

# GREENWAY PROXIMITY STUDY

A LOOK AT FOUR NEIGHBOURHOODS  
IN SURREY, BRITISH COLUMBIA

**1980-2001**



## EXECUTIVE SUMMARY

The purpose of this study is to determine if those single-family sites that border upon a greenway are influenced economically by their proximity to the greenway. The Surrey Parks, Recreation and Culture Department pre-selected subject neighbourhoods within the City of Surrey for examination.

The central question of this study is: Does a greenway border affect single-family property value, in the four study neighbourhoods and during the era from 1980 to 2001?

Our study, supported by relevant data and based upon an analysis of the factors influencing value, clearly supports the inference that a typical greenway border increases the value of single-family property, in the study neighbourhoods during the era from 1980 through 2001. Specifically, the economic impact of greenway depends to some extent upon the design and nature of the greenway (type) and the characteristics of the neighbourhood.

We estimate that adding the existing greenway border increases property value by \$4,092 or **2.8 percent**<sup>1</sup> on an overall basis for all four neighbourhoods.

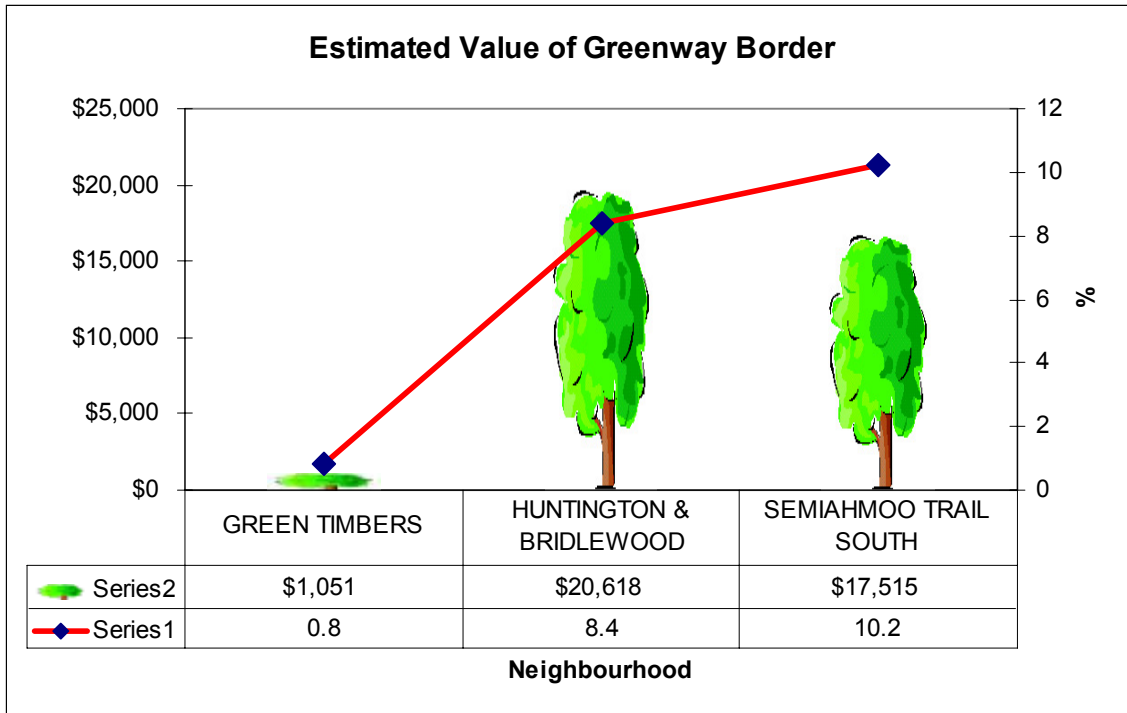
Specifically, the results for Green Timbers indicated that greenways increase property values by \$1,051 (**0.8 percent**), while in the Huntington and Bridlewood neighbourhood greenways increased property values by \$20,618 (**8.4 percent**) with results for the Semiahmoo Trail South neighbourhood indicating an increase in single-family property values by \$17,515 (**10.2 percent**). A greenway border increases the value of single-family property in at least three of the four study neighbourhoods. One neighbourhood was not analyzed due to insufficient sample size.

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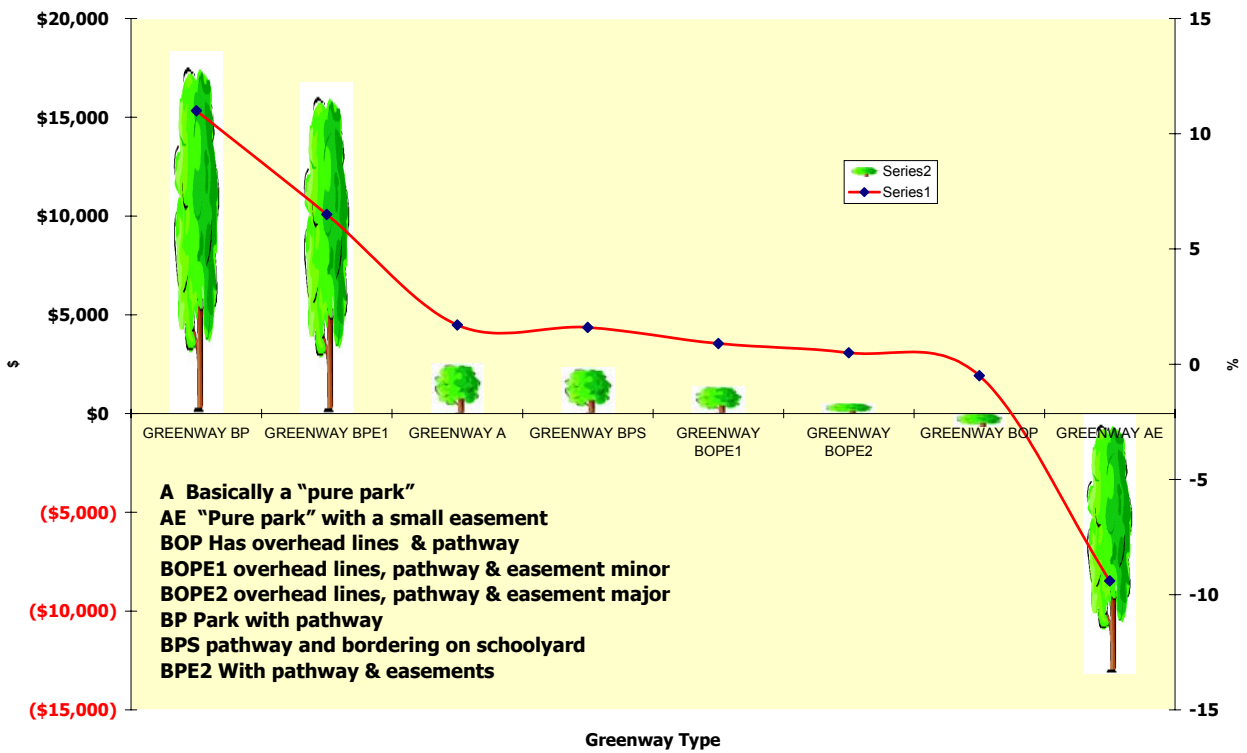
<sup>1</sup> 2.8% of the average sale price.



The summarized results are illustrated below:



**CONTRIBUTING VALUE BY GREENWAY TYPE**



As indicated by the preceding graph, the type of greenway in the neighbourhood had a significant impact upon value. Greenways that contained easements, overhead power lines, pathways, or various combinations of these elements, displayed varying economic impacts upon property values. The greenway type

**TABLE 2. GREENWAY CHARACTERISTICS**

<b>Label</b>	<b># Of Subjects Bordered</b>	<b>Description of Greenway Character</b>
GREENWAY_A	244	Basically a "pure park"
GREENWAY_AE	30	Basically a "pure park" with a small easement
GREENWAY_BOP	37	Park or greenway containing both overhead lines & pathway
GREENWAY_BOPE1	100	Park or greenway containing both overhead lines, pathway & easement (Minor easement)
GREENWAY_BOPE2	94	Park or greenway containing both overhead lines, pathway & easement (Major easement)
GREENWAY_BP	361	Park with pathway
GREENWAY_BPS	51	Park with pathway bordering on schoolyard.
GREENWAY_BPSE1	0	Park with pathway, bordering on school yard and has minor easements
GREENWAY_BPSE2	0	Park with pathway, bordering on school yard and has major easements
GREENWAY_BPG	0	Park with pathway and gated community which does not permit public access from the street
GREENWAY_BPE1	58	Park or greenway with pathway & easements (Minor)
GREENWAY_BPE2	0	Park or greenway with pathway & easements (Major)
Park Size	205	Sliver- when a park space bordering a site is less than 50% of the area of the site. (Relatively small park or greenway)

Source: RealBASE Consulting Inc.

that displayed the highest economic contribution was the Greenway BP type while the Greenway AE type displayed negative values. Unfortunately, Greenway AE comprises of about nine individual sites that border on a Greenway that is largely overgrown and portions are not passable. Based upon our observations, the impact upon value may be attributable to deferred maintenance of the greenway rather than the small existing easements. It is possible that the greenway has been a pathway from North Surrey Secondary School and Community Park in the past and has been allowed to be overgrown to discourage use of the path and the little park at the west end.



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A complete listing of all those who contributed to this project would be difficult and the collective cooperation of the Surrey Parks, Recreation and Culture department, the Engineering Department and the Realty Services Division of the City of Surrey are greatly appreciated. However, the following people deserve a special mention:

Karl Kliparchuk, McElhanney Consulting Services Ltd.

Katherine Morgan, Planning Consultant

Ken MacKenzie and Ernie Vance, Fraser Valley Real Estate Board

Mandy Sayers, Planning, Research & Development Section, Parks, Recreation and Culture

Nadia Carvalho, Planning Consultant

Peter Barber, British Columbia Assessment Authority, Victoria

RCMP Crime Statistics

Rick Miller, British Columbia Assessment Authority, Surrey

Rudy Neilsen and Jeff Puhl, Landcor Data Corporation

Wayne Power, Don Elving, John Dean, City of Surrey Realty Services



## **STUDY OVERVIEW**

### **Purpose and Intended Use of Study**

The purpose of this study is to determine if those single-family sites that border upon a greenway are influenced economically by their proximity to the greenway. The Surrey Parks, Recreation and Culture Department pre selected subject neighbourhoods within the City of Surrey for examination.

### **Data Sources and Participants**

In this study, the various study subject properties are a "single family property bordering a specified greenway". The specified time frame of the study was from June 15, 1980 to April 23, 2001. The total number of sale properties initially entailed some 65,000 individual sales, however, this number was reduced to 32,595 non-subject<sup>2</sup> property sales with an additional 1,792 subject property sales. The non-subject sales represented approximately \$6.4 billion of sales volume, while the subject sales comprised \$363 million in sales volume. The sources of information were Landcor Data Corporation and the British Columbia Assessment Authority. Given the number of property sales involved during the extensive study time frame, ample property sales records were available to select matched pairs of subject and non-subject property sales (control property sales). The principle participants in this study were as follows:

Gary E. Loughton, AACI, P. App, AAPI, RealBASE Consulting Inc.  
David W. Hobden, M. Sc. Business Economist  
Rick Bentley, AACI, Bentley Appraisals Ltd.  
Nadia Carvalho, M.A. Planning Consultant  
Katherine Morgan, M.Sc. Planning Consultant  
Jeff Puhl and Rudy Neilsen, Landcor Data Corporation

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<sup>2</sup> Single-family property not bordering a greenway in the study neighbourhoods.





## **Assumptions, Exclusions and Limiting Conditions**

The scope of this study excludes investigation of broader sociological, ecological and other kinds of value. The economic value measured in this study is restricted as well, to only the value of greenway infrastructure to residential property that borders upon greenway and is actually used for single-family dwellings (some vacant and some with basement suites). The value of a greenway that borders on to commercial, industrial, farm, transportation, communication, utility, civic, institutional, recreational and higher density forms of residential property are beyond the scope of this study. The value of greenway infrastructure to non-adjacent residential property is also beyond this study's scope.

## **Effective Date(s) and Time Frames**

The effective date range for this study was from June 15, 1980 to April 23, 2001.

## **Recorded Crime Statistics and Subject Greenways Correlation**

An attempt to determine if a correlation exists between the recorded crime statistics provided by the RCMP and the subject greenways was unsuccessful. The time frames utilized for the crime statistics did not match with the time frames used in the Greenway Proximity Study. However, a superficial examination of available crime information and the subject property appears to suggest that no direct correlation exists. Maps providing both the recorded crime statistics and the subject greenways are located within the appendix for the reader's reference.

## **SCOPE OF WORK**

We were commissioned by the City of Surrey to conduct a study to determine if those sites that border upon a greenway are influenced economically by their proximity to the greenway. The Surrey Parks, Recreation and Culture department pre-selected four neighbourhoods within the City of Surrey for examination.



In this study, the various study subject properties are a “single family property bordering a specified greenway”. The specified time frame was from June 15, 1980 to April 23, 2001. The total number of sale properties initially entailed some 65,000 individual sales, however, this number was reduced to 32,595 non-subject<sup>3</sup> property sales with an additional 1,792 subject property sales. The non-subject sales represented approximately \$6.4 billion of sales volume, while the subject sales comprised \$363 million in sales volume. Given the number of property sales involved during the extensive time frame, ample property sales records were available to select matched pairs of subject and non-subject property sales (control property sales).

The paired sample is selected by comparing each subject property to every non-subject property sale. The comparison was made based upon 21 assessment inventory characteristics as outlined in Table 8. The end result of the matching process produced 755 matched pairs of subject and non-subject or control property sales.

