

Lower Duwamish Economic Analysis

Prepared for:

King County Department of Natural Resources and Parks, Wastewater Treatment Division

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EXECUTIVE SUMMARY

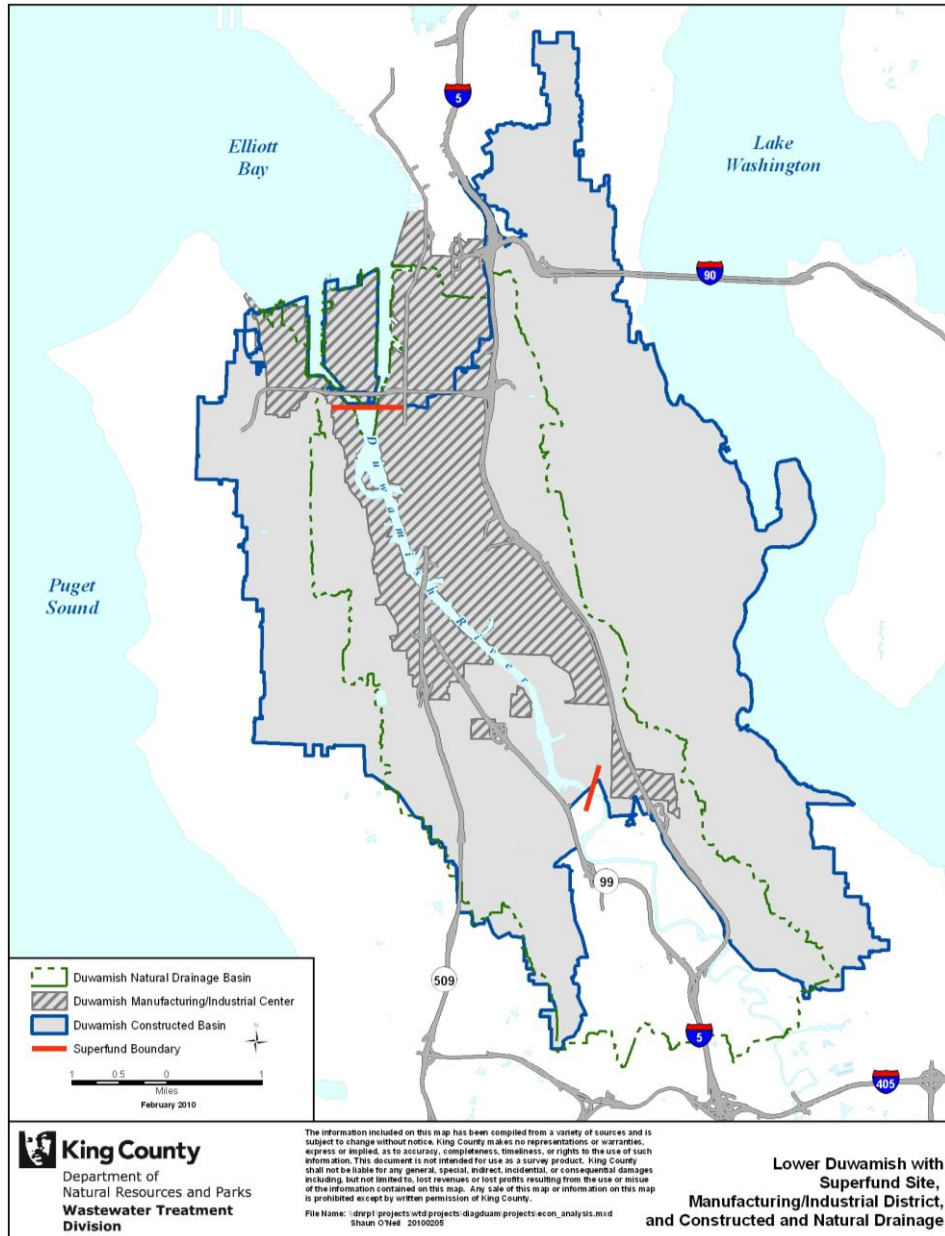
In November 2009, King County engaged ECONorthwest to conduct an economic analysis of the area within and approximate to the Lower Duwamish Waterway Superfund site (the “affected area”). In particular, ECONorthwest was asked to (a) describe the economic output and employment of the industries operating in this area, (b) discuss the relevance of these industries within the context of the greater Seattle and King Count economies, and (c) characterize the regional economic consequences of two alternative futures – a potential decrease in business activity that may be associated with a prolonged and uncertain cleanup process, and, conversely, a potential increase in business activity due to expedited and cost-effective cleanup.

The purpose of this analysis is to assist the major parties concerned with the cleanup with understanding some of the potential economic consequences of action or inaction associated with cleanup of the Lower Duwamish Waterway Superfund site. In so doing, the analysis attests to the importance of designing and implementing a cleanup scenario that maintains or enhances the regional economy. While information and models developed in this analysis could be used to help understand the potential impacts of a specific cleanup scenario, such a specific analysis is premature at this time.

The affected area is comprised of both the Lower Duwamish Superfund site itself, as well as adjacent areas in the region that may have contributed to pollution problems there. This could include areas that have contributed stormwater and/or combined sewer overflows that directly discharge to the Superfund Site, as well as through runoff nearby the adjacent area. Taking a watershed perspective, the study defines the “affected area” at two levels: a larger Tier 1 and a smaller portion more immediately adjacent to the site, Tier 2 (see Figure 1).

The larger Tier 1 area contains the broad area that drains to the Superfund site, including properties that may contribute to stormwater or combined sewer overflows directly flowing to the site. This relatively large, 34 square mile area accounts for almost 24 percent of Seattle’s total land area. The Tier 2 area, a sub-region of the Tier 1 area, is in closer proximity to the Superfund site. The Tier 2 area generally coincides with the concentration of manufacturing/industrial activity adjacent to Superfund site, including the Duwamish manufacturing/industrial center, as well as some adjacent residential and commercial areas. While it appears logical that Tier 2 would contain a greater concentration of the parties potentially responsible for cleanup than Tier 1, the geographical distribution of such parties will not be known for some time.

Figure 1: Lower Duwamish Waterway Superfund Site



Economic and demographic information were developed for the study areas based on zip code level data, obtained through the IMPLAN regional modeling system, and forecast analysis zone (FAZ) data, developed by the Puget Sound Regional Council (PSRC). Separate economic analyses were conducted for the Tier 1 and Tier 2 areas, and the results of both analyses are presented in this report. Tier 1 represents a broader representation of the affected area and Tier 2 represents a more succinct representation.

Some of the key findings of the economic and demographic characterization of the area are summarized in Table 1.

Table 1: Geographic, Demographic, and Economic Characteristics of Tier 1 and Tier 2 Areas

Characterization*	Tier 1: Broader Area, Contributing Stormwater & Combined Sewer Overflows Reaching the Superfund Site	Tier 2: Narrower Zone, More immediately adjacent to the Area; Focused on Manufacturing/Industrial Zoning
Geography		
Characterization	Mixed uses; Mostly within Seattle; Many residential communities	Concentrated area of manufacturing & industrial activity; Mostly within Seattle
Size / Percent of County**	33.5 square miles / 1.5%	8 square miles
Population & Demographics		
2010 Population / Percent of County	135,000 / 7%	60,000 / 3%
Percent of King County's Low Income HHs	9%	4%
Forecast Population Growth 2010-20	Moderate; slower than rest of County	Moderate; slower than rest of County
2010 Households / Percent of County	51,000 / 6%	24,000 / 3%
2010 Person Per Household***	2.6; Higher than County average	2.5; Higher than County average
Employment & Economic Output		
2010 Employment / Percent of County	129,000 (10% of County)	106,000 (8% of County)
Percent in Manufacturing	21% (County = 10%)	24% (County = 10%)
Percent in Wholesale Trade, Transportation, Warehousing	24% (County = 14%)	29% (County = 14%)
Jobs/Resident Ratio	0.96 - higher than rest of City and County	1.75 much higher than rest of City and County
Average Annual Wage (2008)	\$53,000 (County average = \$57,000)	\$56,000 (County average = \$57,000)
Total Wages / Percent of County (2008)	\$9 billion / 10%	\$4.4 billion / 5%
Total Economic Output / Percent of County (2008)	\$27.3 billion / 9%	\$13.5 billion / 4.3%
Total Value Added (2008)	\$15.6 billion / 9%	\$7.3 billion / 4.3%
Forecast Job Growth 2010-20	Slightly slower than rest of County; share of manufacturing/industrial forecast to increase	Slightly slower than rest of County; share of manufacturing/industrial forecast to increase

Source: ECONorthwest analysis of data from PSRC, IMPLAN, and other sources.

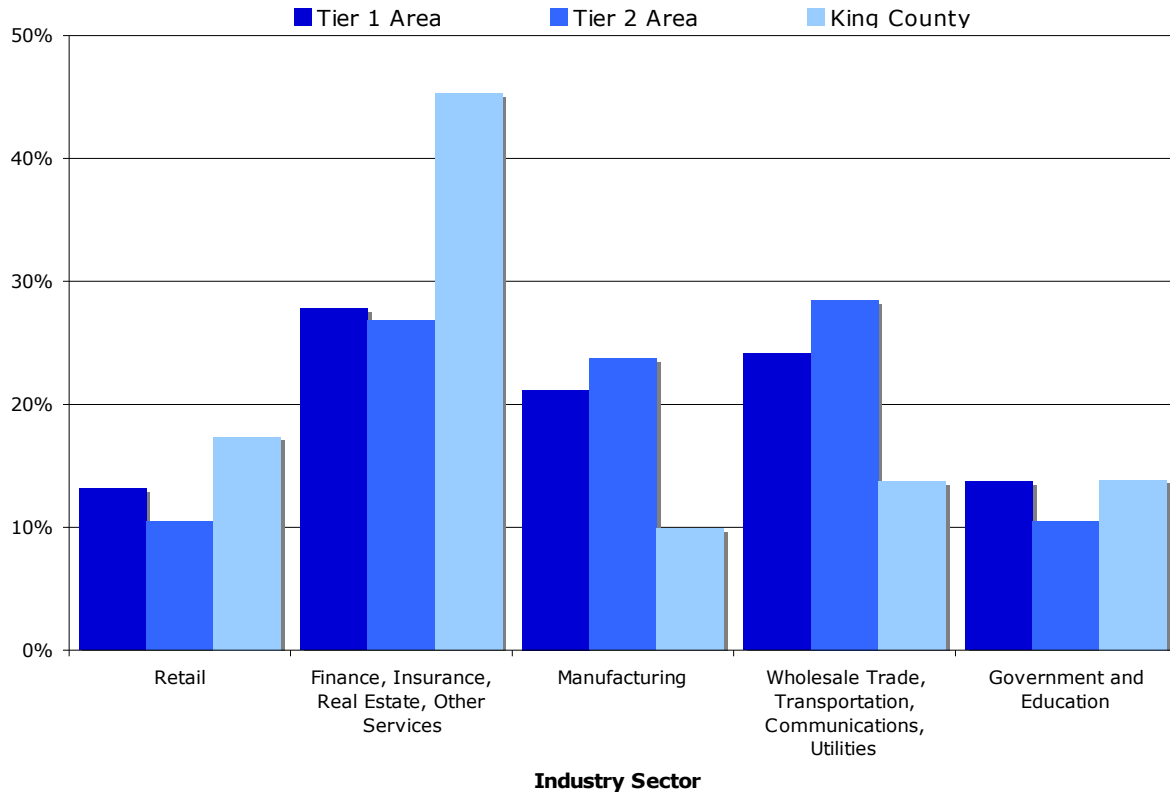
*All 2010 population, demographic, and economic information based on PSRC Population, Household, and Employment Forecast, 2006

**Due to overlap of the zip codes and FAZs used to represent the Tier 1 and Tier 2 areas, the size of the area analyzed is greater than the areas shown in Table 1. For Tier 1, the area analyzed is 45 square miles based on zip code data and 39 square miles based on FAZ data; For Tier 2 area, the size of the area analyzed is 16 square miles based on zip code data and 24.6 square miles based on FAZ data.

***Household population (not total population) used in denominator.

The distribution of employment by industry sector for the Tier 1 and Tier 2 area, and King County are shown in Figure 2.

Figure 2: Distribution of Employment by Industry Sector, Tier 1 and Tier 2 Areas, and King County (2010)*



Source: ECONorthwest analysis of data from PSRC.

*Based on PSRC Population, Household, and Employment Forecast, 2006.

Key observations from the analysis include:

- The Lower Duwamish area is of great economic significance to the City of Seattle and King County. It generates a large amount of City and County employment, wage earnings, and economic output.
- Even the more narrowly defined Tier 2 area directly contains over 100,000 jobs, many of which are in manufacturing and wholesale trade, transportation, and warehousing. The affected area contains substantial amount of the regional employment in these sectors.
- The area is a net job importer (there is a much higher jobs/resident ratio compared to the City of Seattle and other parts of the County).
- Although the area is a concentrated center of economic activity, there are a significant number of residents as well. Household incomes tend to be lower than in the rest of the

County, however income levels are projected to increase over time, perhaps reflective of job opportunities in the area.

