APPENDIX 9A TRANS MOUNTAIN PIPELINE EFFECTS

LANDCOR®
DATA CORPORATION

Report Prepared for:

Kinder Morgan Canada

Project:

Trans Mountain Pipeline Effects

Phase Three

Prepared By:

Tsur Somerville, PhD, **Nadlan Consulting**
Jake Wetzel,MSc, **Condor Consulting**

Data from **Landcor Data Corporation**

July 22, 2015

This page is intentionally left blank

Nadlan Consulting and Condor Consulting*

Tsur Sommerville
NADLAN CONSULTING

Dr. Tsur Somerville is an associate professor, Director of the UBC Centre for Urban Economics and Real Estate, and holder of the Real Estate Foundation Professorship in Real Estate Finance at the Sauder School of Business at UBC. His areas of primary research are real estate development and housing markets. He has published in a wide range of academic journals and served on the boards of the leading academic organizations in urban economics and real estate. Dr. Somerville received his Ph.D. in Economics from Harvard University and his BA from the Hebrew University (Israel) in Economics and East Asian Studies.

Jake Wetzel
CONDOR CONSULTING GROUP

Jake Wetzel is a doctoral candidate in finance from the Sauder School of Business at UBC. He has earned MSc. degrees in Urban Land Economics and Financial Economics from UBC and Oxford University respectively. Jake is the principal consultant of Condor Consulting Group, specializing in real estate and urban economics consulting.

He is also a member of the American Real Estate and Urban Economics Association (AREUEA).

*Complete CVs can be found in Appendix C

About Landcor Data Corporation

Landcor Data Corporation Inc., founded by Rudy Nielsen, is a privately-held technology company based out of New Westminster, British Columbia. Landcor is a part of the Niho Group of Companies.

Landcor recognized that there was a need for a fast, accurate system of valuating and analyzing properties without having to physically inspect each and every one; its direction was thereby aimed at filling this void.

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

Landcor has structured a long-term relationship with the British Columbia Assessment Authority that guarantees access to a wide range of data regarding real property and sales transactions for the entire province. The Landcor system combines multiple sources of data and creates, through the use of Proprietary Applications, a series of customized “value added” reports and property evaluations. Landcor has information on all 1.9 million properties in B.C. and updates between 3,000 and 9,000 sales every week.

A FEW OF THE THINGS WE DO

PORTFOLIO VALUATION

The property data base that Landcor is built upon is second to none in the Province of British Columbia, both in terms of depth (insights into the 8 million + sales back to 1972) and breadth (weekly updates to the 1.9+ million titles). Landcor has the ability to provide bulk data using a cascading model of property valuations. As well, Landcor also has the ability to monitor properties of interest (i.e. rights of way; ownership notification programs), and notify you once changes has been tracked through the BC Assessment Authority.

GIS ANALYSIS

Landcor Data Corporation uses the best data available, including your own proprietary data, to address your business needs. Our experience has shown us that data can be successfully used in some spatial context but not all. Market research in rural British Columbia, for example, requires a significantly different research approach than that of urban BC.

CORE PRODUCTS

- The Property Valuator
- The Adjusted Value Profiler
- Property Profiler
- Title Search
- Name/Corporate Search
- Economic Rent
- BC Registry Documents

The Landcor Team

Jeff Tisdale
VP, CLIENT EXPERIENCE

A key team member, Jeff Tisdale understands the full range of Landcor's unique solutions and how our data tools can address the most difficult projects and problems. Drawing on over 15 years' product development and marketing experience, Jeff helps clients understand how to use property data to support their business decisions. He also manages client delivery and follow up, to ensure client satisfaction on all projects.

Derek Tinney
OPERATIONS MANAGER

With an extensive background in the information and technology sector, Derek Tinney specializes in building and maintaining best-of-breed technological solutions. Having worked for HealthVISION, Canadian Airlines and eOptimize, he is proud to bring over 20 years of knowledge and expertise to the Landcor team.

An integral part of the success of Landcor's ongoing system and product developments, Derek helps Landcor meet the evolving needs of our clients and partners.

Kevin Whitlock
PROJECT MANAGER

With over 18 years' experience in geomatics, Kevin offers Landcor's clients a high degree of professionalism and technical know-how. Helping to inform and guide our clients' actions and decisions, Kevin understands the needs and issues faced by technology users—and how to overcome complex technical problems to extract the solutions unique to each.

Along with his tech-consulting savvy, Kevin is an accredited teacher and trainer in Autodesk and Bentley systems, and has helped hundreds of people upgrade their skills and power up their careers and lives.

Gad Chen
SENIOR DATA ANALYST

Gad is a Landcor veteran, with 10 years of data analysis and modeling under his belt. With a passion for data, Gad has a unique talent for taking streams of raw data, numbers and statistics and pulling out the 'story and structure' underlying, what to others, is a fog of numbers.

Not easily fazed by the sheer volume of data and information, Gad is a master in optimizing MSSQL queries and stored procedures, improving/creating/validating predictive models, designing/optimizing relational data bases. He practices his passion like art, using tools like SSIS, SSAS, ETL, and SPSS.

Introduction

Property owners along potential oil and gas pipeline routes express concern that the presence of a pipeline easement on or near their property will lower the market value of their property. Owners of properties on which there is an easement experience a clear loss of property rights because construction on the easement is either forbidden or restricted.[1] They are compensated for this loss by payments from pipeline companies for the easement. The other potential loss that concerns property owners is the risk of a spill or any disamenity associated with proximity to a pipeline, which could result in lower property values on nearby non-easement properties. The validity of this potential loss depends on awareness of the presence of the pipeline easement and sufficient perception of risk to property from the pipeline to affect prices. Potential home buyers' assessment of pipeline' risk is especially difficult to identify because one cannot be sure that buyers, or possibly even sellers, are fully aware of a pipeline's presence. Unlike overhead transmission lines, a pipeline easement typically has a benign physical presence that is not easily observed, even at short distance. This makes the question of the effect of an easement on nearby residential detached property values strictly an empirical question that this study seeks to answer.

The findings of this study show that single family residential properties with a pipeline easement sell for slightly lower prices than those without, but proximity to an oil pipeline easement does not affect residential property values. The easement unambiguously lowers the market value of residential properties on which it lies, by an average of 5.1 to 5.6 percent. This percentage loss is generally higher for smaller properties and lower for larger properties. When residential properties near to a pipeline have lower transaction prices, the analysis presented here indicates that this results not from the presence of the pipeline easement but from the pipeline easement's land use context. It is the effect of land uses on which there is a pipeline easement, particularly commercial and industrial land uses, which lower the market values of residential properties adjoining the pipeline easement and not the presence of the easement itself. These findings are robust and consistent across a variety of different specifications of the relationship between property transaction prices, location, property characteristics, and the geographic relationship between a property and the pipeline easement, including other nearby land uses, the pipeline's land use context, and whether major features are a "barrier" between the property and the pipeline easement.[2]

This study uses data along a segment of the TransMountain Pipeline (TMPL) through the cities of Burnaby, Coquitlam, and Surrey in the Lower Mainland area of British Columbia. The data for the analysis are the arm's length transactions between 2000 and 2013 of single-family detached properties in a 1.0 km buffer along either side of the pipeline's easement. To address the variation in property prices that result from differences in lot and structure size and type, this study uses a hedonic regression methodology that separates out the different contributions to transaction prices of time and lot, structure, and neighbourhood characteristics from the effects of proximity to the pipeline. A property's proximity to the pipeline is measured in three separate ways: as a continuous function of distance (0 to 1.0 km), in discrete bands of distance away from the pipeline, and finally as an ordinal measure of adjacency. The pipeline easement crosses a variety of different land uses, from residential to non-residential developed land, parks and open-space, and alongside or underneath roads, all of which might affect the relationship between pipeline proximity and value. The analysis accounts for these different contexts in estimating the effects of proximity to the pipeline easement on transaction prices.

[1]The development restriction placed on the land by the easement typically precludes development or any activity that might harm the pipe within the 18.3-meter statutory right-of-way. In addition there is the National Energy Board (NEB) Safety Zone that extends 30 meters on either side of the pipeline easement (NEB Act Section 112), which states that any ground disturbing activity over 30 cm deep within that area requires notification to and approval by the pipeline company.

[2] We describe these land uses as barriers and they include, the Fraser River TransCanada highway, major non-residential areas, and parks. All of which might be expected to have a more immediate effect on a property's value and dominate the effect of the pipeline, which would lie beyond these land uses.

Project Scope

This paper finds that proximity to a pipeline does not affect property values in the absence of a pipeline rupture or incident. The difference in methodology between the research and analysis presented here and the existing published research on pipelines is that here we present more detailed and precise measures of proximity and we address the land use context of the pipeline easement and surrounding areas. When we mimic the standard approach of just including a general distance to the pipeline measure, we find no effect of distance to the pipeline on values, which reflects the results of other work, but when we distinguish discretely between those properties most proximate and others further away, we obtain the results presented above. The central finding of this research is that the effects of proximity to pipeline on property values result not from the presence of the oil pipeline easement itself, but rather from the effect of the easement's land use context, the land use on which there is an easement, on nearby properties. When the land use of the type, such as commercial, industrial, major road, and institutional, that exerts a negative effect on nearby residential properties, then proximity to the pipeline lowers residential property values. When it is a more benign or positive land use, such as green or open space, parks, and residential properties, it does not. An additional contribution of this research is the first reported statistical estimate of the effect of a pipeline easement on residential property values, slight over 5 percent decline, an effect that falls in percentage terms as the size of the parcel increases.

Project Scope

Kinder Morgan Canada is interested in researching the impact of the existing Trans Mountain Pipeline (TMPL) on residential properties. This work is in support of the company's pipeline planning with a particular interest in expansion within the Lower Mainland area of British Columbia. Kinder Morgan Canada engaged Landcor Data Corporation (Landcor) and Nadlan Consulting to carry out the data research and to conduct an analysis of residential market data with a focus on the effect on property values based on a property's proximity to the TMPL.

Landcor provided raw market data for the jurisdictions and to determine and identify all geographic features in the data for the study period (from 2000 to 2013). Nadlan Consulting used the data provided by Landcor to conduct statistical analyses of the relationship between house prices and factors that contribute to house prices: house lot and structure characteristics, geographic features of a unit's location, and the relationship of the unit to the pipeline easement.

Landcor Data Corporation is a licensed reseller of the BC Assessment data roll and has extensive experience conducting custom data extraction and regression analyses on property attributes. The BC Assessment roll is a government-maintained dataset of property valuation, which is the basis for the taxation system for the majority of the two million properties in British Columbia. For residential properties, the BC Assessment valuation calculation is determined using a fair market value methodology based on recent and similar sales. This extensive property coverage and market-based valuation process makes the BC Assessment roll the preferred data source for residential property market research.

Project Scope

Literature Review

The existing academic literature on the effects of oil and gas pipelines on property prices has examined a number of different features of this relationship. These include whether property prices are affected by pipeline proximity alone, the direct effect of a pipeline rupture on the value of properties that experience contamination, and the effect of a rupture on properties that do not experience contamination but are proximate to the affected pipeline. There is no consistent, well-executed research in the existing literature that finds that proximity to pipelines alone lowers estimated property values.[3] In the extant academic work, the diminution in property values from proximity to a pipeline only occurs when the study evaluates property values in the wake of a pipeline rupture that result in leaks, spills, explosions, and environmental damage. These unambiguously lower the value of affected properties. Somerville and Wetzel (2014) find the same pattern for the effect, lower prices in the aftermath of a pipeline release, of the 2007 Westridge spill in Burnaby, BC on the transaction prices of detached residential properties in the affected neighbourhood. The magnitude of the decrease varies by study with the nature, intensity, and awareness these incidents. Following a rupture, properties near the affected pipeline but away from the spill site also see lower property values. Remediable incidents appear to lower property values in the immediate area by approximately 5 percent, a decrease that declines in magnitude the further a property is from the pipeline and the further along the pipeline one is from the incident site.

The effect of pipeline ruptures on nearby properties dissipates with time. Whether the reduction in residential transaction prices disappears entirely depends on the nature of the spill and the algebraic form of the relationship between property value and distance to the spill location or pipeline and the time from the incident. Hansen, et al. (2006) is the only published pipeline incident study that models the decay of the effect on prices with time. The other studies examine the price response to a spill over time use the effect of the British Petroleum Deep Horizon Gulf Coast spill on coastal properties. In this case, the effects disappear within two years following the spill. The change in the effect of the spill on property values cannot be determined with a high degree of certainty because studies only analyze a short period after spills occur. In Somerville and Wetzel's (2014) unpublished report, the fall in prices following the release of oil in the Westridge neighbourhood relative to those in a nearby control neighbourhood is short term and within a few years there is no discernable effect of the spill on property values in the area of the release. The literature on the effects on commercial properties is so sparse and the results so inconsistent that no definitive assessment is possible.

