SDOT
Seattle Department of Transportation

BURKE-GILMAN TRAIL MISSING LINK PROJECT

Economic Considerations Report

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Draft Environmental Impact Statement
May 2016

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ABBREVIATIONS

ADA	Americans with Disabilities Act
AASHTO	American Association of State Highway and Transportation Officials
BGT	Burke-Gilman Trail
BLS	Bureau of Labor Statistics
FIRE	finance, insurance, and real estate
NACTO	National Association of City Transportation Officials
PSRC	Puget Sound Regional Council
RCW	Revised Code of Washington
SDOT	Seattle Department of Transportation
WTU	wholesale trade, transportation, and utilities
USDOT	U.S. Department of Transportation

EXECUTIVE SUMMARY

This Economic Considerations Report describes the existing conditions for the businesses, landowners, and residents within the Burke-Gilman Trail (BGT) Missing Link study area and considers the potential economic impacts of trail construction and operation. This report supplements conclusions drawn from the Transportation Discipline Report (Parametrix, 2016a) and the Parking Discipline Report (Parametrix, 2016b) by providing an economic context through which to understand the likely economic consequences for the region from the BGT Missing Link.

The study area (defined in Section 2.2) for the BGT Missing Link economic analysis consists of all parcels that are located within 0.5 mile of at least one of the Build Alternatives – a commonly accepted distance in the academic literature. The study area is located north of the Ship Canal and bounded by the intersection of 30th Ave NW and NW 54th St to the west, and 11th Ave NW to the east.

The economic impacts of operating the BGT Missing Link on properties in the study area were assessed using a statistical modeling technique. Separate models were estimated for single-family, multi-family, commercial, and industrial properties. In addition, the economic impacts of traffic delays (from the Transportation Discipline Report) and parking impacts (from the Parking Discipline Report) were considered.

Land use within the study area is primarily single-family, commercial, multi-family, and industrial. The highest valued land use types include multi-family properties ($622 million), commercial uses ($555 million), single-family homes ($427 million), and mixed-use ($400 million).

The services industry was the largest employer in the study area in 2015, followed by manufacturing, retail, and construction. From 2000 to 2015, the services industry increased its employment share by 18.3%, the largest increase of the employment categories considered. By comparison, manufacturing had the largest decrease in share (a loss of 7.5%) from 2000 to 2015.

The study modeling suggests that single-family homes are likely to experience a small but statistically significant increase in property values resulting from the operation of the BGT Missing Link. Depending upon the Build Alternative, the expected increase in home value is equivalent to 0.4% to 0.7% of the total 2015 assessed value of single-family homes in the study area. For other property types including multi-family, commercial, mixed-use, and industrial properties, the models suggested the operation of the BGT Missing Link would result in statistically insignificant impacts to property values. These results imply that the operational impacts of the BGT Missing Link for the four Build Alternatives are statistically indistinguishable from the baseline, No Build Alternative. However, the absence of statistical significance does not mean that no impacts would occur, just that they are either too unlikely or not detectable by the approach used (using the land use and price data examined).

The economic impacts associated with intersection delays are expected to be relatively minor for three of the Build Alternatives. In these three alternatives, select intersections would experience modest increases in vehicle delays, and other intersections would see reductions in delays, with the net effect being insignificant as no intersections would degrade from level-of-service (LOS) A, B, C, or D under the No Build alternative to an LOS E or F in the Build Alternative. For the Leary Alternative, higher intersection delays are anticipated, particularly at the NW Leary Way/11th Ave NW intersection, which has the highest weekday traffic count of all study intersections. The higher traffic congestion levels associated with this alternative may impose economic costs to businesses operating in the study area, due to higher labor and delivery delay costs, as well as to residents and commuters who may experience longer traffic delays.

Higher average driveway delays are anticipated along Shilshole Avenue NW for the Shilshole South Alternative as compared to the No Build Alternative. Under the Shilshole North Alternative, only one driveway would experience increased delay. Driveway delays would decrease for all driveways except one under both the Ballard and Leary Alternatives. The extent to which these driveway delays may impact the profitability or viability of study area businesses is presently unknown but should be considered as potential economic issues.

All of the Build Alternatives would result in some loss of on-street parking. However, the economic consequences would vary depending upon the current on-street parking utilization rate and the orientation of local commercial enterprises toward a customer base, employee commuting behaviors, and supplier dependency on automobile travel and parking. The City of Seattle Department of Transportation (SDOT) currently sets a target parking utilization rate of 70% to 85% for mixed-use and commercial zones. The Shilshole South and Shilshole North Alternatives are expected to result in the largest decreases in total parking supply, but this would occur mostly in industrial and commercial zones. These zones currently lack a target parking utilization rate set by SDOT due to their lower overall parking demand. Parking utilization for paid parking varies dramatically throughout the day and is low in the morning and very high later in the evening.

By comparison, although the Ballard Avenue and Leary Avenue Alternatives would both have smaller total reductions in parking supply. Depending upon the time of day, these areas would be either below or at the SDOT target parking utilization rate. Hence, the Ballard Avenue and Leary Alternatives may result in loss of parking supply that could impose economic costs to nearby businesses. The economic costs associated with the loss of parking would be highest when demand is at its peak, which occurs in the afternoon and evening. The economic costs associated with loss of parking for these alternatives may be partially or completely offset by increases in business from pedestrian and bicycle users and from increases in the supply of nearby off-street parking; however, the extent of those costs and offsets can vary greatly from business to business.

CHAPTER 1: INTRODUCTION AND PROJECT HISTORY

1.1 Introduction

The Burke-Gilman Trail (BGT) is a regional trail that runs east from Golden Gardens Park in Seattle and connects to the Sammamish River Trail in Bothell, except for a missing segment through the Ballard neighborhood. Currently, the regional trail ends at 30th Ave NW by the Hiram M. Chittenden (Ballard) Locks on the west, and begins again at the intersection of 11th Ave NW and NW 45th St on the east. The Seattle Department of Transportation (SDOT) proposes to connect these two segments of the BGT with a marked, dedicated route that would serve all users of the multi-use trail. The proposed project to complete the regional facility is referred to as the Missing Link.

Completing this section of the BGT has been discussed since the late 1980s. Refer to Chapter 1 in the Draft Environmental Impact Statement (DEIS) for a detailed summary of the project history. The alternatives evaluated in the DEIS were developed from suggestions received in 2013 during scoping for the DEIS. Suggested routes were evaluated using the following screening criteria: directness of route, number and types of trail crossings (i.e., driveways and intersections), street and arterial classification, adjacent land uses, and right-of-way width.

1.2 No Build Alternative

Under the No Build Alternative, no new multi-use trail would be constructed to connect the existing segments of the regional Burke-Gilman Trail. Trail users would continue to use the existing surface streets and sidewalks to travel between the existing trail segments, a distance of approximately 1.2 miles. Currently, trail users tend to use the most direct route, which is along Shilshole Ave NW. Pedestrians may opt for a street with sidewalks such as Ballard Ave NW or NW Leary Way. The No Build Alternative serves as the baseline condition, against which the Build Alternatives are compared over time to their 2040 design year. Over that time period, population and employment growth is expected to continue in the Ballard neighborhood, leading to an increase in traffic congestion, parking demand, and the number of people walking and biking.

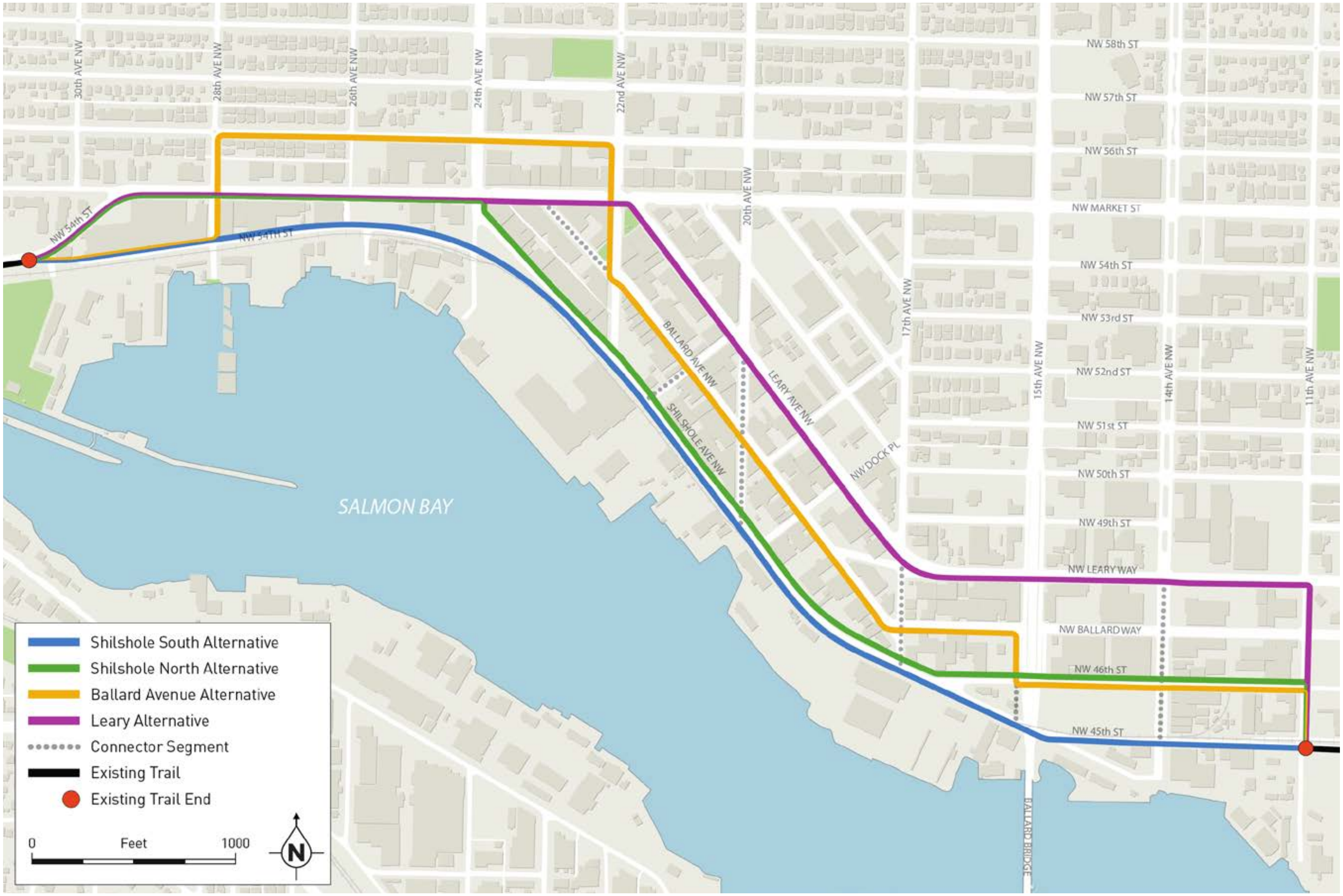
1.3 Build Alternatives

Four Build Alternatives are analyzed in the DEIS: the Shilshole South, Shilshole North, Ballard Avenue, and Leary Alternatives. The alternatives described below are conceptual routes designed to provide distinct alternatives for analysis in the DEIS. The route that is eventually selected as the preferred alternative could be any one of these routes, or a combination of portions of any of them.

1.3.1 Shilshole South Alternative

Under the Shilshole South Alternative, the multi-use trail would be primarily routed along the south side of Shilshole Ave NW (Figure 1-1). There would be changes to parking, lanes, and intersection configurations on both sides of the street along this alternative alignment. The trail would accommodate users on a newly paved surface for most of its length.

Figure 1-1. Proposed Alternatives



Beginning at the existing western trail end at the Ballard Locks, the trail would continue east along the north side of the unimproved NW 54th St right-of-way until the intersection with Shilshole Ave NW, just east of 24th Ave NW. The trail would then proceed along the south side of Shilshole Ave NW, continuing onto the southern side of NW 45th St to the eastern project end at 11th Ave NW.

From the existing western trail end at the Ballard Locks, the trail would be north of the Ballard Terminal Railroad (BTR) tracks until just before 17th Ave NW, at which point the trail would cross to the south of the tracks. A signal would be installed at the intersection of Shilshole Ave NW and 17th Ave NW for trail users crossing Shilshole Ave NW to access 17th Ave NW.

The trail width would vary throughout the corridor due to existing conditions and constraints, but would generally be between 8 and 12 feet wide. Based on the design concepts, the typical right-of-way on Shilshole Ave NW for this alternative would include a buffer zone adjacent to the railroad tracks and vehicle traffic lanes, a multi-use trail, two vehicle travel lanes, and preservation of parking areas where feasible.

1.3.2 Shilshole North Alternative

Under the Shilshole North Alternative, the multi-use trail would be primarily routed along the north side of Shilshole Ave NW (Figure 1-1). Beginning at the existing western trail end at the Ballard Locks, the trail would continue east along the south side of NW 54th St until it turns into NW Market St. The trail would continue along the south side of NW Market St, until it crosses 24th Ave NW and turns south on the east side of 24th Ave NW. The trail would then proceed east along the north side of Shilshole Ave NW to the intersection with NW 46th St. A signal would be installed at the intersection of Shilshole Ave NW and 17th Ave NW for trail users crossing 17th Ave NW. It would continue along the north side of NW 46th St underneath the Ballard Bridge to 11th Ave NW. At this point, the trail would turn south along the east side of 11th Ave NW until it connects to the eastern end of the trail at NW 45th St.

There would be changes to parking, vehicle travel lanes, and intersection configurations on both sides of the street in this alternative. The typical right-of-way section on NW Market St would include a sidewalk, the multi-use trail, a buffer zone, two vehicle travel lanes, center turn lane, and parallel parking areas on both sides of the street. The typical right-of-way on Shilshole Ave NW for this alternative would include a buffer zone and informal parking adjacent to the railroad tracks, two vehicle travel lanes, parallel parking area, buffer area, multi-use trail, and sidewalk. The existing gravel shoulder on the south side of Shilshole Ave NW would be maintained. These elements would vary along the trail due to the existing road configuration and structures.

1.3.3 Ballard Avenue Alternative

Under the Ballard Avenue Alternative, the multi-use trail would be primarily routed along the south side of Ballard Ave NW (Figure 1-1). Beginning at the existing western trail end at the Ballard Locks, the trail would continue east along the north side of the unimproved NW 54th St right-of-way until 28th Ave NW. At this point the trail would turn north along the east side of 28th Ave NW until it reaches NW 56th St. The trail would then turn east along the south side of NW 56th St to the intersection with 22nd Ave NW. At 24th Ave NW and NW 56th St, a new pedestrian-activated signal would be installed to facilitate the trail crossing of 24th Ave NW. The trail would turn south along the west side of 22nd Ave NW, cross NW Market St, and proceed south to Ballard Ave NW. At this point the trail would turn southeast along the south side of Ballard Ave NW and continue east on the south side of NW Ballard Way to the intersection with 15th Ave NW. The trail would then turn south onto the one-way road on the west side of 15th Ave NW, which could potentially be converted to trail-only use (no motor vehicles). The trail would cross to the south side of NW 46th St at a newly signalized intersection and proceed east across 11th Ave NW. It would then turn south along the east side of 11th Ave NW to the eastern trail end at NW 45th St.

There would be changes to parking and vehicle travel lane configurations on all streets traversed by this alternative. The typical right-of-way section on Ballard Ave NW would include pedestrian sidewalks on both sides of the street, buffer zone, two vehicle travel lanes, and a parallel parking area on the north side of the street. These elements would vary along the trail due to the existing road configurations and structures.

1.3.4 Leary Alternative

Under the Leary Alternative, the multi-use trail would be primarily routed along the south side of Leary Ave NW (Figure 1-1). Beginning at the existing western trail end at the Ballard Locks, the trail would continue east along the south side of NW 54th St until it turns into NW Market St. The trail would continue east along the south side of NW Market St, crossing 22nd Ave NW. At 22nd Ave NW, the trail would turn southeast on the south side of Leary Ave NW. The trail would continue east along the south side of Leary Ave NW, which becomes NW Leary Way, to 11th Ave NW. At this point, the trail would turn south along the east side of 11th Ave NW to the current trail end at NW 45th St.

There would be changes to parking, vehicle travel lanes, and intersection configurations on both sides of the street along this alternative. The typical right-of-way on Leary Ave NW would include buffer zones on both sides of the street, a multi-use trail, parking areas on both sides of the street, sidewalks on both sides of the street, two vehicle travel lanes, and one two-way center left turn lane. The typical right-of-way on NW Market St would include a sidewalk, the multi-use trail, a buffer zone, two vehicle travel lanes, center turn lane, and parking areas on both sides of the street. These elements would vary along the trail due to the existing road configuration and structures.