- Based on projections from the Puget Sound Regional Council, employment in the area anticipated to grow in the future, albeit at a slower overall rate than the rest of the County. The area's share of manufacturing, industrial, and warehousing activity is anticipated to grow (perhaps reflecting limited availability of sites for these activities).
- Many of the jobs located in the Duwamish area are constrained by location – they require good transportation corridors (marine, rail, truck) and infrastructure that is difficult to locate elsewhere in the region. These businesses provide important diversity to the County economy.
- Many of the manufacturing jobs located in the area are relatively high paying (higher than the County median), and may not require advanced education or skills.
- Many of the jobs located in the area, particularly the manufacturing, transportation, and industrial sectors-- have significant secondary and induced impacts – in that other jobs (retail, government, other services) depend on them.

Potential Impact of the Superfund Listing on Economic Output

Studies have shown that commercial properties with known or suspected hazardous contamination can experience substantial reductions in property value, and that transaction rates for commercial properties adjacent to known contamination sites are statistically significantly lower than for commercial properties in areas without contamination. Officials in Portland have recently voiced concerns about the Portland Harbor Superfund cleanup process negatively influencing business investment there and the resulting impacts on economic activity throughout the City and region.

Building on the descriptive analysis summarized above, the report considers two alternative scenarios with respect to business investment in the affected area and resulting impact on economic activity within the affected area, as well as in the remainder of the City of Seattle and King County. The purpose of the analysis is to show the importance of implementing cleanup expeditiously, in a manner that maintains and enhances the economic vitality of the area. The alternative scenarios are related to the *perception* of the efficacy of cleanup efforts at the Superfund site.¹ Neither scenario represents a projection of what will happen. Rather, they represent what feasibly could happen.

Scenario A: This scenario assumes that businesses perceive the clean-up effort is not going well and there is a reasonably high likelihood of negative surprises, such as not-yet-identified contamination and/or the possibility of inheriting liability for contamination by past polluters. For any of a number of reasons, investment into firms operating in the affected area decreases,

¹ We use the qualifier “perception” because we are not qualified to judge the actual efficacy of the clean-up effort and because, regardless of the *actual* efficacy of the cleanup, it is the perception of businesses and other investors that the site has been or is being effectively cleaned up that will ultimately guide investment decisions.

resulting in a decrease in economic output. While it is not possible to predict the degree to which output would decrease in such a scenario, the analysis illustrates the potential regional economic impacts associated with a decrease in output of 10 percent in the principal industry sectors in the area (manufacturing, transportation and warehousing, and wholesale trade).

Scenario B: This scenario assumes that businesses perceive the clean-up effort is going well and there is a low likelihood of any negative surprises, such as not-yet-identified contamination and/or the possibility of inheriting liability for contamination by past polluters. Firms operating in the principal industries decide to increase investments and/or additional firms in these industries move into the affected area; economic output in these sectors increases. Mirroring the scenario above, the analysis assumes output increases by 10 percent.

Impacts are estimated for the affected area (Tier 2 Manufacturing/Industrial Center), elsewhere in Seattle, and elsewhere in King County. The measures of economic activity examined include Output (value of final products and/or services produced), Total Value Added (output minus value of all intermediate goods and services), Wages paid to employees, Business & Other Income earned by business owners, shareholders, landlords, Indirect Business Taxes paid to governments, and Jobs, both full- and part-time.

A 10% decrease in economic output by the principal sectors located in the affected area (Scenario A) could result in:

- A reduction of 6,600 jobs annually in King County, corresponding to a 0.57 percent change in employment for King County (an increase in the unemployment rate of 0.57 percentage points)
- A reduction in economic output \$1.4 billion for King County, off of a base of about \$310 billion
- A reduction in wages and business income in King County of \$627 million, off of an estimated base of \$157 billion
- A reduction of \$70 million in sales, property, and other taxes paid by businesses, as well any reduction in taxes paid by individuals due to lower consumptions associated with job loss

Most of the job losses and reductions in economic activity would occur within the affected area. However, many other businesses in King County, but outside of the affected area would also be negatively impacted. Approximately one in three of the estimated 6,600 lost jobs would occur outside of the affected area. Likewise, about 30 percent of the estimated \$1.4 billion in reduced economic output in the County would occur outside of the affected area.

In sum, the designation of the Lower Duwamish Waterway Superfund site affects a relatively small part of King County. However, this small area contains infrastructure and economic activity critical to the overall economic well being of the citizens, businesses, and local governments of King County. Efforts to clean-up the Superfund site that businesses perceive as timely and as having a high probability of success will likely be rewarded with increased investment in the affected area, resulting in increased economic output and jobs. Failure to act

efficiently and effectively to clean up the Superfund site could result in a decline in economic activity within the affected area and throughout the County.

INTRODUCTION

This report presents the results of ECONorthwest's analysis of the regional economic activity occurring within or adjacent to the Lower Duwamish industrial area. This area may be affected by the designation of and/or cleanup activities associated with the Lower Duwamish Waterway Superfund Site. The Superfund site is composed of a 5.5-mile stretch of the Lower Duwamish River before flowing into Elliott Bay just south of downtown Seattle.

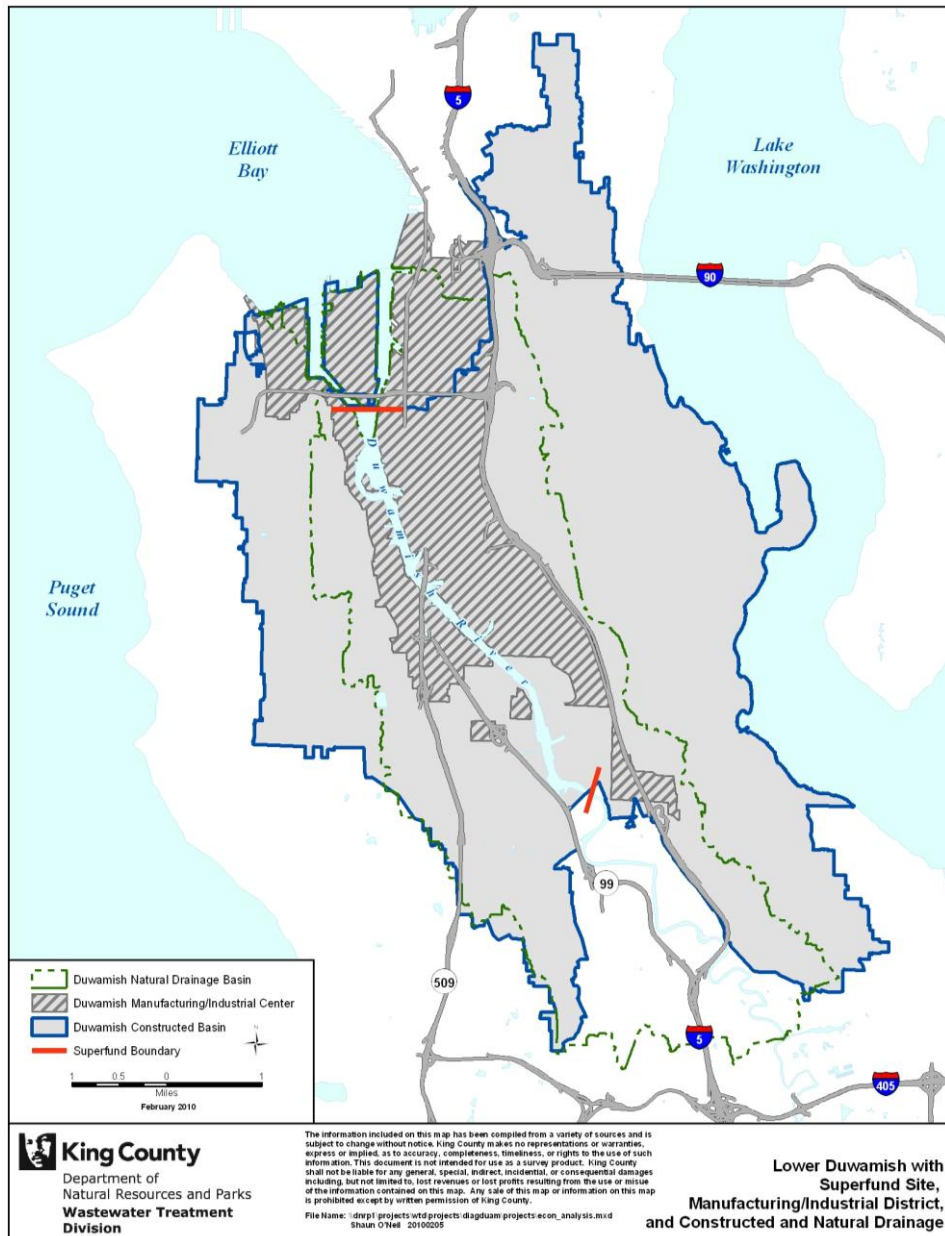
The objective of this study is to describe the relative importance of the Lower Duwamish Waterway to the greater King County economy and to describe the economic activity associated with the Lower Duwamish Waterway Superfund Site, including major industrial sectors, economic output, and employment. The analysis begins by describing the geography and land use designation of the affected area and includes sections that describe the economic and demographic characteristics of the affected area, based on two alternative definitions of the geography of the affected area.

1. DESCRIPTION OF STUDY AREA

Defining the area affected by the Duwamish cleanup activities is a critical first step in the study. Although boundaries of the Duwamish cleanup area have been defined, the boundaries of the area potentially affected by cleanup activities and costs have not. As a result, we approximate the affected area based on the recognized boundaries of the Lower Duwamish Superfund Site contained within a 5.5-mile stretch of the Lower Duwamish River before it flows into Elliott Bay. This area is identified in Figure 1 by the red demarcations along the river path. Figure 1 also shows the Lower Duwamish Watershed, defined as the area contributing either stormwater or combined sewer overflows (CSO) to the Superfund site. These areas are collectively referred to as the Lower Duwamish constructed watershed.²

² The constructed watershed includes the drainage basin that contributes to stormwater and combined sewer overflows that enter the lower Duwamish from nearby urban and industrial areas. However, it does not include the much larger area that contributes to the Duwamish flows at the upper end of the Superfund Site, the upper Duwamish and Green River watershed that originates in the Cascade Mountains.

Figure 3: Lower Duwamish Waterway Superfund Site



The area directly affected by Duwamish cleanup activities should be based, in part, on the location of the parties likely to be responsible for cleanup. Over the past year, the U.S. Environmental Protection Agency (EPA) sent approximately 200 letters asking certain parties for information, identifying them as potentially having some connection to contamination contained within the Superfund site.³ While a cursory examination of the list of parties that

³ These Section 104(e) letters give a preliminary indication of potentially responsible parties, but should not be construed as a definitive list. A Potentially Responsible Party (PRP) is a business or other entity that may ultimately have to pay for some portion of the cleanup activity, depending upon how the EPA or other overseeing agency allocates responsibility. How much a particular business is required to pay will not be known for several years.

received letters from the EPA suggested that, while many listed parties were located adjacent to the waterway itself, some parties identified by the EPA were further away from the waterway, but still within the Lower Duwamish watershed. Other listed parties were located beyond the Lower Duwamish waterway but within the larger watershed. And still others, though once operating within the constructed watershed, relocated prior to the EPA sending the letters. The final list of potentially responsible parties (PRP), and the extent of their responsibility, will remain unknown until much later in the process.

As a result, it is unclear which parcels and parties may be required to institute additional controls or incur additional costs associated with cleanup. Despite these uncertainties about the geographic extent of the affected area, proceeding with the economic analysis requires making educated assumptions about what areas are likely to be directly affected, as well as identifying the location of any parties that may be potentially responsible for some portion of the costs associated with cleanup.

In this analysis, we consider two alternative geographic boundaries of the study area, defined for convenience as Tier 1 and Tier 2.⁴ Tier 1 contains the broadest geographical area, represented by the boundaries of the Lower Duwamish Constructed Watershed. The watershed is defined by the collective stormwater and combined sewer overflow (CSO) basins that drain directly to the portion of the Lower Duwamish region characterized by the Superfund site, through CSO outfalls and storm drains. Tier 2 is a more narrowly defined subset of land within the Tier 1 area.

The Tier 2 area focuses on the manufacturing/industrial activity concentrated near the Superfund site and adjacent waterway, similar to the Duwamish Manufacturing/Industrial Center defined by the Puget Sound Regional Council (PSRC) in their 2002 Urban Centers Report.⁵ Tier 2 is also more congruent with the natural watershed of the lower Duwamish Superfund site, rather than the constructed watershed. The rationale behind analyzing Tier 2 separately is that it seems likely that most PRPs are located in this narrower area, because of their proximity to the Superfund site and that cleanup activities will most directly impact businesses in this area. A cursory review of EPA's 104(3) letters appears to support this assertion.

While the watershed logically defines the broader study area, the economic analysis is constrained by the availability of economic and demographic data for the watershed area. Economic and demographic data are not compiled based on watershed boundaries but, rather, based on zip codes, census tracts, or forecast or traffic area zones used by demographers and

⁴The geographical area of businesses identified as receiving Section 104(3) letters may be developed into a third tier ("Tier 3"). We do not consider the Tier 3 geographical area in this report.