The two strongest papers in this area based on rigour and data are Hansen, Benson, and Hagen (2006) and Fruit (2008). The former tests for the effect of a 1999 Bellingham, Washington pipeline rupture and resulting explosion and fire on properties near the affected pipeline. The latter is an unpublished working paper that studies the effects of the announcement to construct and then the 2004 completion of a 62-mile long gas pipeline on the sales prices of residential single-family properties in Clackamas and Washington counties in Oregon. In the Hansen et al. paper the authors first test whether prior to the spill and explosion distance to either one of two petroleum product pipelines had any effect on house sales price and they find no effect.

[3] For a more in-depth treatment of the literature see Somerville, T. & Wetzel, J. (2014). Pipelines and Property Values: A Review of the Academic Literature. Report prepared for The Trans Mountain Expansion Project, filed with the National Energy Board.

Project Scope

Hansen, Benson, and Hagen (2006) look at the effect on properties close to a pipeline that ruptured and are not directly subject to contamination from the resulting spill. They find that following the well-publicized spill and explosion along the Olympic Pipeline in Bellingham, Washington, which carries jet-fuel, properties 50 feet from the pipeline had prices that were an estimated 5.5 percent lower than properties beyond 1,000 feet from the pipeline.[4] The paper is also noteworthy because they not only evaluate the effect of proximity to the pipeline that ruptured, but also how this changes over time. They evaluate the same for a second pipeline that did not experience an event. Because of the tragic deaths of three people, including two children playing in a park, the spill and explosion on the Olympic event was extremely well known. As noted above, proximity to the Olympic Pipeline elsewhere in Bellingham was associated with lower sales prices; this was not the case for properties close to the second pipeline that did not experience a release or other event. In their analysis, only the pipeline that actually ruptured had a "stigma" effect, where properties close to the pipeline but away from the event site also had declines in property value relative to the pre-event period. With time, even the effects of proximity to the Olympic Pipeline diminished in magnitude. The effect of being 100 feet from the pipeline is reduced by 18 percent between 6 months and a year after the event and by 27 percent by two years.

There are two papers that examine gas pipelines and nearby property values that are relatively thorough. In an unpublished paper, Fruit (2008) finds no negative effect of the gas pipeline on nearby property values. The most compelling aspect of Fruit's work is that he assesses the changes in property prices before and after the announcement and subsequent construction of the pipeline. This allows him to better isolate the effect of the pipeline alone and not some constant attribute of the land on which the pipeline is placed.[5]

Wilde, Williamson, and Loos (2014) have a multi year study of the values of properties near a natural gas pipeline through a master-planned community in Clark Co., Nevada. Prices of properties near the pipeline are similar to prices elsewhere in the community, and the absence of a difference remains through two events: an increase in the pipeline pressure and a well-publicized gas pipeline explosion in California in 2010. Unfortunately, the authors only show their results graphically and do not provide statistical measures of significance.

A drawback of these and other studies is that the land use of the easement is treated as neutral in its effect on nearby properties, so that the all effects of proximity are assumed to be because the pipeline and not whether the easement is green space, a road, a highway, or industrial or commercial land uses. If the pipeline land use is an amenity, then the absence of an effect could reflect the trade-off between the positive amenity with a negative pipeline effect. To accurately assess this, pipeline and easement land use need to be statically separated in the analysis.

Other papers that are less well executed or not published in a peer-reviewed journal find no effect on residential property values from proximity to pipelines. Kinnard, Dickey, and Geckler's (1994) hedonic study on gas pipelines and Diskin et al.'s (2011) matched-pair appraisal of properties adjacent to gas pipeline right-of-ways in three Arizona suburban subdivisions also fails to find a negative relationship between distance from a pipeline and residential sales prices. These papers do not involve a pipeline event so they only reflect the presence of a pipeline. Boxall, Chan, and McMillan's (2005) study on sour gas facilities and rural or ex-urban residential property values outside Calgary, Alberta generates mixed results. Sour gas is different than conventional or sweet gas and oil because of its toxicity to humans and animals at very low concentration levels. Their paper finds that the larger the number of emergency plan response zones from sour gas facilities or pipelines in whose area a residential property is located, the lower the sales price. The effects are small; with a 100 percent increase in this number for a sour gas pipeline resulting in a 3.2 percent decrease in prices, or $9,000 for the average $290,500 (2001) property value. It is not clear if these results are transferable to pipelines whose products are neither as volatile nor hazardous to health as is sour gas.

[4] The decline in values with distance is such that this effect falls by 50 percent at 100 feet and by 50 percent from that for another 100 feet in distance from the pipeline.

[5] Studies that evaluate effects at a single point in time may not control for a factor that might lower house values that is correlated with the location of the pipeline. For instance, the pipeline was located in low value areas to reduce land and easement costs, so that properties near the pipeline are also of lower value because of these same location factors. A study that does not account for this context would have biased estimates of the effect of the pipeline on property values, measuring instead the factor that caused low land values in the first place.

Siegel, Caudill, and Mixon (2013) and Winkler and Gordon (2013) both study the effect of the Deep Horizon spill on coastal property. Both papers find lower prices in shoreline condominiums during the spill period. However, in both cases they find that within less than six months after the end of the spill there is no longer any statistically meaningful effect on prices; once the spill was no longer occurring and cleanup efforts were underway the negative effect on prices dissipated. Both papers suffer from the problem that they assign all time-varying effects around this time to the spill because they do not control for price movements in properties not affected by the spill.

The existing literature suggests that in general there are no effects of proximity to a pipeline on house values. When a spill has occurred, units closer to a pipeline, even if they are not contaminated, have lower values, but these dissipate with time. There are a number of problems with these studies. First, they typically study a small geographic area. Second, they do not adjust for the nature of the pipeline's easement, where distance from green space can be expected to have a different effect on nearby properties than distance from an industrial area. Third, the treatment of distance is typically just a parametric continuous measure and imposes assumptions about the relationship between proximity and value. This type of measure can hide effects that my only apply to a short distances immediately adjacent to the pipeline.

Data and Methodology

This study focuses on the pipeline easement and transactions in the cities of Burnaby, Coquitlam, and Surrey.[6] Burnaby is the pipeline terminus and the three cities reflect the westernmost and most urban section of the pipeline routing in British Columbia. Figure 1 shows the jurisdictions in the Vancouver Census Metropolitan Area (CMA).

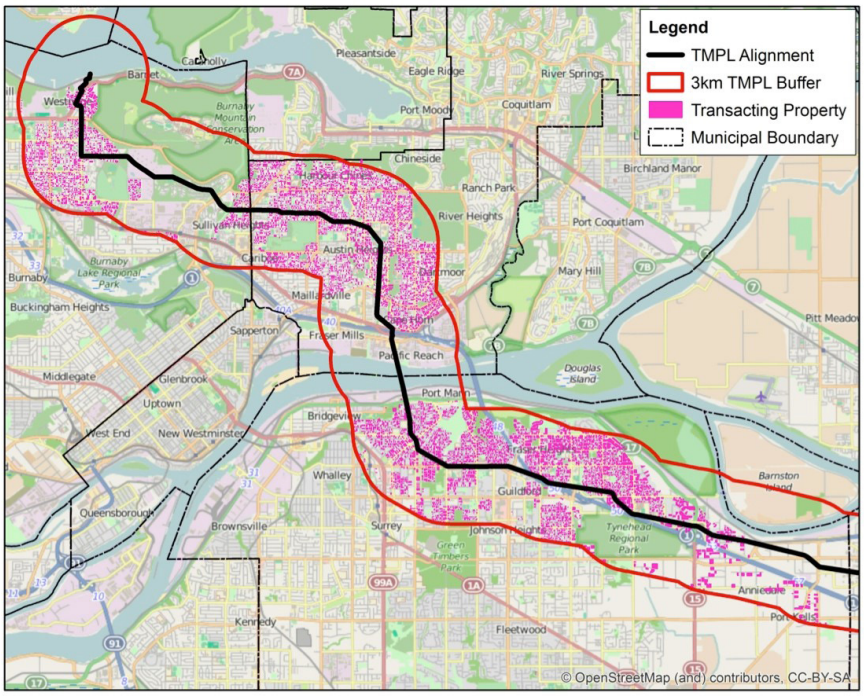
Figure 1 – Vancouver CMA Municipalities

[6] The cities are all part of the Vancouver CMA, the combined population as of the 2011 census of 842,200 making up 35 percent of the metro area's 2.37m population, and 18.6 percent of the area's land mass.

Project Scope

The analysis is limited to transactions in a band 1.0 kilometer on either side of the pipeline easement, balancing transaction volume against neighbourhood homogeneity. Figure 2 shows the easement and the locations of the property transactions.

Figure 2 – Study Area with Transactions



Kinder Morgan Canada provided Landcor Data Corporation with digital, geographic information system (GIS)-formatted files for use in Landcor's property selection and spatial analyses. These include the centerline of the existing TMPL alignment and the easements and right of ways associated with the existing TMPL alignment.[7] The actual number of residential properties with an easement for the TMPL can only be confirmed by way of a property title search through the BC Land Title and Survey Authority (LTSA), which maintains BC's official legal record of private property ownership. Legal information on a land title in British Columbia includes registered owner(s) names, historical title information (back to the date when information was first computerized), reference codes that identify any encumbrances that are contained on the search, and details of encumbrances (such as mortgages and easements).

This study evaluates the effects of pipeline proximity on real estate values using transaction data for single-family detached units. The analysis excludes properties on two or more acres, duplexes, row and town houses, properties identified by BC Assessment as having a suite, and strata properties. All the residential properties in BC are categorized by BC Assessment using their "Actual Use Code" coding scheme (see Appendix A – Glossary). This code denotes a property's primary use and each code has a corresponding "Actual Use Description." A full and comprehensive description of the data extraction and identification process is presented in Appendix B. The results of this identification process and its implications are described below in the body of the report.

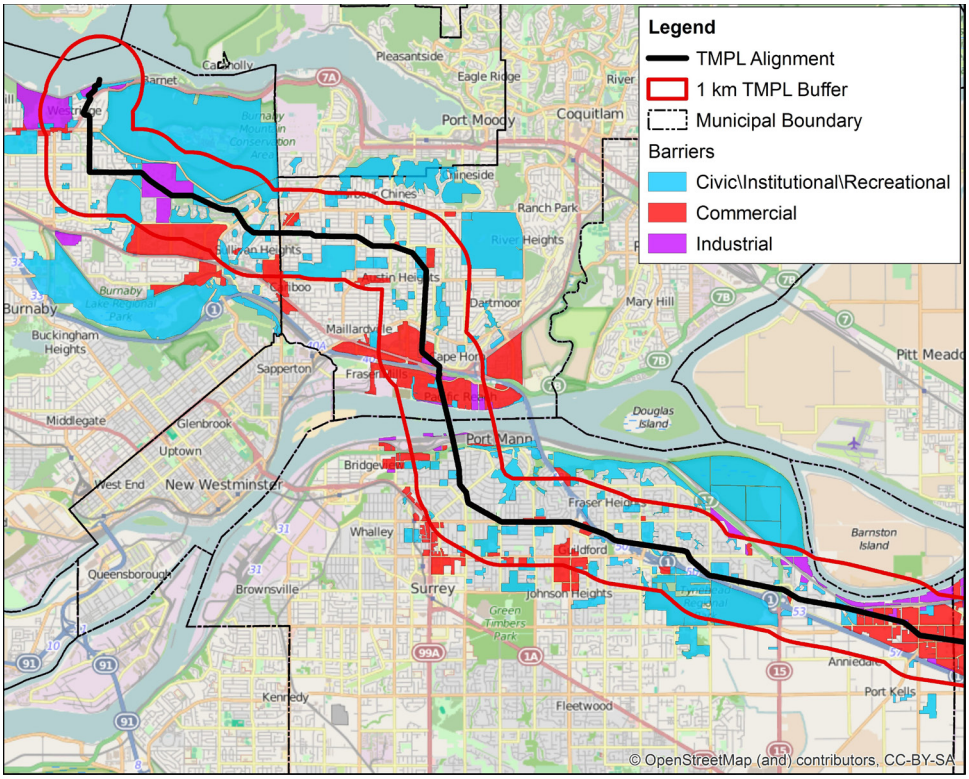
[7] It should be noted that the easement and right of way (RoW) information provided by Kinder Morgan Canada is considered as a reference only and not a precise and definitive delineation of where the easement or RoW actually falls. The TMPL GIS data is intended to show the general location of the Trans Mountain Pipeline. It is specifically not to be used for legal, engineering or surveying purposes, or for doing any work on or around the pipeline, all of which require the specific physical location and marking of the pipeline by qualified personnel and with Kinder Morgan Canada's prior written approval.