1.3.5 Connector Segments

As mentioned previously, there are a number of possibilities to configure the routes, and six segments have been identified as the most likely connectors (Figure 1-1). These segments may be used as connections between portions of the previously identified alternative routes and could be on either side of the road. The connector segments include the following:

- Ballard Avenue NW;
- NW Vernon Place;
- 20th Avenue NW;
- 17th Avenue NW;
- 15th Avenue NW; and
- 14th Avenue NW.

Should NW Vernon Pl be used as a connector segment, a signal at NW Vernon Pl and Shilshole Ave NW may also be warranted, depending on whether the trail would continue on the north or south side of Shilshole Ave NW.

1.4 Features Common to All Build Alternatives

1.4.1 Roadway Design Considerations

Roadway designs would vary for each alternative based on factors such as intersection geometry, vehicle volumes, and types of vehicles. This section describes roadway modifications, intersection treatments, driveway design, and parking lot changes that could be incorporated during the final design phase of the project to address safety, access, non-motorized users, and vehicle types. Similar concepts can be found throughout the city and in design documents such as the Urban Bikeway Design Guide (National Association of City Transportation Officials [NACTO], 2015) and Guide for Development of Bicycle Facilities (American Association of State Highway and Transportation Officials [AASHTO], 2012). These features are common to all Build Alternatives, but the location and other specifics would vary by alternative.

Roadway Design

Adding a trail to the existing street system would require roadway modifications for vehicles to co-exist with non-motorized users. These changes could include geometric changes to create perpendicular intersections, changes to roadway lane configurations, alterations of curb radii, and design details that provide sight lines between vehicles and non-motorized users.

Intersection Design

Intersections would be designed to more clearly identify crossings of the multi-use trail. These improvements could include the following:

- Curb extensions or curb bulbs;
- Pavement markings;
- Raised crosswalks;
- Driveway-style entrances at intersections;
- Signalized intersections;
- Rapid flashing beacons at road crossings of the trail;
- Medians used either to improve the street crossing for pedestrians or to restrict left turns across the trail;
- Barriers, fences, or buffers separating non-motorized trail users from moving vehicular traffic or the railroad; and
- Alternative pavement treatments.

Driveway Design

Driveways that cross or intersect with the multi-use trail would also be evaluated for possible design changes. Design changes could include many of the intersection elements described above, including curb bulbs, and pavement markings and treatments. Driveways and loading docks would be reconfigured so that parked vehicles or trucks would not block the trail. Some driveways may be eliminated, relocated, or consolidated where there are multiple driveways at a single property.

Access Modifications

Some private lots may be affected where vehicle parking currently extends into the public right-of-way, or due to changes to property access from the multi-use trail. For example, striping in parking lots may be modified to prevent vehicles from parking in the right-of-way and blocking the trail, which may reduce the number of parking spaces in some lots.

1.4.2 Construction Activities and Durations

Overall construction of any of the Build Alternatives would last 12 to 18 months. Duration would vary depending on the extent of utility relocations, storm drainage improvements, and existing roadway reconfigurations including bus stop relocations. Construction would likely occur in segments, and one segment would be completed before moving on to the next segment to minimize the construction duration at any given location.

Construction of any of the Build Alternatives would consist of the following general activities:

- Demolition, including removal of pavement, curbs, sidewalks, driveways, trees, signs, bus shelters, fencing, or other features located in the new trail area.
- Construction of new roadway elements, including pavement, curbs and gutters, sidewalks, driveways, trees, bus shelters, fencing, signs, and buffer elements. Buffer elements include such things as paving, landscaping, barriers, fencing, and signage.
- Utility relocations, ranging from moving fire hydrants, stormwater catch basins, and overhead utility and power poles to the installation of new drainage facilities.

1.4.3 Construction Staging

Construction staging and scheduling are typically determined by the contractor; however, the City would specify some mandatory restrictions for the contractor. Demolition would likely be limited to a certain length of the trail; as such, the contractor would not be allowed to demolish the work space along the entire length of the trail. Rather, the project would be constructed in multiple smaller segments.

The project would generally use areas within or near the project footprint for construction staging and storing materials and equipment, including vacant lots, parking lots, and unused rights-of-way. Temporary construction offices (such as trailers) could also use these areas. Alternatively, construction offices may be located in a rented office space. All staging areas would be restored to their pre-construction condition or better.

1.4.4 Construction Traffic and Haul Routes

Construction would generate traffic to transport materials and equipment to the work site and to remove demolition debris and excess soil. The contractor would require access to the site for heavy vehicles such as dump trucks and concrete trucks, light vehicles such as pickup trucks, and heavy equipment such as excavators and compactors. Trucks would transport construction material. The contractor would determine the best construction methods, as permitted by the City and in conformance with the project construction plans and specifications. The exact number of truck trips per day during construction cannot yet be determined because project design is not yet complete. However, preliminary estimates indicate that the highest number would be approximately 20 round-trip truck trips per work day during a paving operation, spread uniformly throughout the day. City streets that could be used as haul routes include Shilshole Ave NW, NW 46th St, NW Leary Way/Leary Ave NW, and 15th Ave NW.

CHAPTER 2: METHODOLOGY

2.1 Data Collection

The economic analysts collected several sources of data including the following:

- Property sales and assessor data including property characteristics data (for example, land use, building square footage, number of bedrooms, views, etc.) for residential, commercial, retail, and industrial land use;
- Transportation data related to the typical expected delays at driveways and intersections, travel times, and traffic safety data related to existing conditions, derived from the transportation alternatives screening analysis and Transportation Discipline Report;
- Data collected from the Land Use Discipline Report including building current use, zoning, and building characteristics;
- Previously collected business characteristic data including firm type and employment; and
- Field observations to observe the four Build Alternative routes and existing conditions for the No Build Alternative.

2.2 Selection of Study Area

Previous literature examining determinants of property values (a more easily measured value with implications for residential and commercial users) have found that the impact of proximity to transportation infrastructure dissipates after approximately 0.5 mile.[1] The consultant therefore treated businesses and residential properties in Ballard within 0.5 mile of the BGT as the primary affected environment for this analysis. Benefits from operation of the BGT Missing Link may extend to residents beyond the 0.5-mile buffer to the extent that trail construction improves connectivity to surrounding communities. However, it is beyond the technical scope of this analysis to estimate the entire stream of benefits that may be provided by the BGT Missing Link project.

2.3 Identification of Impacts

To identify the impact of operating the BGT Missing Link in Ballard, the consultant conducted a “natural experiment” to determine price effects of multi-use trails in other similar locations in the surrounding community. A natural experiment is a statistical study technique that uses data derived from observed economic conditions in a market, as opposed to a study conducted in a laboratory. For this purpose, all parcels located along multi-use trails in the City of Seattle and King County region served as the natural experiment study area. The model included appropriate controls and assumptions to ensure that estimates produced based upon other regions of the county apply to properties located in Ballard. These controls

[1] See for instance Knaap, G.J., C. Ding, and L. D. Hopkins. (2001). “Do Plans Matter? The Effects of Light Rail Plans on Land Values in Station Areas.” *Journal of Planning Education and Research* 21: 32–39. Immergluck, Dan. (2009). “Large Redevelopment Initiatives, Housing Values and Gentrification: The Case of the Atlanta Beltline.” *Urban Studies* 46(8): 1723-1745. To the best of the consultant’s knowledge, no prior literature has estimated the impact of proximity to multi-use trails on home value.

included, but are not limited to, controlling for land use, structure characteristics, presence of other local amenities, proximity to commercial centers, and local infrastructure characteristics.

The consultant constructed an economic impact framework to assess how different properties, including those used for residential and commercial uses, might be impacted. This framework examined land value, rents, and costs of servicing land (e.g., delivery of goods, access of customers, labor access) using econometric models. This analysis was based upon a statistical and qualitative assessment of the four Build Alternatives and connector segments. In addition to trail proximity, this analysis controlled for structural differences in houses (lot size, number of bedrooms, etc.) and geographic characteristics (driving distance to Seattle central business district, zoning, waterfront property/frontage, etc.). Alternative models were run with restrictions based upon the location of the property (e.g., within the City of Seattle, versus all of King County), and the proximity of the parcel to the BGT. These alternative models helped to ensure that conclusions robustly reflect variation in modeling assumptions and include explanatory variables.

The statistical portion of this analysis was conducted using a combination of statistical software packages such as Stata and R, as well as GIS based software such as ArcGIS for mapping applications. A hedonic model of property values was used to evaluate the impacts of the BGT Missing Link on property values. Hedonic models estimate the value of a good or service by breaking it down into identifiable characteristics through a regression analysis[2]. The hedonic models determine the long-term (permanent) effect of BGT Missing Link operation on property values. Accessibility can be quantified based upon the number of available modes of travel (driving, bus, walking, biking) to commute to a given location or community as well as the expected commute time to a given site. Generally speaking, locations that are accessible by more commuting modes and with shorter average commute times are more accessible. Greater accessibility directly translates into higher potential profitability of a business and the value of a home, which can be statistically discerned using the econometric model.

An opportunity cost model of travel time was used to assess the value of travel-time savings based on transportation model outputs that identify travel times and reliability impacts. Weekday traffic volume estimates for each intersection were calculated for 2040 assuming an annual growth in volume for the study area by 0.6%. Intersections identified as having potentially significant impacts under each of the Build Alternatives were those where the level-of-service declined from the baseline (LOS of A–D) to the Build Alternative (LOS of E or F). Since lesser intersection delay impacts can accumulate across multiple intersections, this report also itemizes intersections whose 2040 expected delay times were at least 20% greater than the 2040 No Build Alternative. Total system delays are then calculated by multiplying the count of daily traffic volume times the expected delays for each intersection.

The impacts reported meet standard thresholds for statistical significance. Statistical significance indicates the degree of certainty that the economic impacts statistically differ from zero. For instance, a statistically significant threshold of 95% indicates that there is less than a 5% probability that the true impact is actually equal to zero. This analysis included quantitative and qualitative assessments of how the community is likely to change due to the BGT and, to the extent possible, distinguished differences in expected impacts among different siting options.

[2] Regression analysis is a statistical technique designed to explain variation in the outcome of a particular variable, in this case home property sale price, as a function of the observable attributes (e.g. lot size, structural square footage, etc.).

The economic effects described above fall into the following general categories:

- Changes in use value or user costs of the facility or improvement (e.g., user benefits such as travel time savings);
- Changes in the value or cost of services to property (e.g., freight delivery, customer access, labor accessibility – these are typically the capitalization to land of the benefits to the users of the facility); and
- Changes in amenity value of property adjacent to the improvement (these are the capitalization to land of a broader set of benefits not typically associated with using the transportation facility – e.g., views, proximity to attractive features of the urban environment).

2.4 Other Considerations

The consultant considered the cumulative impacts of the BGT Missing Link and other actions and trends in the Ballard area on the local economy. This assessment included an evaluation of the cumulative impact of the construction of the BGT Missing Link on area property values, transportation access and risk, employment, and the vitality of local businesses.

CHAPTER 3: AFFECTED ENVIRONMENT

This chapter describes the affected environment for the economic analysis using 2015 existing land use and economic conditions. The 2015 conditions provide the baseline to project how changes in trail configurations would impact affected stakeholders.

3.1 Selected Study Area

The study area includes all parcels located near the Build Alternatives that may reasonably be expected to be impacted by the BGT Missing Link. A spatial buffer of 0.5 mile surrounding the Build Alternatives was used to define the boundary of the affected environment (Figure 3-1). A review of the previous literature related to the impact of transportation network improvements on property values finds that properties farther than 0.5 mile from transportation infrastructure are statistically unaffected by its presence.

The study area extends north of Leary Ave and Market Street for 0.5 mile and south of Shilshole Avenue, but includes only those parcels on the northern side of the Ship Canal. Properties that are outside the study area on either the western or eastern sides are excluded, as these properties are assumed to already be served by existing BGT infrastructure.[3] Water areas and rights-of-way were excluded for purposes of the economic analysis.

[3] This assumption does not preclude some possible economic impacts to parcels geographically near the proposed Build Alternatives but outside the study area. However, in our estimation, these effects are likely to be minimal and dwarfed by impacts to parcels inside the study area.

Figure 3-1. Study Area for Economic Analysis

Source: Puget Sound Regional Council GIS, Open Street Map

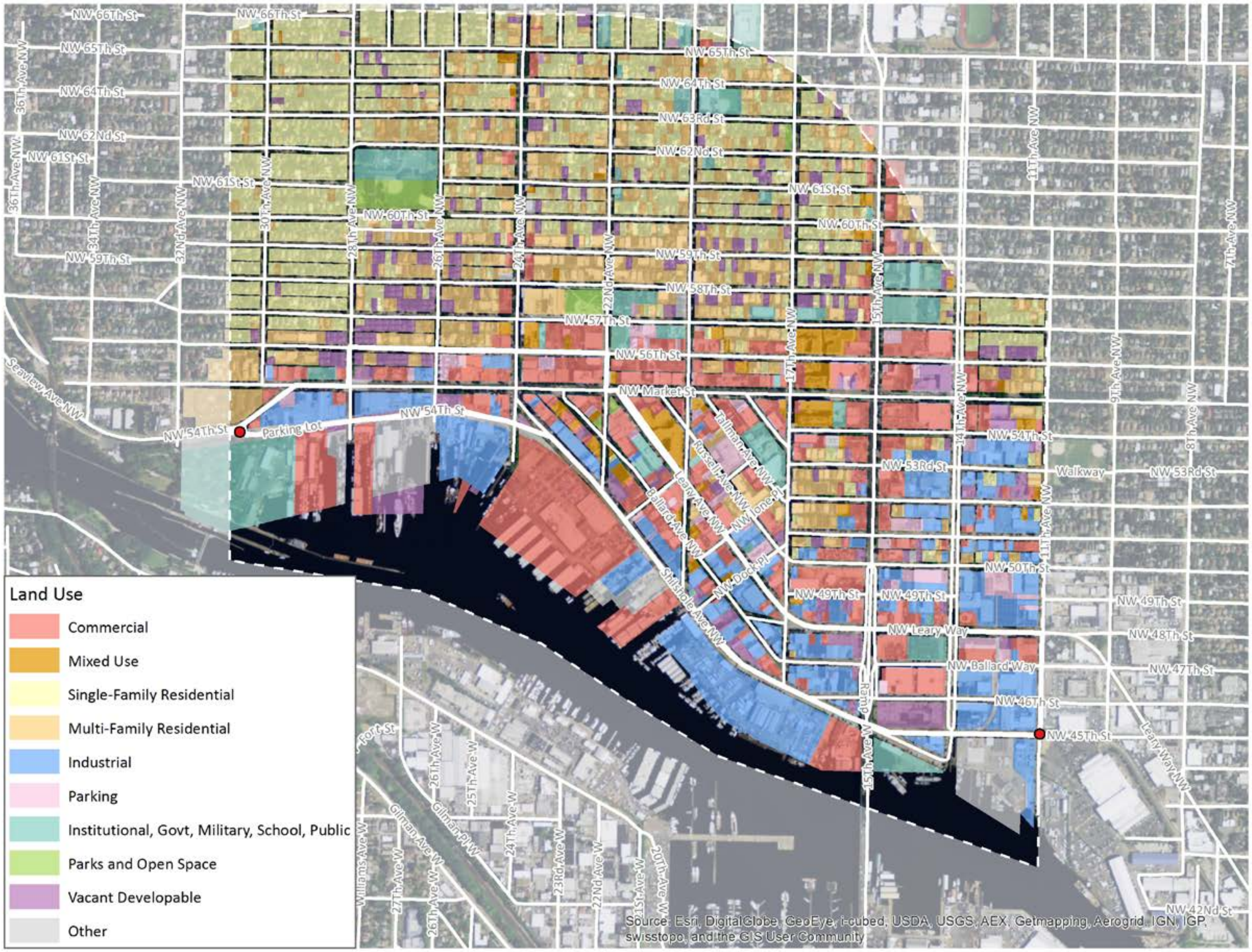
3.2 Existing Land Use Conditions

The existing land uses within the study area include the following nine primary types (Figure 3-2):

- Commercial
- Industrial
- Mixed-use
- Multi-family residential
- Single-family residential
- Government and institutional
- Parks
- Parking
- Vacant

Data for the 2015 land use acreage and valuation estimates were collected from the King County Assessor's office. Overall the affected environment consists of 458 acres including parcels to the north and south of the Build Alternatives.