⁵ According to the PSRC, *the Duwamish Manufacturing/Industrial Center is a unique regional resource and economic engine, and provides the largest concentration of family wage jobs in the Puget Sound region... the MIC is a vital international trade and transportation crossroads, receiving and distributing goods via roadway, water, rail, and air. Its ability to provide multiple modes of transportation represents a unique asset to the region and an enhancement to the local business environment. The Duwamish MIC has been in industrial use for nearly 100 years.* For more information on the Duwamish Manufacturing/Industrial Center, please see:

<http://www.google.com/search?hl=en&q=Manufacturing+Industrial+Zones+PSRC+Duwamish&btnG=Search>

planning agencies. As a result, zip code boundaries were selected in order to use the IMPLAN data essential for the study's economic impact analysis.⁶ As discussed later in the report, this will allow for the estimation of secondary impacts, such as the degree to which the rest of the County economy depends on economic activity in the affected area. It could also allow for estimation of the economic impacts of alternative cleanup scenarios, if the timing and allocation of cleanup costs associated with alternative scenarios can be defined.

Historical and forecast data by Forecast Analysis Zones (FAZ), developed by the PSRC, were used in addition to IMPLAN zip code data to further analyze the population, demographic, and employment trends within the two geographic tiers. FAZ boundaries are built from smaller traffic analysis zones (TAZs) and generally line up with census tract boundaries, with each FAZ containing between 1 to 9 census tracts. The FAZ was chosen over the census tract because the PSRC has historically compiled local data and prepared forecasts at the FAZ-level.

It is important to emphasize that, even with the specific designation of Tier 1 and Tier 2, concern regarding the ambiguity of the true Superfund impact boundary remains. Although a good first step in the evaluation process, the use of a large geographic boundary reduces the resolution of the analysis. This is further complicated by the misalignment between the Tier 1 and 2 boundaries and the boundaries of the FAZ and zip codes. Until the cleanup plan becomes clearer, these boundaries prove the best estimate of potential impact areas. The uncertainties about the geography and coarseness of the analysis should be kept in mind when reviewing the report's findings and conclusions. Precision is neither possible nor intended; rather, the goal is to accurately characterize the economy of the region and make reliable observations.

TIER 1 STUDY AREA—THE CONSTRUCTED WATERSHED

The Tier 1 watershed study area is an approximately 34 square-mile area, comprised of the constructed storm and sewer drainage areas reaching the Superfund site. Note that this does not include the 480 square miles of the Duwamish watershed upstream of the Superfund area, though it also could contribute to water and sediment quality entering the Duwamish Superfund site. The Tier 1 study area was selected because it represents the area containing land parcels and activities potentially contributing pollutants from stormwater runoff, source control, and CSO directly draining to the Superfund site. The Tier 1 area includes the Superfund site itself.

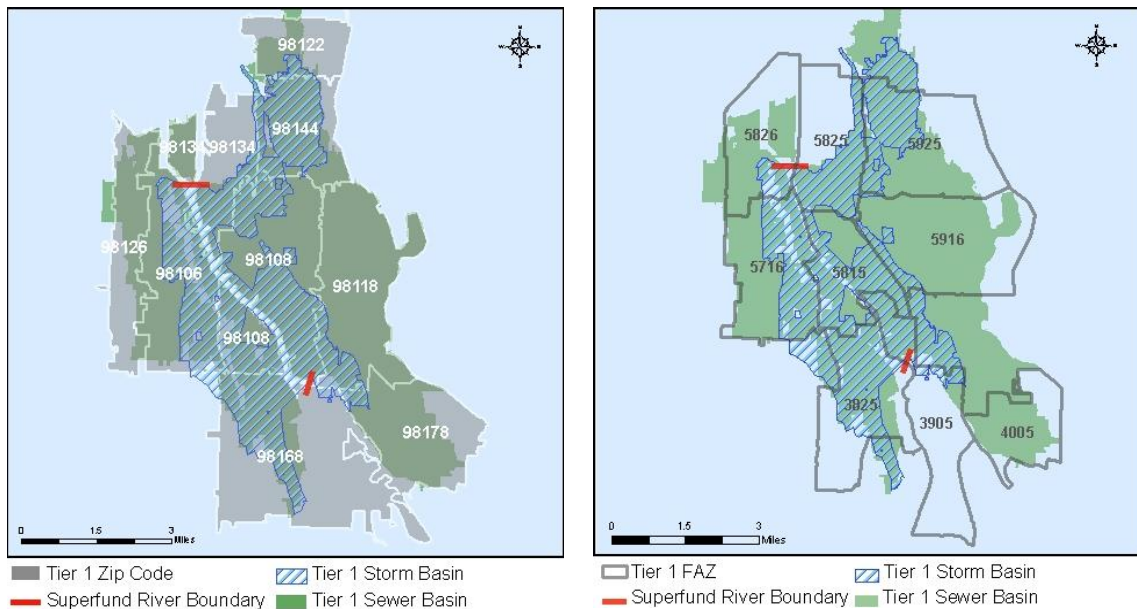
Figure 4 shows the Tier 1 study area, overlaid with both the FAZs (left-hand side figure) and zip codes (right-hand side figure).⁷ Economic and demographic information on the FAZs and the zip codes shown in Figure 2 were aggregated to provide proxies of the economic and

⁶ IMPLAN (for IMpact analysis for PLANning) is an input-output modeling framework developed at the zip code level for the entire U.S. IMPLAN provides an empirical representation of an economy – be it a single zip code, county, or state, or an aggregation of zip codes, counties, or states – and the relationships among the various industry sectors, final consumers, and the larger (regional or national) economy. . IMPLAN is a proprietary product of the Minnesota IMPLAN Group Inc. <http://implan.com/v3/>

⁷ The dimensions of the zip codes and TAZs used to develop the economic and demographic characteristics of the Tier 1 area differ from each other and include a small amount of area outside of the constructed watershed.

demographic characteristics of the Tier 1 study area. The FAZ and zip code boundaries do not match up exactly with the Tier 1 boundaries but they provide a reasonable approximation of the study area. Note that only a small portion of zip code (98134) and the FAZ (3905) fall within the study area, however each contain manufacturing/industrial areas that do fall within the boundaries of the Tier 1 zone and so they were included in the analysis.⁸

Figure 4: Tier 1 Study Area—The Constructed Watershed; Figure on Left Overlaid with FAZs; Figure on Right Overlaid with Zip Code



TIER 2 STUDY AREA—THE DUWAMISH MANUFACTURING/INDUSTRIAL CENTER

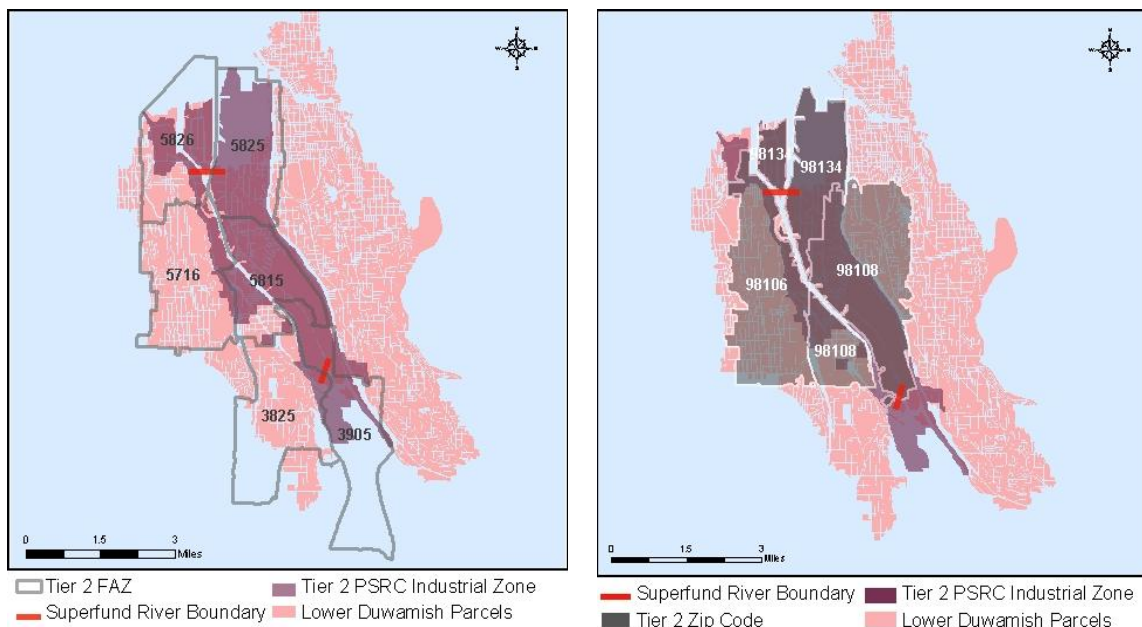
The Tier 2 study area is a sub-set of the FAZs and zip codes contained in the Tier 1 study area.⁹ Figure 5 shows the Tier 2 study area overlaid with the relevant FAZs (left side) and zip codes (right side). As indicated above, Tier 2 is much smaller than Tier 1, at approximately 8 square miles compared to 33.5 square miles in Tier1.¹⁰ As will be shown, relative to the Tier 1 study area, Tier 2 has a higher concentration of industrial/manufacturing employment and a lower concentration of financial and related business and government employment. The Tier 2 study area also contains less residential land than Tier 1. It is logical to assume that Tier 2 appears to contain a majority of the firms likely to be required to contribute to cleanup activities.

⁸ Zip codes used to characterize the Tier 1 study area include: 98126; 98178; 98122; 98118; 98134; 98144; 98168; 98106; 98108; FAZs used to characterize the Tier 1 study area include: 3825; 3905; 4005; 5716; 5815; 5825; 5826; 5916; 5925.

⁹ Zip codes used to characterize the Tier 2 study area include: 98106, 98108, 98134; FAZs used to characterize the Tier 2 study area include: 3825, 3905, 5716, 5815, 5825, 5826.

¹⁰ The dimensions of the zip codes and TAZs used to develop the economic and demographic characteristics of the Tier 2 area differ from each other and include areas outside of the Duwamish Manufacturing/Industrial Center.

Figure 5: Tier 2 Designated Study Area—The Duwamish Manufacturing/Industrial Center; Figure on Left Overlaid with FAZs; Figure on Right Overlaid with Zip Codes



2. ECONOMIC ANALYSIS OF THE TIER 1 AREA—THE CONSTRUCTED WATERSHED

This section describes the economic characteristics of the broad area (referred to the constructed watershed) that contributes stormwater and combined sewer overflow (CSO) that directly drains to the Superfund site. This geographical area is relevant because a cleanup plan could take a watershed perspective, calling for both source control and remedial actions throughout this area. Maps of the constructed watershed were provided by King County staff.

As discussed in section 1, the economic characterization in this report is based on aggregating economic and demographic data for the zip codes and FAZs that make up the Tier 1 area. Information provided in the report includes demographic and economic statistics for the area, which are compared with the City of Seattle and King County as a whole. A general understanding of the economic and demographic factors in the Tier 1 area will provide essential context to policy makers, businesses, and others associated with implementing cleanup activities in the Lower Duwamish Waterway. This overview does not, however, fully describe the importance of this area to the region’s economy, given inter-dependencies that exist. These issues will be developed in Section 4 of the report.

TIER 1 OVERVIEW

The Tier 1 designation, the approximately 34 square mile area that contributes to the Superfund site’s stormwater and CSO outfalls, accounts for 1.5 percent of the total land area of King County. Much of this land is highly developed and includes significant amounts of commercial,

governmental, and residential development, as well as the Duwamish Manufacturing/Industrial center (MIC). Tier 1 is a relatively large urban area, much of which exists within Seattle city limits. The portion of Tier 1 located within the City accounts for nearly 24 percent of Seattle’s total land area. Additionally, many Port of Seattle terminals are located within the Tier 1 area.

Nearly 10 percent of King County employment and 17 percent of Seattle employment is located within the Tier 1 area.¹¹ Table 2.1 shows a relatively high job/resident ratio, similar to the City of Seattle. Like the City, this indicates that the Tier 1 area is a relatively important employment center for the County.¹²

Table 2: Demographic Characteristics of Tier 1 Area, King County, and City of Seattle (2010 Projected)

Demographic Characteristic	Tier 1 Area	King County	City of Seattle
Total Employment	129,045	1,311,186	607,158
Population	134,960	1,892,999	622,598
Household Population	132,317	1,850,421	592,887
Households	50,683	788,303	290,440
Percent Lower-income	33%	24%	29%
Percent Mid-Income	49%	48%	47%
Percent Higher-Income	18%	28%	24%
Persons Per Household	2.6	2.3	2.0
Jobs per Resident	0.96	0.69	0.97

Source: ECONorthwest analysis of PSRC 2006 Projections of FAZ data

Based on PSRC projections for 2010, one-third of Tier 1 households are lower-income based on income data for all of King County. In comparison, 24 percent of all King County households are in lower-income category and 29 percent of Seattle households are in the lower-income category. At the other end of the income distribution, 18 percent of households in the Tier 1 area are in the higher-income category, compared to 28 percent and 24 percent of households, respectively for King County and Seattle. While household income tends to be lower in Tier 1 than in the County or City of Seattle, persons per household tends to be higher – 2.6 persons per household versus 2.3 and 2.0 persons per household, respectively for King County and Seattle.