Project Scope

The relationship of properties to the pipeline is not uniform as other land uses may lie between a property and the property easement. These other uses, such as commercial, industrial, major arterials, and civic (government, institutional, and recreational), may affect a purchaser's notion of value more than the distance to the pipeline. For instance, a pipeline 250 meters from a property may have no effect on the property's value if the TransCanada Highway lies between the two and exerts a greater effect on the property value. Figure 3 shows the identified barriers in the study area.

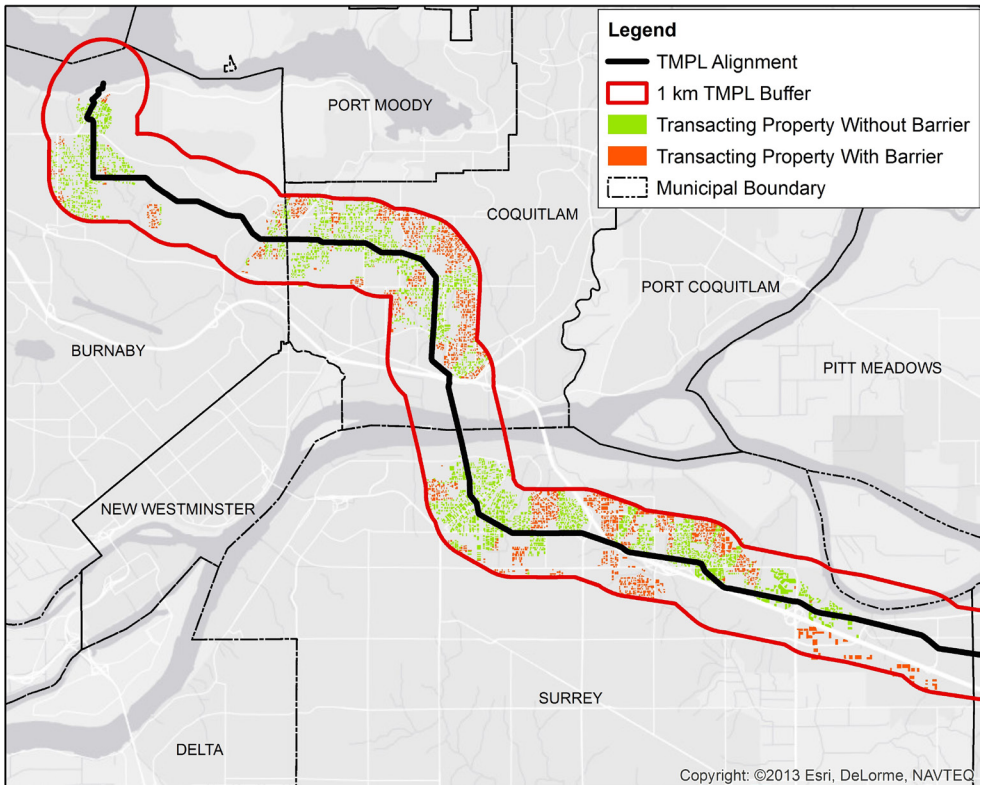
These barrier properties will also have a role in the analysis directly as we control for whether a property is within a short distance of commercial, industrial, or different civic land uses, and within 40 meters of a major (grade separated and non-grade separated highways) and minor (collector) arterial. The effects are allowed to vary across each of these different land uses. Figure 4 shows the geography of properties with and without the barrier. In general, properties further away from the pipeline are more likely to be separated from the pipeline by a barrier.

Figure 3 Pipeline Barriers
Major Arterials, Non-Residential Land Uses, and Civic Land Uses



Project Scope

Figure 4 – Properties Separated from Pipeline by Barriers
Major Arterials, Non-Residential Land Uses, and Civic Land Uses



Project Scope

Rather than just relate properties to the pipeline on a continuous measure of distance, it also possible to think about the relationship in terms of the number of properties that lie between a property and the pipeline easement. The intuition is that when the presence of a pipeline is not immediately evident, a property is more likely to learn about the easement from neighbours. Distance in this case is the number of connections that the flow of information must cross. From one landowner to an adjacent landowner would be one connection, so we measure the number of properties between a landowner and the easement as this type of distance. A property with an easement would have an adjacency of zero, a property adjacent to the property with an easement would have an adjacency of one, the next property, the value would be two. The pattern of adjacency is calculated along a vector perpendicular to the pipeline easement. Figures 5A and 5B show this pattern of adjacency.

Figure 5A – Measuring Adjacency

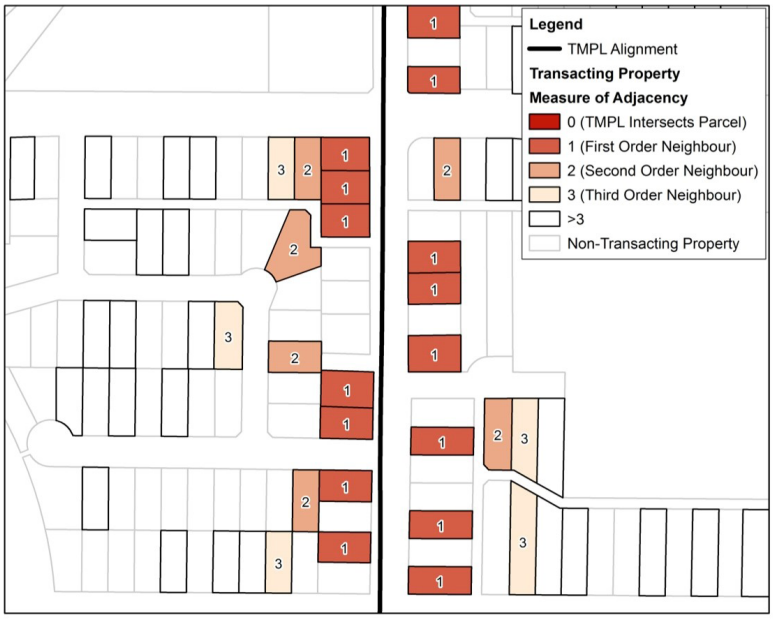


Figure 5B – Measuring Adjacency

Project Scope

The other concern about measuring the effect of a pipeline on property values besides measuring distance is that the nature of the pipeline easement land use context is not constant. Over the area of study, the pipeline easement occurs on residential, commercial, and industrial properties, along or under major and minor arterials, through open or green space, and across civic (government, institutional, and recreational) land uses. A property adjacent to the pipeline easement that is green space can be expected to have a different price effect than one adjacent to a pipeline easement on an arterial road or an industrial land use. Figures 6A and 6B show how the land use context for the pipeline easement can vary even within short pipeline segments. As with adjacency, the land use context for the easement for properties is defined by taking a vector perpendicular to the easement to the centre of a property centroid.

Figure 6A – Pipeline Easement Land Use Context

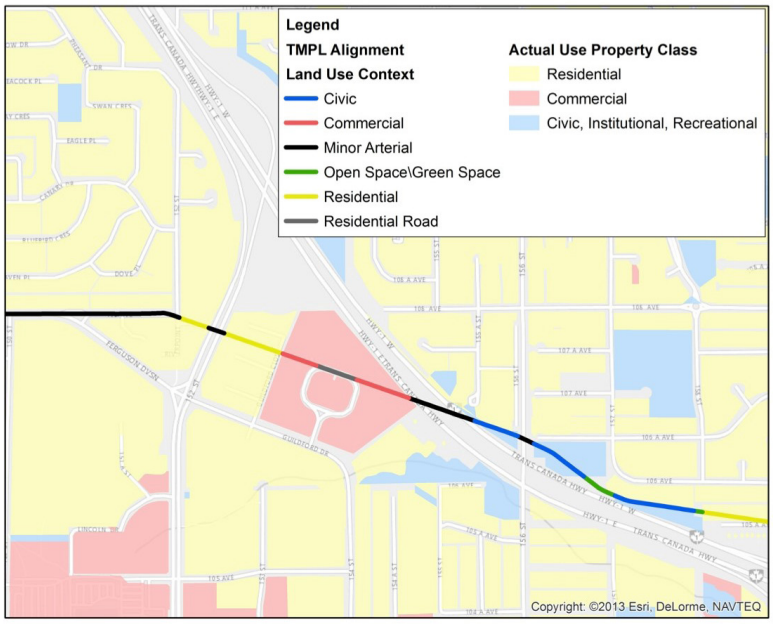
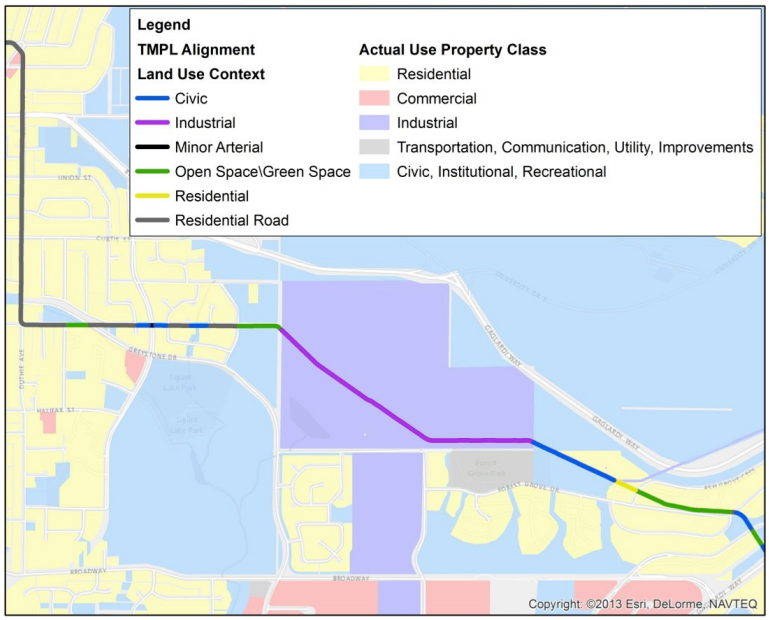


Figure 6B – Pipeline Easement Land Use



Project Scope

Tables 1, 2, 3A, and 3B provide descriptive statistics for the data and variables used in this analysis. Table 1 pools all transactions for all jurisdictions and provides richer descriptive indicators. Table 2 shows mean values by jurisdiction: prices fall and lot sizes rise as one moves away from the centre of metropolitan area, from Burnaby to Coquitlam to Surrey, though surprisingly the houses in Burnaby are larger.[8] Burnaby properties are closer to the pipeline and closer to industrial land uses than the transacting properties in Coquitlam and Surrey, but further from commercial land uses. We use adjusted house prices, where we inflate past house prices using a house price index (HPI) in a method analogous to using the consumer price index (CPI) to create real prices and adjust for inflation. This controls for changes in house prices over time and makes prices over time more comparable.[9]

*T*ables 3A and 3B show number of property transactions in our data relative to the pipeline easement, by distance or number of properties away. Nearly 60 percent of the transactions are for properties within 100 meters of a civic land use, some which like parks provide an amenity and some such as vacant institutions and cemeteries are unlikely to do so. Relatively few of the transactions are for properties within 40 meters of a major or minor arterial roadway, 6.5 and 1.5 percent respectively, while 6.2 percent of the transactions are for properties within 250 meters of an industrial land use.

There are relatively few transactions of properties with a pipeline easement, 134 or 1.08 percent of the sample. However, nearly 12 percent of the sample is within 100 meters of the pipeline easement and, of the parcels that are one to three properties away from the easement, 80 percent of these are within 100 meters. Adjacency effectively breaks down distance to very short distances from the pipeline. In Table 3B we also show the breakdown of parcels close to the easement, by adjacency and distance, depending on the pipeline's land use context. We form three groups based on the type of relationship between the land use and nearby property values. The first are commercial, industrial, and similar civic uses land uses, which are expected to have a negative effect on nearby property values. The second is for minor arterials. The third is for land uses that are unlikely to have a negative effect on nearby properties, which we identify as residential, residential roads, and open space land uses. Over 60 percent of the transactions of properties that are near the pipeline easement are close to locations where the easement is either in a residential area or in open space. But a significant share, up to 24 percent, of these transactions are for properties where the pipeline easement is on land uses that can be expected to exert a negative effect on nearby properties. This suggests the potential importance for accounting for the pipeline easement's land use context in estimating the effect of the pipeline easement on property values.