Figure 3-2. Existing Land Uses in the Study Area

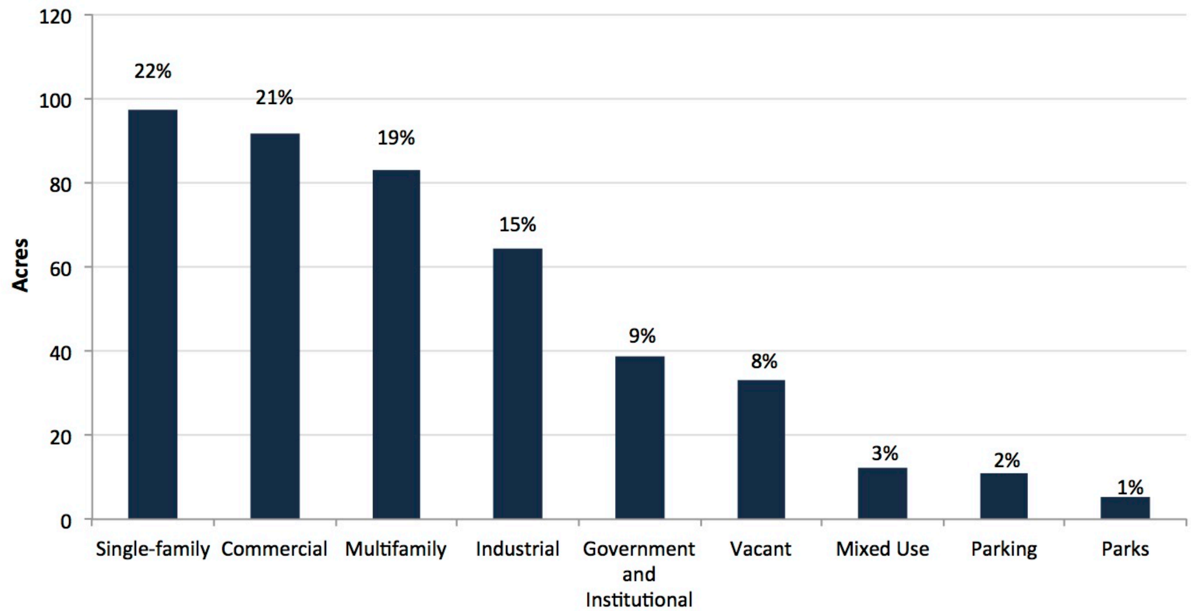


Source: Puget Sound Regional Council GIS, ESRI

3.2.1 Acreage and Percentage Land Use

In the study area, the top four land uses include single-family homes (21.2%), commercial uses (20.0%), multi-family housing (18.0%), and industrial (14.0%) (Figure 3-3). Together, these four land uses account for nearly three-quarters of available land in the study area.

Figure 3-3. Acres of Land by Land Use Type

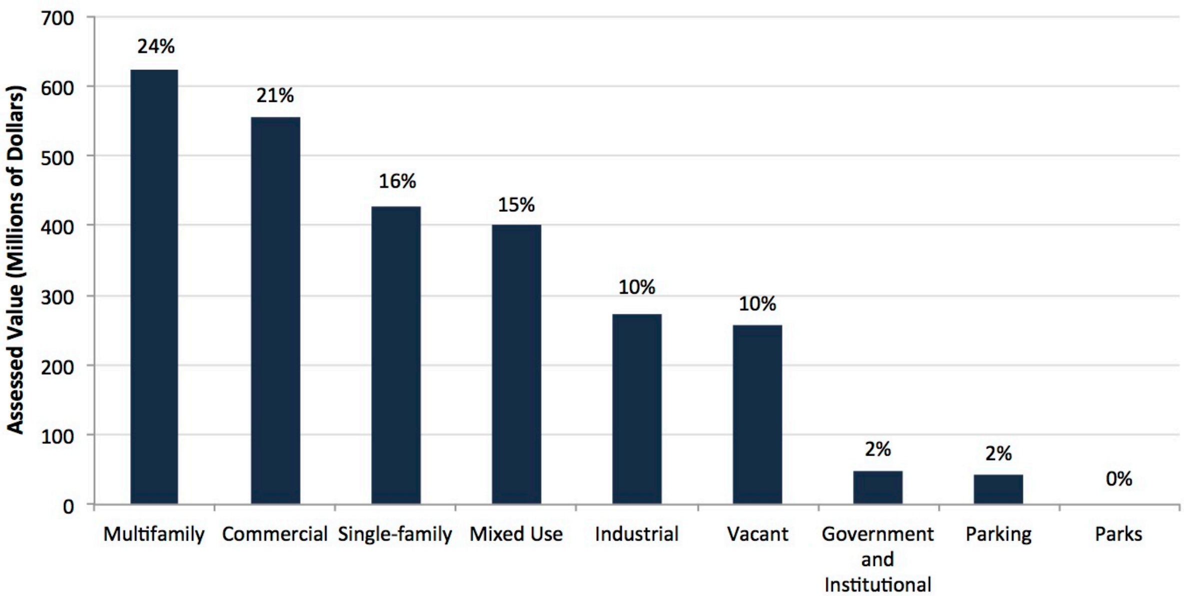


Source: Puget Sound Regional Council

3.2.2 Value of Land

Figure 3-4 provides a breakdown of total value of parcels (as measured in assessed value), including both the land and structural value, by land use type. Because of a 2013 change to state law (RCW 84.40.045 and 84.40.175), government-owned properties are no longer assessed. As of 2015, the total assessed value of parcels in the study area was approximately $2.6 billion. The four land uses with the highest land values include multi-family properties ($622 million), commercial uses ($555 million), single-family homes ($427 million), and mixed-use ($400 million). Of the private land uses, mixed-use lands averaged the highest price per square foot at $444, whereas single-family homes averaged the lowest price per square foot at $106.

Figure 3-4. Assessed Parcel Value by Land Use Type



Source: Puget Sound Regional Council GIS

3.2.3 **Most Valuable Parcels**

Figure 3-5 displays the top 10 most valuable parcels (as measured in total assessed value) for each of the categories of commercial, industrial, mixed-use, multi-family, and institutional lands, respectively. The Swedish Medical Center is the most valuable parcel by assessed value at $46,181,900 in 2015. The top 10 properties by assessed value represented 27.5%, 33.8%, 59.9% and 18.4% of the total assessed value of commercial, industrial, mixed-use, and multi-family parcels, respectively.

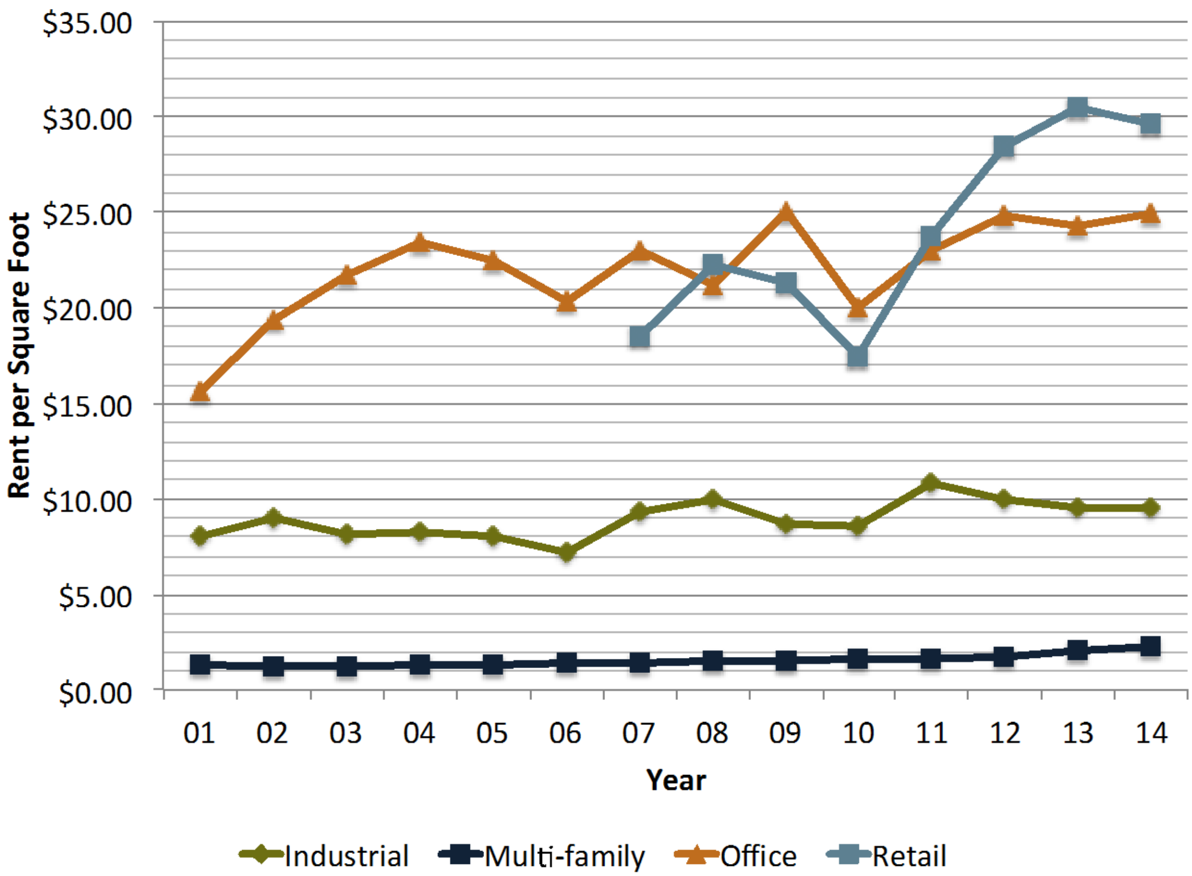
Figure 3-5. Top 10 Most Valuable Parcels for Each Land Use by 2015 Total Assessed Value

Source: Puget Sound Regional Council GIS, Open Street Map

3.3 Occupancy and Rent

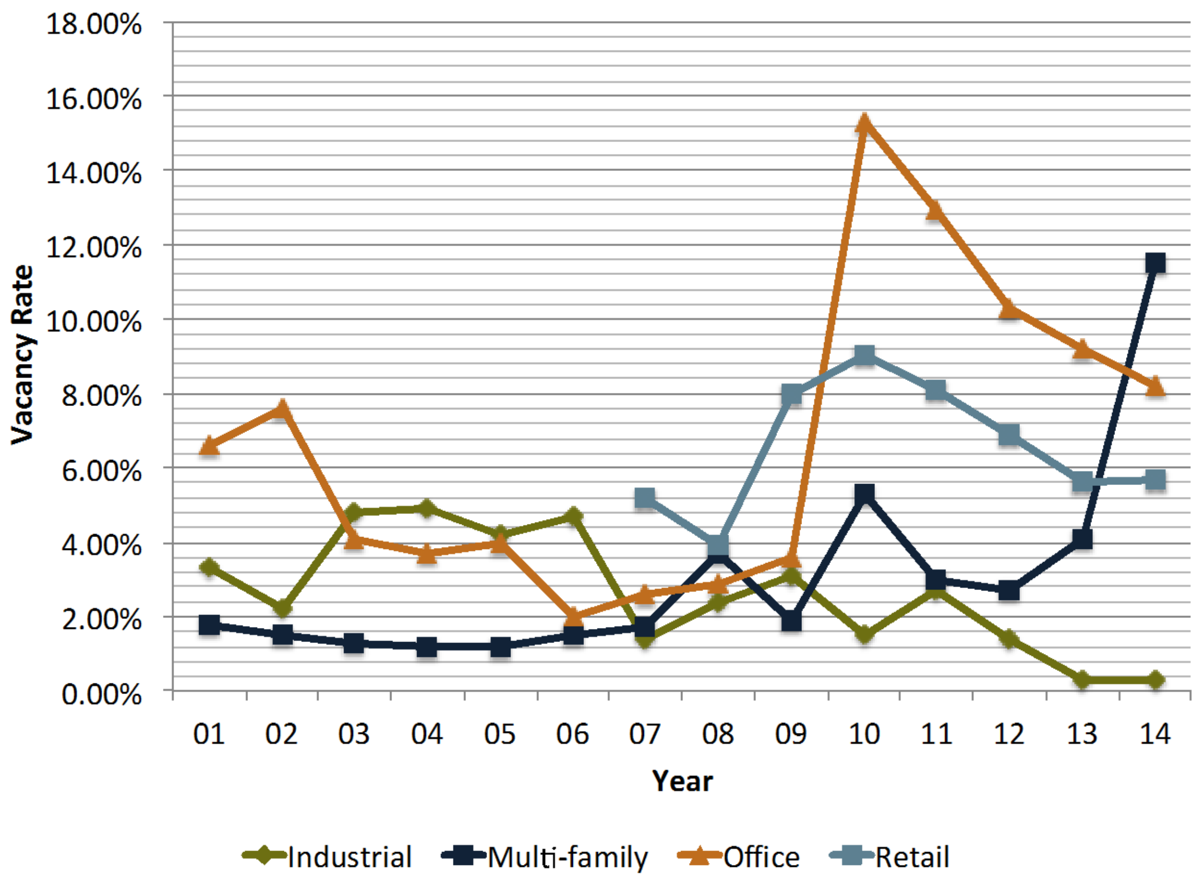
Occupancy and rent data for the region were acquired from Costar data sources, which track rent and vacancy rates for industrial, multi-family, office, and retail land uses based upon quarterly survey data (Costar, 2015). These data are available from 2001 to the present for all land uses except retail, for which data became available starting in 2006. For each land use, mean rental price is reported as dollars per structural square foot per month and vacancy rates over time (Figures 3-6 and 3-7). Rental rates are averaged across properties in the study area but are not weighted by structural square feet; they are based upon the reported lease price but do not include vacant properties.

Figure 3-6. Mean Rental Price (Dollars per Square Foot per Month) by Property Type



Source: Costar Realty Information

Figure 3-7. Vacancy Rate by Land Use



Source: Costar Realty Information

On a rent per square foot of leasable area basis, retail and office land uses commanded the largest premium at approximately $30 and $25 per square foot per month in 2015, respectively. On the lower end, industrial and multi-family rents averaged approximately $9 and $1.50 per square foot, respectively, in 2015. Despite the relatively lower returns per square foot for multi-family properties compared to other land uses, annual growth in rental rates has been strongest for these properties. Multifamily rental rates have grown by an average of 4.3% per year since 2001, with growth rates of over 10% per year from 2011 through 2014. Rental rates for retail properties have also increased rapidly in recent years, growing at an average annual rate of 7.7% from 2011 through 2014.

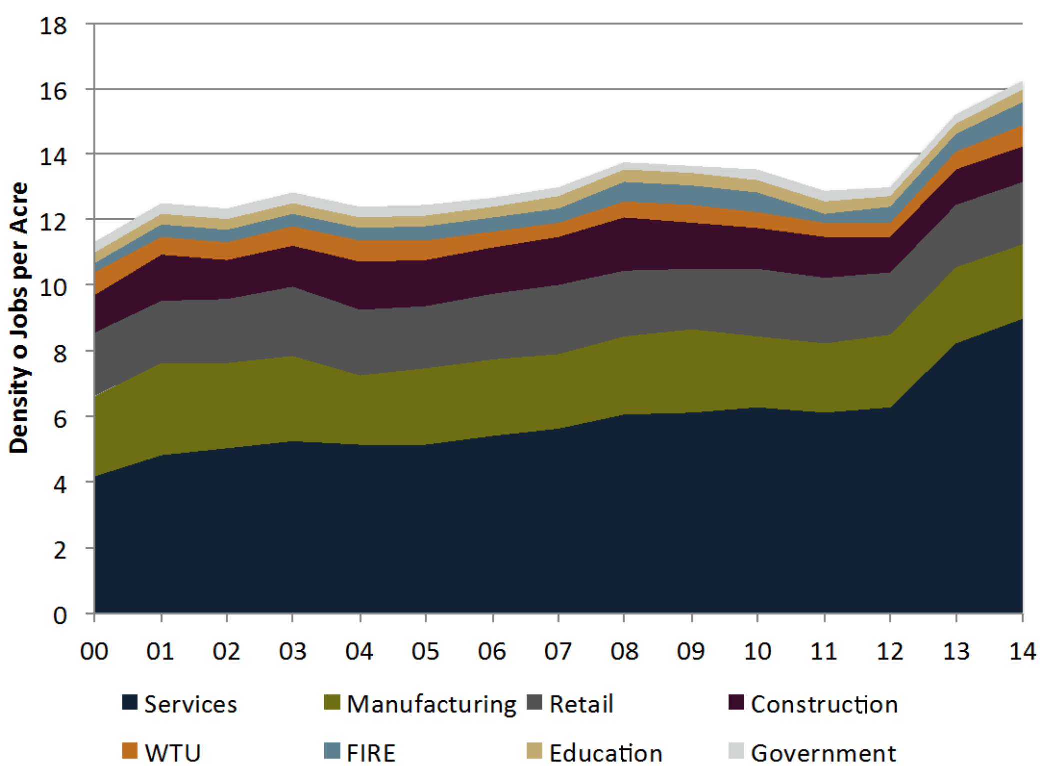
The trends in vacancy are more volatile for most land uses. Both retail and office uses had a spike in vacancy in 2010, which also corresponded to a drop in rental rates, though recent trends in vacancy have been downward. Industrial lands averaged the lowest average vacancy rate over the sample time period and were near zero in 2014 (Costar, 2015). Multi-family vacancy rates have grown over time with a large increase reported in 2015. However, this increase was likely due to the addition of new units, which can often take several months to lease up to capacity (Costar, 2015).