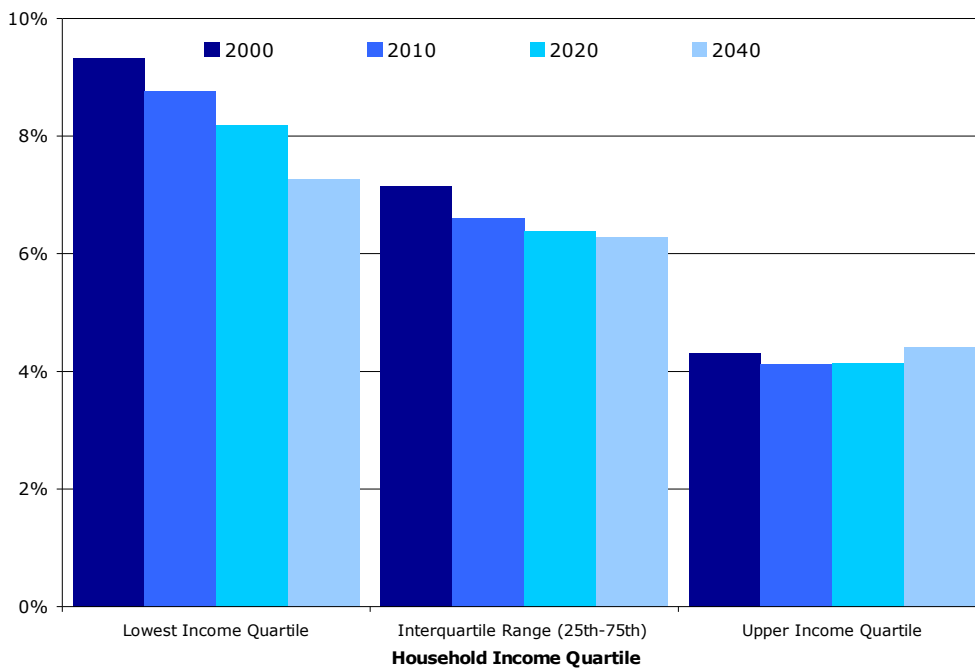
Population in Tier 1 is expected to rise through 2040, but at a slower rate than the rest of the County. Based on PSRC projections, Tier 1 household population will increase by nearly 24,000 residents, but, as a percent of King County population, is expected to drop by about 1 percentage point between 2010 and 2040. Figure 6 shows the projected trend in Tier 1

¹¹ Based on “covered” employment – those employees covered by Washington Employment Security Law and by the program of Unemployment Compensation for Federal Employees (UCFE).

¹² The “jobs/resident ratio” is simply employment divided by population and represents a measure of the concentration of employment per resident.

households as a percent of King County households. Over the next thirty years, the proportion of King County households located in the Tier 1 area will decline, because residential development will be more concentrated in areas of the County currently less developed. The largest decline is expected to be in the lower-income cohort because residential development in less expensive parts of the County is projected to increase and, potentially, neighborhoods within the Tier 1 area are projected to have higher than average income growth (perhaps due to assumed “gentrification”, or a reflection of relatively high paying local job opportunities predicted to be in the area). The proportion of County households with higher-income is expected to increase slightly by 2040 – again, possibly due to predicted gentrification within some Tier 1 neighborhoods.

Figure 6: Tier 1 Households by Income Cohort As a Percentage of King County Households, Historic and Projected



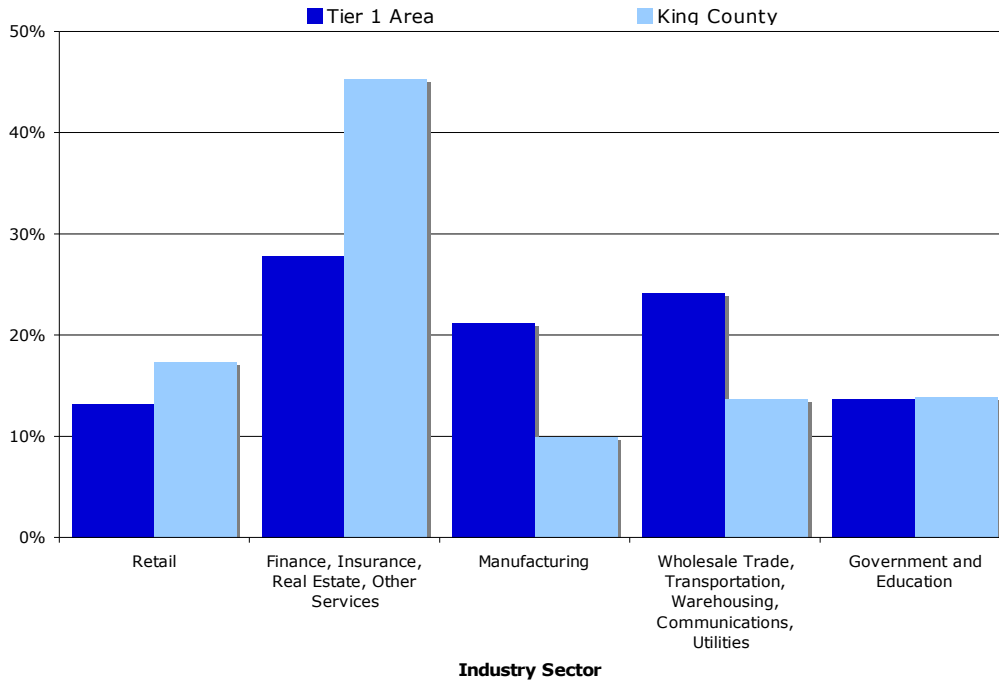
Source: ECONorthwest analysis of PSRC data

TIER 1 ECONOMIC PROFILE

Figure 7 shows the distribution of employment by industry sector for Tier 1 and King County as a whole. Relative to the County, Tier 1 has a lower concentration of employment in the retail sector (13 percent versus 17 percent), as well as the financial, and other services sectors (28 percent versus 47 percent). The Tier 1 area, however, has a much greater concentration of employment in the manufacturing sector than does King County as a whole (21 percent versus 10 percent). This difference is attributable to the presence of the Duwamish MIC and the high proportion of employment within the MIC involved in the manufacturing. In addition, because the Tier 1 area includes several Port of Seattle terminals and Boeing Field, this area has a much higher than County average concentration of employment in the wholesale trade,

transportation, warehousing, communications, and utility sectors (24 percent versus 14 percent).¹³ While the Tier 1 area has a relatively high concentration of employment in these traditionally *blue-collar* industries, it also has a low concentration of *white-collar* employment, relative to King County as a whole (28 percent versus 45 percent).¹⁴

Figure 7: Distribution of Employment by Industry Sector, Tier 1 Geographical Area and Rest of County (2010 Projected)



Source: ECONorthwest analysis of PSRC FAZ data

Table 3 shows employment levels for Tier 1 and King County for 2010 based on data from PSRC’s 2006 forecast. Total employment in Tier 1 is about 129,000, which is about 10 percent of total King County’s employment. As discussed above, some industry sectors are more highly concentrated in the Tier 1 area than in the County as a whole. Manufacturing employment in the Tier 1 area represent 21 percent of manufacturing employment for the County. Likewise, employment in the wholesale trade, transportation, communications, and utilities sectors in Tier 1 represent 17 percent of King County employment in these sectors. For King County, nearly half of all employment is in the finance, insurance, real estate, and other services sectors. For

¹³ Ideally this aggregation of sectors would be split out into (1) wholesale trade, (2) transportation & warehousing, (3) Communications & utilities, however the PSRC forecasts of employment at the FAZ level is conducted only for the aggregation of these sectors. Later tables, based on IMPLAN data, will show data specifically for the wholesale trade sector, as well as for the transportation and warehousing sectors.

¹⁴ Industries characterized as “blue-collar” are those in which the majority of the workers perform manual labor and are paid an hourly wage. Manufacturing, warehousing, transportation, and communications, and wholesale trade are, for the purposes of this report, considered blue-collar industries. Industries characterized as “white-collar” are those in which the majority of the workers perform clerical, sales, managerial, or other non-manual-labor-based tasks. These characterizations, of course, are generalizations and do not represent all employees within an industry sector.

these sectors, however, only 6 percent of County employment is located in the Tier 1 area. The relative importance of Tier 1 is as a location for traditionally *blue-collar* industries, providing economic diversity for a County that is primarily based on service sector employment.

Table 3: Employment by Industry Sector, Tier 1 and King County, (2010 Projected)

Industry Sector	Tier 1 Employment	King County Employment	Tier 1 as a Percent of King County
Retail	16,988	227,295	7.5%
Finance, Insurance, Real Estate, Other Services	35,875	593,592	6.0%
Manufacturing	27,333	129,394	21.1%
Wholesale Trade, Trans, Communications, Utilities	31,176	179,524	17.4%
Government & Education	17,673	181,381	9.7%
Total	129,045	1,311,186	9.8%

Source: ECONorthwest analysis of PSRC FAZ data

Table 4 shows wages and business income for Tier 1, the City of Seattle, and King County for 2008.¹⁵ For Seattle, firms located in Tier 1 were responsible for approximately 19 percent of wages for wholesale trade, 18% for transportation & warehousing, and 9% for manufacturing. For Seattle, firms located in Tier 1 were responsible for 64% of wages paid for wholesale trade, 57% for transportation and warehousing, and 45% for manufacturing. ¹⁶ However, while not represented in the table, the average wage earned per employee within these sectors was lower for employees in Tier 1 than in either the City or County. The average manufacturing wage paid to employees in Tier 1 was 33 percent below the County average for the manufacturing sector. This is because of the high concentration of manufacturing activities elsewhere in the County that pay higher wages than the county average, such as aerospace. Nevertheless, with an average wage of \$60,031 for the manufacturing sector and \$62,588 for the combined wholesale trade, transportation, and warehousing sectors, the Lower Duwamish region offers a higher-than-average wage for King County workers.

¹⁵ The IMPLAN model defines wages as total wages and salaries, as well as other payroll benefits such as health and life insurance, retirement payments, and non-cash compensation. Business income (also called proprietor's income) represents the payments received by small-business owners or self-employed workers (doctors, accountants, lawyers, etc.). 2008 is the most recent year for which data were available.

¹⁶ Of the 9 zip codes aggregated to represent Tier 1, one zip code boundary, 98168, falls outside of the Seattle city limits. Thus, the boundaries of the Tier 1 area defined for this analysis do not fully fall within the City of Seattle.

Table 4: Wages and Business Income for Tier 1 Industry Sectors, 2008 (\$Million)

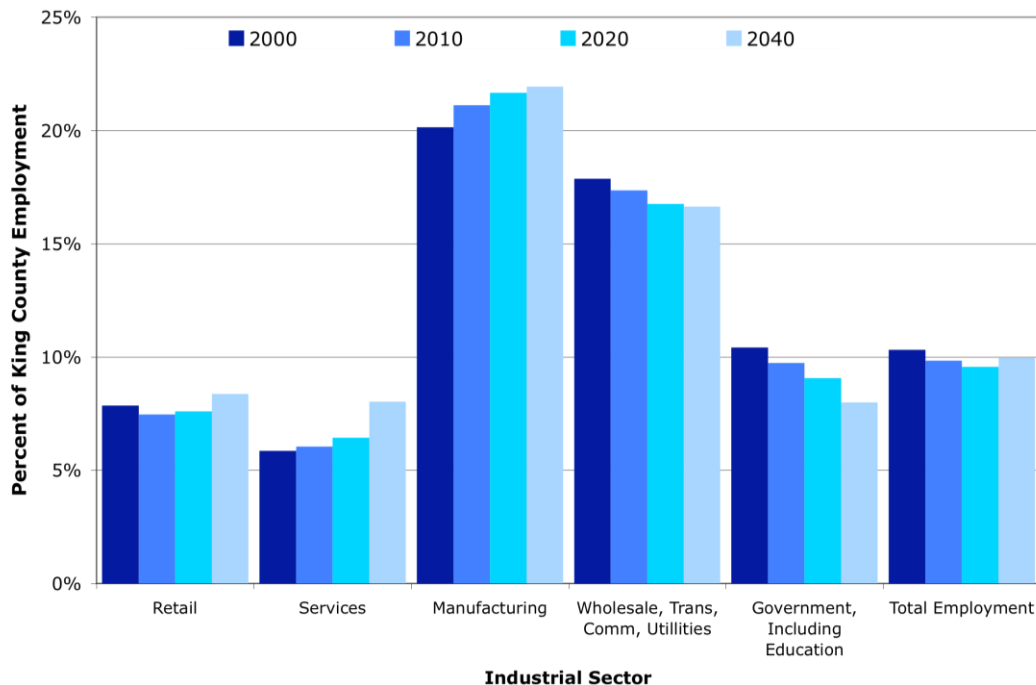
Industry Sector	Tier 1 Area		As a Percent of City of Seattle*		As a Percent of King County	
	Wages	Business Income	Wages	Business Income	Wages	Business Income
Manufacturing	\$930	\$520	45%	40%	9%	8%
Transportation & Warehousing	\$582	\$319	57%	50%	18%	20%
Wholesale trade	\$1,084	\$519	64%	64%	19%	19%
Other Private Industry	\$5,036	\$3,772	21%	18%	8%	7%
Government	\$1,385	\$197	31%	30%	12%	12%
Total	\$9,016	\$5,326	27%	22%	10%	8%

Source: ECONorthwest analysis of IMPLAN data (Note: totals may not sum exactly due to rounding)

* The Tier 1 area includes zip code 98168, which lies outside the City of Seattle

As Figure 8 shows, the PSRC projects the proportion of King County manufacturing employment within the Tier 1 area will grow over the next 30 years, even as total manufacturing employment in King County (and Tier 1) declines. Overall, about 1 in 10 persons employed in King County works in the Tier 1 area. This proportion is expected to stay relatively constant through 2040, with employment in King County projected to grow by 40 percent. Figure 8 shows that, absent any unanticipated developments, the Tier 1 area is expected to continue to be an important center of economic activity for the next thirty years, and its relative importance as a center of manufacturing activity will grow.