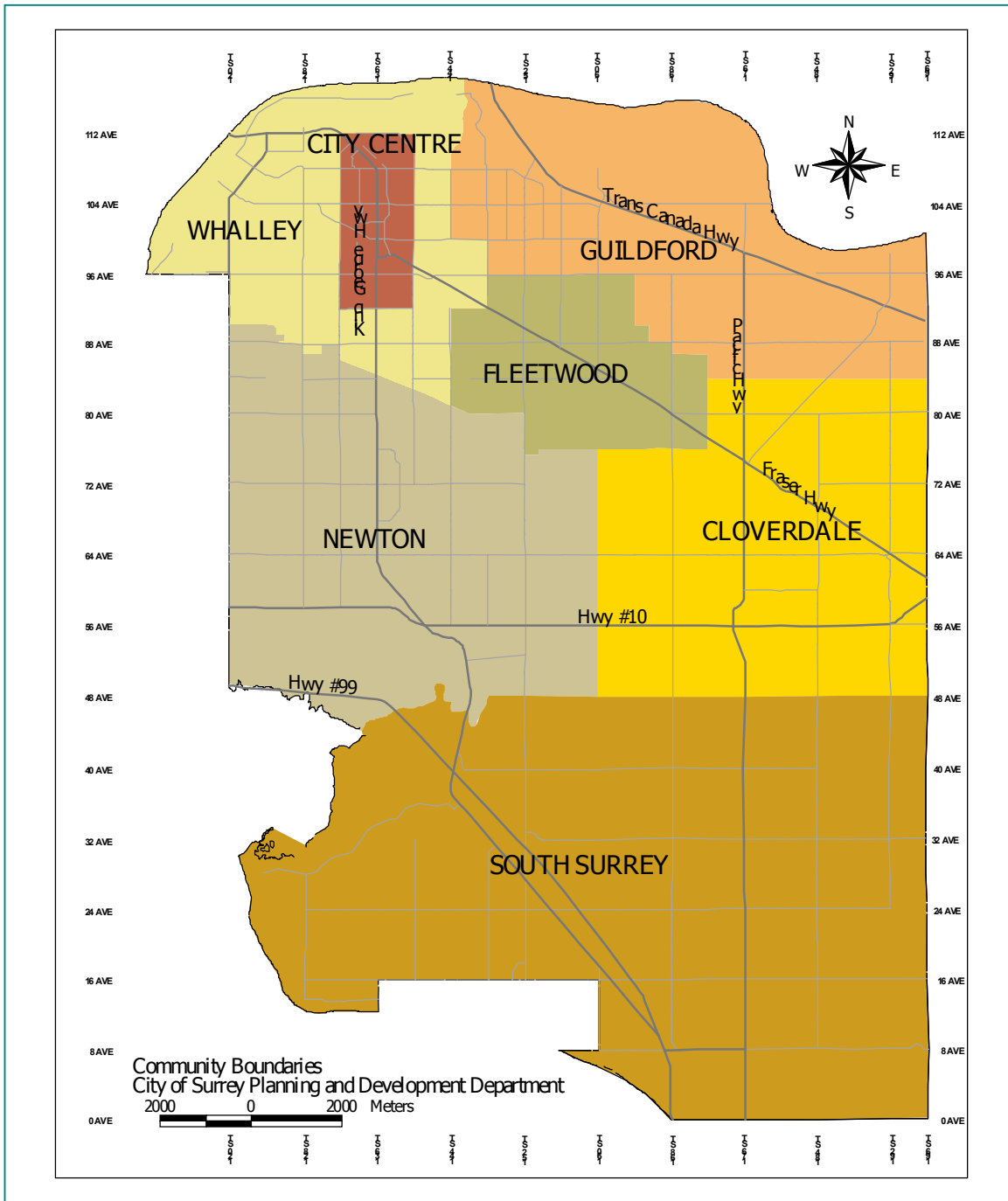
The central question of this study is: Does a greenway border affect single-family property value, in the four study neighbourhoods and during the era from 1980 to 2001? We address this question by estimating the value of a greenway border based on the matched pairs approach described above. These estimates are of the increase (decrease) in property value from adding the greenway border effect. Estimates are made over the whole study scope and for different neighbourhoods, greenway types, eras and property types. The results of these estimates are shown in Table 10.

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<sup>3</sup> Single-family property not bordering a greenway in the study neighbourhoods.



# THE CITY OF SURREY



The City of Surrey is British Columbia’s second largest municipality in terms of both population and area. Although the City of Vancouver has almost twice the



population, it is only one-third the size of Surrey in land area. Within the greater Vancouver region, the City of Surrey has approximately 40% of the farmland, 70% of the rural residential land and about 16% of the region's population.

The City of Surrey is in the south western portion of the Lower Mainland, bounded on the south by the 49th Parallel, Semiahmoo Bay and the Gulf of Georgia; on the west by the waters of Boundary Bay and the Corporation of Delta; on the north by the fast flowing Fraser River; and on the east by the Township of Langley. Surrey is located approximately 25 kilometers southeast of the City of Vancouver and about 200 kilometers north of Seattle, Washington.

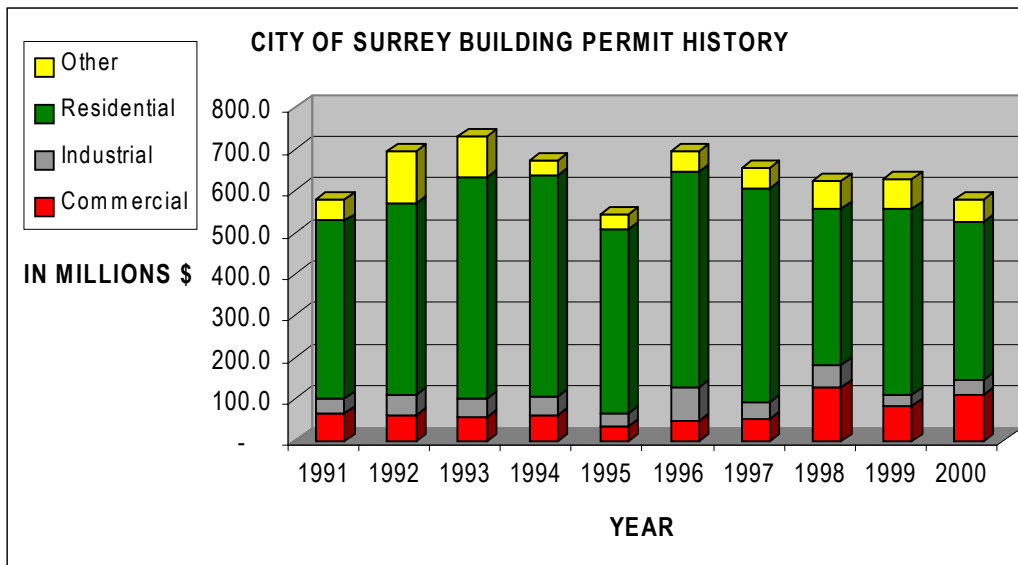
The City of Surrey had a population, as of the last complete census in 1996, of 304,477 residents. The census in 1991 showed a population of just over 245,173 residents for a growth rate during this period (1991-1996) of 24.2%. Population growth is expected to continue. Surrey's population is anticipated to more than double within the next 25 years, making Surrey British Columbia's largest city. BC Stats population estimates for the City of Surrey in July 2000 were 340,094.

Surrey is well serviced by major transportation routes as five provincial highways provide access within the city and to surrounding municipalities. The settlement pattern in Surrey is quite varied with several "Town Centres" being identifiable. These include Surrey City Centre, Whalley, Guildford, Newton, Fleetwood, Cloverdale and the South Surrey area surrounding the City of White Rock. For the most part, commercial development is situated in these identifiable town centre districts in addition to ribbon type development along the Fraser Highway, King George Highway and Scott Road (120 Street), the latter being the border between Surrey and North Delta.

Surrey's ability to combine relatively lower land costs compared to other GVRD Municipalities with good transportation access and a large resident labour force has fostered the industrial and commercial expansion of the Municipality. Industrial areas such as Port Kells, Newton and Cloverdale have been major recipients of such growth. Given such industrial opportunities, local employment growth, and the retail/commercial and housing opportunities, strong population



growth is forecast for the City of Surrey. The chart and table below reviews the building permit activity in the City of Surrey for the last 10 years (in millions \$).

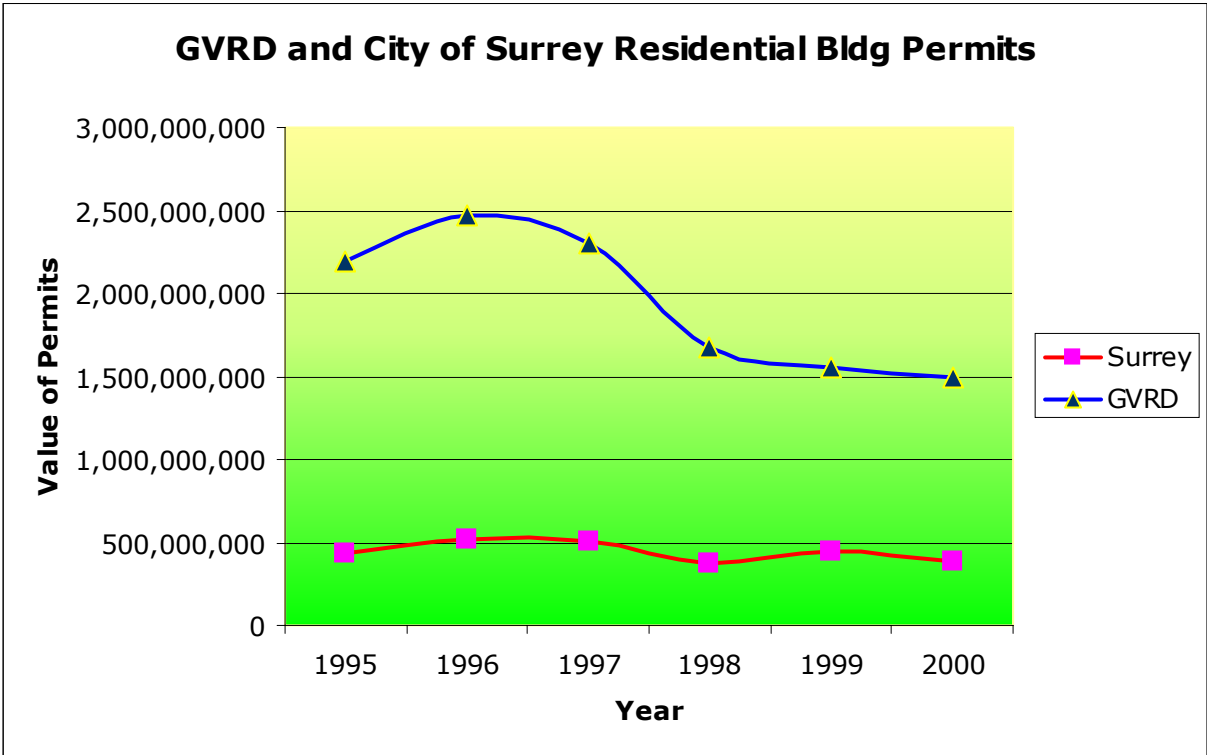
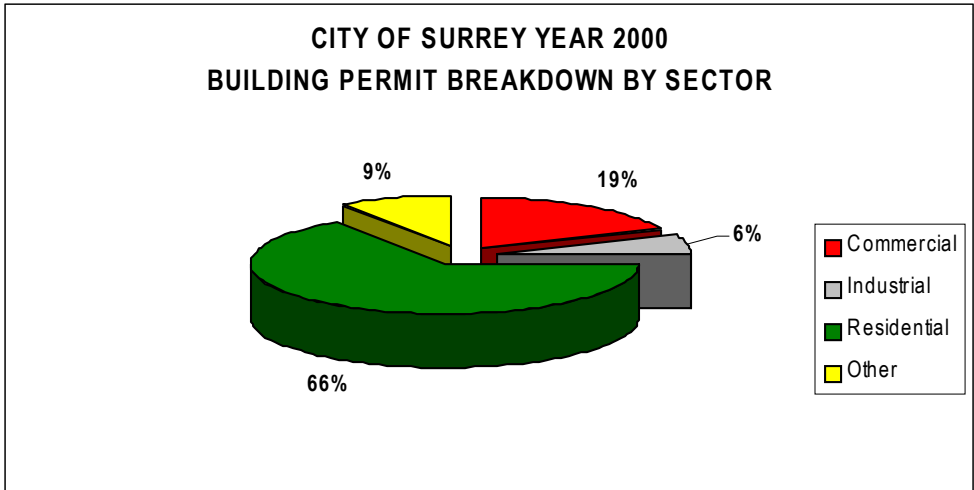


**Building Permit Activity - City of Surrey ( In Millions \$ )**

Year	Commercial	Industrial	Residential	Other	ALL PERMITS
1991	63.7	35.3	428.3	52.9	580
1992	59.4	49.0	462.3	125.8	697
1993	54.1	48.2	529.4	96.9	729
1994	61.2	45.8	529.7	34.7	671
1995	32.4	34.7	438.7	36.4	542
1996	47.1	78.5	518.6	51.6	696
1997	52.0	41.7	510.1	49.8	654
1998	129.5	49.7	377.0	67.5	624
1999	84.3	27.3	443.0	71.3	626
2000	108.7	36.7	379.0	53.9	578
Average	69	45	462	64	640
Median	60	44	453	53	640

As can be observed, building permit activity peaked in 1993, declined steeply in 1995, recovered in 1996 and has been in a gradual decline since that time. Overall results for the year 2000 reflect a decline of 16% since 1996. Residential permits represent the majority of permits with about 66% of all permits issued in the year 2000. On the positive side, commercial permits are up considerably, almost as high as the peak in 1998. Industrial permits peaked in 1996 and have declined to almost half of that figure by 2000.