3.4 Employment Conditions

Historical employment data for the region were collected from the Puget Sound Regional Council (PSRC) Covered Employment Estimates dataset from the year 2000 to 2014 (PSRC, 2014). Covered employees include most full- and part-time, private and government, wage and salary workers. They typically exclude workers paid primarily on a commission basis and the self-employed. These data are available at the census tract level; two census tracts, numbers 47 and 33, closely approximate the boundaries of the study area. Using these census tract boundaries, the consultant generated a time series of data regarding the count of employment by the construction, FIRE (finance, insurance, and real estate), manufacturing, retail, services, WTU (wholesale trade, transportation, and utilities), government and education industries. The analysts then scaled these counts by the land acreage of each census tract to produce an estimate of the density of jobs over time. Employment is reported on a per acre basis to provide a metric of employment intensity, which is comparable across regions with differing spatial scales.

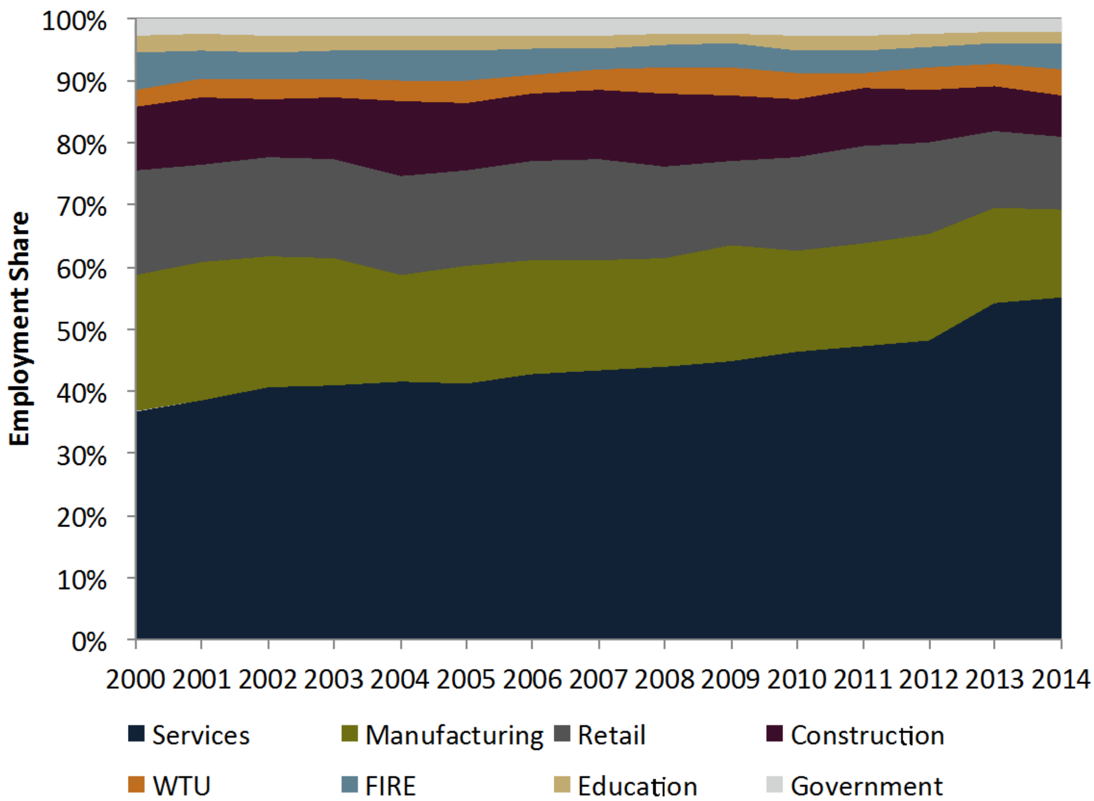
Figures 3-8 and 3-9 present the density of jobs and employment shares by industry in the study area. In 2015, the job density was approximately 16.3 jobs per acre, an increase of nearly 43.9% over 2000 levels. The four largest employing industries in 2015 were services (55%), manufacturing (14.2%), retail (11.6%), and construction (4.4%). Between 2000 and 2014 the services sector experienced the largest gain in employment, with an increase in employment share of 18.3% and an increase in job density by 4.8 jobs per acre. By contrast, during the same timeframe, manufacturing employment decreased both as a share of total employment (-7.5%) and per acre (-0.15 jobs per acre) (PSRC, 2014).

Figure 3-8. Employment Density by Industry in the Study Area



Source: PSRC Covered Employment Estimates, 2014

Figure 3-9. Employment Shares by Industry in the Study Area



Source: PSRC Covered Employment Estimates, 2014

3.4.1 **Taxable Retail Sales**

Taxable retail sales are tracked by the Washington State Department of Revenue for the Ballard region. Table 3-1 displays taxable retail sales from 2010 – 2013. Taxable retail sales are recorded at the point of sale. Some industries, such as retail and service, may predominantly sell products, whereas other industries, such as manufacturing, may predominantly buy products. For most industry types the value of goods and services sold in Ballard increased from 2010 to 2013. The largest valued industries by retail sales over this time period were the retail industry and services industry, which averaged $155 million and $131 million in annual retail sales, respectively. The highest growth industry during this period was the FIRE industry, which recorded a 271% increase in retail sales from 2010 to 2013.

Table 3-1. Taxable Retail Sales by Industry (2010 – 2013)

Year	*Construction*	*FIRE*	*Manufacturing*	*Retail*	*Services*	*WTU*
2010	$21,518,311	$1,185,629	$15,990,209	$144,958,858	$115,614,719	$8,032,392
2011	$15,453,296	$1,883,399	$14,827,022	$145,061,824	$107,544,274	$8,676,526
2012	$15,041,191	$2,854,635	$18,030,007	$160,194,264	$143,823,588	$11,032,262
2013	$18,370,267	$4,399,538	$20,313,355	$170,157,911	$157,904,993	$13,477,614
Average	$17,595,766	$2,580,800	$17,290,148	$155,093,214	$131,221,894	$10,304,699

Source: Washington State Department of Revenue

Figure 3-10 shows the taxable retail sales by sector for the years 2010 to 2013, and Figure 3-11 shows the percentage breakdown of retail sales by sector. The retail (NAICS 44-45) and accommodation and food service (NAICS 72) sectors accounted for 64% of retail sales in 2013.

Figure 3-10. Taxable Retail Sales by Sector and by Year (2010 – 2013)

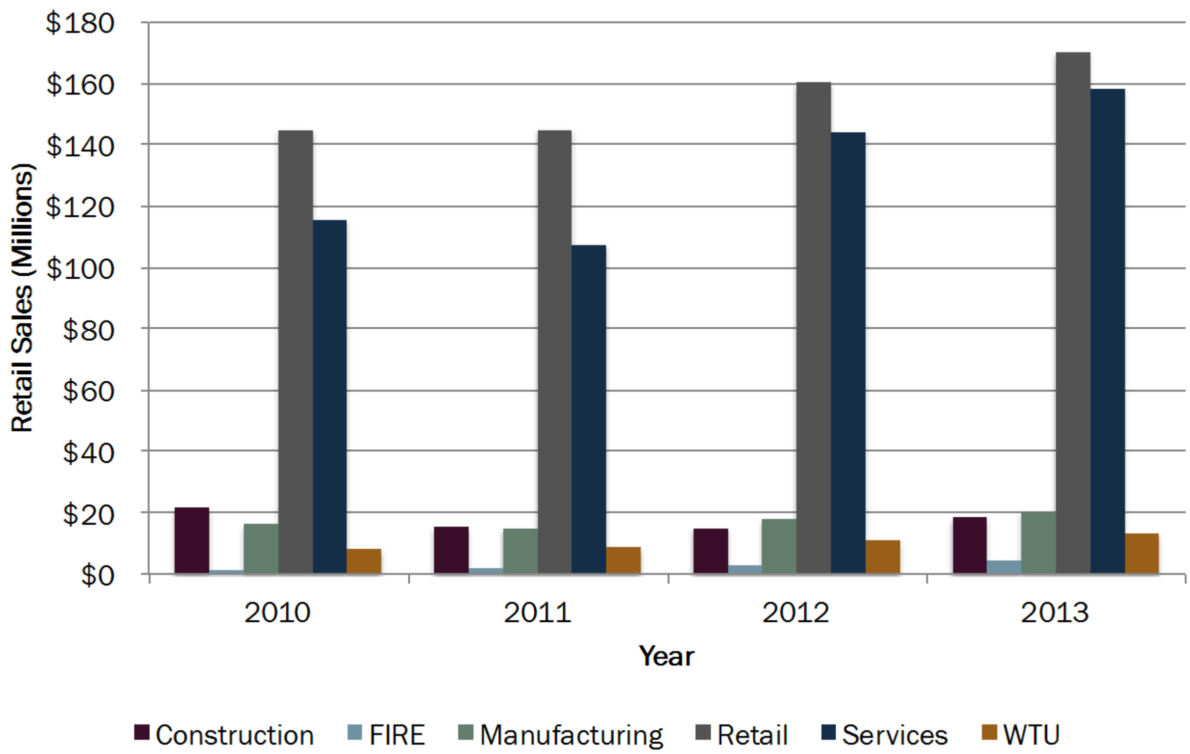
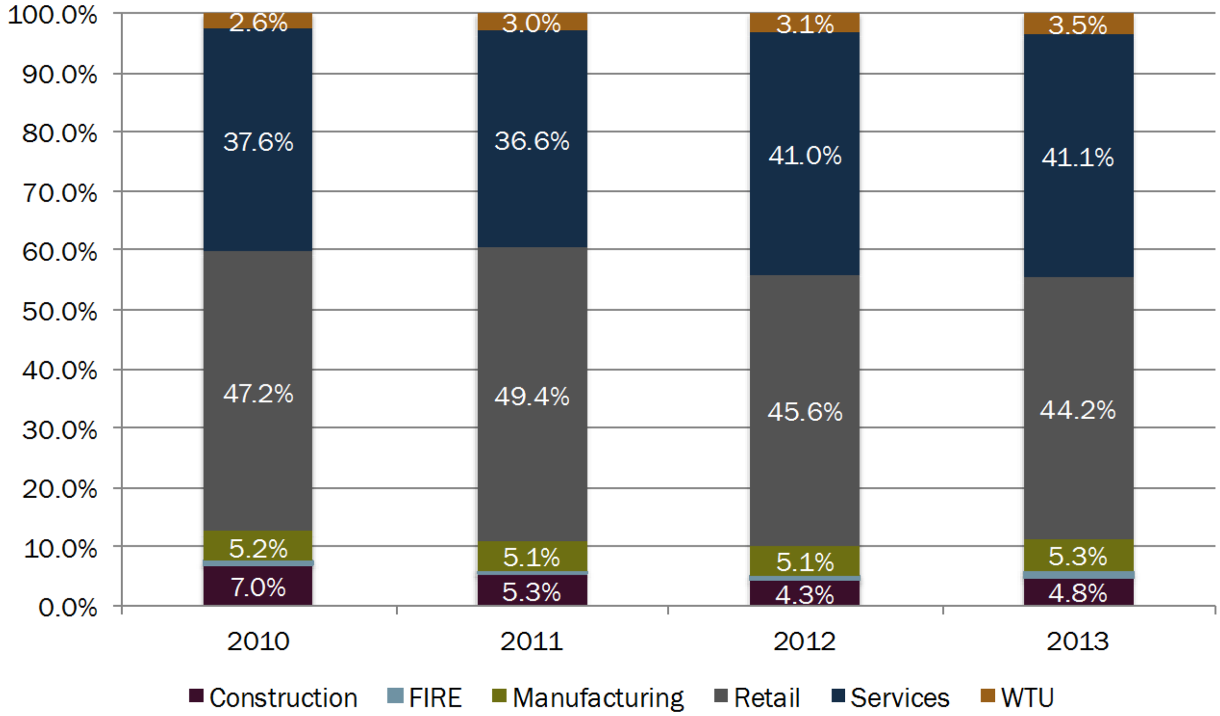


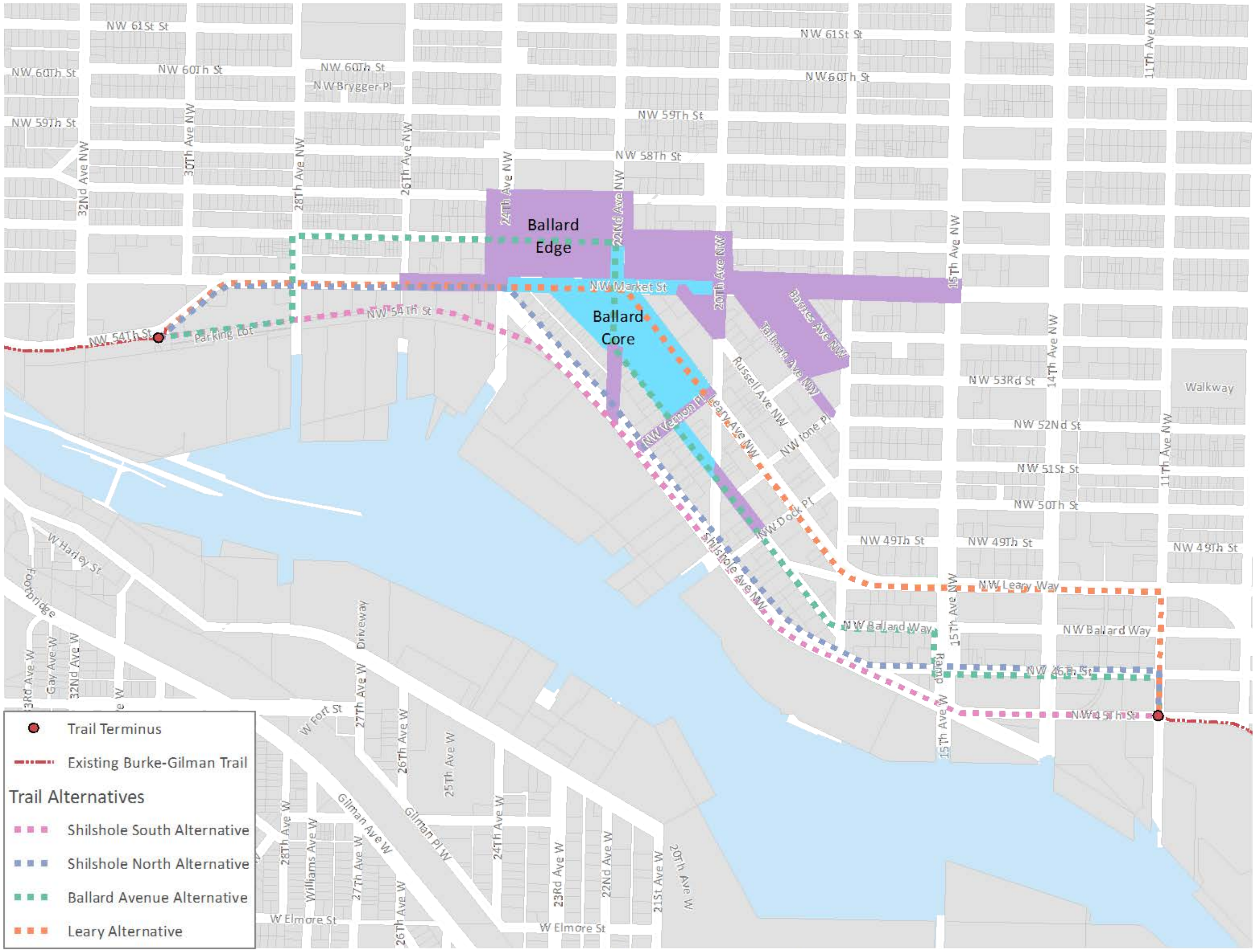
Figure 3-11. Taxable Retail Sales Percent Share by Sector and by Year (2010 – 2013)



3.5 Parking Conditions

Parking conditions are described in detail in Section 4 of the Parking Discipline Report (Parametrix, 2016b). For purposes of analyzing the differential economic impacts to the study region from alternative route alignments, this report summarizes parking utilization rates for the two paid parking subareas managed by SDOT in the study area: Ballard Core and Ballard Edge (Figure 3-12).