Figure 8: Historic and Projected Employment by Sector in Tier 1 Region as a Percent of Employment in King County by Sector



Source: ECONorthwest analysis of PSRC data

In addition to employment, other measures of economic activity include *economic output* and *value added*. Table 5 shows the value of economic output and value added for 2008 for select industry sectors in Tier 1. Output is the broadest measure of economic activity and represents the value of finished goods.¹⁷ Value added represents the difference between the value output and the value of intermediate goods and services purchased to produce that output. Table 5 also shows the proportion of economic output and value added for Seattle and King County attributable to the Tier 1 area.¹⁸

As Table 5 shows, \$27.3 billion in economic output was produced in Tier 1 in 2008. Of this total, \$15.6 billion represented value added activities. Nine percent of King County’s and 25 percent of the City of Seattle’s total value of output (and value added) originates in the Tier 1 area. Tier 1 produces 8 percent and 41 percent, respectively, of the value of manufacturing output for King County and Seattle. For transportation and warehousing and wholesale trade, the proportions are even higher: Tier 1 accounts for approximately 51 percent of Seattle’s transportation and warehousing output and 64 percent of the City’s output in wholesale trade. Likewise, Tier 1 accounts for about 19 percent of the King County’s output for wholesale trade and 18 percent of output in transportation and warehousing.

Table 5: Value of Output and Total Value added for Tier 1 Industry Sectors, 2008 (\$Million)

Industry Sector	Tier 1 Area		As a Percent of City of Seattle*		As a Percent of King County	
	Value of Output	Value Added	Value of Output	Value Added	Value of Output	Value Added
Manufacturing	\$4,933	\$1,482	41%	43%	8%	9%
Transportation & Warehousing	\$1,736	\$960	51%	54%	18%	19%
Wholesale trade	\$3,087	\$2,034	64%	64%	19%	19%
Other Private Industry	\$15,718	\$9,546	19%	19%	8%	8%
Government	\$1,803	\$1,581	30%	31%	12%	12%
Total	\$27,276	\$15,605	25%	25%	9%	9%

Source: ECONorthwest analysis of IMPLAN data

* The Tier 1 area includes zip code 98168, which lies outside the City of Seattle

The three broad industry sectors discussed here (manufacturing, wholesale trade, and transportation & warehousing) are of particular importance in the Tier 1 area – and are even of greater relative importance in the Tier 2 area discussed below. The concentration of these industries within the Lower Duwamish Watershed is not by chance. The proximity to Port of Seattle terminals, Seattle Boeing Field, Seattle International Gateway Rail Yard, Interstate 5, and other important arterials are critically important to the businesses that comprise these industry sectors. For many or even most of these businesses, relocation to another part of the County is

¹⁷ Output includes purchases of intermediate goods and services used in production, as well as total value added during production.

¹⁸ Of the 9 zip codes aggregated to represent Tier 1, one zip code boundary, 98168, falls outside of the Seattle city limits. Thus, the boundaries of the Tier 1 area defined for this analysis do not fully fall within the City of Seattle.

not an option. The transportation infrastructure that these businesses rely on is not available at nearly the same scale in other parts of the county as it is within the Lower Duwamish Waterway region.

3. ECONOMIC ANALYSIS OF THE TIER 2 AREA—THE DUWAMISH MANUFACTURING/INDUSTRIAL CENTER

This section describes Tier 2, the area of the Lower Duwamish industrial sector that may be most directly affected by the Superfund site. Tier 2 generally follows the boundaries of the PSRC-identified Duwamish Manufacturing/Industrial Center (MIC). Tier 2 also includes more of the natural watershed directly draining to the Superfund site. The PSRC designation recognizes the Duwamish MIC as a “unique regional resource and economic engine...[and] major, existing regional employment area of intense, concentrated manufacturing and industrial land uses which cannot be easily mixed at higher densities with other uses”.¹⁹

The PSRC has not updated the 2002 Duwamish Manufacturing/Industrial Center report. However, the aggregation of FAZs selected for Tier 2 (described in Section 1) closely approximates the PSRC’s Duwamish MIC. This, combined with zip-code level economic data from IMPLAN aggregated to the Tier 2 area, provides the data necessary for an updated economic and demographic characterization of the area, trend forecasting, and analysis of the importance of the area to King County’s economy. As with Tier 1, data from these sources provides a reasonable approximation of the economic and demographic structure of the Tier 2 area, which is most likely to be directly affected by the Superfund site designation and cleanup.

TIER 2 OVERVIEW

The eight square mile area comprising Tier 2 spans three zip codes and six FAZ.²⁰ In general, it narrows the larger Tier 1 study area down to the region’s primary industrial area, more closely representing the Superfund Site itself.²¹ Tier 2 accounts for about two-thirds of the Tier 1 land area but has 81 percent of employment located in Tier 1. Tier 2 accounts for almost seven percent of Seattle’s total land, including properties owned by the Port of Seattle and Boeing Field.

¹⁹ PSRC 2002 Urban Centers Report, Duwamish Manufacturing/Industrial Center, please see: <http://www.google.com/search?hl=en&q=Manufacturing+Industrial+Zones+PSRC+Duwamish&btnG=Search>

²⁰ Because the zip codes and FAZs used to characterize Tier 2 do not perfectly overlap the Tier 2 area (nor each other), the area represented by our approximation of the Tier 2 area is 16 square miles based on zip code boundaries and 24.6 square miles based on FAZ boundaries. However, the additional area is largely residential. Most of the economic activity is contained in the Duwamish MIC, as defined by the PSRC, which lies within the 8 square mile area. Therefore, the economic information provided here approximates that within the 8 square mile area. The demographic information generally describes that in the 8 square mile area and surrounding neighborhoods.

²¹ As noted above, the Duwamish MIC, as defined by the PSRC, contains few, if any, residential areas. Comparatively, Tier 2, as an aggregation of either zip codes or TAZs, includes numerous residential areas. Nevertheless, the economic characteristics of the Tier 2 area closely match the economic characteristics of the PSRC MIC.

Currently, an estimated 106,000 people are employed in Tier 2. Of these, 81,000 are employed within the portion of Tier 2 that lies within the City of Seattle—about 13% of Seattle’s total employment. The significance of the area as a center of employment is even more pronounced for King County: although Tier 2 accounts for only one percent of total King County land area, it provides nearly nine percent of total county employment. Tier 2 has a higher ratio of jobs-per-resident, 1.75, compared to 0.69 in King County or 0.97 in the City of Seattle.

Table 6: Demographic Characteristics of Tier 2 Area, King County, and City of Seattle, (2010 Projected)

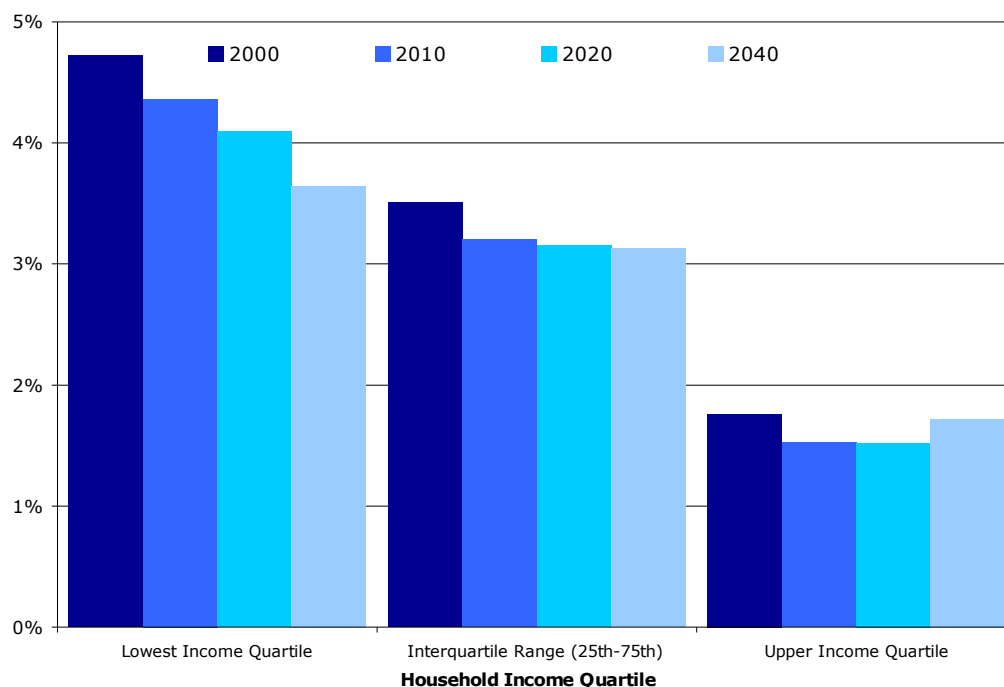
Demographic Characteristic	Tier 2 Area	King County	City of Seattle
Total Employment	105,706	1,311,186	607,158
Population	60,373	1,892,999	622,598
Household Population	59,185	1,850,421	592,887
Households	23,731	788,303	290,440
Percent Lower-income	35%	24%	29%
Percent Mid-Income	51%	48%	47%
Percent Higher-Income	14%	28%	24%
Persons Per HH	2.5	2.3	2.0
Jobs per Resident	1.75	0.69	0.97

Source: ECONorthwest analysis of PSRC 2006 Projections of FAZ data

The characteristics of households in Tier 2 and Tier 1 are very similar, and are projected to change in a similar manner over time, absent any unanticipated shock or change. Currently about 3 percent of King County households are located in the Tier 2 area. This proportion will decrease slightly over the next thirty years, as population growth in King County outpaces population growth within Tier 2.

Figure 9 shows the proportion of King County households by income cohort located in the Tier 2 area. Proportionally more of the County’s lower-income households are located in Tier 2 than mid- or higher-income households. The distribution of households by income cohort is expected to change over time, with proportionally fewer lower-income households expected in 2040 than today.

Figure 9: Households in Tier 1 as a Percent of Households in King County by Income Group, Historic and Projected



Source: ECONorthwest analysis of PSRC data

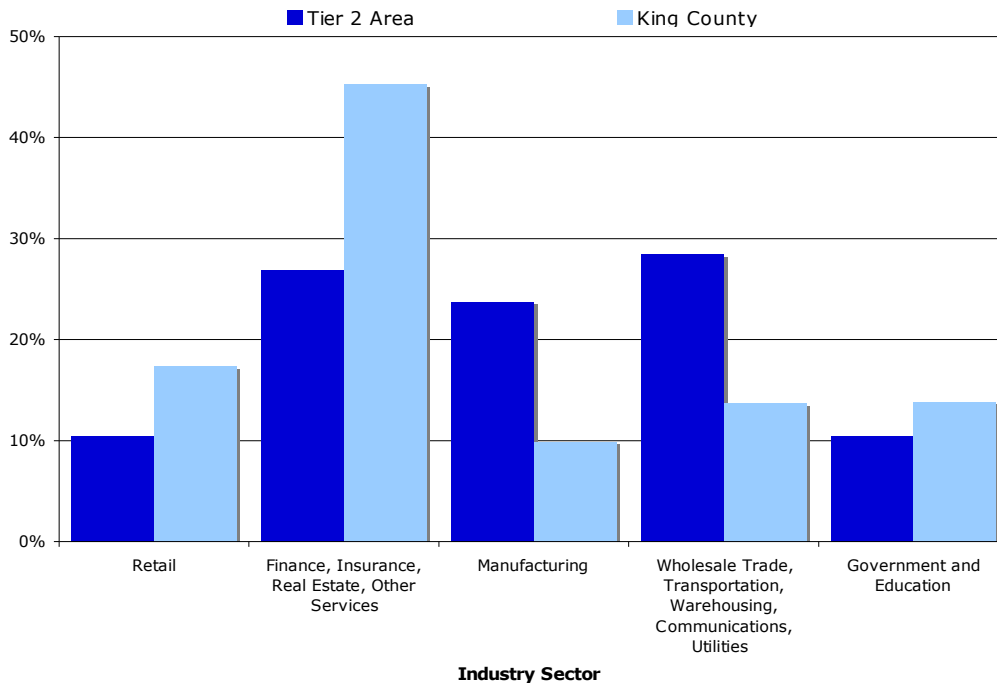
TIER 2 ECONOMIC PROFILE

The eight square mile area that represents the Tier 2 geographic area provides a unique concentration of manufacturing and industrial activity, as well transportation infrastructure. As Figure 10 shows, Tier 2 has a much greater proportion of employment in the manufacturing and wholesale trade, transportation, and communication sectors than the County as a whole. In Tier 2, about one in four jobs are in manufacturing, compared a countywide average of one in ten jobs. Likewise, nearly 30 percent of Tier 2 employment is in the wholesale trade, transportation, warehousing, and communications sectors, compared to about 14 percent for the County as a whole. Conversely, as Figure 10 shows, the Tier 2 area has a relatively low concentration of employment in the service and government sectors compared to the County as a whole.