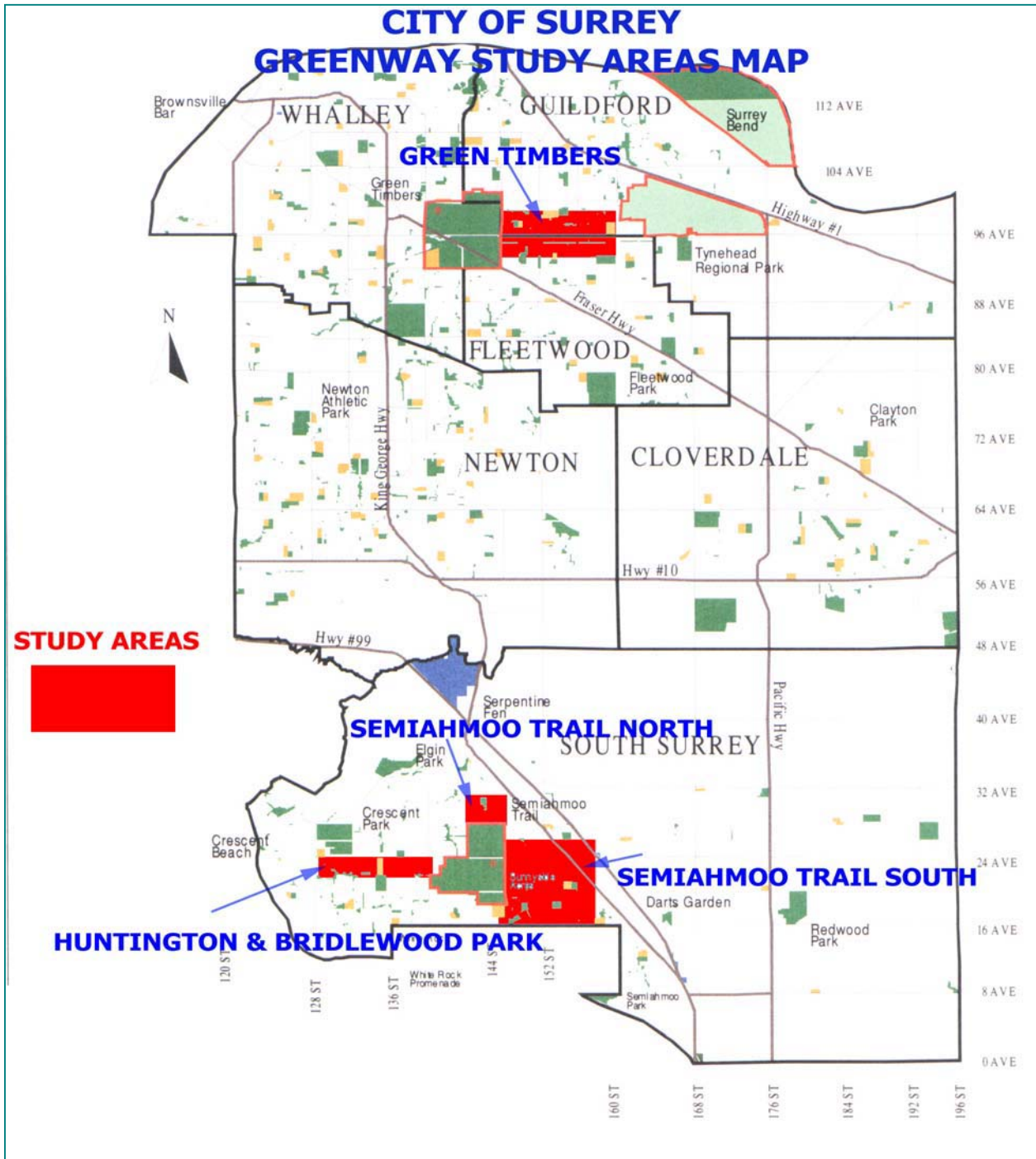
**POPULATION ESTIMATES FOR TOTAL CITY OF SURREY**

	1981 Census	1986 Census	1991 Census	1996 Census	2001 Projected	2006 Projected	2021 Projected
High	-	-	-	-	354,000	423,000	615,000
Medium	147,100	181,138	245,200	304,400	344,000	398,000	550,000
Low	-	-	-	-	328,000	361,000	452,000

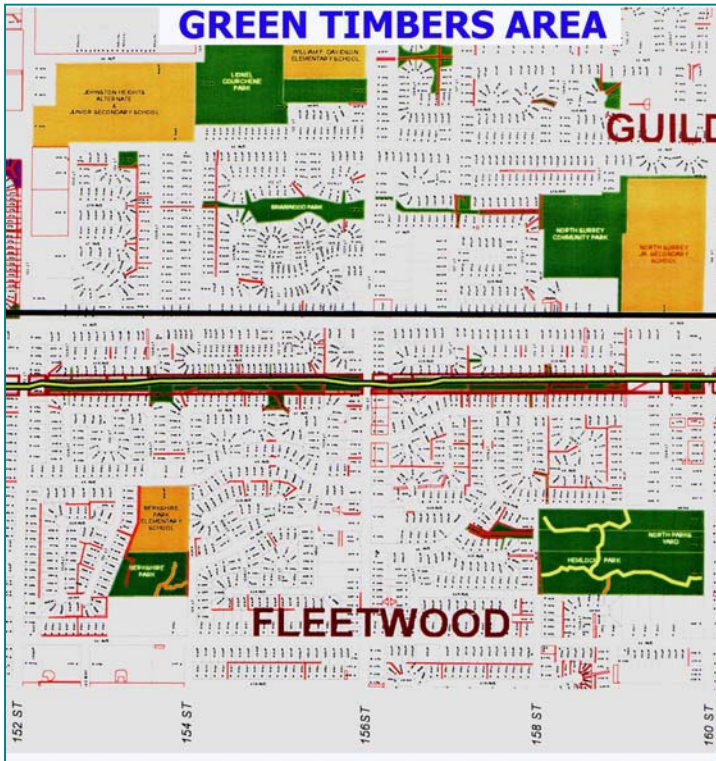


## SUBJECT NEIGHBOURHOODS

The following neighbourhoods were pre-selected by the Surrey Parks, Recreation and Culture department of the City of Surrey. The individual locations and characteristics of the subject neighbourhoods are outlined following:



## GREEN TIMBERS MULTI-USE PATHWAY



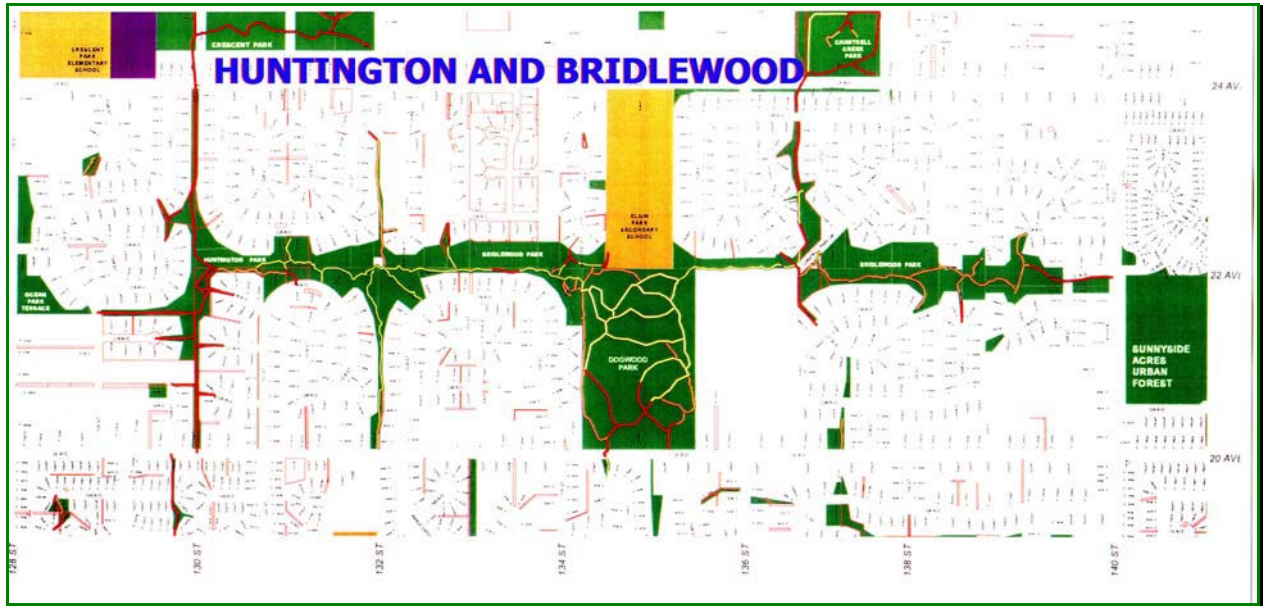
An established urban neighbourhood of predominantly 15 year old detached single-family homes immediately south of the Guildford area of Surrey. A rapid rate of growth was evident from the late 1970's to the late 1980's and the area has been almost fully developed for the past ten years. The neighbourhood is serviced by four elementary schools, a junior secondary school, and a senior secondary school and there are several neighbourhood parks, mostly adjoining the school sites.

The neighbourhood is developed with urban sized single-family lots ranging from 5,000 to 8,000 square feet. The homes appeal to middle income families with a broad ethnic background and most commute outside of Surrey for work. The Guildford Town Centre and the Fleetwood Shopping Centre are within 1 to 2 miles. The 152<sup>nd</sup> St. and 160<sup>th</sup> Street interchanges with Hwy 1 are 2 miles north.

The greenway follows a two-mile portion of a utility corridor between 148<sup>th</sup> St. and 164<sup>th</sup> St., connecting the Green Timbers Urban Forest to the west with Bothwell Park and Tynehead Regional Park to the northeast. The corridor is basically level from 148<sup>th</sup> St. to 160<sup>th</sup> St., sloping downward from 160<sup>th</sup> St. to 164<sup>th</sup> St. and includes an underground natural gas pipeline and overhead power line. An asphalt paved trail was developed in 1987 and is used by walkers, joggers and cyclists. Previous to the trail improvement program there was limited use of the corridor.







## Huntington Park & Bridlewood Park Pathway

This is a suburban neighbourhood comprising mostly half acre gross density residential developed over the past 15 years with executive style homes. The neighbourhood is split in half (north/south) by Elgin Secondary School and Dogwood Park in the 13500 block of 24<sup>th</sup> Ave. and 20<sup>th</sup> Ave. respectively. The west side of the neighbourhood includes the Huntington Park and Bridlewood Park subdivisions; the east side is the Chantrell Park subdivision.

The Greenway or Pathway is located midway between 20<sup>th</sup> Ave. and 24<sup>th</sup> Ave. At this point there is no through road access between the north and south portion, other than 128<sup>th</sup> St. and 140<sup>th</sup> St. which form the west and east boundaries. Future subdivision will provide for extension of Chantrell Park Dr. to align with 136<sup>th</sup> St. at 20<sup>th</sup> Ave. There are numerous trails within the greenway/park areas and frequent access points in the residential areas.





## Semiahmoo Trail - North Greenway

This neighbourhood offers a mix of residential densities including townhouses (Crescent Gardens, Silver Pond Estates), urban 5,000 square foot lots (Heritage Trails), half acre gross density lots (Elgin Park Country Estates) and one to five acre hobby farms. The area has been in transition from residential hobby farms to urban and suburban development over the past 10 to 15 years.

There is a commercial node in the 3100 block of King George Highway including a small strip mall (Redwood Plaza) a service/retail warehouse development (Elgin Centre) and King George Auto Mall on the east side of King George. To the south is Victory Memorial Park. There is access to Hwy 99 via 32<sup>nd</sup> Ave.

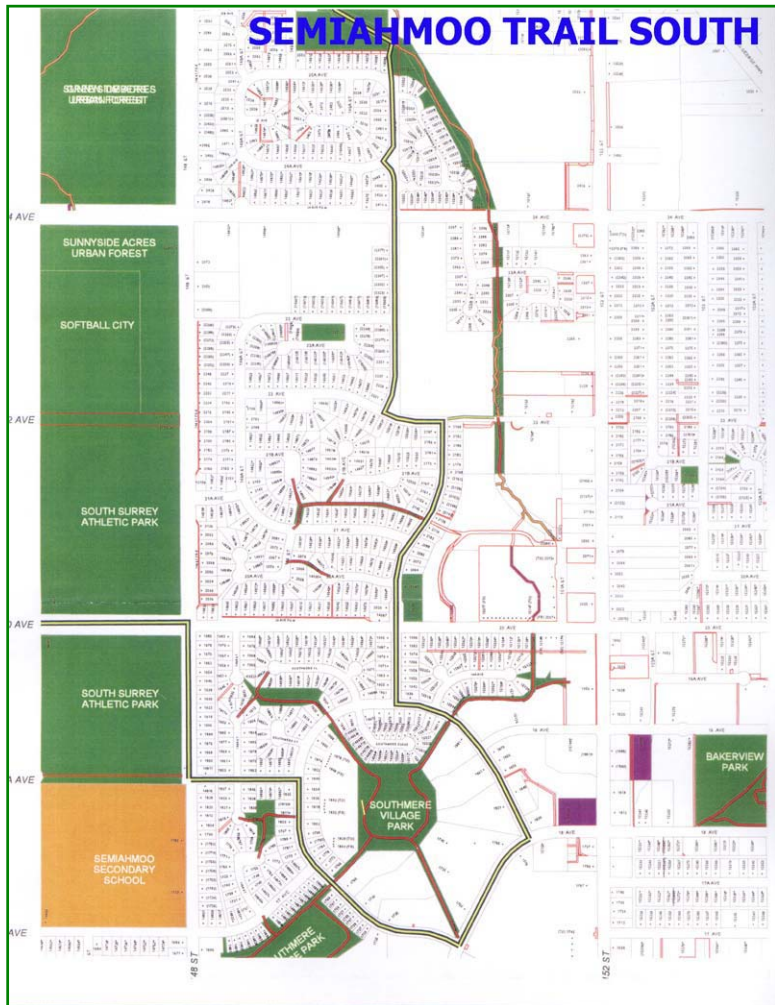
Semiahmoo Trail angles through the neighbourhood from the southeast to the northwest and is a developed road from 28<sup>th</sup> Ave. to 32<sup>nd</sup> Ave. However as further development occurs the road will be closed and developed as a walking trail. North of 32<sup>nd</sup> Ave. the trail passes through hobby farms with the exception of Semiahmoo Trail Elementary School, newer townhouse developments in the 3300 block of King George Highway and 3500 block of 144<sup>th</sup> St. The trail is



actively used by walkers, joggers and cyclists and will connect with the Nicomekl River trail system in the future.