Figure 3-12. Paid Parking Subareas



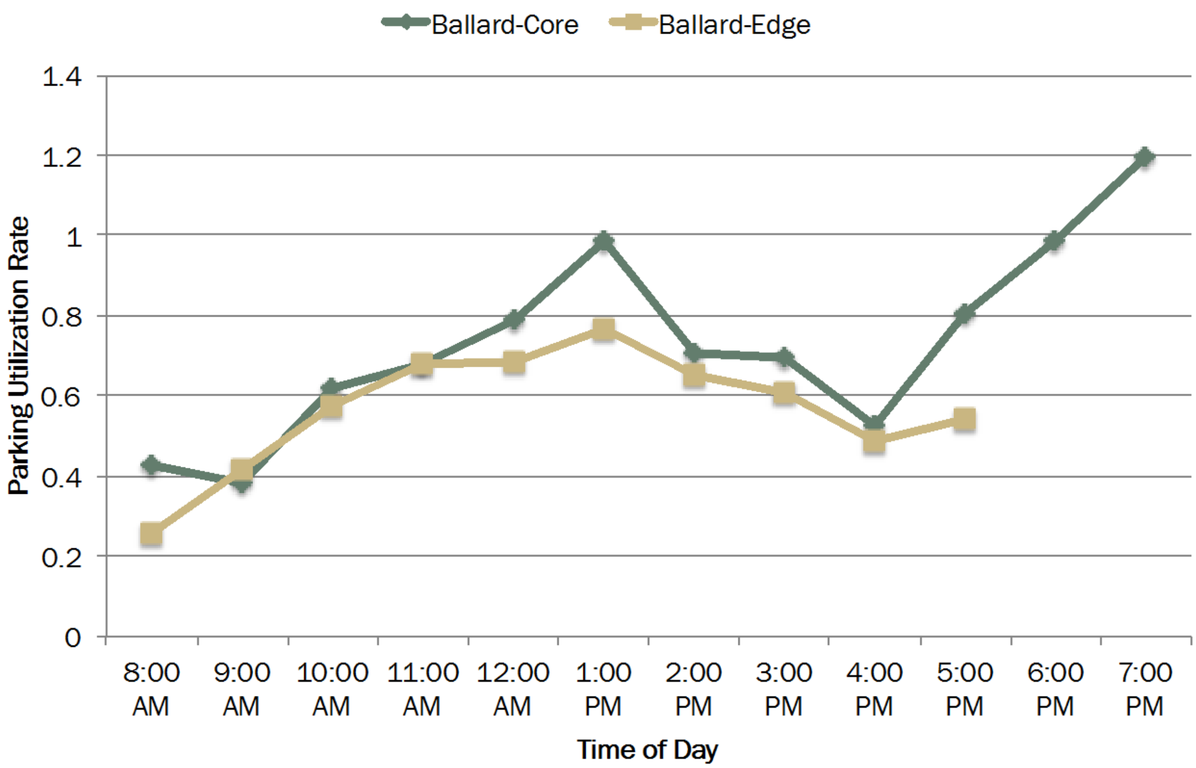
Source: Puget Sound Regional Council GIS, Open Street Map

Areas that are outside either the Ballard Core or Ballard Edge subareas are designated as residential or industrial zones and are not actively managed for paid parking by SDOT. The proportion of the total length of each Build Alternative located within the two paid parking subareas is as follows:

- Shilshole South Alternative: None
- Shilshole North Alternative: 11.5% within Ballard Edge
- Ballard Avenue Alternative: 17.1% in Ballard Edge; 19.6% within Ballard Core
- Leary Alternative: 9.3% within Ballard Edge; 20.1% within Ballard Core

Parking utilization rates for these two subareas were distinct during the year 2015. Once a year during the spring, SDOT conducts a parking study audit to determine average parking conditions in order to set parking rate policy for the following year. This audit study collects data for the number of cars parked on every block face with on-street paid parking supply in the City of Seattle for every hour of the day during the weekday. Figure 3-13 summarizes the parking utilization rate, measured as the number of cars parked divided by the total supply, for the Ballard Core and Ballard Edge, for each hour of the day during the year 2015.

Figure 3-13. Parking Utilization Rate by Time of Day for a 2015 Spring Weekday



CHAPTER 4: POTENTIAL IMPACTS

4.1 No Build Alternative

4.1.1 Operation

The No Build Alternative is treated as the baseline condition for purposes of analyzing economic impacts. These baseline conditions are based on the assumption that the Missing Link is not built and traffic growth continues as it does currently. Estimates of the current real estate value and business activity for the study area were based upon conditions as of 2015. It is anticipated that economic activity in the study area would continue to evolve over the short to medium time horizons, even in the absence of trail construction. The short time horizon is defined as 2015 to 2020, and the medium time horizon is 2015 to 2040. The long term includes changes in economic conditions beyond 2040.

4.2 Impacts Common to all Build Alternatives

4.2.1 Construction Impacts

Transportation

The economic impacts of the construction of the BGT Missing Link are associated with the construction period intersection and driveway delay to transportation system users, as described in the Transportation Discipline Report.

Land use

During construction of the BGT Missing Link, some parcels may experience significant disruption. Significant disruptions are defined as impacts that are likely to affect business operations due to the construction of the BGT Missing Link and for which mitigation measures are likely to be prohibitively costly or not completely effective (however, some measures can be taken to minimize those impacts). Industrial properties may experience reduced or no access for deliveries during certain periods of the day. Retail properties may lack accessibility and may be less attractive to potential customers due to construction. Business impacts would likely vary by phase of construction since disruptions would not be uniform over time. Residents and commuters passing through the region may experience delays in commutes due to lane closures.

4.2.2 Operational Impacts

Transportation

<u>General Traffic Delay</u>

The principal economic cost of traffic is due to general traffic delays associated with intersection operations. Traffic delay directly increases business-related costs due to delay in shipment and higher labor expenditures for drivers. For regular commuters, every additional minute spent on the road is a minute that could be spent working or at leisure. The current U.S. Department of Transportation guidelines recommend valuing time spent commuting at one-half the wage rate (US DOT, 1997). In Seattle, the Bureau of Labor and Statistics (BLS) estimated average wage rate is approximately $28.43 an hour (BLS, 2014). This implies that each additional minute spent in traffic costs the average Seattle area commuter with an average value of time approximately $0.24 in terms of lost time due to traffic congestion. If expected wage growth between 2015 and 2040 exceeds the inflation rate, this per minute cost of delay would grow over the medium term. Hence, these results imply that decreasing the expected wait time at newly signalized intersections and at driveways could generally improve the welfare of drivers by decreasing commute-related delays, all things being equal. By contrast, any increases in wait times could reduce driver welfare by increasing the amount of time spent on the road.

The impacts of the four Build Alternatives were determined using an opportunity cost model of travel time. The affected environment selected to study the transportation impacts was identical to that used for the Transportation Discipline Report (Parametrix, 2016a), which is discussed in Chapter 5. The study area for the Transportation Discipline Report is shown in Figure 5-3 in the Transportation Discipline Report. This figure provides a visual representation of the affected environment and the various study intersections, driveway turnouts, and peak day travel volume. For purposes of this analysis, the baseline conditions were assumed to be the conditions of the No Build Alternative in 2040. These baseline conditions are based on the assumption that the trail segment is not built and traffic growth continues under the No Build Alternative. Changes in delay times resulting from the Build Alternatives are compared to this baseline to determine the impacts specific to each alternative.

<u>Study Area Parking Supply</u>

The study area averages a parking utilization rate of between 60% and 67% for weekdays, depending on time of day (Parametrix, 2016b). The study area includes commercial, mixed-use, industrial, and residential areas. Although SDOT does not set target utilization rates for residential and industrial areas, the average utilization rates are below the target utilization rate of 70% to 85% for commercial and mixed-use areas in Ballard.

All of the Build Alternatives would result in some loss of on-street parking supply. Given the relatively modest rate of parking utilization, the study area should be able to absorb some loss in parking supply without raising the average parking utilization rate above the SDOT target threshold. However, depending on the spatial configuration of the Build Alternatives, the loss in spaces may somewhat limit the localized accessibility to businesses and residences by automobile travelers. In particular, trail alignments within the Ballard Core paid parking subarea may result in a loss of parking during times of day when parking demand outstrips the available supply. Additional impacts associated with the loss of parking supply may be experienced by businesses that cater to round-the-clock customers during evenings and weekends.

Land Use

The construction of the BGT Missing Link could result in changes to accessibility, transportation patterns, and infrastructure in the Ballard area. The resultant changes in operation of the BGT Missing Link are likely to induce alterations to the economic landscape of businesses and residents of Ballard. Some economic impacts could manifest in short-term disruptions in business and commuting activity due to trail construction. Once the trail becomes operational, the local economy would likely adapt to accommodate the presence of the trail over time. The impacts may result in benefits to some parties whose business and residents benefit from increased accessibility to pedestrian/bicycle traffic, as well as negative consequences to some who do not benefit from increased pedestrian and bicycle traffic.

The following sections describe the operational impacts of the BGT Missing Link that are common to all the Build Alternatives. The analysis distinguishes the economic effects based upon the 2015 land use in the Ballard area, separated into nine categories: single-family residences, multi-family residences, commercial uses, mixed-uses (commercial and multi-family residential), industrial, vacant, and institutional. For a breakdown of the distribution of these land uses in the study area, see Figure 3-2. The long-term operational impacts of the BGT Missing Link were assessed by evaluating how proximity to multi-use trails in other areas of King County has been capitalized into land values. Appendices A, B, and C provide details on the models used for this study.

Statistical significance is a concept distinct from significance of impacts for purposes of this report. In statistics, an estimate is statistically significant if the effect exceeds a given threshold with a statistical tool called a p-value. Because the impacts are predicted with some uncertainty, statistical significance indicates the likelihood that the property price impacts differ from zero. In other words, it is a way for the analysts to feel confident that they have "discovered" the size and magnitude of the effect being studied, as opposed to the effect being purely statistical "noise." Statistical significance is typically reported at the 95% and 99% level. The 95% level indicates a high degree of confidence that the result is statistically different from zero, and the 99% level indicates a very high degree of confidence. The predicted economic impacts are therefore reported only for those land use types whose estimated impacts are determined to be statistically significant at the 95% level. Estimates that are determined to be statistically insignificant indicate that the predicted results are not distinguishable from zero, implying little to no expected economic impacts.

There are several important caveats. First, the modeling results provide an overall magnitude for expected impacts but do not imply that the economic impacts would be uniformly positive or negative. Rather, the models provide an estimate of the expected net-impact by land use from trail operation with implicit understanding that some uncertainty exists given the complexity and dynamism in land markets. The following subsections provide a more detailed look at the likely factors that may contribute to both positive and negative economic impacts by land use.

Second, the models use data from existing multi-use trails around King County. Most of these trails have been operational for many years, if not decades, and as a result the surrounding lands have adapted to the presence of the trail over this time. During this span of time local businesses have adapted their daily functions to accommodate the pedestrian and bicycle traffic on nearby trails. Results of the modeling exercise will be used to inform long-term estimates of the effect of the operation of the BGT Missing Link.

<u>Single-family Properties</u>

Based upon results shown in Table C-1 of Appendix C, single-family homeowners in the study area would likely benefit from the operation of the BGT Missing Link. Holding other home attributes constant, on average, single-family homes situated closer to multi-use trails tend to sell for higher prices than those located farther from a multi-use trail. For every tenth of a mile closer to a multi-use trail, single-family homes increase in value by approximately 0.5%. This result is statistically significant at the 95% level, implying a high degree of certainty that these landowners would benefit from multi-use trail operation.

This result is consistent with findings from the previous economic literature in other regions of the U.S. Previous research by Lindsey et al. (2004) found that homes sold within a half-mile of a multi-use trail in Indiana sold for approximately 14% more than comparable homes farther than a half-mile from the trail. Campbell et al. (2007) found that single-family homes near an urban greenway in North Carolina sold for a significant premium over homes farther away. On average, an increase in distance from the greenway by 10% reduced the sale price by approximately 0.3%. Krizek (2006) studied how off-road multi-use trails in the Minneapolis and St. Paul area of Minnesota impact property value. Results of their analysis suggest that off-road trails located in urban areas increased property values. On average, moving a home 10% farther from a multi-use trail resulted in an expected decrease in property value of 0.07%, a result statistically significant at the 95% level.

How Multi-use Trails Positively Affect Property Value

While there have not been studies of the impact of multi-use trails on single-family home values in the Seattle area, evidence from elsewhere in other urban areas around the country suggests overall positive effects. For instance, Corning et al. (2012) performed a case study of resident attitudes toward nearby trails in Bloomington, Indiana. The authors interviewed homeowners located nearby a multi-use trail to ascertain their positive and negative perceptions of the trail. The commonly cited positive perceptions of the trail from their study included access to recreation and the natural world, convenience and accessibility, scenic views, and enhanced social life. On the whole, the authors concluded that the qualitative benefits provided by multi-use trails to residents likely outweigh the relatively few negative impacts cited by the residents.

While the conditions of the trails studied in Corning et al. (2012) may not be entirely applicable to the BGT study area, they nevertheless provide insight into common perceptions of the role that multi-use trails play in nearby residents' daily lives and commutes. Benefits from the BGT Missing Link would likely include improved recreation and accessibility, especially to those commuters accessing other sections of the existing BGT. However, given the urban location of the study area, benefits from access to the natural world and scenic views would likely be more limited. The completion of the BGT Missing Link would, however, provide connections to trails with access to more natural scenery, such as Golden Gardens and Lake Union.

How Multi-use Trails Negatively Affect Property Value

In the case study conducted by Corning et al. (2012), common negative perceptions of the trail included trespassing, less privacy, and dog waste. However, these negative consequences were not widespread among the sample and could be mitigated somewhat with optimal trail design. Most of the negative consequences highlighted from this study for single-family homes are not relevant to the BGT study area. The stock of single-family homes in the study area is predominantly located at the far northern edge of the study area. Thus, residents in single-family homes are not likely to experience a noticeable increase in trespassing or diminished privacy.

<u>Multi-family Properties</u>

Table C-2 Appendix C, presents the impact of proximity to multi-use trails on multi-family apartment buildings. These results are used to extrapolate the projected impact on all multi-family land uses (both apartments and condos). These results suggest that on average, multi-family units that are closer to multi-use trails tend to sell for a slightly higher price than buildings farther away. This result is, however, statistically insignificant. The primary conclusion drawn from this model is that multi-family units are likely to be unaffected by the operation of the BGT Missing Link in Ballard.

Previous economic research has not studied the direct impact of multi-use trails on multi-family buildings. One study by Campbell et al. (2007) estimated the impact of proximity to urban greenways in Charlotte, North Carolina, on several land use types, including multi-family units. Urban greenways in their study encompassed both the urban trail system, meant to serve pedestrians and bicyclists, as well as the resultant increase in preserved open space. Their results suggest that multi-family units benefited, on average, from the operation of urban greenways. Increasing a multi-family unit's distance from the trail by 10% would result in an average decrease in property value of approximately 0.013%, a result statistically significant at the 95% level. The BGT Missing Link would not be accompanied by increases in preserved natural lands. It is unknown how much of the premium in multi-family property prices predicted in Campbell et al. (2007) is due to increases in protected lands nearby. However, as in the case of the trails studies in Campbell et al. (2007), the BGT Missing link would provide improved access to recreation and connectivity to nearby communities and other urban trails, which may have a positive impact on multi-family property values.

How Multi-use Trails Positively Affect Property Value

Many of the benefits associated with premiums in single-family homes would apply to multi-family units as well. Residents in these buildings would likely benefit from the increased accessibility to downtown Seattle and other areas of the city. In addition, the expansion of the BGT would provide increased access to recreational opportunities.

How Multi-use Trails Negatively Affect Property Value

Many multi-family properties are located adjacent to or near one or more of the Build Alternatives. Impacts to multi-family units would be similar to those of single-family homes. These may include trespassing or reduced privacy. The trail could be designed to reduce the economic consequences of reduced security to these properties.

Commercial Properties

The impact of proximity to multi-use trails on commercial properties in King County is shown in Table C-3 Appendix C. In this model, commercial properties include all offices, restaurants, and retail uses. Results of this model suggest that, on average, commercial properties tend to benefit slightly from proximity to multi-use trails, but this result is statistically insignificant. This finding is not robust enough to draw firm conclusions on how these properties might be impacted by the operation of the BGT Missing Link.