The sub-sectors of manufacturing located in Tier 2 vary greatly, and differ from the manufacturing in the rest of the County. For many of these sub-sectors, the Lower Duwamish is the most appropriate (or perhaps only) location within King County where they can efficiently operate because of the access to multiple modes of transportation. The two most obvious sub-sectors that gain advantage from their location in Tier 2 are *seafood processing*, the largest of the manufacturing sub-sector based on both employment and value of output, and *ship building and repair*, the second largest sub-sector based on value of output and third largest based on employment. There are, however, numerous other manufacturing sub-sectors that also rely on access to seaport terminals, Boeing Field and the International Gateway Rail Yard to efficiently receive inputs to their manufacturing processes and export their final products. The infrastructure associated with the transportation sector cannot be moved or rebuilt elsewhere in the County. The warehousing sector, as well as the wholesale trade sector, are closely allied to

the transportation and manufacturing sectors and cannot efficiently relocate elsewhere in the County.

Figure 10: Distribution of Employment by Industry Sector, Tier 2 Geographical Area and Rest of County (2010 Projected)



Source: ECONorthwest analysis of PSRC data

Table 7 shows employment levels for Tier 2 and King County in 2010 based on data from PSRC’s 2006 forecast. Total employment in Tier 2 is estimated at 106,000, accounting for about eight percent of total King County employment. As discussed above, some industry sectors are highly concentrated in the Tier 2 area relative to the County as a whole. Manufacturing employment in the Tier 2 area represents 19 percent of manufacturing employment in the County. Employment in the wholesale trade, transportation, communications, and utilities sectors in Tier 2 accounts for about 17 percent of King County’s employment in these sectors.

For King County as a whole, nearly half of all employment is in the finance, insurance, real estate, and other services sectors. By contrast, only about five percent of County employment in these sectors is located in the Tier 2 area. The relative importance of Tier 2 is as a location for traditionally *blue-collar* industries, which provides economic diversity for a County that is primarily based on service sector employment. This employment is generally well-paid employment and does not require advanced education.

Table 7: Employment by Industry Sector, Tier 2 and King County, (2010 Projected)

Industry Sector	Tier 2 Employment	King County Employment	Tier 2 as a Percent of King County
Retail	11,050	227,295	4.9%
Finance, Insurance, Real Estate, Other Services	28,382	593,592	4.8%
Manufacturing	25,105	129,394	19.4%
Wholesale Trade, Trans, Communications, Utilities	30,106	179,524	16.8%
Government & Education	11,063	181,381	6.1%
Total	105,706	1,311,186	8.1%

Source: ECONorthwest analysis of PSRC FAZ data

Table 8 shows the wages earned and proprietary income received by industries within Tier 2.²² For Tier 2, wages earned within the Lower Duwamish MIC area accounted for 13 percent of wages earned citywide. Tier 2 accounted for a third or more of city wages earned in manufacturing, wholesale trade, transportation and warehousing. Though occupying less than 1 percent of County land, employees working within Tier 2 earned about five percent of the County's total earned wages.

Table 8: Wages and Business Income for Tier 2 Industry Sectors, 2008 (\$Million)

Industry Sector	Tier 1 Area		As a Percent of City of Seattle*		As a Percent of King County	
	Wages	Business Income	Wages	Business Income	Wages	Business Income
Manufacturing	\$678	\$392	33%	30%	7%	6%
Transportation & Warehousing	\$392	\$227	38%	36%	12%	14%
Wholesale trade	\$789	\$378	47%	47%	14%	14%
Other Private Industry	\$2,070	\$1,190	8%	6%	3%	2%
Government	\$480	\$70	11%	11%	4%	4%
Total	\$4,409	\$2,257	13%	9%	5%	3%

Source: ECONorthwest analysis of IMPLAN data

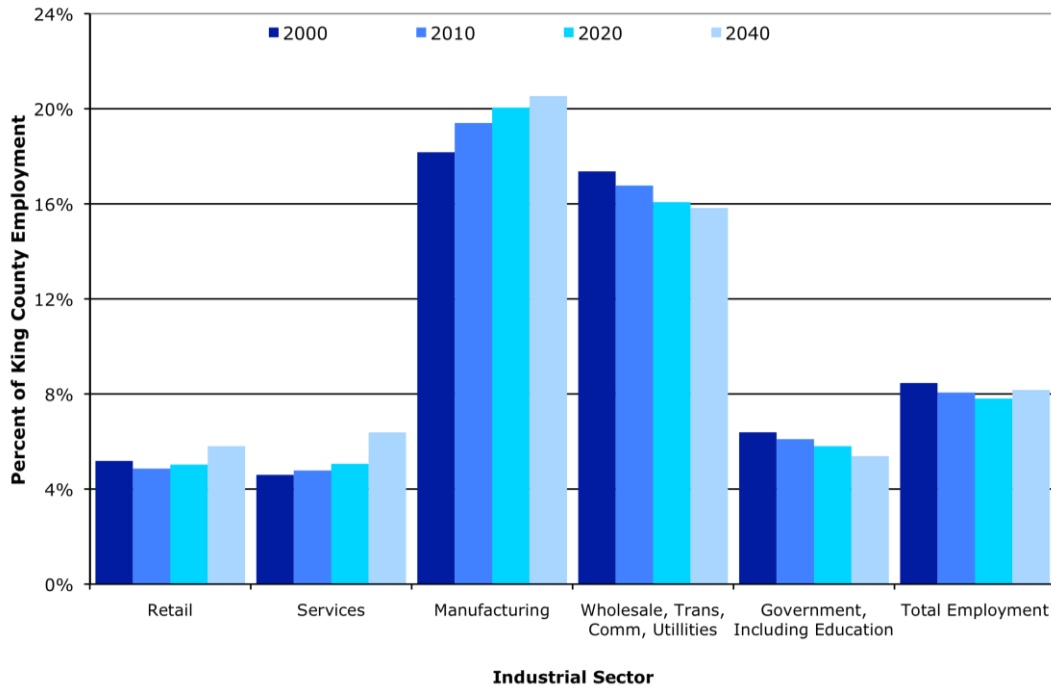
As Figure 11 shows, the PSRC projects that the proportion of King County manufacturing employment within the Tier 2 area will grow over the next 30 years.²³ Overall, about 1 in 12 King County employees works in the Tier 2 area. This proportion is expected to stay relatively constant through 2040, as employment in King County is projected to grow by 40 percent. Absent any unanticipated developments, the Tier 2 area is expected to continue to be an

²² Wages include wages, salaries, as well as other benefits such as health and life insurance, retirement payments, and non-cash compensation. Business income reflects payments received by small-business owners or self-employed workers.

²³ Note: Even as the proportion of King County manufacturing within the Tier 2 area rises over the next 30 years, total manufacturing employment in King County (and Tier 2) is expected to decline.

important center of economic activity and its relative importance as one of King County's centers of manufacturing activity will increase.

Figure 11: Historic and Projected Employment by Sector in Tier 2 Region as a Percent of Employment in King County by Sector



Source: ECONorthwest analysis of PSRC data

Table 9 shows the value of economic output and *value added* for 2008 for select industry sectors in Tier 2. Output is the broadest measure of economic activity and represents the value of finished goods.²⁴ Value added represents the difference between the value output and the value of intermediate goods and services purchased to produce that output. As Table 9 shows, about \$13.5 billion in economic output was produced in Tier 2 in 2008. Of this, \$7.3 billion represented value added activities. Four percent of King County's and 13 percent of the City of Seattle's total value of output (and 12 percent of value added) originates in the Tier 2 area. Tier 2 represents six percent and 30 percent, respectively, of the value of manufacturing output for King County and Seattle. For transportation and warehousing and wholesale trade, the proportions are even higher: Tier 2 accounts for approximately 33 percent of Seattle's transportation and warehousing output and 47 percent of the City's output in wholesale trade. Likewise, Tier 2 accounts for about 12 percent of the King County's output for wholesale trade and 14 percent of output in transportation, and warehousing.

²⁴ Output includes purchases of intermediate goods and services used in production, as well as total value added during production.

Table 9: Value of Output and Total Value Added for Tier 2 Industry Sectors, 2008 (\$Million)

Industry Sector	Tier 2 Area		As a Proportion of City of Seattle		As a Proportion of King County	
	Value of Output	Value Added	Value of Output	Value Added	Value of Output	Value Added
Manufacturing	\$3,620	\$1,095	30%	32%	6%	7%
Transportation & Warehousing	\$1,132	\$659	33%	37%	12%	13%
Wholesale trade	\$2,249	\$1,482	47%	47%	14%	14%
Other Private Industry	\$5,882	\$3,503	7%	7%	3%	3%
Government	\$646	\$550	11%	11%	4%	4%
Total	\$13,529	\$7,288	13%	12%	4%	4%

Source: ECONorthwest analysis of IMPLAN data

4. CONNECTION OF THE LOWER DUWAMISH SUPERFUND SITE TO THE SEATTLE AND KING COUNTY ECONOMIES

This section builds on the descriptive analysis presented in sections 2 and 3 and examines the economic connection of the Lower Duwamish Superfund site – as represented by the Tier 2 geographic area, the manufacturing/industrial zone bordering the lower Duwamish River – to the rest of the economy of Seattle and King County. The Tier 2 area data represents a subset of employment and economic activity for both Seattle and King County. It was felt appropriate to select Tier 2 for this analysis rather than Tier 1 because Tier 2 represents a smaller area, more likely to be impacted to a greater extent than the larger Tier 1 area. In this section we examine likely potential impacts on these two larger economies resulting from two alternative scenarios related to cleanup of the Superfund site:

- A. Businesses may decrease their investment in operations in or near the site because they perceive that reasonable progress in addressing the contamination is *not* being made by the EPA, area governments, and businesses.
- B. Businesses located in or near the Superfund (or those considering moving into the area) site may increase investment because they perceive that the EPA, area governments, and businesses have addressed the environmental issues associated with the Superfund site and are making reasonable progress to adequately remove or mitigate the hazardous materials in the Superfund site.

Businesses may be affected both directly and indirectly by the designation of a Superfund site, as well as by the effectiveness and timeliness of the cleanup of the site.²⁵ Given the uncertainty about liability and what will happen, businesses may be directly impacted in the following

²⁵ In this analysis we do not examine direct or indirect costs incurred by businesses due to the Superfund listing or cleanup. While these could be substantial, the magnitude, timing, and allocation of these costs are not known at this time.

ways: (1) they are reluctant to invest in their facilities located within the affected area; (2) outside investors are reluctant to invest in businesses operating in the affected area; or (3) banks or other financial institutions either refuse to lend to businesses within the affected area or will do so only at higher interest rates. These potential direct impacts affect only those firms within the Superfund site and possibly those firms identified as contributing to the contamination of the site. These firms represent a geographically contained portion of the Seattle and King County economies.

Other businesses may be affected indirectly by the “economic stigma” and uncertainty surrounding the designation of the Superfund area described above. If investment in the principal businesses sectors located within (or closely adjacent) to the Superfund site is redirected to other sites elsewhere in the region or outside of the region, many other businesses within the Superfund site and in the greater regional economy will be indirectly and adversely affected. Likewise, increased investment in the principal business sectors in the Superfund site resulting from the completion of the cleanup or perception that the cleanup will ultimately be successful, other businesses within the Superfund site or in the regional economy will be indirectly and positively affected.

The legislation creating the Superfund program was passed in 1980. There are currently more than 1,200 sites listed on the National Priority List, including the Lower Duwamish Waterway site.²⁶ To our knowledge, the literature does not include any studies quantifying the magnitude of the decrease in economic output of commercial properties resulting from the designation of a Superfund site, particularly during the time period following designation but before action is taken and it is cleaned up. However, there have been numerous studies that examine the impacts on property values for land located within or near a Superfund site.²⁷ Most of these studies, however, focused on residential property because of the greater availability of sales data and the far greater homogeneity of amenities and attributes among residential properties compared with commercial and industrial properties. The variation in the characteristics of commercial and industrial properties are at least as great as variations in the industrial sectors that comprise a local, state, or even regional economy. It is a relatively straightforward exercise to develop a list of comparables for residential properties against which to estimate the impact that location within or proximity to a Superfund site has on property value. Comparable for commercial and industrial properties, however, often do not exist.