### Semiahmoo Trail - South Greenway

This is an urban neighbourhood including the 152<sup>nd</sup> St. commercial corridor, several townhouse and apartment developments and single-family residential subdivisions. Southmere Village (developed by Genstar Developments in the 1980's) includes a wide variety of detached and attached housing. Meridian By The Sea (north-east corner of 148<sup>th</sup> St. and 20<sup>th</sup> Ave.) and Sherbrooke Estates (north-east corner of 148<sup>th</sup> St. and 24<sup>th</sup> Ave.) are quality controlled single-family developments.



Other features of the neighbourhood include Semiahmoo Secondary School (1700-block 148<sup>th</sup> St.), South Surrey Athletic Park (1800 to 2200 block 148<sup>th</sup> St.) Softball City (2200 block 148<sup>th</sup> St.) and Sunnyside Acres Urban Forest (2400 to 2800 block 144<sup>th</sup> St. to 148<sup>th</sup> St.). The trail connects through to Southmere Village Park in the south portion of the neighbourhood.



# VALUATION METHODOLOGY AND DATA SUBJECT PROPERTIES

The neighbourhoods in question are named (municipally) Green Timbers, Huntington & Bridlewood Parkway, Semiahmoo Trail North, and Semiahmoo Trail South. These are largely suburban, residential neighbourhoods in which we identified 975 single-family properties as “subject” property. Subject property has a direct proximity to a greenway; i.e. it borders upon a greenway. We identified subject property from current satellite and other photographs, as well as City Parks Department maps. We also classified characteristics of the greenways that border each subject property.

We matched subject properties by street address to Provincial assessment data acquired for this study. The assessment data includes an extensive array of variables that identify and inventory each property’s characteristics. Most subject properties were built in the decade of the 1980’s. Subject property represents 975 single-family dwellings, totaling 2.4 million square feet of living area and 9 million square feet of lot area. The total assessed value of subject property, as of July 1, 2000, was \$300 million. A brief statistical description of the subject properties is shown in Table 1.

**TABLE 1. SUBJECT PROPERTY: DESCRIPTIVE STATISTICS**

	N	Minimum	Maximum	Sum	Mean
Year Built	975	1946	2000		1985
Finished Area	975	900	7,684	2,387,450	2,448
Lot Size SQFT	975	3,552	45,302	8,917,761	9,146
Assessed Total	975	\$174,100	\$852,000	\$296,035,500	\$303,626
Valid N	975				

Source: Landcor Data Corporation, BCAA



## GREENWAY CHARACTERISTICS

Greenways were classified by various characteristics including pathways, major and minor easements, overhead lines, and schoolyard borders. A brief description of greenway types is shown in Table 2, followed by definitions and illustrations.

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<b>Label</b>	<b># Of Subjects Bordered</b>	<b>Description of Greenway Character</b>
GREENWAY_A	244	Basically a "pure park"
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GREENWAY_BP	361	Park with pathway
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GREENWAY_BPSE1	0	Park with pathway, bordering on school yard and has minor easements
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GREENWAY_BPG	0	Park with pathway and gated community which does not permit public access from the street
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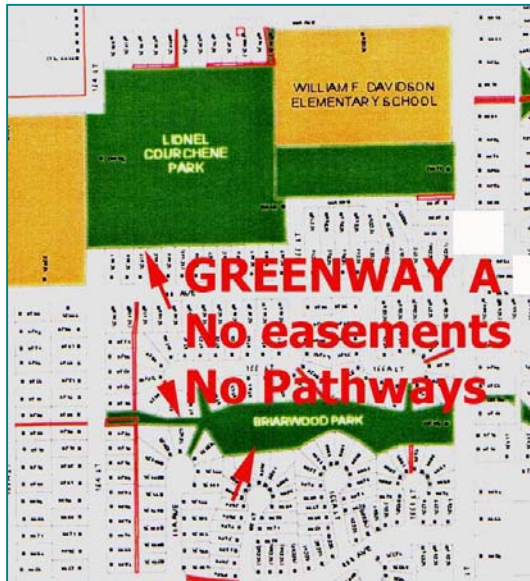
Source: RealBASE Consulting Inc.

The Greenway Characteristics are defined and illustrated as follows:



For our purposes, we define a greenway by those area identified with the colour green within the maps provided by the Parks Department of the City of Surrey.

Having identified those properties that border a greenway, we then are required to further define the greenways by their characteristics. The greenway characteristics are identified following.



### **Greenway A**

This is an unobstructed park area that is probably best identified by what is NOT there besides a native park state. No pathway, no overhead electrical transmission or telephone lines, no easements, basically a “pure” park

### **Greenway AE**

This is a largely unobstructed park area that is probably best identified by what is NOT there besides a native park state but with small easements. No pathway, no overhead electrical transmission or telephone lines, an almost “pure” park

### **Greenway BOP**

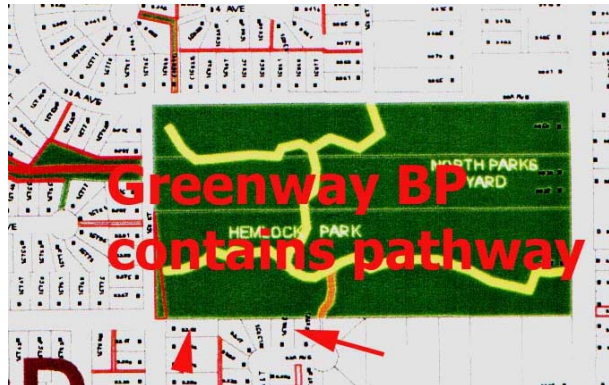
This is a park or greenway area that contains both overhead transmission lines and a pathway. This type of greenway is common to the Green Timbers area; however, the majority of sites have some form of easements along them.





## Greenway BP

This is a park or greenway area that contains a pathway. This type of greenway is common to the Huntington and Bridlewood Park areas.



## Greenway BPS

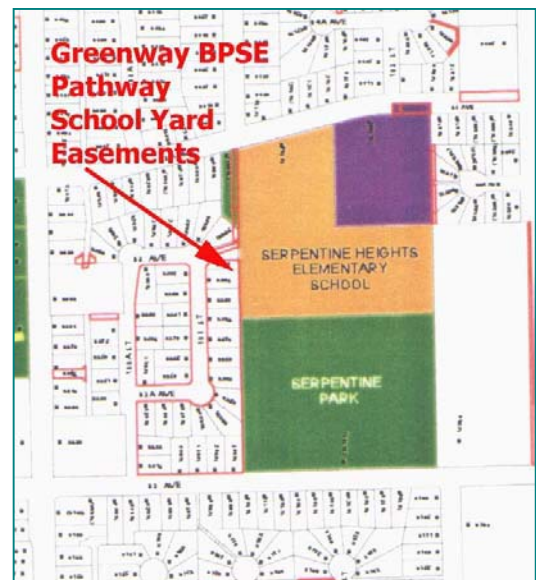
This is a park or greenway area that contains a pathway and also borders upon a schoolyard. This type of greenway is common to the Huntington and Bridlewood Park areas and Semiahmoo Trail North

## Greenway BPSE1

This is a park or greenway area that contains a pathway, borders upon a schoolyard and contains easements. The easements in this classification are minor in nature. This type of greenway is common to most of the study area(s).

## Greenway BPSE2

This is a park or greenway area that contains a pathway, borders upon a schoolyard and contains easements. The easements in this classification are major in nature. This type of greenway is not common to most of the study area(s)





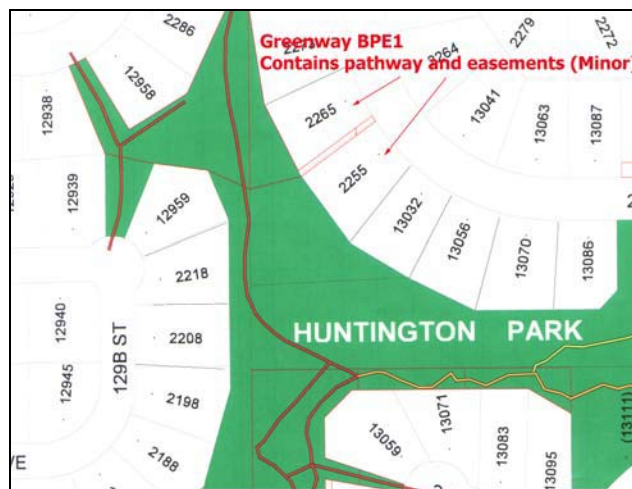
## Greenway BPG

This is a park or greenway area that contains a pathway and also is a gated community that does not permit public access from the street. This type of greenway only exists in the Semiahmo Trail South Greenway.



## Greenway BPE1

This is a park or greenway area that contains pathway(s) and easements. The easements in this classification are minor in nature. This type of greenway is common to the Huntington and Bridlewood area. The BPE2 classification simply indicates that the easements are major in nature.



## PARK SIZE "S"

When the park or greenway space bordering a site is less than 50% of the area of a site, we identify the park or greenway as "S" for sliver, a relatively small park. This classification was created to distinguish between very small sliver park areas and larger more established park or greenway areas.

It should be noted that not all classifications were utilized within the study, as the classifications were created prior to the processing of the sales data.

## NEIGHBOURHOOD PARTICIPATION PERCENTAGE

Subject properties are predominantly in use as single-family dwellings without assessed basement suites. Subject properties are located in all four study neighbourhoods. However, relatively few subject properties are located in Semiahmoo Trail North. Tables 3 and 4 show the distribution of subject properties by actual use and by study neighbourhood.

**TABLE 3. SUBJECT PROPERTY: ACTUAL USE TYPE**

		Frequency	Percent	Valid	Cumulative Percent
Valid	SINGLE DWELLING	933	95.7	95.7	95.7
	SINGLE DWELLING BASEMENT	42	4.3	4.3	100.0
	Total	975	100.0	100.0	

Source: Landcor Data Corporation, BCAA



**TABLE 4. SUBJECT PROPERTY: STUDY NEIGHBOURHOOD**

		Frequency	Percent	Valid	Cumulative Percent
Valid	GREEN TIMBERS	502	51.5	51.5	51.5
	HUNTINGTON BRIDLEWOOD	263	27.0	27.0	78.5
	SEMIAHMOO TRAIL NORTH	31	3.2		81.6
	SEMIAHMOO TRAIL SOUTH	179	18.4	18.4	100.0
	Total	975	100.0	100.0	

Source: Landcor Data Corporation, BCAA

**DESCRIPTIVE STATISTICS ON SUBJECT PROPERTY SALES**

Provincial assessment data acquired for this study includes a 22-year history of sales for each subject property. From June 1980 to April 2001 there were a total of 1,792 “qualified” sales of subject property, representing approximately \$363 million of sales volume. Table 5 shows descriptive statistics on subject property sales.

**TABLE 5. SUBJECT PROPERTY SALES: DESCRIPTIVE STATISTICS**

	N	Minimum	Maximum	Sum	Mean
SALE DATE	1792	06/15/1980	04/17/2001		09/22/1990
SALE AMOUNT	1792	\$25,500	\$930,000	\$363,607,312	\$202,905
Valid N	1792				

Source: Landcor Data Corporation, BCAA

The sales data is qualified so that the history of only those sales involving single-property, cash terms are included. Sales involving non-cash, non-arms-length, multi- property, or other terms not suitable for appraisal analysis are excluded. Most of the qualified sales involve improved subject property; i.e. land and buildings. Fifteen percent of qualified sales involve vacant subject property; i.e.



only the land has assessed value at the time of the sale. Table 6 shows the frequency of sale types included in the subject property sales data.

**TABLE 6. SUBJECT PROPERTY SALES DATA: SALES TYPE**

	Frequency	Percent	Valid	Cumulative Percent
Valid IMPROVED PROPERTY TRANSACTION	1520	84.8	84.8	84.8
VACANT PROPERTY TRANSACTION	272	15.2	15.2	100.0
Total	1792	100.0	100.0	

Source: Landcor Data Corporation, BCAA

The sales history begins in 1980, corresponding to the beginning of a 15-year period of house building on the subject property. Less than 5 percent of subject properties were built before 1980 and few were built after 1995.

### **VALUATION METHOD**

An appraisal is an estimate of value. More specifically, an appraisal is an opinion of value for an adequately described property, as of a specified date, supported by relevant data and based upon an analysis of the factors influencing value sources. In this study, the property is “a single family property bordering on a specified greenway”. The specified date of valuation is the era from June 1980 to April 2001. The relevant data includes the subject property and greenway characteristic data introduced above. What remains is to introduce the method used to analyze the factors influencing value, as well as some additional data on comparable properties.



An obvious factor influencing the choice of analytic methods is that the value sought in this case is, in economic terms, a shadow price. A shadow price is a price imputed to a good, service, or resource that is not priced by the marketplace or that is incorrectly priced by the market. The marketplace does not price "Greenway bordering a single family property" because it only comes bundled with the other characteristics of single-family dwellings adjacent to a greenway. "Greenway border" is not sold as a separate entity because it is an immobile feature of land use.

Over many years economists have developed and adapted various statistical methods to study and measure shadow prices for the purposes of policy analysis. One common method is referred to as "hedonic pricing" (Grilches 1971, Hamilton 1995, 1999). Another common method is referred to as "matched pairs" (Schwartz 1984, Dale-Johnson 1985, Allen 1995). These two methods offer different ways of controlling for non-greenway differences in the sample of property sales. By doing so, the effect of the greenway border on the value of adjacent property is isolated.