Previous research by Campbell et al. (2007) found that commercial properties were on average slightly positively impacted by proximity to urban greenways in North Carolina. An increase in distance from the greenway by 10% resulted in a decrease in commercial property value of approximately 0.17%. Though these results are not directly comparable to those produced from King County, they are of the same direction and rough magnitude.

How Multi-use Trails Positively Affect Property Value

Commercial properties are likely to experience heterogeneous benefits depending upon the primary use of the parcel. For instance, commercial office buildings would likely benefit from increased accessibility provided by the BGT Missing Link to the employees using these facilities. Restaurants and retail establishments would likely benefit due to increased business from bicycle and pedestrian customers. Several prior studies have found that pedestrians and bicyclists tend to spend less money per visit, but visit stores more frequently than customers who arrived by automobile (Bent and Singa, 2009; Clifton et al., 2013). Clifton et al. (2013) also found that for every retail category aside from grocery stores, pedestrian and biking customers tended to spend more per month at retail stores than did automobile-based customers.

Parking facilities may also benefit from a reduced supply of on-street parking. Decreases in public on-street parking tend to increase the value of off-street parking facilities by constraining the potential supply of parking spaces in the study area. Depending upon the location and magnitude of the loss of on-street parking, property values of some parking facilities may increase through more demand.

How Multi-use Trails Negatively Affect Property Value

The operation of the BGT Missing Link may pose several types of impacts to commercial properties. For commercial properties with frequent shipping activity located adjacent to the trail, the traffic on the BGT may disrupt delivery patterns. To some extent, these effects may be mitigated by businesses adjusting their delivery schedules to times of day with less frequent pedestrian and bicycle travel. These changes in delivery activity may harm business profitability and somewhat disrupt traffic patterns in the vicinity.

In addition, some commercial properties would lose street parking access as a result of the construction of the BGT Missing Link. For retail properties and restaurants, the loss of street parking may reduce business from customers arriving by automobile. However, as shown by Clifton et al. (2013), new business generated by biking and pedestrian customers would likely offset most of these anticipated losses. Commercial properties located in the Ballard neighborhood that are not adjacent to the BGT Missing Link are unlikely to face hardship from the operation of the trail.

Reduced security during non-business hours may be a concern for commercial properties located adjacent to the proposed Build Alternatives. The BGT Missing Link may increase the incidence of trespassing and reduced privacy.

Mixed-Use Properties

Mixed-use properties consist of locations with combined multi-family housing and commercial uses, typically retail space. Separate estimates of the impact of proximity to multi-use trails on mixed-use properties were not produced since these buildings tend to be composites of several independently owned and operated units. Therefore, the impact of the operation of the BGT Missing Link on mixed-use properties is based on an average of the predicted impact for commercial and multi-family properties from Table C-1 and Table C-2, Appendix C. Because proximity to multi-use trails predicted statistically insignificant impacts for both multi-family and commercial uses, the impacts to multi-use properties are also expected to be statistically insignificant. No relevant prior research has studied the impact of proximity to trail infrastructure on mixed-use properties.

How Multi-use Trails Positively Affect Property Value

The benefits of multi-use trail operation for mixed-use properties would be consistent with those projected for multi-family and commercial land uses, since mixed-use properties are composed of these two land use types. Generally, most benefits would derive from increased accessibility for residents and potential consumers of these businesses.

How Multi-use Trails Negatively Affect Property Value

Negative impacts to mixed-use properties would be consistent with those described for multi-family and commercial land uses. Some commercial businesses may find their delivery schedules impacted by trail operation, but they may be able to change their delivery schedules to less congested times of day. In addition, some residents and businesses in mixed-use buildings may experience a loss in privacy or reduced security due to increased pedestrian traffic on the nearby trail.

Industrial and Warehouse Properties

The results for the impact of proximity of industrial properties to multi-use trails in King County are shown in Table C-4, Appendix C. Industrial properties include locations whose activities are light/medium industrial, heavy industrial, flex industrial, or warehouse uses. The results indicate a slight negative effect from proximity to multi-use trails but this result is statistically insignificant. This finding is not robust enough to draw firm conclusions on how these properties might be impacted by the operation of the BGT Missing Link. There has not been previous research examining the economic link between multi-use trail operation and industrial property value or business activity.

How Multi-use Trails Positively Affect Property Value

The principal benefit of operation of the BGT Missing Link to industrial uses in the Ballard area would be improved access for employees.

How Multi-use Trails Negatively Affect Property Value

The operation of the BGT Missing Link may impede some industrial users located adjacent to the trail due to the congestion of industrial traffic with pedestrian and bicycle use. Industrial users may be required to adjust delivery patterns where the trail crosses loading docks or driveways. In addition, the operation of heavy machinery and trucks in an environment with more pedestrian and bicycle travelers may increase risk of accident. Increases in risk of automotive accidents could result in higher insurance costs or require additional labor expenditures to employ traffic flaggers to avoid collisions. Industrial businesses may adapt somewhat by adjusting delivery schedules to times of day with relatively few pedestrians and bicyclists using the BGT. This may result in more scheduled hours of operation and higher labor costs for these users. These additional operating challenges are likely to increase costs of production for these users, and these costs are unlikely to be passed on to consumers due to competition from producers elsewhere in the region.

Institutional Properties

The only privately operated institutional property operating in the study area that may be affected by the BGT Missing Link is the Swedish Ballard Medical Plaza. This property is not located adjacent to any of the Build Alternatives but may be affected due to a general increase in pedestrian and bicycle traffic that may spill over into the study area.

Due to a lack of property sales for hospital uses in King County, a separate model was not run for institutional land uses. For purposes of this analysis, it is assumed that the impact of the BGT Missing Link might be similar to that of industrial properties in the Ballard neighborhood, where there is not enough information to draw firm conclusions on how these properties might be impacted by the operation of the BGT Missing Link.

How Multi-use Trails Positively Affect Property Value

Although the overall effect of the BGT Missing Link on Swedish Hospital is likely to be small or slightly negative, some positive benefits may result as well. The Swedish Ballard Medical Plaza, a medical office building associated with the hospital, may be somewhat positively affected by the BGT Missing Link to the extent that the trail improves accessibility for employees, patients, and family members.

How Multi-use Trails Negatively Affect Property Value

The Swedish Hospital is not located adjacent to any of the Build Alternatives and is therefore unlikely to be significantly impacted by the operation of the BGT Missing Link.

Vacant Properties

There are several vacant properties in the study area. Since the future land uses of these locations are constrained by the allowable zoning, economic impacts were assigned based upon the current zoning of these locations. For instance, if a parcel is zoned primarily for commercial uses, economic impacts were based upon estimates from the commercial property model.

Institutional, Government, Military, School, Public, Parks and Open Space

Many government-owned properties are located in the study area, including institutional, government, military, school, public, as well as parks and open space. While it is theoretically possible that the operation of the BGT Missing Link may cause some impacts to these properties, current Washington State law (RCW 84. 40.045 and 84.40.175) prevents assessors' offices from collecting information on the value of government-owned parcels. Hence, in the absence of sufficient market transactions and with a lack of data for valuation, it is presently impossible to quantify the economic impacts to government-owned parcels in the study area.

Other Properties

Due to lack of comparable properties from elsewhere in the King County region, economic impacts were not assessed for properties whose dominant land use is recorded as "other" in the study area. However, these parcels represent a minority (less than 5%) of the acreage and parcel values. In addition, based upon the statistically derived results for the other land uses, other parcels are likely to be unaffected by the operation of the BGT Missing Link.

4.3 Shilshole South Alternative

4.3.1 Construction

Construction impacts common to all Build Alternatives are discussed in Section 4.2.1.

4.3.2 Operation

The Shilshole South Alternative would likely have relatively modest effects on area property values over the long term. The only land use type with statistically significant impacts is single-family residential properties (see Table C-1, Appendix C). Operation of the Shilshole South Alternative would likely result in an expected increase in single-family residential property value of $1.9 million or 0.4%.

All other major land uses in the study area would likely experience statistically insignificant impacts from proximity to the multi-use trail. While other property types are unlikely to face significant impacts on average, some properties located directly adjacent to the Shilshole South Alternative may face acute impacts from trail operation if their business activities are significantly disturbed by increased pedestrian and bicycle traffic.

Transportation Impacts

The estimated traffic delays for intersections and driveways under the Shilshole South Alternative in 2040 were compiled from the Transportation Discipline Report (Parametrix, 2016a). Intersections were considered to have potentially significant economic impacts where expected delays for the 2040 Shilshole South Alternative would be at least 20% larger than those predicted for the 2040 No Build Alternative

(Table 4-1). In addition, Table 4-1 provides the average weekday traffic volume, per car delay, and increase in delay for all study intersections. Only one intersection (NW 46th St/Shilshole Ave NW) has an expected delay that increases by more than 20% compared to the 2040 No Build Alternative. For this intersection, the average expected delay would increase from 9 to 28 seconds. However, reported traffic volumes are relatively modest at this intersection with 380 cars per day expected in 2040. Most of the remaining intersections would experience net decreases in traffic under the Shilshole South Alterative compared to the No Build Alternative.

For all study intersections, the expected intersection delay times per car are expected to decrease from 22.5 seconds in the 2040 No Build Alternative to 21.0 seconds in the Shilshole South Alternative. This is represents the largest reduction in average delay time of any Build Alternative. It is therefore expected that the economic impacts from traffic delay at studied intersections are likely to be insignificant for the Shilshole South Alternative.

Table 4-1. Intersections with Significant Increases in Delay Time for 2040 Shilshole South Alternative

Intersection	*Predicted 2040 Weekday Traffic Count*	*2040 No Build Delay (seconds)*	*2040 Shilshole South Delay (seconds)*	*Percent Difference*	*Total Increase in Delay (seconds per weekday)*
NW 46th St/ Shilshole Ave NW	381	9	28	211%	7,237
Intersection Average for all intersections affected by Shilshole South Alternative	4,420	22.5	21.0	-7%	-6,464

For the study driveways, expected delay under the 2040 Shilshole South Alternative would increase by an average of 4.2 seconds compared to the 2040 No Build Alternative. The increase in driveway delays may increase costs of operating businesses in the study area. To the extent that the businesses and properties that operate these study driveways are dependent upon driveway traffic to maintain a profitable enterprise, these delays could result in higher costs of production. However, businesses may reduce exposure to delay costs by adjusting their delivery and drive schedules to times of day and days of the week with relatively few pedestrian and bicycle travelers on the BGT Missing Link.

It is anticipated that the trail would improve safety overall for pedestrian and bicycle modes. But if the higher volume of pedestrian and bicycle traffic near industrial businesses and in loading and unloading zones increases the localized probability of industrial vehicle involved bicycle and pedestrian conflicts, then business operating expenditures could increase due to higher costs of insurance. However, the full extent of any potential increases in business costs under the 2040 Shilshole South Alternative and how these costs compare to the 2040 No Build Alternative are unknown.

Parking Impacts

Based upon estimates from the Parking Discipline Report (Parametrix, 2016b), the Shilshole South Alternative would result in a loss of parking equivalent to 261 spaces. This reduction represents 8% of the on-street parking supply and 7% of the total parking supply in the parking study area. The Shilshole South Alternative would result in the greatest loss of parking of any Build Alternative. Using estimates of the current parking utilization rate in the study area, and assuming that parking demand would remain unchanged from the No Build Alternative, the average parking utilization rates would increase to between 66% and 73% for the study area.

These estimates are in line with SDOT's target utilization rate of 70% to 85% for commercial and mixed-use areas. The reduction in parking resulting from the Shilshole South Alternative is unlikely to result in acute shortages of parking supply. There are relatively few locations adjacent to the Shilshole South Alternative with large amounts of retail or residential uses, where automobile traffic and parking utilization tend to be highest. As shown in Figure 3-12, none of the Shilshole South Alternative trail alignment crosses into either the Ballard Core or Ballard Edge parking subareas.

4.4 Shilshole North Alternative

4.4.1 Construction

Construction impacts common to all Build Alternatives are discussed in Section 4.2.1.

4.4.2 Operation

For most property types, including commercial, multi-family, mixed-use, industrial, and institutional, the study results suggest that operation of the Shilshole North Alternative would insignificantly impact property values (see Appendices A, B, and C). For each of these property types, the economic impacts are statistically indistinguishable from zero. The only property type that may experience statistically significant impacts under the Shilshole North Alternative is single-family homes. The total economic impact was calculated for single-family homes by determining the distance from each home in the study area to the Shilshole North Alternative and applying land value estimates from Table C-1, Appendix C. Operation of the Shilshole North Alternative would likely result in a net increase in single-family home value of approximately $2.5 million, an increase equivalent to 0.6% of total 2015 assessed property values.

Transportation Impacts

Transportation impacts were derived by comparing expected delay times for intersections and driveways from the 2040 Shilshole North Alternative to the 2040 No Build Alternative from the Transportation Discipline Report (Parametrix, 2016a). Intersections were considered to have potentially significant economic impacts where the expected delays for the 2040 Shilshole North Alternative would be at least 20% larger than those predicted for the 2040 No Build Alternative (Table 4-2). In addition, Table 4-2 provides the average weekday traffic volume, per car delay, and increase in delay for all study intersections. As compared to the 2040 No Build Alternative, expected wait times for two intersections would increase by more than 20%. These intersections include NW Market St/28th Ave NW (increased delays from 7 seconds per car to 23 seconds per car), and NW 46th St/Shilshole Ave NW (increased delays from 9 seconds per car to 28 seconds per car).

Table 4-2. Intersections with Significant Increases in Delay Time for 2040 Shilshole North Alternative

Intersection	*Predicted 2040 Weekday Traffic Count*	*2040 No Build Delay (seconds)*	*2040 Shilshole North Delay (seconds)*	*Percent Difference*	*Total Increase in Delay (seconds per weekday)*
NW Market St/28th Ave NW	3,418	7	23	229%	54,684
NW 46th St/ Shilshole Ave NW	381	9	28	211%	7,237
Intersection Average for all intersections affected by Shilshole North Alternative	4,420	22.5	22.0	-2%	-2,186

On an individual car basis, these delays are relatively modest; however, the collective increase in delay time for freight and commuter travel through these intersections is likely to result in some decrease in total community economic welfare, particularly for the NW Market St/28th Ave NW intersection. These higher commuting costs would be distributed among businesses and residents operating in Ballard, as well as commuters traveling through the study area. To the extent feasible, traffic patterns would naturally adjust to avoid intersections with excessive delays in favor of alternative routes with less traffic. It is presently unknown how these increases in economic hardship may impact the profitability of businesses located in Ballard. However, owing to the distributed nature of these costs, it is unlikely that any one business would be significantly harmed or would go out of business due to increased delays for the small set of intersections impacted by the Shilshole North Alternative.

Other intersection studies would experience negligible increases in delay time or net reductions. The average per car intersection wait time for all intersections would fall from 22.5 seconds with the 2040 No Build Alternative to 22.0 seconds with the 2040 Shilshole North Alternative. This change would not be noticeable for drivers or have economic consequences.

For study driveways in the study area, the average delay time with the 2040 Shilshole North Alternative would be approximately 1.9% less than expected under the 2040 No Build Alternative. Only Shilshole Ave NW/Salmon Bay Sand and Gravel (north side) would have expected delay times under the 2040 Shilshole North Alternative that are more than 20% higher than the 2040 No Build Alternative. The delay times at this driveway would increase from 11 seconds in the No Build Alternative to 23 seconds under the Shilshole North Alternative. These economic costs may be reduced by adjusting delivery schedules to times of day with less frequent pedestrian and bicycle traffic.

Parking Impacts

The total expected reduction in available on-street parking from the Shilshole North Alternative is approximately 227 parking spaces (Parametrix, 2016b). This is equivalent to a 7% reduction in on-street parking supply and a 6% reduction in total available parking in the study area. Assuming that the reduced supply of parking is absorbed evenly through the study area, this reduction in supply would increase average parking utilization to between 65% and 72% depending upon time of day. This predicted increase is within the target utilization range of 70% to 85% that SDOT sets for commercial and mixed-use zones. It is possible that depending on demand more localized block-face utilization rates could exceed these thresholds.

The acute effects of reduced parking supply resulting from the Shilshole North Alternative are unlikely to be severe. Reduced parking in these areas is likely to be absorbed on neighboring streets without disruption to accessibility of nearby parcels or increases in parking utilization above critical thresholds. As shown in Figure 3-12, a short segment of the Shilshole North Alternative, approximately 11.5% of the total length, crosses through the Ballard Edge parking subarea. As shown in Figure 3-13, the parking utilization rates for this subarea range between 25% at 8 AM and 76% at 1 PM, and the loss of parking within this subarea is unlikely to cause significant parking supply shortages.

