaw Page 150-1	
	Multi-Unit buildings - Downtown	1.0	1.0	1.35		0.1		
	Secured rental Residential Units within 400 m of SkyTrain Stations or FTN	1.0						
	Secured rental Residential Units - Downtown	0.6		0.8				
North Vancouver City	Residential One and Two –Unit Use	1 per dwelling unit				0.1 when >10 spaces are required	Bylaw Page 149/1125 Section 908	
	Rental Apartment	0.6						
North Vancouver District	Apartments	1 stall per unit, plus 1 stall per 100m ² of gross area, to maximum parking minimum of 2.0 stalls				Base includes 0.25	Bylaw Page 66	
Pitt Meadows	Apartments not in TC, MC	1.3		1.5		0.2	Bylaw Page 7-1	
	Apartments in TC, MC	1.2						
Port Coquitlam	Apartment Less than 6 storeys	1.0	1.3	1.5	2.0	0.2	Bylaw Page 2	
	Apartment greater than 6 storeys	1.0				0.1		
Port Moody	Apartment Market Ownership	1.0		1.5		0.2 for the first 100 units 0.1 for each additional unit	Bylaw Page 36, 38	
	Market Rental	1.1						
	Below Market Rental	0.9						0.1
	TOD Areas (Moody Centre and Inlet Centre)	Market Ownership	1.0		1.35			0.2 for the first 100 units 0.1 for each additional unit
		Market Rental	1.0					
Below Market Rental	0.8				0.1			
Richmond	Apartment Housing	1.5				0.2	Bylaw Page 7-5, 7-14	
	Affordable Housing Unit	1.0						
	Apartment Housing – City Centre	Zone 1	1.0					
		Zone 2	1.2					
		Zone 3	1.4					
Affordable Housing Unit – City Centre	0.9							

Municipality	Notes	Residential Parking Requirements (Stalls per Dwelling Unit)					Link
		OBR	1BR	2BR	3+BR	Visitor	
Surrey	City Centre: Multi-Unit Residential Dwelling – Ground Oriented	1.6				0.16	Bylaw Page 5.9
	City Centre: Multi-Unit Residential Dwelling – Non Ground Oriented	0.9 minimum 1.1 maximum				0.1	
	Multi-Unit Residential Dwelling – Ground Oriented	2.0				0.2	
	Multi-Unit Residential Dwelling – Non Ground Oriented	1.3		1.5		0.2	Bylaw Page 5.9
Vancouver	Downtown	0.0 [Except in the West end and Robson North Permit Area (WERNPA)] WERNPA sub-area of, parking for multiple dwellings adheres to City-wide rates.				The lesser of: a) 5% of total residential spaces; and b) 0.05 spaces per dwelling unit, to a maximum of 0.1	Bylaw 4.3.2 Map 2B 4.8.4 4.3.4
	City-Wide - Strata	0.5 / unit with less than 50m ² GFA 0.6 / unit with greater than 50m ² plus 1 for each additional 200m ² GFA No more than 1.5 per unit with greater than 180m ²				0.05 per unit to a max of 0.1	Bylaw 4.2.1.13 4.1.16
	City-Wide – Secured Market Rental	Min per 125m ² GFA Max space equal to the total number of min number of spaces plus 0.5				0.05 to a max of 0.1	Bylaw 4.5B 4.1.16
West Vancouver	Apartment	A minimum of the greater of 1/unit, or 1 for every 84 sq metres GFA				N/A	Bylaw Page 300-4
White Rock	Apartment	1.2				0.3	Bylaw Page 23
UBC Campus	Market Housing	A maximum of the lesser of 1.0 per 70m ² of building areas of 1.8 spaces per dwelling unit				0.1	Development Handbook Page 38
UBC Endowment Lands	Apartment	1.6				0.25	Schedule

Appendix 4: Key Informant Interviews on Treating On-Site and Street Parking as a System

Project staff interviewed municipal staff to gather current insights, experience, and tactics to manage and monitor street parking in more systematic ways¹³.

It can be difficult finding the right balance between on-site facility and on-street parking for both residents and visitors for apartment buildings and adjacent land uses. Surrounding land uses, such as commercial retail, can generate trips that increase the demand for on-street visitor parking. This can often be in conflict with the demand for residential visitor parking when on-site visitor parking is limited.

Coordinated parking strategies can help mitigate negative outcomes of limited parking supplies through the appropriate use of on-street parking restrictions. By considering both on-site and nearby on-street residential and visitor parking as a system, parking supplies can be controlled for the net benefit of an area and help alleviate the difficulties of finding parking.

Nearby Street Parking

The use of parking policies and regulation, such as pricing, can be adjusted to ensure that there is street curb parking available for businesses, customers and residents in popular areas where current parking utilization is high during most days and times of the week.

Anecdotal observations from several peer municipal staff in Metro Vancouver suggest that there is a correlation between on-site visitor parking utilization and whether or not the nearby streets have regulations (i.e. where apartment sites tend to have lower facility utilization if the nearby streets are unregulated).

By regulating street parking to restrict nearby street parking through a combination of pricing, time limits, on-site parking facility utilization of both residential and visitor parking may increase. Similarly, parking regulations that allow for shared-use of on-street visitor and residential spaces, particularly in during periods when residential spaces are underutilized, can support apartment visitors as well as nearby businesses customers to park in residential permit spaces.