## **Hedonic Pricing**

With hedonic pricing, non-greenway differences in the sample of property sales are controlled for by means of statistical regression. An equation is specified that relates the observed characteristics of sampled property sales to the sale price of those properties. The observed characteristics typically include the quantity of each attribute that, *a priori*, determine the sale price of a property. These attributes usually include the type of property (e.g. detached, attached, apartment), location of property (e.g. neighbourhood, legal plan), time of sale, mass characteristics (e.g. lot area, building area, number of bathrooms) and momentum characteristics (e.g. age of improvements). One or more measures of the variables under study, in this case greenway border, are added to the equation, and the coefficients of the equation are estimated by regression analysis. Estimated coefficients are interpreted as measuring the shadow prices of the property sale characteristics (e.g. greenway border).



## Match Pairs Approach

The matched pairs approach to estimating the effect of “greenway border” on the value of single family property controls for the non-greenway influences on the value of subject property by matching each subject property with one or more otherwise comparable “control” properties. The full power of this method is realized when the property inventory and sales data are sufficiently detailed and numerous to allow a close match between subject and control property.

The statistical mean of the differences in sale prices for greenway and control properties is an unbiased estimator of the shadow price of greenway border. The standard deviation of the differences in sale prices is the basis for calculating both a confidence interval on the “mean-difference” estimate, as well as an inference statistic (a *t*-ratio) used to test the hypothesis that “greenway border is of no value”. A brief explanation of the *t*-ratio is provided in the Appendix.

Under conditions of approximate symmetry and normality, and based on the matched pairs sample employed, “mean-difference” estimates of value follow the well known *Student’s-t* probability distribution. Confidence intervals and hypothesis tests can then be relied upon with an estimated degree of statistical confidence, typically 95 percent. In addition, the point estimate of value, the mean difference in sale prices, is often the only robust empirical information available for making policy decisions that depend on shadow prices.

## Alternative Methods

The alternative methods of hedonic pricing and matched pairs are comparable on statistical criteria and analysis effort. One estimation method is not uniformly superior to the other, although they do have different statistical properties. Hedonic price estimates tend to be more statistically reliable (narrower confidence intervals). Matched pairs estimates tend to be less biased (truer point estimates). However, if properly applied, either method will generate reasonably reliable and unbiased estimates of shadow prices.

Hedonic pricing has the additional advantage of being more suitable for testing complex hypotheses involving multiple value estimates. For example, testing



whether the value of a greenway border is more or less in one neighbourhood than another. In addition, due to the small number of matched pairs typically available in a property sales database, hedonic pricing facilitates a more detailed breakdown of estimates. For example, there may be an insufficient number of matched pairs of sales to generate greenway value estimates in certain neighbourhoods and at various levels of analysis. Hedonic pricing largely overcomes this limitation by using all of the property sales data available rather than only the matched pairs subset of the available data.

The real issue of selecting statistical methods is whether to employ one or two alternative statistical estimators (one parametric and the other non-parametric). The combined results of the two separate methods (hedonic and matched pairs) are generally more robust than the results of either method alone. In this study, the client has chosen a single method, the matched pairs method.

### **Control Property Sales**

The assessment data acquired for this study is sufficiently detailed and numerous for either matched pairs or hedonic pricing analysis. As described above, the study data includes inventory and sale records for the subject property. In addition, the available data includes inventory and sale records for all other property of similar use in the study neighbourhoods. Moreover, the data includes inventory and sale records for all other properties of similar use in the six neighbourhoods defined by the Provincial Assessment Authority that together encompass the four study neighbourhoods. There are a significant number of property sale records from which to select matched pairs of subject and control property sales.

Table 7 shows descriptive statistics on the subject and non-subject property sales employed in the matched pairs analysis. From June 1980 to April 2001, non-subject property sales represented approximately \$6.4 billion of sales volume. The 1,792 subject property sales can be compared to 32,595 non-subject property sales to obtain the required matched pairs sample.



**TABLE 7. PROPERTY SALES USED IN STUDY: DESCRIPTIVE STATISTICS**

		N	Minimum	Maximum	Sum	Mean
NON-SUBJECT	SALE	32595	06/15/1980	04/23/2001		12/23/1991
PROPERTY	SALE	32595	\$11,100	\$3,300,000	\$6,426,471,234	\$197,161
	Valid N	32595				
SUBJECT	SALE	1792	06/15/1980	04/17/2001		09/22/1990
PROPERTY	SALE	1792	\$25,500	\$930,000	\$363,607,312	\$202,905
	Valid N	1792				

Source: Landcor Data Corporation BCAA

The paired sample is selected by comparing each subject property sale to every non-subject property sale. The comparison is made on the basis of the assessment inventory characteristics that describe the property sales and are included in the study data. Property sale characteristics used for the matched pairs comparison are listed in Table 8.

**TABLE 8. MATCH VARIABLES**

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Sale Date  
 Sale Type  
 Actual Use Type  
 Manual Class Type  
 Manual Class Deviation  
 Legal Plan Number  
 Finished Area  
 Lot Size  
 Foundation Type  
 Number of Garage Stalls  
 Number of Carport Stalls  
 Pool on Site  
 Other Buildings on Site  
 Corner Lot  
 Water on Lot  
 Waterfront Lot  
 Quality of View from Site  
 Effective Age of Improvements  
 Number of Bathroom Pieces  
 Assessment Neighbourhood  
 Number of Stories

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The criteria applied for selecting matched pairs were extensive in order to isolate, as far as possible, the influence of a greenway border on subject property value. For example, sales had to match exactly, or within narrow tolerances, on all the characteristics listed in Table 8. The exceptions to this rule were several characteristics used as substitutes: 1) legal plan or assessment neighbourhood, and 2) manual class type or number of stories. For substitute characteristics, the sales had to match only one (e.g. same legal plan or same assessment neighbourhood). However, the tolerance level for selecting matched pairs on several characteristics depended upon which substitute characteristic was matched. For example, a matched pair is within 90 days on the date of sale, unless the pair has different plan numbers, in which case the pair is in the same assessment neighbourhood and matches within 60 days on the date of sale.

The search algorithm made four passes through the data before a large enough sample of matched sales was obtained. Each pass through the data compared each subject property sale not yet matched with every non-subject property sale. Each pass involved a slightly less restrictive combination of tolerance levels and substitute characteristics as the criteria for selecting matched pairs. The end result was a sample of 755 matched pairs of subject and control property sales. A brief description of the matched pairs sample obtained is shown in Table 9. In fact, the sample is closely matched on all of the characteristics listed in Table 8.



**TABLE 9. MATCHED PAIRS SAMPLE: DESCRIPTIVE STATISTICS**

	N	Minimum	Maximum	Mean	Std. Deviation
<b>SUBJECT SALES: Single-family property bordering a greenway in the study neighbourhoods.</b>					
SALE DATE: SUBJECT	755	07/15/1980	02/26/2001	02/10/1989	
SALE AMOUNT: SUBJECT	755	\$25,500	\$575,000	\$147,741	\$83,321
LOT SIZE SQFT: SUBJECT	755	3,552	16,553	6,932.89	1,414.81
FINISHED SQFT: SUBJECT	755	1,145	3,812	2,058.75	427.19
EFFECTIVE AGE: SUBJECT	755	0	22	2.40	4.05
ASSESSED TOTAL: SUBJECT	755	\$184,800	\$537,000	\$244,689	\$52,008
<b>CONTROL SALES: Single-family property not bordering a greenway in the study neighbourhoods.</b>					
SALE DATE: CONTROL	755	07/15/1980	04/20/2001	02/09/1989	
SALE AMOUNT: CONTROL	755	\$32,000	\$613,000	\$143,649.30	\$80,807
LOT SIZE SQFT: CONTROL	755	3,553	16,553	6,920.36	1,406.70
FINISHED SQFT: CONTROL	755	1,195	3,960	2,057.05	427.50
EFFECTIVE AGE: CONTROL	755	0	23	2.40	4.24
ASSESSED TOTAL: CONTROL	755	\$185,300	\$565,000	\$243,496	\$51,183
Valid N (listwise)	755				

## SUMMARY OF FINDINGS AND CONCLUSIONS

### VALUATION RESULTS

The central question of this study is: Does a greenway border affect single-family property value, in the four study neighbourhoods and during the era from 1980 to 2001? We address this question by estimating the value of a greenway border based on the matched pairs estimator described above. These estimates are of the increase (decrease) in property value from adding the greenway border effect. Estimates are made over the whole study scope and for different neighbourhoods, greenway types, eras and property types. The results of these estimates are shown in Table 10.

The first estimate is of the change in value for an average single-family property from adding the existing greenway border. As a result of this analysis of the data, we estimate that adding the existing greenway border increases property



value by \$4,092 or 2.8 percent<sup>4</sup>. The t-statistic for the test of the hypothesis of no change in value is <sup>5</sup>4.3 and this effect is highly significant at the 99.9 percent confidence level.

4.3 is the value of the t-statistic testing the hypothesis of no value. As per the appendix on t-stats, a t-ratio of 2 is generally significantly different from zero at the 95% confidence level. That is, the hypothesis of no change in value may be rejected with 95% confidence. A t-ratio of 4.3 is highly significant as the hypothesis of no change in value can be rejected with 99.9% confidence.

The estimate is considered accurate within the range of \$2,207 to \$5,977 with 95 percent confidence. These results are based on the full sample of 755 matched pairs of qualified property sales. Our analysis of the study neighbourhoods during the era from 1980 through 2001, supported by relevant data and based upon an analysis of the factors influencing value, strongly supports the inference that a typical greenway border increases the value of single-family property.

The next estimate is of the change in value when the greenway border is on a small park. Small parks are a type of greenway defined by having an area less than half the area of the adjacent single-family property. We estimate that adding a small park border increases property value by \$11,356 (6.9 percent). This estimate is significantly different from the hypothesis of no change in value at the 99.6 percent confidence level (t-statistic of 2.9). The estimate is considered accurate within the range of \$3,639 to \$19,072 with 95 percent confidence. A small park type of greenway appears from our analysis of the data, to be more valuable to single-family property than a typical type of greenway.

The next three estimates are of the change in value for an average single-family property in each study neighbourhood separately. The small number of single-family properties bordering a greenway in Semiahmoo Trail North (31) prevents us from efficiently applying the matched pairs estimator in this one study neighbourhood.

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<sup>4</sup> 2.8% of the average sale price.

<sup>5</sup>



We estimate that adding the existing greenway border in Green Timbers increases property value by \$1,051 (0.8 percent). The t-statistic for the test of the hypothesis of no change in value in Green Timbers is 1.4 and this effect is of moderate significance at the 84 percent confidence level. The estimate is considered accurate within the range of (\$420) to \$2,522 with 95 percent confidence.

In Semiahmoo Trail South, we estimate that adding the existing greenway border increases single-family property value by \$17,515 (10.2 percent). We reject, with 99.9 percent confidence, the hypothesis of no change in value (t-statistic of 4.9), and the 95 percent confidence interval for the estimate in Semiahmoo Trail South is from \$10,400 to \$24,630.

We estimate that adding the existing greenway border in Huntington and Bridlewood Parkway increases property value by \$20,618 (8.4 percent). The t-statistic for the test of the hypothesis of no change in value is only 1.6 and this effect is only moderately significant at the 88 percent confidence level. The 95 percent confidence interval for the estimate in Huntington and Bridlewood Parkway is from (\$5,684) to \$47,099. In this neighbourhood, the small and relatively heterogeneous sample of single-family properties bordering a greenway prevents us from efficiently making a more accurate estimate.

A greenway border increases the value of single-family property in at least three of the four study neighbourhoods. One neighbourhood was not analyzed due to insufficient sample size. The values of a greenway bordering single-family property in the neighbourhoods of Semiahmoo Trail South and Huntington/Bridlewood Parkway are significantly higher than in Green Timbers.

The next eight estimates are of the change in value for an average single-family property from adding different types of existing greenway border. We estimate that adding the existing border on GREENWAY A type greenways increases property value by \$2,524 (1.7 percent). The t-statistic for the test of the hypothesis of no change in value is 2.0 and this effect is significant at the 95



percent confidence level. The estimate is considered accurate within the range of -\$2 to \$5,050 with 95 percent confidence.

We estimate that adding the existing border on GREENWAY AE type greenways decreases property value by \$13,148 (-9.4 percent). The t-statistic for the test of the hypothesis of no change in value is -3.2 and this effect is significant at the 99 percent confidence level. The estimate is considered accurate within the range of -\$21,749 to -\$4,546 with 95 percent confidence.

We find no significant change in the value of single-family property from adding a border to greenway types GREENWAY BOP, GREENWAY BOPE1, GREENWAY BOPE2 or GREENWAY BPS.

We estimate that adding the existing border on GREENWAY BP type greenways increases property value by \$18,307 (11 percent). The t-statistic for the test of the hypothesis of no change in value is 4.6 and this effect is highly significant at the 99.9 percent confidence level. The estimate is considered accurate within the range of \$10,375 to \$26,240 with 95 percent confidence.

No subject properties identified in the study data bordered on greenways of type GREENWAY BPSE1, GREENWAY BPSE2, GREENWAY BPG or GREENWAY BPE2.

We estimate that adding the existing border on GREENWAY BPE1 type greenways increases property value by \$16,750 (6.5 percent). The t-statistic for the test of the hypothesis of no change in value is only 1.2 and this effect is of little statistical significance at the 74 percent confidence level. The 95 percent confidence interval for the estimate is from -\$13,965 to \$47,465. The small and relatively heterogeneous sample of single-family properties bordering on GREENWAY BPE1 type greenways prevents us from efficiently making a more accurate estimate.