[8] While not shown here, properties with an easement have larger lot sizes, similar floor areas, and lower prices than those one, two, and three properties away from the pipeline easement.

[9] We use a reap sales methodology using transactions from the three cities that are more than 1.5 km from the pipeline easement to estimate jurisdiction specific house price indexes for 2000-14.

Project Scope

Table 1 – Summary Statistics – All Properties - Pooled

	All Jurisdictions				
	mean	median	sd	min	max
Property Characteristics Variables					
Sales price	478,848	430,000	227,747	83,000	2,060,000
Repeat Sale Index adjusted price	687,837	652,425	271,018	157,314	2,515,604
Log of adjusted sales price	13.37	13.39	0.37	11.97	14.74
Floor area in sq/ft	2,658	2,403	976	812	6,150
Log of property floor area in sq/ft)	7.82	7.78	0.37	6.70	8.72
Lotsize in sq/ft)	8,262	7,649	3,296	3,709	46,174
Log of lotsize in sq/ft)	8.98	8.94	0.24	8.22	10.74
Number of full bathrooms	2.03	2.00	1.17	1.00	6.00
Log of number of full bathrooms	0.56	0.69	0.54	0.00	1.79
Effective age of property structure	31.67	30.00	14.3	2.00	95.00
Number of bedrooms	4.20	4.00	1.25	1.00	8.00
Number of stories	1.42	1.00	0.49	1.00	2.00
Single garage dummy variable	0.22	0.00	0.41	0.00	1.00
Multiple garage dummy variable	0.58	1.00	0.49	0.00	1.00
Pool dummy variable	0.03	0.00	0.16	0.00	1.00
Effective age of property structure	31.67	30.00	14.3	2.00	95.00
Geographic Control Variables					
Distance to nearest major civic - 1 land use in km (park/golf course/open green space)	0.62	0.58	0.42	0.00	1.50
Distance to nearest major civic - 2 land use in km (govt bldg/works yard/cemetary)	0.59	0.58	0.44	0.00	1.50
Distance to nearest major civic - 3 land use in km (institutional land use)	0.23	0.19	0.17	0.00	1.07
Distance to nearest major commercial land use in km	0.49	0.44	0.29	0.00	1.64
Distance to nearest major industrial land use in km	1.63	1.67	0.98	0.00	3.97
Pipeline Proximity Variables					
Distance to pipeline in km	0.47	0.46	0.30	0.00	1.00
Observations			12,419		

Table 2 – Summary Statistics – By jurisdiction

	Burnaby	Coquitlam	Surrey
Property Characteristics Variables			
Sales price	681,541	511,798	413,290
Repeat Sale Index adjusted price	1,117,063	724,827	566,425
Log of adjusted sales price	13.89	13.47	13.20
Floor area in sq/ft	3,006	2,522	2,647
Log of property floor area in sq/ft)	7.95	7.79	7.80
Lotsize in sq/ft)	7,850	8,370	8,302
Log of lotsize in sq/ft)	8.95	9.02	8.97
Number of full bathrooms	2.03	1.70	2.20
Log of number of full bathrooms	0.55	0.40	0.64
Effective age of property structure	32.97	32.92	30.69
Number of bedrooms	4.50	4.28	4.09
Number of stories	1.42	1.21	1.53
Single garage dummy variable	0.19	0.29	0.19
Multiple garage dummy variable	0.60	0.39	0.66
Pool dummy variable	0.03	0.04	0.02
Effective age of property structure	32.97	32.92	30.69
Geographic Control Variables			
Distance to nearest major civic - 1 land use in km (park/golf course/open green space)	0.52	0.51	0.70
Distance to nearest major civic - 2 land use in km (govt bldg/works yard/cemetery)	0.70	0.63	0.55
Distance to nearest major civic - 3 land use in km (institutional land use)	0.19	0.31	0.19
Distance to nearest major commercial land use in km	0.71	0.48	0.45
Distance to nearest major industrial land use in km	0.86	2.25	1.49
Pipeline Proximity Variables			
Distance to pipeline in km	0.38	0.49	0.48
Observations	1,665	3,731	7,023

Project Scope

Table 3A– Summary Statistics – Pipeline Proximity Categories

Controls	Count	Proportion (%)
Dummy Variable : Property is 100m from civic land use = (park/golf course/open green	1693	13.63
Dummy Variable : Property is 100m from civic land use = (govt bldg/works yard/cemetery)	2681	21.59
Dummy Variable : Property is 100m from civic land use = (institutional land use)	3204	25.80
Dummy Variable : Property is 250m from industrial land use	772	6.22
Dummy Variable : Property is 250m from commercial land use	2638	21.24
Dummy Variable : Property is 40m from major arterial road	809	6.51
Dummy Variable : Property is 40m from minor arterial road	186	1.50
Dummy Variable : Barrier	4486	36.12

Pipeline Proximity - Adjacency Measures	Count	Proportion (%)	Cumulative (%)
Dummy Variable : Pipeline easement on property	134	1.08	1.08
Dummy Variable : Property is 1 parcel from pipeline	587	4.73	5.81
Dummy Variable : Property is 2 parcels from pipeline	490	3.95	9.75
Dummy Variable : Property is 3 parcels from pipeline	421	3.39	13.14
Total	1,498	13.14%	

Pipeline Proximity - Distance Bands	Count	Proportion (%)	Cumulative (%)
Dummy Variable : Property is 0 - 100m from pipeline	1,474	11.87	11.87
Dummy Variable : Property is 100 - 250m from	2,098	16.89	28.76
Dummy Variable : Property is 250 - 500m from	2,927	23.57	52.33
Total	6,499	52.33%	

Table 3B– Summary Statistics – Pipeline Proximity Categories

	Property is 1 Parcel from Pipeline	Property is 2 Parcels from Pipeline	Property is 3 Parcel from Pipeline	(%) Total by Row
Property is 0 - 100m from pipeline	38.18	28.91	13.02	80.11
Property is 100 - 250m from pipeline	1.00	3.00	14.95	18.96
Property is 250 - 500m from pipeline	0.00	0.80	0.13	0.93
(%) of Total by Column	39.19	32.71	28.1	100%
Total Observations				1,498

Pipeline Proximity and Pipeline Easement Context	Count	Proportion of Obs with same Adjacency (%)	Proportion of Total Obs (%)
Interaction : Property is 1 parcel from pipeline x Pipeline easement context = Civic/Comm/Ind/Utility	101	17.21	0.81
Interaction : Property is 1 parcel from pipeline x Pipeline easement context = Minor Arterial	85	14.48	0.68
Interaction : Property is 1 parcel from pipeline x Pipeline easement context = Open/Residential/Res.Road	401	68.31	3.23
Interaction : Property is 2 parcels from pipeline x Pipeline easement context = Civic/Comm/Ind/Utility	118	24.08	0.95
Interaction : Property is 2 parcels from pipeline x Pipeline easement context = Minor Arterial	64	13.06	0.52
Interaction : Property is 2 parcels from pipeline x Pipeline easement context = Open/Residential/Res.Road	308	62.86	2.48
Interaction : Property is 3 parcels from pipeline x Pipeline easement context = Civic/Comm/Ind/Utility	46	10.93	0.37
Interaction : Property is 3 parcels from pipeline x Pipeline easement context = Minor Arterial	77	18.29	0.62
Interaction : Property is 3 parcels from pipeline x Pipeline easement context = Open/Residential/Res.Road	298	70.78	2.40
Total	1,498		12.06%

Pipeline Proximity and Pipeline Easement Context	Count	Proportion of Obs in same Dist. Band (%)	Proportion of Total Obs (%)
Interaction : Property is 0 - 100m from pipeline x Pipeline easement context = Civic/Comm/Ind/Utility	264	17.91	2.13
Interaction : Property is 0 - 100m from pipeline x Pipeline easement context = Minor Arterial	193	13.09	1.55
Interaction : Property is 0 - 100m from pipeline x Pipeline easement context = Open/Residential/Res.Road	1,017	69.00	8.19
Interaction : Property is 100 - 250m from pipeline x Pipeline easement context = Civic/Comm/Ind/Utility	411	19.59	3.31
Interaction : Property is 100 - 250m from pipeline x Pipeline easement context = Minor Arterial	322	15.35	2.59
Interaction : Property is 100 - 250m from pipeline x Pipeline easement context = Open/Residential/Res.Road	1,365	65.06	10.99
Interaction : Property is 250 - 500m from pipeline x Pipeline easement context = Civic/Comm/Ind/Utility	689	23.54	5.55
Interaction : Property is 250 - 500m from pipeline x Pipeline easement context = Minor Arterial	510	17.42	4.11
Interaction : Property is 250 - 500m from pipeline x Pipeline easement context = Open/Residential/Res.Road	1,728	59.04	13.91
Total	6,499		52.33%

Project Scope

The statistical analysis here uses the standard hedonic regression methodology. The natural log of the adjusted transaction price is regressed against a set of structure characteristics and lot size.[10] In addition, we control for neighbourhood context by accounting for the average neighbourhood value, defining neighbourhood by the census tract.[11] We also account for the effects of other land uses on property value, using an average proximity effect for land uses likely to exert negative or positive effects on proximate residential property such as civic, commercial, and industrial land uses, as well as distance to major and minor arterials.[12]

The baseline regression specification is shown in Table 4. In all cases, the dependent variable is the natural log of adjusted house prices. These preliminary regressions do not include any of the variables relating properties to the pipeline and are a presentation of the hedonic specification that will be used for the later regressions. The first set of specifications, regressions (1) to (4), exclude geographic context variables; regressions (5) to (8) include them. All regressions include census tract dummies and jurisdiction specific year dummies. The signs of the coefficients are consistent with hedonic house price regressions; values rising in lot size, floor area, number of bathrooms, stories, garage size, and a pool, and falling in the number of bedrooms (or rooms, which for a given floor area means smaller rooms) and age. The geographic variables for proximity to other land uses in regression (5) to (8) are, for the most part, as expected. Properties that are more proximate to industrial, commercial, government, and institutional land uses have lower sales prices.[13] Prices for single-family houses near major arterials such as the TransCanada, Barnett, or Lougheed Highways are 10.5 percent lower in the aggregate. Prices for single-family properties within 250 meters of industrial land uses are in the aggregate nearly 6 percent lower. Single-family houses within 100 meters of a park, playground or golf course have transaction prices nearly 2 percent higher than similar properties elsewhere.

Table 4 – Baseline Regression – No Pipeline Proximity Variables
Dependent Variable = ln(Adjusted Price)