4.5 Ballard Avenue Alternative

4.5.1 Construction

Construction impacts common to all Build Alternatives are discussed in Section 4.2.1.

4.5.2 Operation

For commercial, multi-family, mixed-use, industrial, and institutional properties, the estimates provided in Appendices A, B, and C suggest that the operation of the Ballard Avenue Alternative would have statistically insignificant impacts on property values. This indicates that the overall economic impacts are statistically indistinguishable from zero.

For single-family homes, the Ballard Avenue Alternative is likely to have statistically significant and positive impacts on property values. The total impact of the Ballard Avenue Alternative on property values was calculated by determining the distance from each property in the study area to the Ballard Avenue Alternative and applying the property value impacts estimated in Table C-1, Appendix C. These results indicate that single-family homes in the study area are likely to increase in value by approximately $1.9 million or 0.4% relative to the No Build Alternative.

Transportation Impacts

The transportation impacts were determined by comparing expected traffic delays for intersections and driveways under the 2040 Ballard Avenue Alternative to the 2040 No Build Alternative using estimates produced for the Transportation Discipline Report (Parametrix, 2016a). Table 4-3 displays intersections whose expected delay times with the 2040 Ballard Alternative would increase by at least 20% relative to the 2040 No Build Alternative. In addition, Table 4-3 shows the average intersection delay for all study intersections in Ballard. Only two intersections would have more than a 20% increase in expected delay under the 2040 Ballard Avenue Alternative compared to the 2040 No Build Alternative. These intersections include NW Market St/28th Ave NW (increased delay from 7 seconds per car to 9 seconds per car), and NW 46th St/Shilshole Ave NW (increased delay from 9 seconds per car to 29 seconds per car). The expected daily traffic volume at both of these intersections is expected to be relatively modest, with 3,400 and 380 cars per weekday. For all study intersections, the average per car intersection wait time is expected to decrease from 22.5seconds to 21.0seconds with the 2040 Ballard Avenue Alternative, which would not be noticeable for drivers or have economic consequences.

Table 4-3. Intersections with Significant Increases in Delay Time for 2040 Ballard Avenue Alternative

Intersection	*Predicted 2040 Weekday Traffic Count*	*2040 No Build Delay (seconds)*	*2040 Ballard Avenue Delay (seconds)*	*Percent Difference*	*Total Increase in Delay (seconds per weekday)*
NW Market St/28th Ave NW	3,418	7	9	29%	6,835
NW 46th St/ Shilshole Ave NW	381	9	29	222%	7,618
Intersection Average for all intersections affected by Ballard Avenue Alternative	4,420	22.5	21.0	-6%	-6,340

No studied driveways are projected to experience increased delays under the 2040 Ballard Avenue Alternative that are greater than 20% larger than delays under the 2040 No Build Alternative. In fact, the average expected delay under the 2040 Ballard Avenue Alternative for driveways is approximately 17% less than the delay time from the 2040 No Build Alternative. Therefore, businesses operating driveways in the study area are unlikely to face significant impacts from the operation of the Ballard Avenue Alternative.

Parking Impacts

Based upon results of the Parking Discipline Report (Parametrix, 2016b), the Ballard Avenue Alternative would result in a loss of 198 parking spaces, which represents 6% of the on-street supply and 5% of the total parking supply in the study area. Assuming that these losses are absorbed locally in the study area, on-street parking utilization rates may increase to between 64% and 72%. This utilization is still below SDOT's target utilization rate of 70% to 85% for mixed-use and commercial zones.

Given the large supply of retail and residential properties along the Ballard Avenue Alternative, it is likely that the loss of parking could result in acute shortages in available parking in some locations during high demand hours of the day. Approximately 19.6% of the Ballard Avenue Alternative is located within the Ballard Core parking subarea and 17.1% within the Ballard Edge subarea. As shown in Figure 3-13, the Ballard Core already faces shortages in parking supply during high demand periods of the day, with parking utilization rates above the SDOT target at 1 PM and after 5 PM. The additional loss of parking in this subarea from the operation of the Ballard Avenue Alternative may further exacerbate these supply shortages. In addition, although the 2015 parking utilization rates for the Ballard Edge subarea are not above the SDOT maximum target of 80% for any time of day, it is possible that the additional loss of parking from the Ballard Avenue Alternative may cause parking supply shortages during the high demand period in the afternoon.

The extent to which these parking supply shortages may cause economic impacts to businesses in the area is unknown. Customers intending to visit retail locations in the area by car may have to park farther away than they would otherwise prefer and increase their parking costs. Thus, automobile based customer traffic may decrease for some retail and commercial locations along the Ballard Avenue Alternative. In addition, due to the reduction in supply of on-street parking, managers of off-street parking lots could increase parking rates and/or parking supply, potentially providing additional available off-street parking spaces in the area but at a higher cost to the customer.

4.6 Leary Alternative

4.6.1 Construction

Construction impacts common to all Build Alternatives are discussed in Section 4.2.1.

4.6.2 Operation

For commercial, multi-family, mixed-use, industrial, and institutional land uses, the economic impacts of proximity to the Leary Alternative were predicted to be statistically insignificant (see Appendices A, B, and C). These results imply that the Leary Alternative is unlikely to cause significant impacts to property values for these land uses and that the estimated impacts are statistically indistinguishable from zero.

For single-family residential properties, the Leary Alternative is likely to have a statistically significant and positive impact on property values. The total economic impact to single-family residential properties was determined by calculating the distance from each property in the study area to the Leary Alternative and applying the estimates predicted in Table C-1, Appendix C. Under the Leary Alternative, single-family home values would increase in value by approximately $2.9 million or 0.7%, on average. The Leary Alternative would result in the largest net increase in single-family home values of all of the Build Alternatives.

Transportation Impacts

Transportation impacts were estimated by comparing the predicted 2040 intersection and driveway delay times under the Leary Alternative to those predicted for the No Build Alternative. Table 4-4 shows intersections where 2040 Leary Alternative delay times are over 20% larger than expected delay times for the 2040 No Build Alternative. In addition, Table 4-4 provides the average weekday traffic volume, per car delay, and increase in delay for all study intersections. On average, expected delay times for all study intersections under the 2040 Leary Alternative are 86% higher than those estimated for the 2040 No Build Alternative. A total of six intersections would experience delays under the 2040 Leary Alternative that are at least 20% larger than those reported for the 2040 No Build Alternative. In particular, the NW Leary Way/11th Ave NW intersection would have both a large percentage increase in delay time (311%) and the highest weekday traffic volume (19,508) of any study intersection. This intersection alone contributes over 72% of the increased delay time for all intersections under the Leary Alternative as compared to the No Build Alternative.

Table 4-4. Intersections with Significant Increases in Delay Time for 2040 Leary Alternative

Intersection	*Predicted 2040 Weekday Traffic Count*	*2040 No Build Delay (seconds)*	*2040 Leary Delay (seconds)*	*Percent Difference*	*Total Increase in Delay (seconds per weekday)*
NW Market St/28th Ave NW	3,418	7	23	229%	54,684
NM Market St/ 22nd Ave NW	2,449	81	97	20%	39,986
15th Ave NW/NW Leary Way	4,735	20	57	185%	175,195
NW Leary Way/14th Ave NW	9,057	10	29	190%	172,085
NW Leary Way/11th Ave NW	19,508	18	74	311%	1,092,434
NW 46th St/ Shilshole Ave NW	381	9	29	222%	7618
Intersection Average for all intersections affected by Leary Alternative	4,420	22.5	48.2	114%	113,804

It is likely that the Leary Alternative would contribute to higher traffic-related costs in the study area. Longer intersection delays would increase congestion and commute times for travelers passing through Ballard. For residents of Ballard and commuters traveling to and from the region, longer travel times result in less time available for other productive activities including working and leisure, reducing individual welfare and imposing additional economic costs. For freight travelers operating in the region, longer commutes would result in higher labor expenditures for drivers and increased delivery delay costs. Commuting patterns should naturally adjust to avoid the most significantly affected intersections. However, given the number of intersections affected and volume of travelers at these intersections, it is unlikely that greater commuting related expenditures could be completely ameliorated. It is presently unknown if any business would face significant and irreparable harm from these commute costs that could result in bankruptcy or relocation.

There are no driveways in the 2040 Leary Alternative whose expected delay times are greater than 20% of the 2040 No Build Alternative. All study driveways but one would experience decreases in delay with the Leary Alternative. Study driveways averaged a reduced delay time of 18% with the Leary Alternative compared to the No Build Alternative.

Parking Impacts

Results of the Parking Discipline Report (Parametrix, 2016b) suggest that the Leary Alternative would result in a total reduction of 103 on-street parking spaces in the study area. This represents approximately 3% of on-street parking supply and 2.5% of the total available parking supply within the study area. Overall, the Leary Alternative is expected to result in the smallest disruption to parking supply of the alternatives considered. Assuming that losses of on-street parking are all absorbed in the study area, this is expected to raise average parking utilization rates to between 62% and 69%, still below the SDOT target rate for commercial and mixed-use zones.

The Leary Alternative may result in some acute shortages of available parking supply in high demand locations with large amounts of retail and residential properties during high demand times of day. Approximately 20.1% of the Leary Alternative is located within the Ballard Core parking subarea and 9.3% within the Ballard Edge subarea. In particular, the additional loss in parking supply within the Ballard Core may exacerbate supply shortages that frequently occur in the afternoon and after 5 PM based upon 2015 conditions. The degree to which these supply shortages could impact commercial and retail businesses located near the Leary Alternative is unknown. The loss in parking supply would raise commute costs for automobile based customer traffic, thereby lowering aggregate demand from these users; however, these losses could be offset, in part, from increases in aggregate demand stemming from increases in traffic from pedestrians and bicyclists on the trail facility. In addition, due to reductions in on-street parking, managers of off-street parking locations would have incentives to increase prices and expand supply, which may help compensate for the loss of on-street parking spaces.

CHAPTER 5: OTHER CONSIDERATIONS

The study area is a rapidly changing and growing community. This report determined the likelihood of economic costs from the BGT Missing Link by comparing economic outcomes under each Build Alternative to the baseline conditions in 2015 for the No Build Alternative. However, over the medium to long term, the study area is likely to experience significant socioeconomic and industry changes, regardless of whether or not the BGT Missing Link is constructed.

As shown in Figure 3-9, from 2000 to 2014, the employment share in the services industry in Ballard increased by approximately 18.3%, while employment share in the manufacturing industry fell by 7.5%. In addition, recent trends suggest strong growth in rents for multi-family housing, implying strong demand for housing and population growth in the region. Between 2015 and 2040, these economic trends are likely to continue, if not accelerate. Hence, industrial and other lower-rent land users are likely to face increasing competitive pressure from service-based and residential land users. It should be noted that zoning currently protects industrial land uses in the city’s industrial zones where residential uses are not allowed and retail and office uses are limited.

The operation of the BGT Missing Link may add to the competitive pressures facing industrial users, and appropriate steps should be taken to avoid or mitigate these costs. Given the economic trajectory of the study area, the incremental impact of any of the Build options for BGT Missing Link seems small by comparison. Displacement, or transformation, of existing businesses may necessarily take place as Ballard continues to develop.

Based upon available data from the King County region, this analysis fails to find negative and statistically significant impacts to land prices for single-family, multi-family, commercial, mixed-use, industrial, or institutional properties. However, while the economic impacts from operation of the BGT Missing Link are likely to be modest on average, these results do not imply that a negative effect could not occur to some properties.

CHAPTER 6: REFERENCES

Bent, Elizabeth, and Krute Singa. "Modal Choices and Spending Patterns of Travelers to Downtown San Francisco, California: Impacts of Congestion Pricing on Retail Trade." *Transportation Research Record: Journal of the Transportation Research Board* 2115 (2009): 66-74.

Bureau of Labor Statistics. "Occupational Employment and Wages in Seattle-Bellevue-Everett, May 2014." Available at http://www.bls.gov/regions/west/news-release/occupationalemploymentandwages_seattle.htm

Campbell, Harrison S., and Darla K. Munroe. "Greenways and greenbacks: the impact of the Catawba Regional Trail on property values in Charlotte, North Carolina." *southeastern geographer* 47.1 (2007): 118-137.

Clifton, Kelly J., Christopher Devlin Muhs, Sara Morrisse, Tomás Morrissey, Kristina Marie Currans, and Chloe Ritter. "Examining Consumer Behavior and Travel Choices". Civil and Environmental Engineering Faculty Publications and Presentations (2013). Paper 145. http://pdxscholar.library.pdx.edu/cengin_fac/145

Corning, Sarah E., Rasul A. Mowatt, and H. Charles Chancellor. "Multiuse trails: Benefits and concerns of residents and property owners." *Journal of Urban Planning and Development* 138.4 (2012): 277-285.

Costar Realty Information. CoStar Group, 2015. www.costar.com. Accessed November 2015.

Lindsey, Greg, et al. "Property values, recreation values, and urban greenways." *Journal of Park and Recreation Administration* 22.3 (2004): 69-90.

Parametrix. "Transportation Discipline Report." Burke-Gilman Trail Missing Link: SEPA Draft Environmental Impact Statement. Prepared for Seattle Department of Transportation. (2016a).

Parametrix. "Parking Discipline Report." Burke-Gilman Trail Missing Link: SEPA Draft Environmental Impact Statement. Prepared for Seattle Department of Transportation. (2016b).

U.S. Department of Transportation. "Departmental Guidance for the Valuation of Travel Time in Economic Analysis". Office of the Secretary of Transportation, U.S. Department of Transportation. Available at: http://ostpxweb.dot.gov/policy/Data/VOT97guid.pdf. (1997).

CHAPTER 7: LIST OF PREPARERS

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APPENDIX A

HEDONIC METHODOLOGY

Consider the market for single-family homes, although a home is often thought of as a single good, it actually represents a bundle of attributes that are valued by the market. These attributes may reflect the physical characteristics of the home, such as the square footage, number of bedrooms, and age of the home. They also may reflect the amenities of the neighborhood such as school quality or proximity to transportation infrastructure. However, when an individual buys a home, he or she pays a single price, which reflects the collective willingness to pay for the bundle of home attributes. Although the individual's value for each attribute of the home cannot be directly observed, these values may be implicitly determined through the theory of hedonic pricing.

The hedonic pricing model dates back to Waugh (1929) and is used to study markets, such as home sales, with an abundance of differentiated products and unique product attributes. Much of the hedonic theory was codified by Rosen (1974). Under the law of one price, given a competitive market for goods and services, two products with identical attributes must, necessarily, sell for same price. Therefore, disparities in the price of two differentiated products (such as two distinct homes) must be attributable to the value of the differences in the underlying characteristics of the goods in question. Following this line of reasoning, transaction level price paid for a good, such as a home, may be represented as a function of the unique characteristics of the product, as done in Equation 1.

(1) $Price = f(Physical\ Attributes, Neighborhood, Interest\ Rate, Employment, etc)$

Given enough market transactions and a reasonable depiction of the relevant product characteristics valued by homeowners, a statistical representation of the determinants of home sales price may be constructed, represented in Equation 2.

(2) $P = \beta_1 x_1 + \beta_2 x_2 + ... + \beta_n x_n + \varepsilon$ $P = \beta_1 x_1 + \beta_2 x_2 + ... + \beta_n x_n + \varepsilon$

Here, *P* represents the final sale price of a given home with *n* different home characteristics represented by the parameter *x* and an error term ε ε. The parameter β_i β_i represents the marginal effect of home attribute x_i x_i on the equilibrium sales price. For a small change in the value of x_i, β_i x_i, β_i provides the value of the resultant change in home sales price. As an example, if x_i x_i represents home square footage, β_i β_i represents the value of the increase in home price due to an increase in the size of the home by one square foot. Thus, in this way, the final sales price of a home may be decomposed into the contributions from all the relevant home characteristics.

APPENDIX B

ECONMETRIC MODEL USED TO VALUE EXISTING TRAIL INFRASTRUCTURE

The value of proximity to multi-use trails may be statistically distinguished from overall property price using the hedonic methodology outline in Appendix A. Multi-use trails may have disparate impacts on properties depending upon their predominant land use. Therefore, separate models were estimates for single-family homes, multi-family apartment complexes, commercial and industrial properties. In each of these cases, the explanatory variables used to explain property price differ somewhat but the fundamental model structure was identical.

The first step of this analysis is to identify an appropriate sample size to isolate the impact of multi-use trail access on property values from other structural and parcel attributes. The potential sample used for this analysis includes all parcels within King County, Washington. In an ideal world, proximity to existing multi-use trail would be purely randomly assigned to parcels around the county. However, in practice, multi-use trails do not follow a purely random spatial pattern. Instead, these trails tend to be concentrated in and around large population centers such as Seattle and Bellevue. Many pedestrian and biking trails, including the Burke-Gilman Trail, follow rail road beds that have been converted to pedestrian uses as the these tracks have been abandoned over the years. Hence, proximity to multi-use trail is also very likely associated with other measures of accessibility such as drive time to population centers and proximity to other transportation infrastructure.