**TABLE 10. THE EFFECTS OF GREENWAY BORDER ON SINGLE FAMILY PROPERTY VALUE**LEVEL OF ANALYSIS: **ALL STUDY NEIGHBOURHOODS**

ALL STUDY NEIGHBOURHOODS	Estimated Value of Greenway Border		95% Confidence Interval on Estimated Value of Greenway Border		Hypothesis Test: "No change in value".		
	\$	%	Lower	Upper	t Ratio	Degrees of Freedom (N - 1)	Significance (2-Tail)
GREENWAY <sup>6</sup>	\$4,092	2.8	\$2,207	\$5,977	4.261	754	.000
SMALL PARK SIZE	\$11,356	6.9	\$3,639	\$19,072	2.914	117	.004
GREEN TIMBERS	\$1,051	0.8	-\$420	\$2,522	1.403	620	.161
HUNTINGTON & BRIDLEWOOD PARKWAY	\$20,618	8.4	-\$5,684	\$47,099	1.595	28	.122
SEMIAHMOO TRAIL SOUTH	\$17,515	10.2	\$10,400	\$24,630	4.882	104	.000
SEMIAHMOO TRAIL NORTH						0	
GREENWAY A	\$2,524	1.7	-\$1,51	\$5,050	1.973	163	.050
GREENWAY AE	-\$13,148	-9.4	-\$21,749	-\$4,546	-3.211	18	.005
GREENWAY BOP	-\$670	-0.5	-\$6,629	\$5,289	-.225	60	.823
GREENWAY BOPE1	\$1,359	0.9	-\$1,235	\$3,954	1.036	139	.302
GREENWAY BOPE2	\$544	0.5	-\$1,877	\$2,965	.443	196	.658
GREENWAY BP	\$18,307	11.0	\$10,375	\$26,240	4.566	128	.000
GREENWAY BPS	\$2,344	1.6	-\$4,275	\$8,962	.723	30	.475
GREENWAY BPSE1						0	
GREENWAY BPSE2						0	
GREENWAY BPG						0	
GREENWAY BPE1	\$16,750	6.5	-\$13,965	\$47,465	1.178	13	.260
GREENWAY BPE2						0	
1980 THRU 1986	\$3,462	3.5	\$1,572	\$5,352	3.615	184	.000
1987 THRU 1993	\$3,716	2.8	\$1,069	\$6,362	2.759	455	.006
1994 THRU 2001	\$6,621	2.6	\$663	\$12,578	2.202	113	.030
IMPROVED TRANSACTIONS	\$6,038	3.5	\$3,749	\$8,328	5.180	568	.000
VACANT TRANSACTIONS	-\$1,862	-3.0	-\$4,813	\$1,090	-1.244	185	.215

<sup>6</sup> **GREENWAY** : All data results within the study or specific neighbourhood area.



The next three estimates (in Table 10) are of the change in value for an average single-family property during different periods within the study era from 1980 to 2001. We divide the 22-year era under study into three approximately equal time periods: 1) 1980 through 1986, 2) 1987 through 1993, and 3) 1994 through 2001. The average cash price of a single-family property in the study neighbourhoods and their surrounding assessment neighbourhoods was \$94,016, \$169,794, and \$282,724 during the 1980 through 1986, 1987 through 1993, and 1994 through 2001 eras, respectively. Note that the change in average property price over the study era reflects both pure price inflation and change in property quality due to development and improvement.

We estimate that adding the existing greenway border during the 1980 through 1986 period increased property value by \$3,462 (3.5 percent). During the 1987 through 1993 period, adding the existing greenway border increased property value by \$3,716 (2.8 percent), while adding the border on existing greenway during the 1994 through 2001 period increased property value by \$6,621 (2.6 percent). The t-statistics for the tests of the individual hypotheses of no change in these values are all highly significant, and each effect is significant with at least 97 percent confidence. The estimates of change in property value during different time periods are consistent with the notion that the value of a greenway border has increased over the past 21 years, though not as fast as the average value of single family property. This increase in value reflects both pure price inflation and quality improvement.

The final two estimates shown in Table 10 are of the change in value for an average single-family property, depending on whether the property has a house built on it (improved property) or is vacant. We estimate that adding the existing greenway border increases improved single-family property value by \$6,038 (3.5 percent). We reject, with 99.9 percent confidence, the hypothesis of no change in value on improved property (t-statistic of 5.2), and the 95 percent confidence interval for the estimate is from \$3,749 to \$8,328. By contrast, we find no significant (or slightly negative) effect of a greenway border on the value of vacant property. Our analysis is thus consistent with a typical greenway border in the study neighbourhoods being valuable to homeowners rather than homebuilders.



In the next two sections, we examine separately the results of our analysis for the neighbourhoods of Green Timbers and Semiahmoo Trail South. There was insufficient data for a more detailed analysis of the Huntington & Bridlewood Parkway and Semiahmoo Trail North neighbourhoods.





## **SPECIFIC ANALYSIS: GREEN TIMBERS**

The central question of this section is: Does greenway border affect single-family property value in the Green Timbers neighbourhood during the era from 1980 to 2001? As before, our estimates of value of a greenway border are based on the matched pairs estimator described earlier. These estimates are of the increase (decrease) in property value from adding the greenway border effect. Estimates are made over the whole neighbourhood and for different greenway types, eras and property types. The results of these estimates are shown in Table 11.

The first estimate is of the change in value for an average single-family property from adding the existing greenway border. As discussed in the previous section, we estimate that adding the existing greenway border in Green Timbers increases property value by \$1,051 (0.8 percent). The t-statistic for the test of the hypothesis of no change in value in Green Timbers is 1.4 and this effect is of moderate significance at the 84 percent confidence level. The estimate is considered accurate within the range of -\$420 to \$2,522 with 95 percent confidence.

The next estimate is of the change in value in Green Timbers when the greenway border is on a small park. Recall that small parks are a type of greenway defined by having an area less than half the area of the adjacent single-family property. We estimate that adding a small park border in Green Timbers decreases property value by \$6,812 (-5.2 percent). This estimate is significantly different from the hypothesis of no change in value at the 99.4 percent confidence level (t-statistic of -2.9). The estimate is considered accurate within the range of -\$11,512 to -\$2,112 with 95 percent confidence.

In Green Timbers, a small park type of greenway border has a negative value for adjacent single-family property compared with a moderate positive value for a typical type of greenway border in this neighbourhood. In addition, the negative value of a small park border in Green Timbers is opposite of the substantial positive value of a small park greenway border in the overall study area.



To explain this apparent paradox, it may be necessary to physically inspect the small park greenways in Green Timbers and the other study neighbourhoods. We suspect what we would find is that the small park greenways in Green Timbers tend to be pathways with narrow easements that either facilitate sidewalk traffic between streets or are poorly maintained, narrow greenways that are not particularly attractive.

The next seven estimates (Table 11) are of the change in value for an average single-family property from adding different types of existing greenway border in Green Timbers. We estimate that adding the existing border on GREENWAY A type greenways increases property value by \$3,672 (2.6 percent). The t-statistic for the test of the hypothesis of no change in value is 3.7 and this effect is significant at the 99.9 percent confidence level. The estimate is considered accurate within the range of \$1,698 to \$5,646 with 95 percent confidence.

We estimate that adding the existing border on GREENWAY AE type greenways in Green Timbers decreases property value by \$13,148 (-9.4 percent). The t-statistic for the test of the hypothesis of no change in value is -3.2 and this effect is significant at the 99 percent confidence level. The estimate is considered accurate within the range of -\$21,749 to -\$4,546 with 95 percent confidence.

In Green Timbers, we find no significant change in the value of single-family property from adding a border to greenway types GREENWAY BOP, GREENWAY BOPE1, GREENWAY BOPE2, GREENWAY BP or GREENWAY BPS.

Our analysis thus indicates that, in Green Timbers, a border on a greenway of type GREENWAY A has a significant positive effect on single-family property. A border on a greenway of type GREENWAY AE has a significant negative effect on single-family property value. These two results are equivalent to those found for the overall study area since most of the GREENWAY A and GREENWAY AE types are located in Green Timbers. A border on a greenway of type BP has no significant effect on single-family property value in Green Timbers, unlike the overall study area, where a border on this type of greenway has a significant positive effect on property value.



The next three estimates (Table 11) are of the change in value, in Green Timbers, for an average single-family property during three different periods within the overall study era (from 1980 to 2001). We estimate that adding the existing greenway border in Green Timbers during the 1980 through 1986 period increased property value by \$3,173 (3.1 percent). This estimate is highly significant (t-statistic of 3.1), and the 95 percent confidence interval is from \$1,148 to \$5,198. We find no significant effect on property value in Green Timbers during the 1987 through 1993 period. Adding the border on existing greenway during the 1994 through 2001 period in Green Timbers increased property value by \$5,362 (2.3 percent). This estimate is significant (t-statistic of 2.1), and the 95 percent confidence interval is from \$192 to \$10,531. The estimates of change in property value during different time periods in Green Timbers are consistent with the notion that the value of a greenway border has increased over the past 21 years, though not as fast as the average value of single family property. This increase in value reflects both pure price inflation and quality improvement.

The final two estimates shown in Table 11 are of the change in value, in Green Timbers, for an average single-family property, depending on whether the property has a house built on it (improved property) or is vacant. We estimate that adding the existing greenway border increases improved single-family property value by \$2,144 (1.3 percent). We reject, with 99 percent confidence, the hypothesis of no change in value on improved property in Green Timbers (t-statistic of 2.5), and the 95 percent confidence interval for the estimate is from \$456 to \$3,831. By contrast, we find no significant (or slightly negative) effect of a greenway border on the value of vacant property. Our analysis is thus consistent with a typical greenway border in Green Timbers being valuable to homeowners rather than homebuilders.



**TABLE 11. THE EFFECTS OF GREENWAY BORDER ON SINGLE FAMILY PROPERTY VALUE**LEVEL OF ANALYSIS: **GREEN TIMBERS**

	Estimated Value of Greenway Border		95% Confidence Interval on Estimated Value of Greenway Border		Hypothesis Test: "No change in value".		
	\$	%	Lower	Upper	t - Ratio	Degrees of Freedom (N - 1)	Significance (2-Tail)
<b>GREEN TIMBERS</b>							
GREENWAY	\$1,051	0.8	-\$420	\$2,522	1.403	620	.161
SMALL PARK SIZE	-\$6,812	-5.2	-\$11,512	-\$2,112	-2.929	40	.006
GREENWAY A	\$3,672	2.6	\$1,698	\$5,646	3.674	157	.000
GREENWAY AE	-\$13,148	-9.4	-\$21,749	-\$4,546	-3.211	18	.005
GREENWAY BOP	-\$670	-0.5	-\$6,629	\$5,289	-.225	60	.823
GREENWAY BOPE1	\$1,359	0.9	-\$1,235	\$3,954	1.036	139	.302
GREENWAY BOPE2	\$544	0.5	-\$1,877	\$2,965	.443	196	.658
GREENWAY BP	-\$471	-0.3	-\$32,348	\$31,407	-.032	14	.975
GREENWAY BPS	\$2,344	1.6	-\$4,275	\$8,962	.723	30	.475
GREENWAY BPSE1						0	
GREENWAY BPSE2						0	
GREENWAY BPG						0	
GREENWAY BPE1						0	
GREENWAY BPE2						0	
1980 THRU 1986	\$3,173	3.1	\$1,148	\$5,198	3.094	159	.002
1987 THRU 1993	-\$961	-0.8	-\$2,871	\$949	-0.989	367	.323
1994 THRU 2001	\$5,362	2.3	\$192	\$10,531	2.060	92	.042
IMPROVED TRANSACTIONS	\$2,144	1.3	\$456	\$3,831	2.496	465	.013
VACANT TRANSACTIONS	-\$2,235	-3.9	-\$5,207	\$738	-1.485	154	.140



## **SPECIFIC ANALYSIS: SEMIAHMOO TRAIL SOUTH**

The central question of this section is: Does greenway border affect single-family property value in the Semiahmoo Trail South neighbourhood during the era from 1980 to 2001? As before, our estimates of value of a greenway border are based on the matched pairs estimator described earlier. These estimates are of the increase (decrease) in property value from adding the greenway border effect. Estimates are made over the whole neighbourhood and for different greenway types, eras and property types. The results of these estimates are shown in Table 12.

The first estimate is of the change in value for an average single-family property from adding the existing greenway border. As discussed earlier, in Semiahmoo Trail South, we estimate that adding the existing greenway border increases single-family property value by \$17,515 (10.2 percent). We reject, with 99.9 percent confidence, the hypothesis of no change in value (t-statistic of 4.9), and the 95 percent confidence interval for the estimate in Semiahmoo Trail South is from \$10,400 to \$24,630.

The next estimate (Table 12) is of the change in value in Semiahmoo Trail South when the greenway border is on a small park. We estimate that adding a small park border in Semiahmoo Trail South increases property value by \$19,862 (13.1 percent). This estimate is significantly different from the hypothesis of no change in value at the 99.9 percent confidence level (t-statistic of 5.1). The estimate is considered accurate within the range of \$12,087 to \$27,636 with 95 percent confidence. In Semiahmoo Trail South, a small park type of greenway border has approximately the same value for single-family property as a typical type of greenway border. In addition, the substantial positive value of a small park border in Semiahmoo Trail South is higher than the positive value of a typical small park greenway border in the overall study area.

The next two estimates (Table 12) are of the change in value for an average single-family property from adding different types of existing greenway border in Semiahmoo Trail South. We estimate that adding the existing border on GREENWAY BP type greenways increases property value by \$15,979 (9.6



percent). The t-statistic for the test of the hypothesis of no change in value is 4.3 and this effect is significant at the 99.9 percent confidence level. The estimate is considered accurate within the range of \$8,605 to \$23,353 with 95 percent confidence.

We estimate that adding the existing border on GREENWAY BPE1 type greenways in Semiahmoo Trail South increases property value by \$33,191 (15.1 percent). The t-statistic for the test of the hypothesis of no change in value is 2.5 and this effect is significant at the 97 percent confidence level. The estimate is considered accurate within the range of -\$4,040 to \$62,341 with 95 percent confidence. The small sample size prevents a more accurate estimate in this market segment.