Dependent Variable : Log Adjusted Price	(1) All	(2) Burnaby	(3) Coquitlam	(4) Surrey	(5) All	(6) Burnaby	(7) Coquitlam	(8) Surrey
Property Characteristics Variables								
Log of lotsize in sq/ft)	0.1721***	0.2002***	0.1463***	0.1606***	0.1766***	0.1916***	0.1365***	0.1673***
	(0.0073)	(0.0228)	(0.0156)	(0.0093)	(0.0073)	(0.0224)	(0.0150)	(0.0094)
Log of property floor area in sq/ft	0.2786***	0.3529***	0.3007***	0.2637***	0.2677***	0.3394***	0.2787***	0.2565***
	(0.0077)	(0.0202)	(0.0132)	(0.0106)	(0.0076)	(0.0197)	(0.0127)	(0.0107)
Log of number of full bathrooms	0.0132***	0.0632***	0.0111	–0.0116	0.0196***	0.0632***	0.0246***	–0.0069
	(0.0049)	(0.0108)	(0.0070)	(0.0080)	(0.0049)	(0.0104)	(0.0067)	(0.0080)
Number of bedrooms	–0.0037**	–0.0056	–0.0007	–0.0022	–0.0039**	–0.0052	–0.0009	–0.0028
	(0.0018)	(0.0037)	(0.0028)	(0.0027)	(0.0017)	(0.0036)	(0.0027)	(0.0027)
Number of stories	0.0452***	0.0220*	0.0580***	0.0233***	0.0425***	0.0185*	0.0556***	0.0218***
	(0.0048)	(0.0116)	(0.0071)	(0.0074)	(0.0047)	(0.0112)	(0.0068)	(0.0073)
Single garage dummy variable	0.0089**	–0.0081	0.0013	0.0187***	0.0077*	–0.0117	0.0038	0.0156**
	(0.0044)	(0.0115)	(0.0058)	(0.0071)	(0.0043)	(0.0112)	(0.0056)	(0.0071)
Multiple garage dummy variable	0.0548***	0.0383***	0.0459***	0.0530***	0.0540***	0.0332***	0.0505***	0.0509***
	(0.0048)	(0.0116)	(0.0063)	(0.0082)	(0.0047)	(0.0113)	(0.0060)	(0.0082)
Pool dummy variable	0.0444***	0.0351	0.0476***	0.0421**	0.0417***	0.0353*	0.0343***	0.0457***
	(0.0098)	(0.0221)	(0.0129)	(0.0165)	(0.0096)	(0.0214)	(0.0123)	(0.0164)
Effective age of property structure	–0.0026***	–0.0021***	–0.0029***	–0.0026***	–0.0026***	–0.0026***	–0.0027***	–0.0026***
	(0.0002)	(0.0005)	(0.0003)	(0.0003)	(0.0002)	(0.0005)	(0.0003)	(0.0003)
Geographic Control Variables								
Dummy Variable : Property is 100m from park/ golf course / open green space					0.0182***	0.0119	0.0034	0.0309***
					(0.0052)	(0.0186)	(0.0081)	(0.0072)
Dummy Variable : Property is 100m from govt bldg / works yard / cemetary					–0.0216***	–0.0110	–0.0648***	–0.0063
					(0.0052)	(0.0137)	(0.0083)	(0.0073)
Dummy Variable : Property is 100m from institutional land use					–0.0117***	–0.0332***	0.0032	–0.0100**
					(0.0038)	(0.0095)	(0.0073)	(0.0051)
Dummy Variable : Property is 250m from industrial land use					–0.0599***	–0.0510***	–0.0460***	–0.0487***
					(0.0075)	(0.0152)	(0.0171)	(0.0105)
Dummy Variable : Property is 250m from commercial land use					–0.0088**	0.0054	–0.0223***	–0.0068
					(0.0040)	(0.0128)	(0.0059)	(0.0058)
Dummy Variable : Property is 40m from major arterial road					–0.1051***	–0.1454***	–0.1255***	–0.0712***
					(0.0064)	(0.0169)	(0.0079)	(0.0109)
Dummy Variable : Property is 40m from minor arterial road					–0.0413***		–0.0241	–0.0580***
					(0.0126)		(0.0160)	(0.0183)
Census Tract Dummies	Y	Y	Y	Y	Y	Y	Y	Y
Jurisdiction x Year Dummies	Y	Y	Y	Y	Y	Y	Y	Y
Adj. R-square	0.780	0.651	0.575	0641	0.787	0.673	0.611	0646
Number of Cases	12,419	1,665	3,731	7,023	12,419	1,665	3,731	7,023

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses

[10] Adjusted prices take the nominal transaction prices and scale them using a jurisdiction specific quarterly house price index to create year 2014 values.

[11] Formally we use census tract fixed effects, dummy variables.

[12] Regression tests result in the selection of dummy variables for these distance effects: within 100 meters of a civic land use, 250 meters of a commercial or industrial land use, and 40 meters from an arterial.

[13] Park, golf course and open green space are land uses with a BC Assessment actual use code of 601, 612, or 615. Government building, work yards, or cemeteries have codes of 600, 620, 630, or 642. Institutional is use code 601.

Project Scope

In Table 5, we replicate the approach of the existing research by adding distance to the pipeline easement. These regressions use specification (5) from Table 4, the three jurisdictions pooled together, the same regressions controls are included and indicated at the bottom of the table. In specification (1), we add distance to pipeline, which suggests that property prices rise 1.4 percent with each kilometer away from the pipeline easement, suggesting that the pipeline is a disamenity for residential properties. However, as regressions (2) and (4) indicate, that at least over the entire buffer this is not necessarily because of the distance to the pipeline. The positive and statistically different coefficient on the interaction of distance from the pipeline easement and being separated by a "barrier" land use (see Figures 3 and 4) from the pipeline easement, combined with the statistically not different from zero effect of distance alone, suggest that it is distance from the barrier that raises value, not distance from the pipeline. Only units behind a barrier land use and more distant from said barrier have higher values. In these two frameworks, the effect of distance from the pipeline itself is not statistically different from zero. In specification (4), we add a dummy variable that takes on the value of one if the property has a pipeline easement. The easement is associated with a 5.1 percent lower sales price.

Table 5 – With Continuous Distance to Pipeline & Barrier Effect
Dependent Variable = ln(Adjusted Price)

Dependent Variable : Log Adjusted Price	(1)	(2)	(3)	(4)
Distance to pipeline in km	0.0137**	0.0021		–0.0017
	(0.0066)	(0.0078)		(0.0079)
Interaction : Distance to pipeline x barrier dummy		0.0170***	0.0179***	0.0177***
		(0.0060)	(0.0051)	(0.0060)
Dummy Variable : Pipeline easement on property				–0.0511***
				(0.0152)
Property Control Variables	Y	Y	Y	Y
Geographic Control Variables	Y	Y	Y	Y
Census Dummies	Y	Y	Y	Y
Jurisdiction x Year Dummies	Y	Y	Y	Y
Adj. R-square	0.787	0.787	0.787	0.787
Number of Cases	12,419	12,419	12,419	12,419

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

In Table 6, we replace a linear expression of distance with distance rings. This allows a more flexible effect of proximity on property value, one where the marginal effect varies by distance. With these, the average effect on transaction prices if a property is within 100 meters of the pipeline easement can differ without constraint from the average effect for being 100-250 meters away, and the average effect of being another 250 to 500 meters distant. Specifications (1) and (2) introduce these ring dummies, the difference between the two is that in regression (2) we allow the easement effect to vary by lot size rather than be a constant percentage of property value. As a constant percentage of property value, regression (1) generates an estimate that the presence of the pipeline easement lowers a single-family residential property's transaction price by 5.5 percent. With fewer than 150 transactions of easement properties the coefficient estimates in specification (2) are not statistically different from zero but their pattern suggests the percentage falls with size; the pipeline easement on a property would lower the price of the property on a 6,000 sq. ft. lot by 8.3 percent, but a property on a 24,000 sq. ft. lot by 2.2 percent. The coefficient on the interaction between lot size and the presence of the easement is negative but is not statically different from zero with at least 90 percent confidence.[14]

[14] In other specifications the statistical significance of this form of relating easement to property price yields some coefficients that are statically different from zero.

Table 6 – With Easement and Continuous Distance to Pipeline & Barrier Effect
Dependent Variable = ln(Adjusted Price)

Dependent Variable : Log Adjusted Price	(1)	(2)	(3)	(4)
Dummy Variable : Pipeline easement is on property	−0.0550***	−0.4714	−0.0562***	−0.4782*
	(0.0153)	(0.2894)	(0.0153)	(0.2895)
Interaction : Pipeline easement is on property x Log lot size		0.0447		0.0453
		(0.0310)		(0.0310)
Dummy Variable : Property is 0 - 100m from pipeline	−0.0126**	−0.0125**		
	(0.0056)	(0.0056)		
Dummy Variable : Property is 100 - 250m from pipeline	0.0013	0.0014		
	(0.0049)	(0.0049)		
Dummy Variable : Property is 250 - 500m from pipeline	0.0022	0.0023		
	(0.0043)	(0.0043)		
Interaction : Property is 0 - 100m from pipeline x Pipeline easement context = Civic/Comm/Ind/Utility			−0.0416***	−0.0418***
			(0.0116)	(0.0116)
Interaction : Property is 0 - 100m from pipeline x Pipeline easement context = Minor Arterial			0.0058	0.0057
			(0.0137)	(0.0137)
Interaction : Property is 0 - 100m from pipeline x Pipeline easement context = Open/Residential/Res.Road			−0.0086	−0.0084
			(0.0064)	(0.0064)
Interaction : Property is 100 - 250m from pipeline x Pipeline easement context = Civic/Comm/Ind/Utility			−0.0063	−0.0064
			(0.0092)	(0.0092)
Interaction : Property is 100 - 250m from pipeline x Pipeline easement context = Minor Arterial			0.0212**	0.0211*
			(0.0108)	(0.0108)
Interaction : Property is 100 - 250m from pipeline x Pipeline easement context = Open/Residential/Res.Road			0.0001	0.0003
			(0.0058)	(0.0058)
Interaction : Property is 250 - 500m from pipeline x Pipeline easement context = Civic/Comm/Ind/Utility			−0.0042	−0.0042
			(0.0074)	(0.0074)
Interaction : Property is 250 - 500m from pipeline x Pipeline easement context = Minor Arterial			0.0123	0.0123
			(0.0091)	(0.0091)
Interaction : Property is 250 - 500m from pipeline x Pipeline easement context = Open/Residential/Res.Road			0.0033	0.0034
			(0.0051)	(0.0051)
Property Control Variables	Y	Y	Y	Y
Geographic Control Variables	Y	Y	Y	Y
Census Dummies	Y	Y	Y	Y
Jurisdiction x Year Dummies	Y	Y	Y	Y
Adj. R-square	0.787	0.787	0.787	0.787
Number of Cases	12,419	12,419	12,419	12,419

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

The distance ring dummies in both regression (1) and (2) unambiguously show a negative effect on transaction price of proximity to the pipeline but only for the closest properties, those within 100 meters of the pipeline easement. And this effect is small, an estimated decrease of 1.25 percent reduction in property transaction price. The problem with this estimate, which we address in specifications (3) and (4), is that the pipeline easement is not a single consistent land use. As shown in Table 3B, the land on which there is a pipeline easement includes land uses that would be expected to exert a negative effect of the value of adjacent properties, even in the absence of the pipeline, an expectation confirmed by the results presented in Table 4.

In specifications (3) and (4) in Table 6, we interact the distance ring dummies with the pipeline easement's land use context. These coefficients are an estimate of percentage effect on property transaction of being a certain distance from the pipeline easement where the easement occurs on a particular type of land use. We have an interaction for each group of land use types, so that we cover the total types of land use context for the pipeline easement in the data. The clear result is that the negative effect of the pipeline easement on nearby properties, of 4.2 percent, occurs because the pipeline is passing through a land use (civic/commercial/industrial/utility) that has a negative effect on adjacent properties. When the land use is not one that has a negative effect, there is no statistically different zero relationship between transaction price and proximity the pipeline easement. If it was the pipeline easement, rather than the land use, causing the negative effect found in regressions (1) and (2) for properties within 100 meters of the pipeline easement, then the negative and statistically different from zero effect of proximity would occur across all three of the land use contexts. Instead, it is only for land uses that themselves exert a negative effect on nearby properties, as per the results in Table 4.

In Table 7 we introduce a more textured notion of distance from the pipeline easement than just linear distance as used in Table 5.[15] Here we use adjacency, using dummy variables that take on the value of one if the property is one, two, or three parcels from the pipeline easement. From Table 3B, we see that this allows for the effect of distance to vary even with a short, 100 meter range from the pipeline easement as over 80 percent of these adjacent parcels are within 100 meter of the pipeline easement. For an adjacency of one – the property next to the property with the easement – the average distance to the easement is 22m, for adjacency of two it is 69m, and for an adjacency of three it is 101m.

[15] Distance alone says going from next to the pipeline to 100 meters away has the same effects moving from 2 km to 2.1 km away, which seems implausible.

The results in Table 7 are extremely consistent with those in Table 6. The presence of an easement on a property lowers the transaction price by an average of 5.5 percent, with the likelihood that this falls with lot size, as in specifications (2) and (4). And again, like the results in Table 6, the estimate of the magnitude of the decrease in this percentage with lot size is not statistically different from zero with 90 percent confidence.[16] Regressions (1) and (2) suggest that a property directly adjacent to the property with the pipeline easement experiences a negative effect on its transaction price because of this proximity, on the order of nearly 2 percent. This is completely dissipated for properties only one further removed.