Consolidated Parking

The consistent observation of parking supplies exceeding demand by a wide margin illustrates that many apartment buildings across the region have abundant unused supplies, sometimes in areas experiencing consistently high utilization of street parking. By considering ways to consolidate parking by opening up the unused parking spaces for nearby business and commercial uses can free up space on the street. Cities can also explore with developers if required parking ratios can be met through shared-use parking supplies with adjacent land uses and their existing or new development's parking supply.

Nearby Frequent Transit Services

Across the region, a trends that has continued since the 2012 Apartment Parking Study is the consistent observation that not only does parking supply in apartments exceed parking demand by a wide margin, but that this over supply is further pronounced for locations close to transit than further abroad.

¹³ Interviews were conducted in January/February 2019 with staff at Coquitlam, New Westminster, City of North Vancouver, Surrey, and Vancouver.

While many municipal parking policies consider possible reduced residential parking requirements based on proximity to transit, they are currently focused on new apartment developments close to existing and new SkyTrain stations. This study suggests that apartment parking ratios can take into account a development's proximity to frequent bus routes.

Parking Monitoring and Spatial-Temporal Data Analysis

Monitoring parking behaviour and utilization is important component to understanding parking supplies and demand by time period, particularly in areas where parking supplies are limited. Municipalities report deploying monitoring strategies and techniques on an upon-request basis, usually where there are residential complaints around on-street parking constraints. Using digital monitoring techniques, such as Parking App and digital parking meters, as well as Automated License Plate Reading technology, can provide powerful insights without the need for manual monitoring or surveys. These technologies will often capture a vehicle's license plate number, which can be cross-referenced with ICBC data. By proactively monitoring on-street parking supplies throughout a city, and cross-referencing vehicle's registration addresses, municipalities can proactively assign parking regulations in a given area by understanding if local residents are using on-street parking for their parking needs.

Appendix 5: Additional Household Survey Analysis

The following tables, based on the Household Survey, provide supplemental information to Section 5.1 'Apartment Residential Parking Supply and Utilization' and Section 5.4 'Relationship with Transit Proximity'.

Table 44. Resident Parking by Tenure

Building Tenure (# responses)	Household Survey		
	Stalls per DU (HS)	Parked Vehicles per DU (HS)	Parking Oversupply Estimate 2
Strata (n=1,185)	1.39	1.17	+19%
Market Rental (n=133)	1.10	0.89	+23%
Mixed Tenure (n=186)	1.24	0.93	+34%
Mixed Rental (n=35)	1.49	1.09	+37%
Non-Market Rental (n=28)	0.90	0.43	+111%

Table 45. Resident Parking in Strata Sites by Subregion

Strata Sites by Subregion (# responses)	Household Survey		
	Stalls per DU (HS)	Parked Vehicles per DU (HS)	Parking Oversupply Estimate 2
Burnaby/NW (n=265)	1.32	1.09	+21%
North Shore (n=151)	1.42	1.17	+21%
Northeast Sector+ (n=317)	1.34	1.21	+11%
Richmond (n=72)	1.25	1.15	+9%
South of Fraser (n=279)	1.31	1.25	+5%
Vancouver/UBC (n=101)	1.38	1.08	+28%

Table 46. Resident Parking in Rental Sites by Subregion

Rental Sites by Subregion (# responses)	Household Survey		
	Stalls per DU (HS)	Parked Vehicles per DU (HS)	Parking Oversupply Estimate 2
North Shore (n=25)	1.05	0.84	+25%
Northeast Sector+ (n=9)	2.44	1.22	+100%
Richmond (n=17)	1.13	1.12	+1%
South of Fraser (n=49)	1.33	1.29	+3%
Vancouver/UBC (n=282)	1.14	0.81	+41%

Table 47. Resident Parking in Strata Sites by Transit

Strata Sites by Proximity to FTN (# responses)	Household Survey		
	Stalls per DU (HS)	Parked Vehicles per DU (HS)	Parking Oversupply Estimate 2
Within 800m of rapid transit (n=633)	1.26	1.14	+11%
Within 400m of frequent bus only (n=408)	1.33	1.19	+12%
Away from FTN (n=144)	1.36	1.29	+5%

Table 48. Resident Parking in Market Rental sites by Transit

Market Rental Sites by Proximity to FTN (# responses)	Household Survey		
	Stalls per DU (HS)	Parked Vehicles per DU (HS)	Parking Oversupply Estimate 2
Within 800m of rapid transit (n=32)	0.59	0.53	+11%
Within 400m of frequent bus only (n=49)	1.08	0.80	+35%
Away from FTN (n=52)	1.35	1.21	+12%

Table 49. Resident Parking in Mixed Tenure Sites by Transit

Mixed Tenure Sites by Proximity to FTN (# responses)	Household Survey		
	Stalls per DU (HS)	Parked Vehicles per DU (HS)	Parking Oversupply Estimate 2
Within 800m of rapid transit (n=126)	0.99	0.83	+19%
Within 400m of frequent bus only (n=60)	1.23	1.15	+7%