Our results thus indicate that, in Semiahmoo Trail South, there is a substantial positive increase in the value of single-family property from bordering on GREENWAY BP and GREENWAY BPE1 type greenways. Other types of greenways in Semiahmoo Trail South were either not identifiable, or our sample size was too small to yield value estimates.

The next three estimates (Table 12) are of the change in value, in Semiahmoo Trail South, for an average single-family property during three different periods within the study era from 1980 to 2001. We estimate the incremental value of a greenway border in Semiahmoo Trail South during the 1980 through 1986 period increased property value by \$5,923 (8.8 percent). This estimate is fairly significant (t-statistic of 1.8), and the 95 percent confidence interval is from -\$990 to \$12,835. During the 1987 through 1993 period in Semiahmoo Trail South, adding the border on existing greenway increased single-family property value by \$20,206 (11.3 percent). Adding the border on existing greenway during the 1994 through 2001 period in Semiahmoo Trail South increased property value by \$20,467 (6.8 percent). These last two estimates are highly significant (t-statistics of 4.1 and 2.8).

The estimates of change in property value during different time periods in Semiahmoo Trail South are consistent with the notion that the value of a greenway border has increased over the past 21 years, though not as fast as the



average value of single family property. This increase in value reflects both pure price inflation and quality improvement.

The final two estimates shown in Table 12 are of the change in value, in Semiahmoo Trail South, for an average single-family property, depending on whether the property has a house built on it (improved property) or is vacant. We estimate that adding the existing greenway border increases improved single-family property value by \$23,601 (11.6 percent). We reject, with 99.9 percent confidence, the hypothesis of no change in value on improved property in Semiahmoo Trail South (t-statistic of 5.7), and the 95 percent confidence interval for the estimate is from \$15,399 to \$31,803. By contrast, we find no significant effect of a greenway border on the value of vacant property. Our analysis is thus consistent with a typical greenway border in Semiahmoo Trail South being valuable to homeowners rather than homebuilders.

There could be several explanations for this result. For instance, the bare lot sales may have occurred before the greenway was actually improved. In this case, a builder buying a lot in a new subdivision is looking at bare unimproved land, so the value of the greenway border might have appeared minimal at the time.

Another possibility is that the bare lot sales may tend to be the “end of the run” subdivision lots. Land developers may have improved the “trophy” and the better lots in the subdivision and sold the lower quality vacant lots to independent builders.



**TABLE 12. THE EFFECTS OF GREENWAY BORDER ON SINGLE FAMILY PROPERTY VALUE**  
**LEVEL OF ANALYSIS: SEMIAHMOO TRAIL SOUTH**

	Estimated Value of Greenway Border		95% Confidence Interval on Estimated Value of Greenway Border		Hypothesis Test: "No change in value".		
	\$	%	Lower	Upper	t - Ratio	Degrees of Freedom (N - 1)	Significance (2-Tail)
<b>SEMIAHMOO TRAIL SOUTH</b>							
GREENWAY	\$17,515	10.2	\$10,400	\$24,630	4.882	104	.000
SMALL PARK SIZE	\$19,862	13.1	\$12,087	\$27,636	5.120	55	.000
GREENWAY A						0	
GREENWAY AE						0	
GREENWAY BOP						0	
GREENWAY BOPE1						0	
GREENWAY BOPE2						0	
GREENWAY BP	\$15,979	9.6	\$8,605	\$23,353	4.304	92	.000
GREENWAY BPS						0	
GREENWAY BPSE1						0	
GREENWAY BPSE2						0	
GREENWAY BPG						0	
GREENWAY BPE1	\$33,191	15.1	\$4,040	\$62,341	2.537	10	.030
GREENWAY BPE2						0	
1980 THRU 1986	\$5,923	8.8	-\$990	\$12,835	1.793	19	.089
1987 THRU 1993	\$20,206	11.3	\$10,452	\$29,959	4.130	72	.000
1994 THRU 2001	\$20,467	6.8	\$4,125	\$36,808	2.757	11	.019
IMPROVED TRANSACTIONS	\$23,601	11.6	\$15,399	\$31,803	5.728	79	.000
VACANT TRANSACTIONS	-\$1,960	-2.8	-\$14,115	\$10,196	-0.333	24	.742





## CONCLUSIONS

Our study, supported by relevant data and based upon an analysis of the factors influencing value, clearly supports the inference that a typical greenway border increases the value of single-family property, in the study neighbourhoods during the era from 1980 through 2001. For the four study neighbourhoods in aggregate, a small park type of greenway appears to be even more valuable to single-family property than a typical type of greenway.

Our analysis indicates a greenway border increases the value of single-family property in at least three of the four study neighbourhoods. One neighbourhood was not analyzed due to insufficient sample size (Semiahmoo Trail North). The estimated values of a greenway border on single-family property are significantly higher in Semiahmoo Trail South and Huntington/Bridlewood Parkway than in Green Timbers.

For the four study neighbourhoods in aggregate, we find a significant increase in the value of single-family property from a border on greenway types GREENWAY A and GREENWAY BP. We find a significant decrease in value for greenway type GREENWAY AE. Other types of greenway borders exhibited either no significant effect on the value of adjacent single-family property, or our sample size was too small to yield value estimates.

Unfortunately, GREENWAY AE comprises of about nine individual sites that border on a Greenway that is largely overgrown and portions are not passable. Based upon our observations, the impact upon value may be attributable to deferred maintenance of the greenway rather than the small existing easements. It is possible that the greenway has been a pathway from North Surrey Secondary School and Community Park in the past and has been allowed to be overgrown to discourage use of the path and the little park at the west end. Photographs illustrating the condition of the greenway are presented on the following page.





We also estimated the change in single-family property value from adding greenway border during different periods within the study era from 1980 to



2001. Our analysis is consistent with the notion that the value of a greenway border has increased over the past 21 years, though not as fast as the average value of single-family property. This increase in value reflects both pure price inflation and quality improvement.

In addition, we analyzed the change in value from a greenway border for an average single-family property, depending on whether the property has a house built on it (improved property) or is vacant. Our analysis is consistent with a typical greenway border in the study neighbourhoods being valuable to homeowners rather than homebuilders.

We also examined separately the effect of greenway border on single-family property value in the neighbourhoods of Green Timbers and Semiahmoo Trail South. There was insufficient data for a more detailed analysis of the Huntington & Bridlewood Parkway and Semiahmoo Trail North neighbourhoods.

In Green Timbers, a border on a small park type of greenway has a negative value for single-family property compared with a moderate positive value for a typical type of greenway border in this neighbourhood. In addition, the negative value of a small park border in Green Timbers is opposite of the substantial positive value of small park greenway borders in the overall study area.

Our analysis indicates that, in Green Timbers, a border on a greenway of type A has a significant positive effect on single-family property value. A border on a greenway of type AE has a significant negative effect on single-family property value. These two results are equivalent to those found for the overall study area since most of the GREENWAY A and GREENWAY AE types are located in Green Timbers. A border on a greenway of type BP has no significant effect on single-family property value in Green Timbers, unlike the overall study area, where a border on this type of greenway has a significant positive effect on property value.

The estimates of change in property value during different time periods in Green Timbers are consistent with the notion that the value of a greenway border has increased over the past 21 years, though not as fast as the average value of



single family property. In addition, our analysis is consistent with a typical greenway border in Green Timbers being valuable to homeowners rather than homebuilders.

In Semiahmoo Trail South, a small park type of greenway border has approximately the same value for single-family property with a typical type of greenway border. In addition, the substantial positive value of a small park border in Semiahmoo Trail South is higher than the positive value of small park greenway borders in the overall study area.

Our results also indicate that, in Semiahmoo Trail South, there is a substantial positive increase in the value of single-family property that borders on GREENWAY BP and GREENWAY BPE1 type greenways. Other types of greenways in Semiahmoo Trail South were either not identifiable, or our sample size was too small to yield value estimates.

The estimates of change in property value during different time periods in Semiahmoo Trail South are once again consistent with the notion that the value of a greenway border has increased over the past 21 years, though not as fast as the average value of single family property. In addition, our analysis is once again consistent with a typical greenway border in Semiahmoo Trail South being valuable to homeowners rather than homebuilders.



## **MARKET EXPOSURE TIME COMPARISON**

The purpose of this analysis is to test the hypothesis that the time needed to market a single family property that borders on a greenway (subject property) is shorter than the time required to market an otherwise comparable property (control property). As shown in the previous analysis, a greenway border generally adds significant value to the sale price of single-family property in the study neighbourhoods. The question examined in this section is whether the value of a greenway border also translates into a shorter marketing time for single-family property.

To test this hypothesis, we obtained sales data from the Fraser Valley Real Estate Board's (FVREB's) Multiple Listing Service (MLS). This data was needed because the British Columbia Assessment Authority's data used in the preceding analysis of sale prices does not include any information on the time period required to successfully market the properties. The FVREB supplied us with MLS sales records for some of the properties in our matched pairs sample of sales. This data includes a field which measures the number of days from the initial listing date to the final sales date, commonly referred to as "Total Days on Market".

We matched the MLS sales data to the matched pairs Assessment Authority data using three common variables: 1) Property identification number (PID#), 2) Sale price, and 3) Sale date. A "one-to-one" match was not possible for several reasons. Assessment data includes all property sales, whereas FVREB data includes only property sales marketed via the MLS. In addition, MLS sales were only available for the last eight years, beginning in 1993, due to changes in the FVREB's database over the 22-year study period. The MLS data obtained was also limited by a substantial number of missing values on the sale date and sale price variables.

Of the 755 matched pairs of property sales in our test sample (Table 9), we were able to match 94 subject property sales and 91 control property sales with their MLS transaction records. The net result of merging the MLS sales to our matched pairs sample was 75 pairs that had MLS data on both the subject and



control sales. The average total days on the market for subject property sales was 108.3 days versus an average of 115.6 days on the market for control property sales. Thus, the statistical mean of the differences in marketing time for greenway versus otherwise comparable non-greenway properties is -7.3 days. That is, single-family property with a greenway border appear to sell approximately seven days faster, on average, than comparable properties without a greenway border. The results of this analysis are summarized in Table 13.

**TABLE 13. MATCHED PAIRS SAMPLE: TOTAL DAYS ON MARKET**

	N	Minimum	Maximum	Mean	Std. Deviation
<b>SUBJECT SALES:</b> Single-family property bordering a greenway in the study neighbourhoods.					
DAYS ON MARKET: SUBJECT	<b>75</b>	<b>1</b>	<b>1,940</b>	<b>108.3</b>	<b>233.9</b>
<b>CONTROL SALES:</b> Single-family property not bordering a greenway in the study neighbourhoods.					
DAYS ON MARKET: CONTROL	<b>75</b>	<b>1</b>	<b>1,884</b>	<b>115.6</b>	<b>304.4</b>
<b>PAIRED DIFFERENCES:</b> Days on market for subject sales minus days on market for control sales.					
	<b>75</b>			<b>-7.3</b>	<b>365.6</b>

We performed a *t*-test on the average differences in days on market and the result indicated that this difference is not significantly different from zero. However, the *t*-test is not appropriate for testing the statistical significance of this result, and thus cannot be relied on for statistical confidence. The reason is that marketing time, as measured by days on market, is not distributed anywhere near symmetric, which is a requirement of the *t*-test method of statistical inference. **Thus, it appears that property with a greenway border does, on average, sell more quickly than comparable property without a greenway border.**



## CONTRIBUTING CONSULTANTS

**Gary E. Laughton, AACI, P. App, AAPI** has provided appraisal and real estate consulting services for over 20 years in Canada, United States, Australia and Southeast Asia. He was awarded the AACI designation by the Appraisal Institute of Canada as well as the AAPI designation by the Australian Property Institute, and is a Certified Practicing Urban Valuer in the State of Queensland, Australia. Gary is a past member of the National Environmental Committee of the Appraisal Institute of Canada and is also a member of the British Columbia Expropriation Association in addition to membership in a number of real estate and computer organizations.

Gary is the author of the **North American Ground Lease Report**, an international study on airport ground lease rates prepared for the Vancouver International Airport Authority, the **Mid Island Ferry Land Acquisition Report** for British Columbia Ferry Corporation, won the National Appraisal Competition for the disposition appraisal of the **Port of Churchill** for Transport Canada and was awarded the sole-source valuation assignment for the **1.6 million acre Banff National Park**. He has completed numerous consulting and valuation assignments for Public Works Canada, British Columbia Lands, Greater Vancouver Regional District, British Columbia Ferry Corporation, Vancouver Port Corporation and various provincial organizations and municipalities. Additionally, he has been commissioned by all major Canadian Banks as well as Bank of America, Citicorp and Bank of Tokyo.

The major focus of the consulting practice is to provide expert valuation and strategic real estate support services to clientele with large real estate holdings with new technology input combined with established valuation methodologies.

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**Landcor** is building the best source of real estate data and analytic tools available on the Internet. Landcor acquires comprehensive, accurate and current information and develops sophisticated programs to allow a wide range of users to use this data to make real estate decisions.

Our initial area of operations is British Columbia, Canada. We have structured a long-term relationship with the British Columbia Assessment Authority that guarantees our access to a wide range of data about real property and sales transactions in the entire province. We are currently negotiating comparable agreements in other jurisdictions. Our goal is to provide coverage across North America.

Landcor Data Corporation (LANDCOR.com) was founded in April 1987 by Rudy F. Nielsen R.I (B.C) F.R.I, a real estate professional with extensive experience in real estate appraising, property acquisition, land development, and air photo, satellite and mapping information management. Landcor's analytical tools have been developed by a multi-disciplinary team including:

- Urban land economists.
- Experts in statistical analysis.
- Software developers.
- Web site designers.
- Appraisers.
- Real estate consultants.
- Academics.