Table 7 – Distance in Adjacency Measures and Discrete Bands
Dependent Variable = ln(Adjusted Price)

Dependent Variable : Log Adjusted Price	(1)	(2)	(3)	(4)
Dummy Variable : Pipeline easement is on property	–0.0551***	–0.4664	–0.0552***	–0.4898*
	(0.0151)	(0.2895)	(0.0151)	(0.2895)
Interaction : Pipeline easement is on property dummy x Log lot size		0.0441		0.0466
		(0.0310)		(0.0310)
Dummy Variable : Property is 1 parcel from pipeline	–0.0196***	–0.0195***		
	(0.0075)	(0.0075)		
Dummy Variable : Property is 2 parcels from pipeline	–0.0105	–0.0103		
	(0.0080)	(0.0080)		
Dummy Variable : Property is 3 parcels from pipeline	0.0105	0.0107		
	(0.0086)	(0.0086)		
Interaction : Property is 1 parcel from pipeline x Pipeline easement context = Civic/Comm/Ind/Utility			–0.0354**	–0.0356**
			(0.0173)	(0.0173)
Interaction : Property is 1 parcel from pipeline x Pipeline easement context = Minor Arterial			–0.0250	–0.0251
			(0.0205)	(0.0205)
Interaction : Property is 1 parcel from pipeline x Pipeline easement context = Open/Residential/Res.Road			–0.0144	–0.0141
			(0.0089)	(0.0089)
Interaction : Property is 2 parcels from pipeline x Pipeline easement context = Civic/Comm/Ind/Utility			–0.0637***	–0.0638***
			(0.0160)	(0.0160)
Interaction : Property is 2 parcels from pipeline x Pipeline easement context = Minor Arterial			0.0231	0.0230
			(0.0217)	(0.0217)
Interaction : Property is 2 parcels from pipeline x Pipeline easement context = Open/Residential/Res.Road			0.0028	0.0033
			(0.0100)	(0.0100)
Interaction : Property is 3 parcels from pipeline x Pipeline easement context = Civic/Comm/Ind/Utility			–0.0182	–0.0183
			(0.0252)	(0.0252)
Interaction : Property is 3 parcels from pipeline x Pipeline easement context = Minor Arterial			0.0187	0.0185
			(0.0197)	(0.0197)
Interaction : Property is 3 parcels from pipeline x Pipeline easement context = Open/Residential/Res.Road			0.0139	0.0142
			(0.0102)	(0.0102)
Property Control Variables	Y	Y	Y	Y
Geographic Control Variables	Y	Y	Y	Y
Census Dummies	Y	Y	Y	Y
Jurisdiction x Year Dummies	Y	Y	Y	Y
Adj. R-square	0.787	0.787	0.787	0.787
Number of Cases	12,419	12,419	12,419	12,419

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

[16] The coefficient on the interaction between lot size and easement is negative but not statistically different from zero with even a 90 percent degree of confidence

Project Scope

As with the distance rings, we test whether the negative effect of proximity to the pipeline easement on transaction prices is because of the pipeline or the effect of the land uses on which the pipeline easement happens to be. Here too we find it is the land use context, not the pipeline easement that affects the transaction prices of the most adjacent single-family properties. In regressions (3) and (4) instead of dummy variables for a property's degree of adjacency, we interact these indicators variables with the type of land use that has the pipeline easement. The results show that it is only when a property is both adjacent to the pipeline easement and the land use is of the type that imposes negative effects of nearby properties that there is a negative effect on transaction prices. For the other land use types, the estimated effects of the interaction are not statistically different from zero. These findings are consistent with those in Table 6 except that they highlight that effects of land uses on neighbouring properties can decay very quickly with distance.

SUMMARY AND CONCLUSIONS

Summary and Conclusions

Summary and Conclusions

This study finds that proximity to an oil pipeline is not associated with lower transaction prices for single-family properties. Having a pipeline easement on a property clearly lowers property values, by an average of 5.5 percent for the properties in this data set, and a rate that is highly likely to decline with lot size. However, for adjacent and nearby properties, it is not the presence of a pipeline easement that affects prices but the effect of the type of land use on which there is an easement. This study is the most in-depth analysis of the relationship between oil pipeline easements and property values among the reports and academic articles surveyed with a very careful treatment of the geographic determinants of property value. The results clearly highlight the importance of statistically accounting for nearby land uses in estimating the effects on property values of features such as a pipeline.

Summary and Conclusions

References

Boxall, P. C., Chan, W. H., & McMillan, M. L. (2005). The impact of oil and natural gas facilities on rural residential property values: a spatial hedonic analysis. Resource and energy economics, 27(3), 248-269.

Diskin, B. A., Friedman, J. P. , Peppas, S. C. , & Peppas, S. R. (2011). The Effect of Natural Gas Pipelines on Residential Value. Right of Way. Jan/Feb, 24-27

Fruit, E. (2008). The Impact of the Presence of a Natural Gas Pipeline on Residential Property Values. Portland State University Working Paper, Electronic copy available at: http://ssrn.com/abstract=1518065.

Hansen, J. L., Benson, E. D., & Hagen, D. A. (2006). Environmental Hazards and Residential Property Values: Evidence from a Major Pipeline Event. Land Economics, 82 (4), 529-41.

Kinnard, W.N., Jr., S.A. Dickey, & Geckler, M.B. (1994). Natural Gas Pipeline Impact on Residential Property Values: An Empirical Study of Two Market Areas. Right of Way, June/ July, 26–9.

Siegel, C., Caudill, S. B., & Mixon, F. G. (2013). Clear Skies, Dark Waters: The Gulf Oil Spill and the Price of Coastal Condominiums in Alabama. Economics and Business Letters, 2(2).

Simons, R. A. (1999). The Effect of Pipeline Ruptures on Noncontaminated Residential Easement- Holding Property in Fairfax County. The Appraisal Journal, 67 (3), 255–63.

Simons, R. A. & Saginor, J. S. (2006) Meta – Analysis of the Effect of Environmental Contamination and Positive Amenities on Residential Real Estate Values. Journal of Real Estate Research, 28 (1), 71-104

Simons, R.A., Winson-Geideman, K., & Milkelbank, B. (2001). The Effects of an Oil Pipeline Rupture on Single-Family House Prices. The Appraisal Journal, 69 (4), 410–18.

Somerville, T. & Wetzel, J. (2014). Westridge Spill and Clean-Up: Effect
on Local Property Values. Unpublished consulting report by Nadlan Consulting prepared for TransMountain Expansion Project, August 11, 2014.

Wilde, L., Loos, C., &. Williamson, J. (2012). Pipelines and Property Values: An Eclectic Review of the Literature. Journal of Real Estate Literature, 20 (2), 245-

Wilde, L., Williamson, J., & Loos, C. (2014). A Long-Term Study of the Effect of a
Natural Gas Pipeline on Residential Property Values. Journal of Real Estate Literature, 22 (1), 47-65.

Winkler, D. T. & Gordon, B. L. (2013). The Effect of the BP Oil Spill on Volume and Selling Prices of Oceanfront Condominiums. Land Economics, 89(4), 614-631.

APPENDICES

Appendix A

Glossary

Assessment Roll

Lists all properties that are subject to assessment. The Assessment Authority Act Regulations (B.C. Reg 497/77) list the information that must be contained in the Assessment Roll. This includes the name and address of the assessed owner, a description of the property's location (legal description and/or property address), and the actual value and classification of land and improvements.

Actual Use Code

This three digit, internally used, BC Assessment code (abbreviated AUC), denotes a folio's (property's) primary use. Each folio can have only one primary code.

Effective Year

Effective Year refers to the effective age of an improvement. Effective age is defined in s. 1 of the Depreciation of Industrial Improvements Regulation (BC Reg 379/88) as follows:

"Effective Age" means the number of years determined by:

- calculating the total cost of the industrial improvement,
- multiplying the chronological age of each part of the industrial improvement by the cost of that part to give the weighted age of that part,
- adding the weighted ages of all of the parts of the industrial improvement, and
- dividing the sum of the weighted ages by the total cost of the industrial improvements and rounding the quotient up to the next whole year to yield the effective

Folio

A collection of data, identified by a roll number that consists of ownership, actual value and other information required for assessment purposes. The data in a folio usually describes one parcel and any improvements on it. A folio may describe multiple parcels and their improvements, or a portion of a parcel and/or the improvements on such a parcel. Folio is synonymous with (Assessment) Roll Number.

Homogeneous

A descriptor generally applied to single-family residential neighbourhoods where there are several groups of homes that are all relatively or reasonably similar in age, construction, and features. A homogeneous neighbourhood is more commonly encountered in urban and suburban areas. (International Association of Assessing Officers (IAAO) - BC Assessment Modified)

Source: BC Assessment Glossary, http://www.bcassessment.ca/about/Pages/Glossary.aspx

Appendix A

Improvements

Any building, fixture, or other similar structure attached to land or another improvement. An improvement is defined by Section 1 of the Assessment Act as: “Any building, fixture or structure on or in land (or water over land) or on or in another improvement, but does not normally include any of the following: production machinery; anything intended to be moved as a complete unit in its day to day use; furniture and equipment that is not affixed for any purpose other than its own stability and that is easily moved by hand”.

Without limiting the definition of “improvements” in subsection (1), the following things are deemed to be included in that definition unless excluded from it by a regulation under section 22 (1) (a) or 74 (2) docks, wharves, rafts and floats; floating homes and any other floating structures and devices that are used principally for purposes other than transportation

Land includes land covered by water, quarries, and sand and gravel, but does not include coal or other minerals

Single Family Dwelling/Residence

A detached residential dwelling unit, which has been designed and built to accommodate single-family use

Appendix B

Data Methodology Appendix

TMPL Alignment and Buffer

- Existing TMPL alignment was provided to Landcor by Kinder Morgan.
- Landcor used the GIS to create a 3 km wide buffer (1.5 km on either side) of the existing TMPL.
- The 3km buffer extends from 216the Street in the Township of Langley to the Kinder Morgan Westridge Marine Terminal in Burnaby.
- The total length of the section of TMPL used in the study is approximately 34 km.
- The total area of the 3 km buffer is approximately 105 km2.
- The section of the TMPL used in the study passes through the Township of Langley, the City of Surrey, the City of Coquitlam, and the City of Burnaby.
- The 3 km buffer extends, at most, around 200 m into the City of Port Moody; the relatively small number of properties therein, combined with these properties being very close to the maximum extents of the study area, resulted in all Port Moody properties being removed following the property selection process.
- The area of the buffer that extends into Port Moody is approximately 0.4 km2, which is less than 0.4% of the total area of the buffer.

TMPL Land Use Context

- The TMPL alignment was segmented to reflect the land use context through which it runs; in other words, the buried pipeline was attributed with the predominant land use or land ownership class that occurs above it.
- The resultant TMPL segments were classified as being one of the following nine classes:
    - Civic\Institutional\Recreational (which includes Crown and municipally-owned properties, recreational facilities, and schools, among others)
    - Commercial
    - Industrial
    - Minor Arterial Road (4 lanes or more)
    - Open Space\Green Space
    - Residential (pipeline runs under residential properties)
    - Residential Road (no more than 2 lanes)
    - River Crossing (where pipeline runs under the Fraser River)
    - Utility (pipeline runs under telecommunications or other utility-related land use)

Segment Class	Count of Segments in Class	Sum of Length of Segments (km)	Percentage of Total Length in Class
Residential Road	33	9.2 km	27%
Residential	29	8.5 km	25%
Civic	44	6.1 km	18%
Minor Arterial Road	24	5.6 km	17%
Industrial	11	4.6 km	13%
Commercial	26	4.1 km	12%
River Crossing	2	2.7 km	8%
Open Space\Green Space	12	1.5 km	5%

Appendix B

Residential Property Selection

- The 3km buffer was used to select properties for the study.
- Landcor, as a Value Added Reseller member of the Integrated Cadastral Information Society (ICIS), has access to the BC Assessment (BCA) Fabric.
- Description of the BCA Fabric from http://www.icisociety.ca/bc-assessment/
    - o "The BC Assessment Fabric is a geospatial representation of the assessment roll. It contains a record for almost every assessed property in British Columbia. Unlike a legal cadastre fabric,it is an ownership fabric. This means there may be many legal lots represented by one assessed property or folio. Properties that do not have a spatial representation defined by its corresponding local government are occasionally represented using a diamond shape as a placeholder. This is done to assist finding a property's location, and is usually a precursor to having a property boundary defined. The BC Assessment Fabric represents 98.4% of the assessment roll as of April 2013."
- Landcor also receives regularly updated BC Assessment Roll data in tabular form through their partnership with BCA.
- Together, the BCA Fabric and the Assessment Roll form the basis of the spatial representation and attribute information used in this study.
- The BCA Fabric from which the properties were selected was downloaded from ICIS on June 6th, 2014.
- Using a GIS, the buffer was overlain on the BCA Fabric in order to extract all the properties boundaries and their associated non-spatial attributes.