There are significant differences among residential, commercial, and industrial property markets, including market size, relevant amenities, structural economic changes, and differences in financing practices. A variety of factors make it more difficult to determine the effect that proximity to hazardous contamination has on commercial and industrial property values than to determine the effect on residential property values. Simons, et al. (1997) considers both residential and commercial properties in their analysis of sales of properties with

²⁶ EPA National Priorities List <http://www.epa.gov/superfund/sites/query/queryhtm/npltotal.htm>

²⁷ For the purposes of this analysis, we assume that commercial and industrial property values represent a reasonable proxy for potential economic productivity.

underground storage tanks (UST), a common source of ground and water contamination.²⁸ The authors conclude that the inclusion of commercial properties is essential for determining the full effects of (potential) contamination on property values. They found that residential properties experienced a 14 percent to 16 percent reduction in value when contamination was known to exist, while commercial properties experienced a 28 percent to 42 percent reduction.

Simons and Sementelli (1999) re-examine property transaction data on the leaking underground storage tanks (LUST) sites in Cuyahoga County.²⁹ The authors found that commercial properties adjacent to the LUST sites transacted at a rate of 2.7 percent per year, while other commercial properties transacted at a rate of 4.0 percent per year, a statistically significant difference. The authors also found that sales of properties adjacent to the LUST sites were more frequently financed by sellers than were other commercial properties.

Patchin (1994) analyzed sales of commercial and industrial properties with on-site contamination.³⁰ The author found that the sites experienced between 21 percent and 94 percent reduction in property value because of the contamination. He also concluded, however, that strong market conditions tend to mitigate these strong negative impacts of contamination and that properties in demand because of their location tend to have less reduction in values, which is perhaps relevant to the Lower Duwamish Superfund site. The Lower Duwamish Superfund site's location in Seattle and its high-value infrastructure (e.g. Boeing Field, seaport terminals) could be significant mitigating factors against decreases in property values, compared to site located further from Seattle, without such infrastructure present.

Page and Rabinowitz (1993) use a case study approach to examine the impacts of groundwater contamination on property values for six commercial/industrial sites from California, Pennsylvania, and Wisconsin and seven residential areas in Wisconsin.³¹ The authors find no adverse impacts on residential property values, but significant impacts for commercial/industrial properties. They speculate that the difference in effect between residential and commercial/industrial is the result of: (1) the greater diligence exercised by commercial entities and (2) the assumption of potential responsibility for cleanup of the site and other associated liabilities.

Like Seattle, Portland is dealing with a major Superfund cleanup of one its primary industrial areas. The Portland Harbor Superfund site is located in the midst of Portland's industrial harbor. Like the Lower Duwamish Superfund site in Seattle, the Portland Harbor Superfund site contains a deepwater port and rail access to move freight to and receive freight from destinations throughout the U.S. But according to media reports, concerns about liability are

²⁸ Simons, R.A., W.M. Bowen, and A.J. Sementelli, 1997, *The Price and Liquidity Effects of UST Leaks from Gas Stations on Adjacent Contaminated Residential and Commercial Properties*, *The Appraisal Journal*, 67:2, 186-94.

²⁹ Simons, R.A., and A.J. Sementelli, 1999, *Liquidity Loss and Delayed Transactions with Leaking underground Storage Tanks*, *The Appraisal Journal*, 65:3, 255-60.

³⁰ Patchin, P.J., 1994, *Contaminated Properties and the Sales Comparison Approach*, *The Appraisal Journal*, 62:3, 402-9.

³¹ Page, G.W., and H. Rabinowitz, 1993, *Groundwater Contamination: Its Effects on Property Values and Cities*, *Journal of the American Planning Association*, 59:4, 473-81.

contributing to a lack of investment in the area. ³² While the area has lost jobs since 2000, a substantial number (approximately 38,000) of people currently work in Portland Harbor. ³³ Many of these jobs are relatively well paying for workers without a college education, with manufacturing-for-export firms that have a high economic impact for the City (i.e., they bring in money from outside the region). While it is not known how long it will take or how much it will cost to complete the cleanup of the Portland Harbor, there are concerns that cleanup will take decades and that the costs will run in the hundreds of millions. Given that this is a key part of Portland's manufacturing land base and its center for shipping to and from destinations throughout the world, there are significant concerns among local officials that uncertainty about cleanup will discourage redevelopment and investment in the site, resulting in job losses and other negative regional economic impacts. ³⁴

Quantifying the Potential Impacts of Cleaning-up or Not-Cleaning-up the Lower Duwamish Superfund Site

The Duwamish Manufacturing/Industrial Center (i.e., Tier 2) includes key infrastructure for the Seattle Metro Area and King County, including several Port of Seattle seaport terminals and Seattle Boeing Field.³⁵ In addition, the Tier 2 area contains much of the City's seafood processing and other manufacturing facilities (approximately 30 percent); nearly half of Seattle's wholesale trade sector – due in large part to proximity to the Port of Seattle and Boeing Field; a third of the City's transportation and warehousing activity – again, resulting from the location of the Port of Seattle and Boeing Field within the Tier 2 area. For the purposes of the impact analysis, we refer to these three sectors – manufacturing, wholesale trade, and transportation and warehousing – as the principal industry sectors of the Tier 2 area because of their relative importance to the City and County economies.

We focus on these three sectors of the economy when analyzing the potential impacts to the Seattle and King County economies resulting from cleaning-up or not cleaning-up toxic materials within the Lower Duwamish Waterway Superfund site. The buildup of toxic materials in the Superfund site occurred over many decades and was largely a negative externality of economic activity by businesses and government entities within the Duwamish Manufacturing/Industrial Center and the greater Duwamish Constructed Watershed. The benefits associated with this economic activity accrued (and continues to accrue) to businesses

³² IBID

³³ IBID

³⁴ IBID

³⁵ According to analysis commissioned by King County, Boeing Field's economic impact is \$3.2 billion per year in terms of local business sales, supports 12,618 jobs, and creates \$804 million in labor income for King County. For more information on the local economic impact of Boeing Field, see <http://www.kingcounty.gov/transportation/kcdot/airport.aspx>.

Note: Boeing Field is also known as King County International Airport.

and residents located within the affected areas, as well as to businesses, residents, and governments throughout Seattle and King County.³⁶

The EPA listed the lower five miles of the Duwamish Waterway as a Superfund site in 2001. The scope of our analysis does not include changes in business activity or investment (if any) by firms in the years preceding the listing, nor does it include any such changes (if any) at the time of the listing or the years immediately following the listing. Instead, we take as our baseline the economic environment firms and investors face today – as represented by the matrices of economic relationships in the IMPLAN modeling system.³⁷ Thus the focus of this analysis is prospective in nature – that is, we care about the decisions firms make today based on the economic and policy environment they currently face and their current perceptions of the state of cleanup efforts.

The analysis is comprised of two alternative scenarios related to the *perception* of efficacy of cleanup efforts at the Superfund site.³⁸

“Pessimistic” Scenario A: For the Scenario A, we assume that businesses perceive the clean-up effort is not going well and there is a reasonably high likelihood of negative surprises, such as not-yet-identified contamination and/or the possibility of inheriting liability for contamination by a past polluters. One or more of the following occur:

- Firms operating in the principal industries decide to decrease spending on updating and maintaining current capital and put on hold any investments in additional capital
- The operating lines of credit of firms operating in the affected area are decreased or financing costs increased due to banks’ perceptions of increased risk associated with the Superfund cleanup
- Firms once considering moving into the affected area, look to other sites outside of Seattle and King County because of these concerns

The likelihood and extent of such impacts is not clear. There is concern that there is some risk to economic activity in the lower Duwamish and the region as a whole. The purpose of the analysis is not to predict such impacts, but rather to demonstrate the importance of the area to the broader regional (county) economy, and the potential magnitude of the risk

³⁶ In fact, of course, benefits accrued to entities far beyond King County, however, the focus of this analysis does not go beyond King County.

³⁷ The IMPLAN modeling system is based on economic and employment data from state and federal government sources. Because of the time necessary for the government sources to compile, review, and when necessary adjust the reported data, the most current source of underlying data for IMPLAN is 2008. Though economic relationships are based on data for 2008, the estimates of economic impacts reported in this report are for 2010 and beyond.

³⁸ We use the qualifier “perception” because we are not qualified to judge the actual efficacy of the clean-up effort and because, regardless of the *actual* efficacy of the cleanup, it is the perception of businesses and other investors that the site has been or is being effectively cleaned up that will ultimately guide investment decisions.

facing businesses and residents in both the lower Duwamish and elsewhere in King County. Because no definitive figure was available from a literature review, the analysis examines the regional impacts resulting from a 10 percent decrease in economic output in the principal industry sectors in the affected area from current levels. This decrease in economic activity by the principal industries will persist into the future as long as businesses and investors perceive that the clean-up effort is not going well. The scenario also assumes that these economic activities cannot be moved to other parts of the County (though they may be able to be moved outside of the County, but remain in the Puget Sound region).

“Optimistic” Scenario B: For the Scenario B, we assume that businesses perceive the clean-up effort is going well and there is a low likelihood of any negative surprises, such as not-yet-identified contamination and/or the possibility of inheriting liability for contamination by a past polluters. Firms operating in the principal industries decide to increase investments and/or additional firms in these industries move into the affected area. The converse of scenario A, this assumes that economic output in these sectors in the affected area increases by 10 percent from current levels. This increase in output by the principal industries will persist into the future as the new baseline of economic activity.

It is important to note that, while both scenarios appear well within the realm of possibilities given the potential magnitude and complexity of the Duwamish Superfund cleanup, neither scenario represents a projection of anticipated outcome. We affix no likelihood to occurrence or outcome of either scenario. Rather, the two scenarios are intended to be illustrative of what could happen given the perceptions of businesses and investors regarding cleanup of the site. They demonstrate the regional economic significance of the Lower Duwamish area.

Results of the analysis are shown in Table 10. The dollar impacts represent annual impacts, using 2010 as a base year. For illustration purposes, the analysis does not consider a transition period, but rather that impacts are immediate. Future year impacts are discussed below.

The impacts shown in each table represent the change in economic activity, and are the same for either scenario (but are in the opposite direction). For (pessimistic) Scenario A, the impacts shown represent decreases in economic activity; for (optimistic) Scenario B, the impacts represent increases in economic activity. The baseline against which each scenario is compared is the current regional economy, as it exists today.³⁹ The estimated impacts represent the economic change associated with a change in perceptions from how they exist today.⁴⁰

³⁹ Note: the “economy as it exists today” is actually the regional economic structure as it existed in 2008 – the most recent year of economic output data available. The overall structure of the economy is assumed to be the same today as in 2008, even as the overall level of economic activity has changed over the past two years. Economic impacts are in 2010 dollars.

⁴⁰ While the Site has been designated a Superfund site for several years, many businesses may only now be becoming aware of the area’s status as a superfund site and the potential consequences. For example, in the summer of 2009 many businesses recently received letters from EPA asking for specific information on their past activities. As the cleanup process proceeds to the Remedial Investigation stage (with potential cleanup alternatives and cost estimates), it is likely that business may become more aware of the potential consequences, and more likely that the listing will affect business decisions.

Table 10 shows the impacts associated with a 10 percent change in the economic output of the principal industry sectors (manufacturing, transportation and warehousing, and wholesale trade) located in the Tier 1 area:

- **Direct impacts** are those affecting the principal industries in the affected area
- **Indirect impacts** are those affecting the businesses that provide inputs to the primary industries (located throughout the County)
- **Induced impacts** associated with reduced spending by workers and businesses owners directly or indirectly impacted (located throughout the County)

Impacts are estimated for the affected area (Tier 2 Manufacturing/Industrial Center), elsewhere in Seattle, and elsewhere in King County. Total countywide impacts are computed by summing impacts across the nested areas.

The measures of economic activity examined include Output (value of final products and/or services produced), Total Value Added (output minus value of all intermediate goods and services), Wages paid to employees, Business & Other Income earned by business owners, shareholders, landlords, Indirect Business Taxes paid to governments, and Jobs, both full- and part-time.

As Table 10 shows, most of the impacts (either negative as in Scenario A or positive as in Scenario B) are confined to the Tier 2 affected area and most of the impacts within the affected area are direct impacts to the principal industries. We estimate annual output in the affected area would change by about \$940 million, nearly half of this being value added. Changes in wages for workers in the affected area would be \$256 million and would impact just over 4,200 jobs. Business and other incomes would change by about \$147 million and indirect business taxes would change by about \$51 million.

Impacts elsewhere in Seattle and elsewhere in King County would be smaller than in the area affected by the Superfund designation, but would still be substantial. Change in annual economic output elsewhere in Seattle and King County is estimated to total about \$428; changes in wages are estimated to total \$121 million and there would be an estimated 2,385 change in the number of jobs.