Landcor's research and development efforts are ongoing. We are continuing to develop new applications of real estate data and secure new sources of data. For more information about LANDCOR.com, contact:

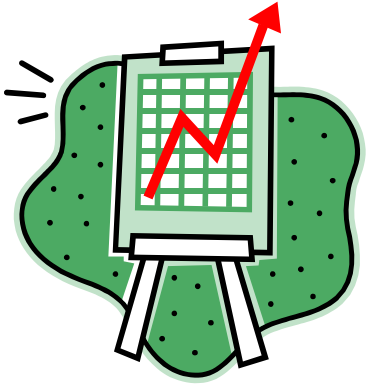
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## David W. Hobden, M.Sc. BUSINESS ECONOMIST

David Hobden produces economic consulting services in the real estate and finance sectors. David is a qualified urban land economist and specializes in forecasting and policy analysis. Services include literature review, group survey, market analysis, statistical analysis and modeling and hypothesis testing.



David has provided proprietary consulting services since 1996 and has worked as a housing market analyst and financial economist since earning his Master's degree in urban land economics from the University of British Columbia in 1991. David's clients include Canada Mortgage and Housing Corporation, Real Estate Board of Greater Vancouver and Landcor Data Corporation.

### ***BRIEF RESUME***

B.Com. (Finance) 1988, M.Sc. (Urban Land Economics) 1991, University of British Columbia; Association of Professional Economists of British Columbia, 1994 - ; Market Analyst, Canada Mortgage and Housing Corporation, 1992 - 95; Economist, Credit Union Central of British Columbia, 1997; Author of studies in housing market analysis, mortgage finance and financial intermediation; Instructor of Real Estate Finance, College of New Caledonia, 1992-93

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## References and Resources

Below is a review of other recent studies on the effects of parks, open spaces and greenways on property values. Ten articles and reports are listed, with links for those available on-line. These are followed by links to several web sites (mostly United States) that have a greenways focus.

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### 1.

#### Citation and Link:

Crompton, John L., "The Impact of Parks on Property Values", *Parks & Recreation*, Jan. 01 Vol. 36(1), p. 62

Full text available through [Vancouver Public Library](#), Electronic Publications, Academic Search Elite Database. The article is essentially summarizing a larger publication, entitled "The Impact of parks and Open Space on Property Values and the Property Tax Base" available for sale (\$35 USD nonmembers) through <http://www.activeparks.org> (the National Recreation and Parks Association).

#### Key Findings:

- The empirical evidence from 20 of the 25 studies reviewed supported the premise that parks and open space contributed to increasing proximate property values. In four of the five studies that did not support the proximate principle, it was suggested that the ambivalent findings might be attributable to methodological limitations.
- The support extended beyond urban areas, to include properties that were proximate to large state parks, forests and open space in rural areas.
- The conventional wisdom that creating large state or federal park or forest areas results in a net reduction in the value of an area's tax base was not supported.
- Parks embracing primarily active use recreation areas showed much smaller proximate increases than those accommodating only passive use.



- The magnitude of the proximate effect will vary according to size, usage and design of parklands, but a positive impact of 20% on property values abutting or fronting a passive park area is a reasonable guideline as a point of departure.
- The proximate impact of park land and open space is likely to be substantial up to 500 feet, and in the case of community parks is likely to extend out to 2000 feet.

**Abstract:**

Analyzes the impact of parks on the values of real estate property. Proximate principle in real estate management; Hypothetical illustration of an investment in parks; Results of a research on urban park development in the late 1960s and 1970s; Impact of greenways and golf courses on property values.

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**2.**

**Citation and Link:**

B. Bolitzer, N.R. Netusil, The impact of open spaces on property values in Portland, *The Journal of Environmental Management*, 7/1/00, Vol 59 (3), pp. 185-193

<http://www.idealibrary.com/links/artid/jema.2000.0351/production/pdf>



## Key Findings:

Proximity to greenspace	Impact under different modeling methods	
	linear model	semi-log model
Within 1500 feet of an open space	Sells for \$2105 more than a house located more than 1500 feet from an open space	Increases the selling price of the house by 1.43%
Each additional acre of open space	Increases the selling price of the house by \$28.33 US	
Within 1500 feet of 20 acres of open space	Sells for \$2670US more than a house located more than 1500 feet from an open space	Sells for \$1247US more than a house located more than 1500 feet from an open space
Within 1500 feet of a public park	Increases the home's sale price by \$2262	Increases the home's sale price by \$845US
Within 1500 of a golf course	Increases the home's sale price by \$3400US	Increases the home's sale price by \$3940US
Within 1500 feet of a public park (mean size 20 acres)	Increases the home's sale price by \$2780US	Increases the home's sale price by \$1360US

## Abstract:

Open spaces such as public parks, natural areas and golf courses may have an influence on the sale price of homes in close proximity to those resources. The net effect of open-space proximity is theoretically uncertain because the positive externalities associated with proximity, such as a view or nearby recreation facility might be outweighed by negative externalities, for example, traffic congestion and noise. The impact of open-space proximity and type is examined empirically using a data set that includes the sales price for homes in Portland, Oregon, a major metropolitan area in the United States, geographic information system derived data on each home's proximity to an open-space and open-space type, and neighbourhood and home characteristics. Results show that proximity to an open-space and open-space type can have a statistically significant effect



on a home's sale price. These estimates provide an important step in quantifying the overall benefit from preserving open spaces in an urban environment.

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### 3.

#### **Citation and Link:**

Quayle, Maura and Stan Hamilton, "Corridors of Green and Gold: Impact of Riparian Suburban Greenways on Property Values," prepared for the Fraser River Action Plan, April 1999.

[http://www-heb.pac.dfo-mpo.gc.ca/english/publications/PDF/corr\\_gg.PDF](http://www-heb.pac.dfo-mpo.gc.ca/english/publications/PDF/corr_gg.PDF)

#### **Key Findings:**

In four study areas in British Columbia, sales price was higher for properties adjacent to greenways (although there was a sampling error in one area). The findings included:

An increase of 15.6% in the sale price of adjacent properties in Sturgeon Bank, Richmond, with similar finding for the assessed value of the property and land;  
An increased home sale price of 11.9% was found in Cougar Creek, Delta; and  
An increased home sale price of 14.45% was found in Kanaka Creek, Maple Ridge.

#### **Description:**

This study focuses on one component of the information puzzle: the economic impact of proximity to riparian (stream-side) greenways on suburban residential property values. Section 2 provides a brief summary of related literature. The research methodology is presented in section 3 and the four study areas are described in section 4. The results are presented in section 5 and the survey results are summarized in section 6. Section 7 concludes the report noting that the results of this study support the hypothesis that proximity to riparian greenways has a positive impact on residential property prices for adjacent properties.

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### 4.



**Citation and Link:**

National Park Service, *Economic Impacts of Protecting Rivers, Trails and Greenway Corridors: A Resource Book*, 1995, 4<sup>th</sup> Edition revised, Washington DC GPO.

[http://www.nps.gov/pwro/rtca/econ\\_index.htm](http://www.nps.gov/pwro/rtca/econ_index.htm)

**Key Findings:**

This study was the source for all of the remaining resources. Key findings related to property values are summarized below with their source.

Other economic benefits of creating greenways: in addition to increased property values, the National Park Service Study (1995) identifies non-consumptive fees as a source of funding for greenway preservation. Non-consumptive fees are charged to companies that want to use the land for activities that will not interfere with the recreational purpose of the trail. Commercial companies usually purchase right of way easements for telephone cables, fiber optic communications and cable television wire to name a few.

Found that property values are likely to be highest near greenways, which “highlight open space rather than highly developed facilities, have limited vehicular access, but some recreational access and have effective maintenance and security.” (Brown and Connelly: Colwell, 1986)

“Designing greenways to minimize potential homeowner - park user conflicts and maximize the access and views of the greenway can help to avoid a decrease in property values of immediately adjacent properties.”

**Description:**

The purpose of this resource book is to:

- Encourage local professionals and citizens to use economic concepts as part of their effort to protect and promote greenways;
- Provide examples of how greenways and parks have benefited local and regional economies;
- Demonstrate how to determine the potential economic impacts of river, trail, and greenway projects; and
- Suggest other sources of information.



Sections include: real property values, expenditures by residents, commercial uses, tourism, estimating the effects of spending; agency expenditures; corporate relocation and retention; public cost reduction; and benefit estimation.

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## **5.**

### **Citation and Link:**

Seattle Office for Planning, May 1987, *Evaluation of Burke-Gillman Trail's Effect on Property Values and Crime*, Seattle, WA

### **Key Findings:**

Properties near but not adjacent to the trail sold for 6% more than similar properties away from the trail.

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## **6.**

### **Citation and Link:**

Arthur C. Nelson, "Using Land Markets to Evaluate Urban Containment Programs",  
*APA Journal* (1986) Spring 156-171

### **Key Findings:**

Urban land adjacent to a privately owned greenbelt (actually rural farmland) in Salem, Oregon was worth \$1,200US more per acre than land more than 1,000 feet away.



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7.

**Citation and Link:**

Margaret Kimmel (1985) "Parks and Property Values: an Empirical study in Dayton and Columbia", Thesis: Oxford OH: Miami University, Institute of Environmental Sciences. Source: <http://www.greenways.org>

**Key Findings:**

Being near a park and arboretum accounted for 5 percent of the selling price.

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8.

**Citation and Link:**

More, Thomas A., Thomas Stevens and P. Goeffrey Allan, (August 1982), "The Economics of Urban Parks," *Parks and Recreation*

**Key Findings:**

In Worcester, MA houses located 20 feet from an urban park sold for \$2,675 (1982 dollars) more than houses located 2,000 feet away.

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9.

**Citation and Link:**

Correll, Lillydahl and Singell. (May 1978) "The Effects of Greenbelts on Residential Property Values", *Land Economics*

**Key Findings:**

Found that the total value of the neighbourhood near a greenbelt in Boulder, Colorado was \$5.4 million more than if there hadn't been a green belt.





Housing prices declined an average of \$4.20 for each foot of distance from the greenbelt up to 3200 feet. In one neighbourhood, this figure was \$10.20 per foot up to 3200 feet from the greenbelt. Property adjacent to the greenbelt would be 32 percent higher than those 3,200 feet away.

## 10.

### **Citation and Link:**

John Weicher and Robert Zerbst (1973) "The Externalities of Neighbourhood Parks: An Empirical Investigation", *Land Economics* 49(1):99-105

### **Key Findings:**

Houses that faced the park sold for 7 to 23 percent more than homes one block from the park. Homes that backed up onto the park sold at prices similar to houses one block away.

## **Additional References**

Allen, M.T., T.M. Springer and N.G. Waller 1995. "Implicit Pricing Across Residential Rental Submarkets", *Journal of Real Estate Finance and Economics* 11 pp. 137-151.

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Hamilton, S.W. and G.M. Schwann (1995). "Do High Voltage Electric Transmission Lines Affect Property Value?", *Land Economics* 71(4) pp. 436-444.

Schwartz, A.L. and S.D. Kapplin 1984. "Economic Implications of Alternative Home Financing", *Housing Finance Review* 3:2 pp. 165-175.



## **Greenways web sites:**

Trust for Public Land

<http://www.tpl.org/>

Founded in 1972, the Trust for Public Land is the only national nonprofit working exclusively to protect land for human enjoyment and well-being. TPL helps conserve land for recreation and spiritual nourishment and to improve the health and quality of life of American communities.

Florida's greenways and trails web site:

<http://www8.myflorida.com/communities/learn/trails/>

Ohio Greenways Organization:

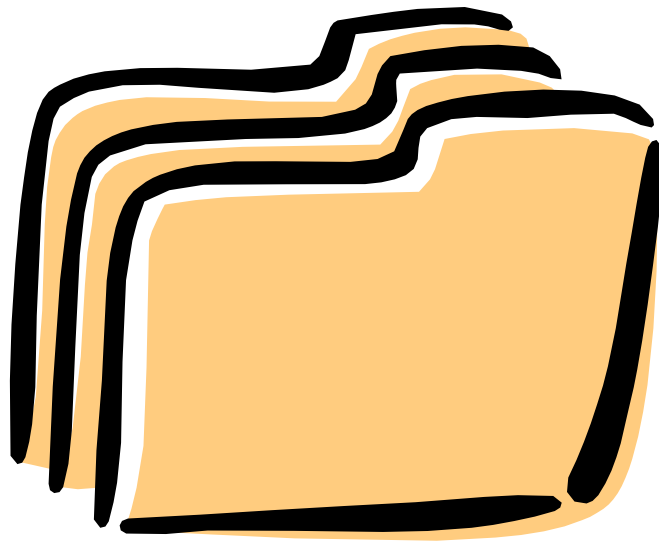
<http://www.ohiogreenways.org>

Greenbelt Alliance

<http://www.greenbelt.org>



## APPENDIX



## **t-Statistic**

The t-statistic, also known as the t-test or t-ratio, is used to determine the significance of each estimate. In this study, the estimator is the mean of the differences in value of an appropriately “matched pairs” sample. The t-statistic indicates the number of standard deviations that the particular estimate is away from zero. The t-statistic can be positive or negative and is calculated by dividing a particular estimate by the standard deviation of that estimate.

There are two ways to interpret whether the individual estimates are considerably different from zero and therefore more indicative of statistical significance. The more refined method is to obtain the “Significance (2-Tail)” from the well-known Student’s-t probability distribution, which is determined by the appropriate “degrees of freedom”. The degrees of freedom for a single estimate is the number of observations in the sample on which the estimate is based, less one. The 2-tail significance level is an estimate of the probability of rejecting the hypothesis of “no change in value” when in fact there is no significant change in value. For example, a significance of 0.05 indicates a 95 percent probability of correctly rejecting the hypothesis of no change in value.

The second method of determining statistical significance is the use of a general rule of thumb for inferring whether the estimate is significantly different from zero at the 95 percent confidence level. If the value of the t-statistic for a particular estimate is greater than or equal to the absolute value of two, then the estimate is very likely to be statistically different from zero with at least 95 percent confidence. That is, a t-statistic of two or more (whether positive or negative) is a high confidence rejection of the hypothesis of no change in value. The higher the value of the t-statistic, the greater the confidence in the estimate.