Residential Property Filtering

- To facilitate accurate ("apples-to-apples") comparisons among the properties in the study, only those properties classified as Single Family Dwellings (SFDs) in the Residential property class were considered for inclusion.
- Description of SFD from http://www.bcassessment.ca/about/Pages/Glossary.aspx
    - o "A detached residential dwelling unit, which has been designed and built to accommodate single family use."
- Some of the SFDs that were initially selected for inclusion were subsequently rejected because they exhibited some anomalous traits as compared to the rest of the properties; for instance, SFDs that were identified as being in the BC Agricultural Land Reserve (ALR) or were on lots greater than 2 acres were removed.
- The total number of anomalous properties removed was 120, which represents less than 0.8% of the final property selection.

Residential Property Sales

- In order to obtain fair-market values for the properties in the study area, only those SFDs that were sold between January 1st, 2001 and November 30th, 2014 were included.
- For each included SFD property, each sale date and sale price was obtained from the BCA property sales table; in cases where a single property had sold multiple times in the 2001-2014 time period, each sale date and sale price was recorded.
- Only "valid" sales (arms-length transactions) were recorded; invalid sales were rejected.

Appendix B

Final Residential Property Selection

- The total number of SFDs with valid sales between 2001 and 2014 that are within 3 kms of the TMPL and not in the ALR or on lots greater than 2 acres is 15,667.

Non-Residential Properties and Land Use Categories

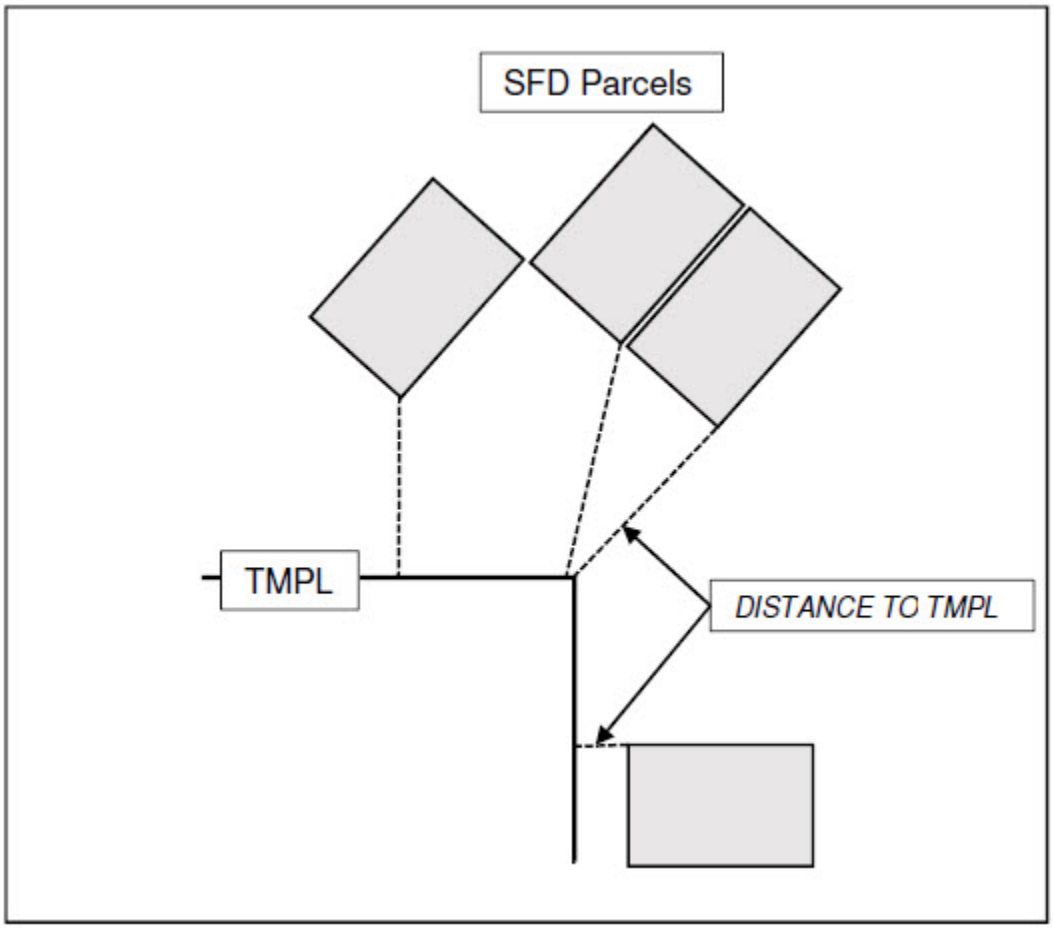
- Additional non-residential property types within the buffer were included in the study as they may impact property values.
- BCA's non-residential property categories are:
    - Civic\Institutional\Recreational
    - Commercial
    - Farm
    - Industrial
    - Transportation\Communication\Utility\Improvements
- Of these other property classes, the Farm and Transportation\Communication\Utility\Improvements classes were determined to be of secondary importance due to them being a relatively small percentage of the total count of properties and their thereby having a relatively small contribution to influencing property values of nearby residential properties.
- All Civic\Institutional\Recreational, Commercial and Industrial properties that fell within or intersected the TMPL buffer were retained and amalgamated into larger parcel groupings based on their relative proximity to one another. For example, clusters of commercial properties were amalgamated into commercial centers or districts by removing internal property boundaries. Similarly, civic parks and adjacent schools were amalgamated into larger civic units.
- The amalgamated non-residential land uses were retained provided they were greater than 10,000 m^2 in area (approximately 2.5 acres); this area was selected as it represents roughly half an average 100m by 200 m block in the study area. This was determined to be the minimum area for a non-residential property to be considered as a property value influencer.
- The process of amalgamating and filtering the non-residential property types based on their areas reduced the number of individual non-residential properties to be considered as potentially influencing the market values of the residential properties in the study and resulted in simplified, logical groupings of industrial-, commercial- , and civic-related land that adequately reflects the real-world conditions and externalities.

Pipeline Proximity Measures

- A continuous distance measure was created to measure the straight-line distance from every SFD in the study area to the TMPL.

Appendix B

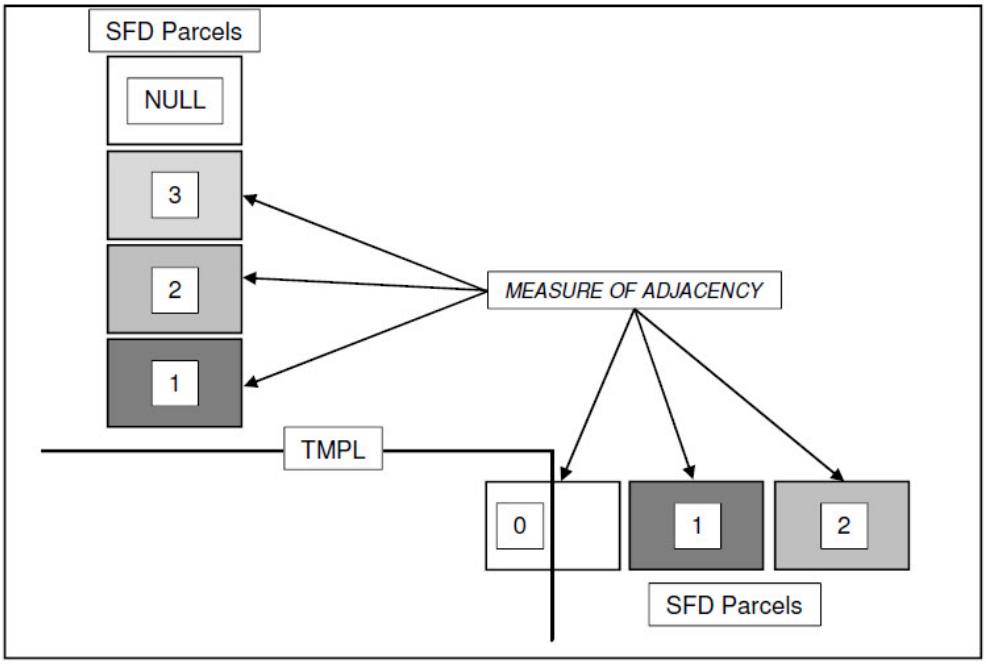
Figure A-1- Distance to TMPL Calculation



- A second method of measuring proximity to the TMPL was by creating an ordinal variable referred to as the “measure of adjacency”.
- Properties intersected by the TMPL were assigned a measure of adjacency value of zero. Properties one parcel removed from the TMPL were assigned a value of “1”, two parcels removed were coded as “2”, and those 3 parcels removed from the TMPL were coded as “3”. All other properties were not assigned a measure of adjacency and are coded as “NULL”.
- Properties adjacent to the TMPL or adjacent to a parcel intersected by the pipeline are referred to as “first order” neighbours; “second order” and “third order” neighbours are those parcels with two or three parcels, respectively, between itself and the pipeline.
- The measure of adjacency accounted for any other parcel type, residential or non- residential, between the TMPL and an SFD in the property selection set, not just other SFDs between the property and the pipeline.

Appendix B

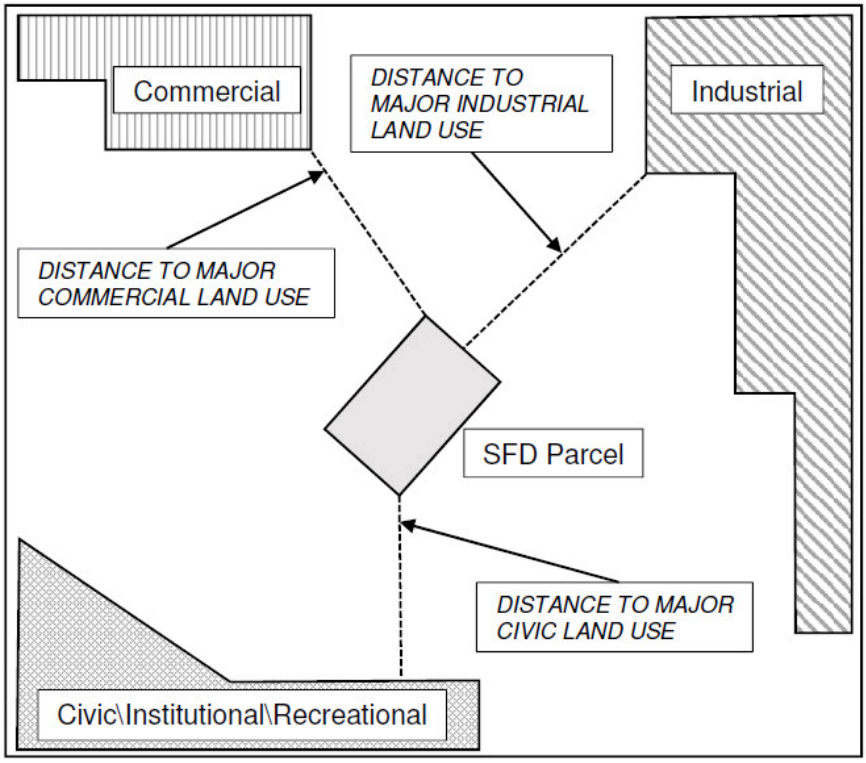
Figure A-2- Measure of Adjacency Calculation



Non-Residential Land Use Proximity Measures

- Using the same methodology as described above, a continuous distance measure was created to mea sure the distance form every SFD in the study area to the Trans-Canada Highway (HWY1).
- Similarly, a continuous distance measure from each SFD parcel to each of the nearest major non-residential land use categories was created, as shown in Figure A-3:

Figure A-3- Distance to Other Land Uses



Appendix B

Barrier Effects

- In order to account for the effect of major non-residential land uses occurring between a subject property and the pipeline, the concept of “barrier effect” was employed and a measure of this effect was created for every SFD in the study.
- The barrier effect occurs where a park, school, commercial center, highway, or industrial park exists between the pipeline and a subject SFD property; where large areas of alternative, non-residential land use interrupt the straight-line distance measures between the property and the TMPL, the barrier effect is observed.
- To account for the barrier effect, each property was evaluated as to whether an major alternative land use exists between it and the pipeline; where these alternative land uses were observed, the distance from the edge of the subject property to the edge of the major non-residential land use was calculated.
- Furthermore, the class (Civic\Recreational\Institutional, Commercial, or Industrial) and the area of the major alternative land use barrier was appended to each of the SFDs in the study area.

Appendix C

Curriculum Vitae

Craig Tsuriel (Tsur) Somerville

Academic Address:
Sauder School of Business
University of British Columbia
2053 Main Mall
Vancouver, BC V6T 1Z2
(604) 822-8343
tsur.somerville@sauder.ubc.ca

Consulting Address:
Nadlan Consulting
395 West 23rd Ave
Vancouver, BC V5Y 2H2
(604) 329-4585
nadlan.consulting@gmail.com

Education

Harvard University, Cambridge, Mass.
Ph.D., Economics, 1994; A.M., Economics, 1991.