Table 10: Impacts of a 10 Percent Change in Economic Output by the Principal Industry Sector Located in the Tier 2 Lower Duwamish Manufacturing/Industrial Center (Estimated for 2010)

Impact Measure	Direct	Indirect	Induced	Total
Within Affected Area (Tier 2: Industrial/Manufacturing Center)				
Output	\$727,460,892	\$171,168,657	\$40,849,524	\$939,485,736
Total Value Added	\$335,877,996	\$92,734,475	\$25,033,510	\$453,656,140
Wages	\$192,929,347	\$51,271,825	\$11,881,980	\$256,081,272
Business & Other Income	\$103,561,800	\$32,892,330	\$10,324,400	\$146,786,056
Indirect Business Taxes	\$39,386,849	\$8,570,321	\$2,827,130	\$50,788,812
Jobs	3,052	883	277	4,214
Elsewhere in Seattle				
Output	\$0	\$48,743,559	\$136,287,361	\$181,641,939
Total Value Added	\$0	\$25,169,509	\$86,023,179	\$109,405,188
Wages	\$0	\$12,157,051	\$43,580,160	\$54,708,814
Business & Other Income	\$0	\$11,939,832	\$34,508,683	\$45,830,637
Indirect Business Taxes	\$0	\$1,072,626	\$7,934,338	\$8,865,738
Jobs	0	219	962	1,158
Elsewhere in King County				
Output	\$0	\$131,947,686	\$113,380,927	\$246,909,812
Total Value Added	\$0	\$69,362,789	\$63,975,170	\$133,999,872
Wages	\$0	\$36,094,765	\$30,065,698	\$66,662,269
Business & Other Income	\$0	\$29,219,577	\$27,907,063	\$57,231,525
Indirect Business Taxes	\$0	\$4,048,447	\$6,002,409	\$10,106,079
Jobs	0	612	601	1,227
Total Countywide Impacts				
Output	\$727,460,892	\$351,859,902	\$290,517,812	\$1,368,037,487
Total Value Added	\$335,877,996	\$187,266,773	\$175,031,859	\$697,061,200
Wages	\$192,929,347	\$99,523,641	\$85,527,838	\$377,452,355
Business & Other Income	\$103,561,800	\$74,051,739	\$72,740,146	\$249,848,218
Indirect Business Taxes	\$39,386,849	\$13,691,394	\$16,763,877	\$69,760,629
Jobs	3,052	1,714	1,840	6,599

Source: ECONorthwest analysis of data from 2008 IMPLAN modeling system

The information shows that a relatively small change (i.e., 10%) in output from the principal economic sectors in the lower Duwamish would have significant regional economic impacts. Based on data from the Washington Department of Employment Security, average monthly employment in King County during 2009 was 1,156,848.⁴¹ Taking this as a baseline level of employment for 2010, the total change in employment (either increase or decrease) associated with a 10 percent change in economic output by the principal industry sectors located in the area affected by the Superfund site, represents a 0.57 percent change in annual employment for King County.⁴²

Economic impacts associated with a 10 percent change in each of the principal industries are shown in the Appendix. Table 11 shows the impacts associated with the manufacturing sector;

⁴¹ Washington Department of Employment Security, County Trends website: <https://fortress.wa.gov/esd/lmea/countydashboard/>

⁴² Percent change in employment calculation: $1,156,848 / (4,214 + 1,158 + 6,599) = 0.0057, \times 100 = 0.57\%$.

Table 12 shows the impacts associated with the transportation & warehousing sector; and Table 13 show the economic impacts associated with the wholesale trade sector.

Future Year Impacts

The results of the analysis (shown in tables 11-13) represent annual impacts, using the current year (2010) as a base. The results represent one-year impacts, without consideration of a transition period.⁴³ Future year impacts are not presented, but it is important to discuss the persistence of these impacts over time in the context of a large, dynamic economy such as the Seattle Metro area. The IMPLAN model from which these results were derived represents a static view or “snapshot” of the economy. In actuality, economic activity and the relationships between sectors of an economy, as well as the interactions between local and regional economies are constantly adjusting. IMPLAN represents this information for a single year.

The direct impacts on the principal industries associated with Scenario A, the “pessimistic” scenario, are assumed to *persist into the future as long as businesses and investors perceive that the clean-up effort is not going well*. Thus, as long as businesses and investors hold a negative perception of the clean-up effort, the direct impacts are assumed to persist. As defined in Scenario B, the “optimistic” scenario, the direct and positive impacts on the principal industries are assumed to *persist into the future as the new baseline of economic activity. This future holds as long as the perception by businesses of the efficacy of the clean-up activity holds*.

The indirect impacts are a measure of the economic activity by businesses (and government) to provide goods and services to the businesses directly impacted by the change in output. The magnitude of *negative* indirect impacts estimated for 2010 (associated with Scenario A) would certainly decrease over time as businesses in King County that are not directly affected by the Superfund cleanup make adjustments to their operations or are replaced by new enterprises as the regional economy adjusts.

Induced impacts are a measure of the economic activity associated with workers spending their wages for food, housing, and other goods and services. The magnitude of negative induced impacts estimated for 2010 (associated with Scenario A2) would also decrease over time as workers (either directly or indirectly affected) seek similar employment in other businesses not affected by Superfund site, or obtain additional training or education in order to pursue new opportunities within the King County economy.

Overall, the potential impact to the region from delayed action could be significant. The regional (Countywide) economic impacts would likely dissipate over time to some extent, though the impacts on the affected area could be felt for years to come.

⁴³ In all likelihood, impacts under such a scenario would not be immediate, but rather would occur gradually, and persist for several years. The specifics of such a scenario are difficult to predict, and beyond the scope and purpose of this analysis. Presenting results in annual terms serves to demonstrate the potential magnitude of such impacts and the overall regional economic significance of the Lower Duwamish.

APPENDIX: ECONOMIC IMPACTS BY PRINCIPAL INDUSTRIES

Table 11: Impacts of a 10 Percent Change in Economic Output of Manufacturing Sector Located in the Tier 2 Manufacturing/Industrial Center (Estimated for 2010)

Impact Measure	Direct	Indirect	Induced	Total
Affected Area (Tier 2: Industrial/Manufacturing Center)				
Output	\$376,166,723	\$97,585,547	\$16,807,882	\$490,566,923
Total Value Added	\$112,760,113	\$50,280,701	\$10,292,298	\$173,343,269
Wages	\$69,745,448	\$27,414,278	\$4,886,782	\$102,044,628
Business & Other Income	\$40,415,729	\$17,998,073	\$4,244,665	\$62,665,991
Indirect Business Taxes	\$2,598,936	\$4,868,350	\$1,160,851	\$8,632,650
Jobs	1,091	446	114	1,652
Elsewhere in Seattle				
Output	\$0	\$28,225,334	\$48,945,279	\$75,550,804
Total Value Added	\$0	\$13,152,163	\$29,905,397	\$42,238,587
Wages	\$0	\$5,689,480	\$14,408,184	\$19,633,023
Business & Other Income	\$0	\$6,834,308	\$12,558,251	\$19,109,502
Indirect Business Taxes	\$0	\$628,375	\$2,938,962	\$3,496,062
Jobs	0	110	329	429
Elsewhere in King County				
Output	\$0	\$87,143,714	\$58,820,413	\$146,779,053
Total Value Added	\$0	\$43,738,566	\$33,663,780	\$77,644,341
Wages	\$0	\$22,432,453	\$15,316,130	\$38,020,686
Business & Other Income	\$0	\$18,869,750	\$15,045,685	\$33,874,709
Indirect Business Taxes	\$0	\$2,436,363	\$3,301,964	\$5,748,946
Jobs	0	391	320	716
Elsewhere in King County				
Output	\$376,166,723	\$212,954,595	\$124,573,574	\$712,896,780
Total Value Added	\$112,760,113	\$107,171,430	\$73,861,475	\$293,226,197
Wages	\$69,745,448	\$55,536,211	\$34,611,096	\$159,698,337
Business & Other Income	\$40,415,729	\$43,702,131	\$31,848,601	\$115,650,202
Indirect Business Taxes	\$2,598,936	\$7,933,088	\$7,401,777	\$17,877,658
Jobs	1,091	947	763	2,797

Source: ECONorthwest analysis of data from 2008 IMPLAN modeling system

Table 12: Impacts of a 10 Percent Change in Economic Output of Transportation & Warehousing Sector Located in the Tier 2 Manufacturing/Industrial Center (Estimated for 2010)

Impact Measure	Direct	Indirect	Induced	Total
Affected Area (Tier 2: Industrial/Manufacturing Center)				
Output	\$117,639,301	\$25,715,072	\$8,410,999	\$151,765,257
Total Value Added	\$69,552,217	\$13,647,115	\$5,157,570	\$88,356,900
Wages	\$41,379,811	\$7,934,419	\$2,446,681	\$51,760,909
Business & Other Income	\$23,991,183	\$4,622,577	\$2,127,606	\$30,741,366
Indirect Business Taxes	\$4,181,223	\$1,090,119	\$583,283	\$5,854,625
Jobs	981	145	57	1,184
Elsewhere in Seattle				
Output	\$0	\$6,036,629	\$29,357,319	\$34,752,158
Total Value Added	\$0	\$3,455,505	\$18,833,224	\$21,919,039
Wages	\$0	\$2,040,058	\$9,773,059	\$11,594,587
Business & Other Income	\$0	\$1,273,789	\$7,381,070	\$8,535,973
Indirect Business Taxes	\$0	\$141,658	\$1,679,096	\$1,788,479
Jobs	0	34	212	241
Elsewhere in King County				
Output	\$0	\$15,948,357	\$18,652,475	\$35,074,587
Total Value Added	\$0	\$8,863,609	\$10,379,716	\$19,514,899
Wages	\$0	\$5,045,363	\$4,985,389	\$10,187,159
Business & Other Income	\$0	\$3,263,660	\$4,455,675	\$7,808,108
Indirect Business Taxes	\$0	\$554,586	\$938,652	\$1,519,633
Jobs	0	80	92	178
Elsewhere in King County				
Output	\$117,639,301	\$47,700,058	\$56,420,793	\$221,592,002
Total Value Added	\$69,552,217	\$25,966,229	\$34,370,510	\$129,790,838
Wages	\$41,379,811	\$15,019,840	\$17,205,129	\$73,542,655
Business & Other Income	\$23,991,183	\$9,160,026	\$13,964,351	\$47,085,447
Indirect Business Taxes	\$4,181,223	\$1,786,363	\$3,201,031	\$9,162,737
Jobs	981	259	361	1,603

Source: ECONorthwest analysis of data from 2008 IMPLAN modeling system

Table 13: Impacts of a 10 Percent Change in Economic Output of Wholesale Trade Sector in Tier 2 Manufacturing/Industrial Center (Estimated for 2010).

Impact Measure	Direct	Indirect	Induced	Total
Affected Area (Tier 2: Industrial/Manufacturing Center)				
Output	\$233,654,868	\$47,868,038	\$15,630,643	\$297,153,556
Total Value Added	\$153,565,666	\$28,806,659	\$9,583,642	\$191,955,971
Wages	\$81,804,088	\$15,923,128	\$4,548,517	\$102,275,735
Business & Other Income	\$39,154,888	\$10,271,680	\$3,952,129	\$53,378,699
Indirect Business Taxes	\$32,606,690	\$2,611,852	\$1,082,996	\$36,301,537
Jobs	980	292	106	1,378
Elsewhere in Seattle				
Output	\$0	\$14,481,596	\$57,984,763	\$71,338,977
Total Value Added	\$0	\$8,561,841	\$37,284,558	\$45,247,562
Wages	\$0	\$4,427,513	\$19,398,917	\$23,481,204
Business & Other Income	\$0	\$3,831,735	\$14,569,362	\$18,185,162
Indirect Business Taxes	\$0	\$302,593	\$3,316,280	\$3,581,197
Jobs	0	75	421	488
Elsewhere in King County				
Output	\$0	\$28,855,615	\$35,908,039	\$65,056,172
Total Value Added	\$0	\$16,760,614	\$19,931,674	\$36,840,632
Wages	\$0	\$8,616,949	\$9,764,179	\$18,454,424
Business & Other Income	\$0	\$7,086,167	\$8,405,703	\$15,548,708
Indirect Business Taxes	\$0	\$1,057,498	\$1,761,793	\$2,837,500
Jobs	0	141	189	333
Elsewhere in King County				
Output	\$233,654,868	\$91,205,249	\$109,523,445	\$433,548,705
Total Value Added	\$153,565,666	\$54,129,114	\$66,799,874	\$274,044,165
Wages	\$81,804,088	\$28,967,590	\$33,711,613	\$144,211,363
Business & Other Income	\$39,154,888	\$21,189,582	\$26,927,194	\$87,112,569
Indirect Business Taxes	\$32,606,690	\$3,971,943	\$6,161,069	\$42,720,234
Jobs	980	508	716	2,199

Source: ECONorthwest analysis of data from 2008 IMPLAN modeling system