The analysis proceeded by first determining the network distance (i.e. distance driving) from each parcel in King County to the closest multi-use trail. Network distance was used as opposed to Euclidean distance (i.e. as the crow flies) to account for geographic constraints such as waterways and the layout of the existing road grid in determining trail accessibility. Next, the sample was constrained to only those properties that are located less than one mile from a multi-use trail. This restriction was imposed for several important reasons. Firstly, it is anticipated that only parcels geographically "close" to trail infrastructure are likely to be impacted from the trail. Hence, parcels further than one mile are unlikely to be affected either positively or negatively by the presence of a multi-use trail. Secondly, the potential for unobserved variable bias due to correlation between proximity to multi-use trails and other measures of accessibility is reduced by restricting the sample in this way. While parcels that are closer to existing trails may be more accessible than parcels further away, within one mile of a multi-use trail it is unlikely that some parcels are systematically better served by transit infrastructure or meaningfully closer to population or commercial centers. Thus, by restricting the sample in this way, the impact of proximity to multi-use trails may be isolated.

Once the appropriate sample was selected, the hedonic model was constructed for each land use type. The hedonic pricing model uses recent property transactions from 2005 – 2015 and predicts the final price property price as a function of parcel and structural attributes. Let $\ln P_{it}$ $\ln P_{it}$ be the natural log of the sales price for parcel *i* in period *t* adjusted for inflation to 2015 dollars. The natural log of home price is used to compensate for outlier observations sold well above the mean sales price and is common in the literature. In addition, let X_{it} X_{it} be a vector of parcel attributes (lot square footage, structural square feet, year built, etc.) and the variable d_i d_i represents the driving distance from the parcel to the closest multi-use trail. T_t T_t is a vector of fixed effects for transaction year the parcel was sold and M_t M_t represents the month of year the parcel was sold. Equation 3 represents the hedonic pricing model used to estimate the impact of proximity to multi-use trail on property value for each land use type $l \in L$ $l \in L$ (e.g. single family, multi-family apartment, commercial, etc.).

(3) $$\ln P_{it}^L = d_i^L \beta_1^L + X_{it}^L \beta_2^L + T_t^L \beta_3^L + M_t^L \beta_4^L + \varepsilon_{it}^L \quad \ln P_{it}^L = d_i^L \beta_1^L + X_{it}^L \beta_2^L + T_t^L \beta_3^L + M_t^L \beta_4^L + \varepsilon_{it}^L$$

The variable ε_{it} ε_{it} is a normally distributed error term with mean zero and which is clustered at the block group level to account for unobserved spatial correlation in the distribution of property prices. The parameters $\beta_1 - \beta_4$ $\beta_1 - \beta_4$ are parameters to be estimated and represent the marginal contribution of each property to the final determination of home sales price.

The primary parameter of interest is β_1 β_1, which represents the marginal impact of an increase in distance from a multi-use trail has on property value. If β_1 β_1 is less than zero and statistically significant, this would indicate that parcels closer to the trail benefit from the trails presence. On the other hand, if β_1 β_1 is greater than zero, this would indicate that parcels further away from the trail are statistically better off. It is anticipated that parcels may have a heterogeneous response to proximity to trails. We therefore estimate separate models for each land use type $l \in L$.

$l \in L$.

APPENDIX C

RESULTS OF HEDONIC VALUATION MODELS

Separate hedonic models were estimated for single family homes, multi-family apartments, commercial and industrial land uses according to Equation 3 in Appendix B. Data used for purposes of estimation were collected from the King County Assessor's office. This information includes a spatial record for the location and dimensions of each parcel in a geographic information system (GIS), relevant parcel and structural attribute information, and records of every property sale from the late 1980s to the present day (King County Assessor). This section provides summary statistics for the explanatory variables and model results for each land use type.

Single-Family Homes

For the model of single-family homes, the dependent variable is the natural log of the final price paid for homes sold in King County. There were a total of 57,381 home sales transactions between the years 2005 to 2015 included in this analysis. Home price is modeled as a function of the lot acreage, the number of stories of the home, the structural square footage (in 100s of square feet), the number of bedrooms, age of the structure, the number of bathrooms, a dummy variable if the home has a fireplace, a categorical variable capturing the quality of construction, and the waterfront frontage (in 100s of feet). In addition, we include several geographic parcel attributes based upon the location of the parcel. These variables include the distance to multi-use trail, distance to downtown Seattle, distance to Bellevue, distance to the Puget Sound, and distance to the closest lake, measured in miles, along with dummy variables which capture if the parcel has a waterfront view, a mountain view, a city view, or the presence of a nuisance on the parcel. In addition, the model includes controls for the year and month the home was sold and the city the parcel is located in. Table C-1 provides coefficients and standard errors for the hedonic model of single-family home sale price. Asterisks reported next to coefficients indicate the statistical significance of these results. Three asterisks (***) indicate significance at the 99% level, two asterisks (**) indicate significance at the 95% level, and one asterisk (*) indicates significance at the 90% level.

Table C-1. Hedonic Model of Single-family Homes Sold in King County (2005 – 2015) within 1mi of a Multi-use Trail

Variable	*Coefficient*	*Standard Error*
Building Characteristics		
Lot Acres	0.034864***	0.007414
Stories	0.017967*	0.010305
Structure Square Feet (100s)	0.018322***	0.000711
Bedrooms	-0.009689***	0.003666
Age	-0.007979***	0.000903
Age^2	0.000221***	0.000022
Age^3	-0.000001***	0.0000001
Bathrooms	0.025983***	0.004204

Variable	*Coefficient*	*Standard Error*
Fireplace	0.086461***	0.009507
Construction Quality	0.152504***	0.006132
Waterfront Frontage (100s)	0.20351**	0.089525
Spatial Amenities		
Distance to Trail	-0.047155**	0.021879
Distance to Puget Sound	-0.005457	0.007216
Distance to Lake	-0.009425	0.007523
Distance to Major Road	0.06613***	0.009337
Distance to Seattle	-0.018714**	0.00736
Distance to Bellevue	-0.016354*	0.00861
Location Amenity		
Water View	0.138988***	0.017147
Mountain View	0.061625***	0.014827
City View	0.077358***	0.027282
Property Nuisances	-0.042722***	0.006421
Fixed Effects		
City	Yes	
Sale Month	Yes	
Sale Year	Yes	
Observations	57,381	
Clusters	519	

***Statistical significance at the 99% level
**Significance at the 95% level
*Significance at the 90% level

The results reported in Table C-1 generally conform to expectation where significant. Larger parcels with more square footage, building stories and bathrooms tend to sell for more money. After controlling for structural square footage, the number of bedrooms has a negative effect, indicating diminishing returns to increasing the number of bedrooms relative to the overall structural square footage. Homes with better construction quality, more waterfront frontage and with a fireplace also tend to sell for higher values. Age of the structure has a non-linear effect. At first, as a home ages it diminishes in value, increasing the age of a new home by one year decreases the value of the home by -0.7%. Once a home reaches approximately 40 years old, the value begins to rise by approximately 0.3% per year, due to the vintage nature of these homes. Distance to major roads have a positive effect on home value, which is most likely due to the nuisance of being close to major transportation infrastructure. Parcels that are further away from the job centers of Seattle or Bellevue also tend to be less valuable. Finally, homes that report having any sort of view tend to sell for more than homes that lack a view. Water views are the most valuable and mountain views are the least valuable.

The primary variable of interest is the distance to the closest multi-use trail. The coefficient for this variable is negative, indicating that increasing distance from a trail tends to reduce the value that a home is sold for. These results suggest that increasing the distance of a home from a multi-use trail by a tenth of a mile would reduce the expected sale price of the home by approximately -0.5%. This coefficient is statistically significant at below the 95% level. Hence, these results support the hypothesis that expanding access to multi-use trail by constructing the BGT Missing Link would likely result in an increase in the value of single family homes in the vicinity. The expected magnitude of the impact would depend upon the relative position of the home in relation to the new trail.

<u>Multi-family Apartment Buildings</u>

In the model of multi-family apartment, the dependent variable is the natural log of building price per building square foot. There were a total of 2,774 apartment buildings sold in King County between the years 2005 to 2015 that were within one mile of a multi-use trail. The variables used to predict the building price per square foot include lot acreage, building square footage, the number of buildings, the average quality of construction, the average number of stories per building, the average age of the structures and waterfront frontage (in 100s of feet). Other spatial controls include the distance to multi-use trail, distance to Downtown Seattle, distance to Bellevue, distance to the Puget Sound, distance to the closest lake and the distance to major road. Table C-2 reports the coefficients and standard errors for the model of the hedonic building price per square foot for multi-family apartment buildings sold in King County.

Table C-2. Hedonic Model of Multi-family Apartment Buildings Sold in King County (2005 – 2015) within 1 mi of a Multi-use Trail

Variable	*Coefficient*	*Standard Error*
Building Characteristics		
Lot Acres	-0.013124***	0.003619
Total Square Feet	-0.00014**	0.000064
Number of Buildings	0.009469	0.007763
Constriction Quality	0.192399***	0.038229

Variable	*Coefficient*	*Standard Error*
Stories	0.001915	0.008699
Age	-0.008325	0.011316
Age^2	0.000101	0.000269
Age^3	-0.000001	0.000002
Waterfront Frontage (100s)	-0.154137	0.227356
Spatial Amenities		
Distance to Trail	-0.190683	0.165652
Distance to Puget Sound	-0.039952	0.04198
Distance to Lake	-0.047123	0.049689
Distance to Major Road	0.054459	0.062096
Distance to Seattle	0.035824	0.043733
Distance to Bellevue	-0.063876	0.056205
Fixed Effects		
City	Yes	
Sale Month	Yes	
Sale Year	Yes	
Observations	2,774	
Clusters	298	

***Statistical significance at the 99% level
**Significance at the 95% level
*Significance at the 90% level

Relatively few coefficients from the hedonic model of apartment sale price are statistically significant. Both lot acreage and structural square footage have a negative impact on the building price per square foot. Increasing lot acreage and building square footage by 10% would decrease price paid per square foot by -0.3% and -0.7% respectively. These results indicate decreasing returns to increasing apartment size. Smaller apartment buildings can charge higher prices per square foot than larger ones, though the total building value is still larger on average for bigger buildings. Also, as expected, buildings with higher quality sell for higher value.

The coefficient for distance to a multi-use trail is negative but insignificant. The model suggests that on average apartment buildings are expected to benefit from locating close to a multi-use trail. On average, increasing the distance from multi-use trail by a tenth of a mile is expected to decrease the building price by approximately -1.7%. However, because this result is insignificant, these results primarily support the hypothesis that apartment buildings are statistically unaffected by the presence of nearby multi-use trails.

Commercial Buildings

The dependent variable for the hedonic model of commercial property transaction is the natural log of property sale price per building square foot, adjusted for inflation. Our sample of commercial properties consists of all commercial office buildings, retail and restaurants located within one mile of a multi-use trail in King County sold between 2005 and 2015. This combines for a total sample size of 990 commercial property sales. The variables used to predict the building price per square foot include lot acreage, building square footage, the number of buildings, the average quality of construction, the average number of stories per building, the average age of the structures, waterfront frontage (in 100s of feet) and variables which capture the percentage of the property devoted to retail and restaurant uses. Other spatial controls include the distance to multi-use trail, distance to Downtown Seattle, distance to Bellevue, distance to the Puget Sound, distance to the closest lake and the distance to major road.

Table C-3 reports the coefficients and standard errors for the model of the hedonic building price per square foot for commercial buildings sold in King County.

Table C-3. Hedonic Model of Commercial Buildings Sold in King County (2005 – 2015) within 1 mile of a Multi-use Trail

Variable	*Coefficient*	*Standard Error*
Building Characteristics		
Lot Acres	-0.019966***	0.003398
Total Square Feet	-0.000067	0.000081
Number of Buildings	1.565988***	0.449505
Quality	0.076134	0.065101
Stories	-0.001883	0.013125
Age	-0.027974*	0.015024
Age^2	0.000506*	0.000306
Age^3	-0.000003	0.000002
Waterfront Frontage (100s)	0.229003**	0.111839
Restaurant	0.304709**	0.139303

Variable	*Coefficient*	*Standard Error*
Retail	-0.091911	0.142282
Spatial Amenities		
Distance to Trail	-0.208228	0.231239
Distance to Puget Sound	-0.069013	0.072306
Distance to Lake	-0.09142	0.082184
Distance to Major Road	-0.002755	0.098697
Distance to Seattle	0.044539	0.07842
Distance to Bellevue	-0.091465	0.085707
Fixed Effects		
City	Yes	
Sale Month	Yes	
Sale Year	Yes	
Observations	990	
Clusters	192	

***Statistical significance at the 99% level
**Significance at the 95% level
*Significance at the 90% level

Several important property characteristics have a significant effect on determining property values. Lot acreage and building square footage exhibit diminishing marginal returns. A ten percent increase in lot acres and building square footage would result in a decrease in price per square foot of -0.6% and -0.4%, respectively. The number of buildings and waterfront frontage are also significant and positive. Age of the structure has a largely negative effect on property value. An increase in property age decreases property value by approximately -0.8% on average. Relative to commercial office spaces, restaurants command higher price premiums and retail commands slightly lower price premiums.

Distance to multi-use trail is insignificant but negative in these results. An increase in distance from trail is expected to decrease property values by approximately -1.8% on average. This effect is, however, insignificant supporting the hypothesis that commercial properties would be largely unaffected by proximity to multi-use trails.

Industrial Buildings

The dependent variable for the hedonic analysis of industrial property values is the natural log of sale price per building square foot, adjusted for inflation. The sample consists of all properties located within one mile of a multi-use trail sold between 2005 – 2015 that are used for light/medium industrial, heavy industrial, flex industrial, storage or other industrial. The total sample size consists of 593 properties. The explanatory variable used to predict industrial property value include lot acreage, building square footage, the number of buildings, the average quality of construction, the average number of stories per building, the average age of the structures, waterfront frontage (in 100s of feet) and variables which capture the percentage of the property devoted to heavy industrial, flex industrial, storage of other industrial uses. Other spatial controls include the distance to multi-use trail, distance to Downtown Seattle, distance to Bellevue, distance to the Puget Sound, distance to the closest lake, and the distance to major road.

Table C-4 reports the coefficients and standard errors for the model of the hedonic building price per square foot for industrial buildings sold in King County.

Table C-4. Hedonic Model of Industrial Buildings Sold in King County (2005 – 2015) within 1mi of a Multi-use trail

Variable	*Coefficient*	*Standard Error*
Building Characteristics		
Lot Acres	-0.001732	0.002364
Total Square Feet	-0.000085**	0.000037
Number of Buildings	-0.156518	0.209141
Quality	0.03952	0.031258
Heavy Industrial	-0.283022	0.263402
Flex Industrial	0.080458	0.135767
Storage	0.977779*	0.511835
Other Uses	0.41695*	0.251989
Stories	0.135941**	0.063362
Age	0.009265	0.009666
Age^2	-0.000364	0.000253
Age^3	0.000003	0.000002
Waterfront Frontage (100s)	0.212678	0.31894

Variable	*Coefficient*	*Standard Error*
Spatial Amenities		
Distance to Trail	0.103329	0.163103
Distance to Puget Sound	0.009467	0.055789
Distance to Lake	-0.004398	0.045377
Distance to Major Road	0.090829*	0.051478
Distance to Seattle	-0.036603	0.081533
Distance to Bellevue	0.037894	0.082403
Fixed Effects		
City	Yes	
Sale Month	Yes	
Sale Year	Yes	
Observations	593	
Clusters	110	

**Significance at the 95% level
*Significance at the 90% level

Similar to results from other building type models, we find that both lot acreage and building square footage have a negative effect on building price per square foot. Overall, an increase in lot acres and building square footage by 10% would result in a decrease in price per square foot by approximately -0.05% and -0.5%, respectively. On average, both storage and other industrial uses command higher price premiums relative to light/medium industrial uses and the number of building stories has a positive impact on industrial land values. Most geographic proximity variables are statistically insignificant though distance to major road is significant and positive, albeit at the 90% level.

There is little evidence to suggest that industrial properties are substantially harmed by locating near multi-use trails. The results suggest that an increase in distance from a multi-use trail by a tenth of a mile would increase property values by approximately 1.1%, which is statistically insignificant. Industrial properties located closer to multi-use trails may be slightly detrimentally impacted by the trail, but this effect is statistically indistinguishable from zero.