Hebrew University, Jerusalem, Israel
B.A., Economics and East Asian Studies, 1986.
Graduated with Honours, Faculty of Social Sciences Dean's List.

Academic Positions

University of British Columbia, Sauder School of Business, Vancouver, BC

Director, UBC Centre for Urban Economics and Real Estate, 2002-

Associate Professor (with tenure), Strategy & Business Economics Division 2001-

Real Estate Foundation Professorship of Real Estate Finance, 2001-

Professional

Nadlan Consulting (formerly Pituach Consulting), real estate and urban economics consulting

President, 2003 - present

Clients include: ICBC, CMHC, BCREA, and Stantec.

Appendix C

...continued

Academic Papers

Articles Published and Forthcoming

Repairs under Imperfect Information, (joint with Sanghoon Lee and John Ries), *Journal of Urban Economics* 73, 2013.

School Quality and Residential Property Values: Evidence from Vancouver Rezoning (joint with John Ries), *Review of Economic and Statistics*, 92 (4), 2010.

Irreversible Investment, Real Options, and Competition: Evidence from Real Estate Development. (joint with Laarni Bulan and Chris Mayer). *Journal of Urban Economics*, 65 (3), May 2009, 237-251

Economic and Social Status in Household Decision Making: Evidence from Extended Family Mobility. (joint with Chang Chin-Oh and Chen Shu-Mei). *Urban Studies*, 40(4), 733-46, 2003.

Government Regulation and Changes in the Affordable Housing Stock. (joint with Chris Mayer). *NYFRB Economic Policy Review*, 9(2): 45-62, 2003. See http://www.ny.frb.org/rmaghome/econ_pol/

Does the Lender Matter? Lender Type and Home Office Location and Real Estate Development Lending. *Canadian Journal of Administrative Sciences*. 19 (4), 2002.

Dynamics of the Market Low-income Housing Stock: Micro-data Analysis of Filtering. (joint with Cynthia Holmes). *Journal of Housing Research*. 12 (1), 2001.

Site Density Restrictions: Measurement and Empirical Analysis. (joint with Fu Yuming). *Journal of Urban Economics*. 49 (4), 2001.

Permits, Starts, and Completions: Structural Relationships vs Real Options. *Real Estate Economics*. 29 (1), 2001.

Land Use Regulation and New Construction. (joint with Chris Mayer). *Regional Science and Urban Economics*. 30 (6), 639-662, 2000.

Residential Construction: Using the Urban Growth Model to Estimate Housing Supply. (joint with Chris Mayer). *Journal of Urban Economics*. 48 (1), 85-109, 2000.

Land Use Rights, Government Land Supply, and the Pattern of Redevelopment in Shanghai. (joint with Fu Yuming, Huang Tongcheng, and Gu Mengdi). *International Real Estate Review*. 2 (1), 49-69, 1999.

The Industrial Organization of Housing Supply: Market Activity, Land Supply, and the Size of Homebuilder Firms. *Real Estate Economics*. 27 (4), 669-694, 1999.

Residential Construction Costs and the Supply of New Housing: Finding Consistent Effects of Structure Costs on Homebuilding Activity. *Journal of Real Estate Finance and Economics*, 18 (1), 43-62, 1999.

Regional Housing Supply and Credit Constraints. (joint with Chris Mayer). *New England Economic Review,* November/December, 1996.

The Contribution of Land and Structure to Builder Profits and House Prices. *Journal of Housing Research*, 7 (1), 127-141, 1996.

Appendix C

...continued

Do House Price Indexes Based on Transacting Units Represent the Entire Stock? Evidence from the American Housing Survey. (joint with Denise DiPasquale). *Journal of Housing Economics*, 4, 195-229, 1995.

The Economic Reform Spiral in China: 1976-86. *Journal of Economics and International Relations*, 1, 179-194, 1987.

Working Papers, Selected Papers, and Reports

Hunting for the Olympics Bounce: Any Evidence in Real Estate? UBC Centre for Urban Economics and Real Estate Discussion Paper. January 2010 (joint with Jake Wetzel).

The Subprime Crisis – Weathering the Storm in the U.S., Canada, and Australia January 2010 (joint with Clarke, Judith, Crouchane, Marsha J., and Cynthia Holmes)

Reducing Mortgage Costs: Amending the NHA and Reforming CMHC to Benefit Canadian Homebuyers," September 2008

Are Canadian Housing Markets Overpriced. BC Centre for Urban Economics and Real Estate Discussion Paper. August 2008. (joint with Kitson Swan)

Land Assembly: Measuring Hold-up. UBC Centre for Urban Economics and Real Estate Working Paper. (joint with Fu Yuming and Dan McMillen),

Who are Loss Averse and From Which Reference Point?, July 2007, (joint with Seow Eng Ong and Neo Po Har), revise and resubmit to *Real Estate Economics*

Are Renters Being Left Behind? Homeownership and Wealth Accumulation in Canadian Cities. UBC Centre for Urban Economics and Real Estate Discussion Paper. January 2007 (joint with Li Qiang, Paulina Teller, Michael Farrell, Derek Jones, and Yosh Kasahara).

British Columbia Real Estate's Place in an Investment Portfolio. UBC Centre for Urban Economics and Real Estate Discussion Paper. October 2006 (joint with Cam Fleming and Anita Smidesang).

Real Estate Development: A Structural Option Model, December 2005, (joint with Yongheng Deng and Christopher J. Mayer).

Metropolitan Growth and Residential Capitalization Rates. (joint with Denise DiPasquale), Unpublished UBC mimeo, 1995.

Metropolitan Home Prices and the Costs of Homeownership. (joint with Denise DiPasquale and John Cawley, Jr.), Joint Center for Housing Studies Working Paper, Harvard University, 1992.

Appendix C

...continued

Other Papers, Chapters, and Reports

Articles Published and Forthcoming

Do Restrictions on Renting Increase Condominium Values? Evidence from Vancouver, Canadian Property Valuation, Volume 53 Book 4 2009 (joint with Chris Kay and Seung Dong You)

Is There a Role for Private Title Insurance in British Columbia? Report for BCREA. 2008. (joint with Deborah Meredith)

"What's behind a real estate row", Vancouver Sun, Thursday, September 21, 2006.

The Place of British Columbia Real Estate in an Investment Portfolio. Input. Real Estate Institute of British Columbia. 2006.

How Much Does a Good Neighbourhood School Matter? Input. Real Estate Institute of British Columbia. 30 (3) 2005, 4-5.

New Horizons, Canadian Appraiser, 49 (4), 2005, pp. 31-35.

Permits vs. Starts vs. Completions: What Do They Tell Us About Housing Markets. Input. Real Estate Institute of British Columbia. 29 (1), 6-7, Spring 2004.

Real Options: Valuing Flexibility in Investments. Forum Members' Newsletter. National Executive Forum on Public Property. August 2002.

Real Estate Development Lending: National vs. Local Banks. Input. Real Estate Institute of British Columbia. 27 (1), 6-7, Spring 2002.

Book Chapters and Reports

"Do Renter's Miss the Boat? Homeownership, Renting, and Wealth Accumulation," in Agarwal, Sumit and Brent W. Ambrose, eds., Financial Instruments for Households:Credit Usage from Mortgages to Credit Cards, Palgrave/MacMillan, 2007.

Zoning and Affordable Housing: A Critical Review. Ottawa: Canada Mortgage and Housing Corporation (CMHC) paper, 2004.

Institutional Features of Canadian Real Estate. In How, Hebe, Kent, Paul and William Seabrooke, eds. International Real Estate: An Institutional Perspective. Blackwell, 2004

Trends in Housing Affordability: Measuring the Effects of Municipal Regulations on House Prices and Rents. Ottawa: Canada Mortgage and Housing Corporation (CMHC) paper, 1995.

Increasing the Productivity of the Nation's Urban Transportation Infrastructure: Measures to Increase Transit Use and Carpooling. (joint with John F. Kain, et al), U.S. Department of Transportation, 1992.

Appendix C

...continued

Conference Proceedings

Municipal Regulations and Housing Affordability: Measuring the Relationship. Conference Proceedings, Canada Mortgage and Housing Corporation (CMHC) Symposium on Housing Affordability, Ottawa, ON, November 1995.

Land Use and Builder Size. Conference Proceedings, Pacific Northwest Regional Economic Conference, Seattle, WA, April 1994.

Media Interviews & Contacts

Print & Online

Advisor's Edge
BC Business
Bloomberg
Business in Vancouver
Calgary Inc
Calgary Sun
Canadian Business
Canadian Press
Delta Optimist
Edmonton Journal
Epoch News
Georgia Straight
Globe & Mail
Handelsblawtt (Dusseldorf business paper),
Huffington Post
Journal of Commerce
Le Presse
Macleans
Metro News
Ming Pao
Moneysense
Montreal Gazette
Montreal L'Affairs
Nanaimo Daily News
National Post
New Local Homes
New York Times
Northshore News
Penticton Herald
Prince Albert Daily Herald
Regina Leader Post
Reuters
Richmond Tribune
Sing Tao
Surrey Leader
The Tyee
Times Colonist
Toronto Star
Tsing Hua
24 Hours
Vancouver Courier
Vancouver Province
Vancouver Sun
Wall Street Journal
Washington Post

Radio

Alberta Radio, The Rutherford Show
CBC National & Local
CHQR AM 770 - Calgary
CKNW 980
Dutch national radio
NPR
News 1130
Opinion 250

Television

Al-Jazeera
BBC
BNN
CBC National & Local
CBC Newsworld
City TV
CTV National & Local
CTV Newsnet
Fairchild TV
Global National & Local

Appendix C

...continued

Industry Activity

Advisory Board, ULI British Columbia Chapter, current.
Arbutus Land Expert Advisory Panel, past.
NAIOP Distinguished Fellow 2006-09, past.
Academic Advisor, USC-Wells Fargo Undergraduate Real Estate Case Competition.
Academic Advisor, NAIOP Pacific Northwest Real Estate Challenge.
GVRD Greater Industrial Land Inventory Working Group, past.
Vancouver Board of Trade, Economic Development Subcommittee, past.

Professional Societies & Forums

American Economics Association (AEA)
American Real Estate and Urban Economics Association (AREUEA), Board Member 2005-07, 2010-2013
American Real Estate Society (ARES)
Asian Real Estate Society (AsRES), past President , Board member 2002-
National Executive Forum on Public Property, Western Academic Representative
Urban Land Institute

Academic Journals, Editorial Boards

International Real Estate Review
International Journal of Housing Markets and Analysis
Journal of Real Estate Research
Real Estate Economics

Appendix C

Curriculum Vitae

Jake Wetzel

Academic Address:
Sauder School of Business
University of British Columbia
2053 Main Mall
Vancouver, BC V6T 1Z2
(604) 822-8343
tsur.somerville@sauder.ubc.ca

Consulting Address:
Condor Consulting Group
402 -71 East Pender st.
Vancouver, BC V6A 1S9
(778) 378-8140
jake_wetzel@mac.com

Education

Sauder School of Business, University of British Columbia
PhD Candidate, Finance, 2014

Sauder School of Business, University of British Columbia
MSc., Urban Land Economics, 2007

Said School of Business, Oxford University
MSc., Financial Economics, 2005

University of California at Berkeley
B.A., Economics and Statistics, 2002

Related Professional Activities

Condor Consulting Group, real estate and urban economics consulting

President, 2008 - present

Clients include: REALpac, Millar Foran, Nadlan Consulting, Rizklab, Primewest

Academic Papers

Articles Published and Forthcoming

Davidoff, Thomas and Wetzel, Jake, Do Reverse Mortgage Borrowers Use Credit Ruthlessly? (July 22, 2014). Available at SSRN: http://ssrn.com/abstract=2279930

Working Papers, Selected Papers, and Reports

Hunting for the Olympics Bounce: Any Evidence in Real Estate? UBC Centre for Urban Economics and Real Estate Discussion Paper. January 2010 (joint with Jake Wetzel).

Appendix C

...continued

Conference Proceedings

Determinants of Mortgage Contract Terms, American Real Estate and Urban Economics Association Summer Conference, Jerusalem, July 2013.

Professional Societies & Forums

American Real Estate and Urban Economics Association (AREUEA)

LANDCOR®
DATA CORPORATION

313 Sixth Street, Suite 200
New Westminster, BC
V3L 3A7

sales@landcor.com
1-866-LANDCOR