

2007 Buildable Lands Report Employment Density Study

Methodology for Converting Floor Area Square Feet per Employee Assumptions for SIC Employment Categories to NAICS Categories

April 2007

Executive Summary

The purpose of this study was to convert the floor area per employee assumptions used in the *Snohomish County Tomorrow 2002 Buildable Lands Report* over to the categories used in the 2007 Buildable Lands Project. The recommended assumptions are shown in table 1.

The Washington State Growth Management Act (GMA) requires Snohomish County and the cities to review and evaluate growth trends and remaining urban land capacity every five years in the Buildable Lands Report. To calculate remaining employment capacity, the observed development densities for businesses and industrial uses are applied to the remaining buildable lands. Development density is measured by the amount of square feet built per land area over the last five years, which is multiplied by the assumed floor area square feet per employee based on the category of employment to arrive at employment density.

The floor area square feet per employee assumptions used in the *2002 Buildable Lands Report* corresponded to categories based on the Standard Industrial Classification (SIC) of jobs. In the last few years, agencies in the United States have switched to using the North American Industry Classification System (NAICS) rather than SIC codes.

This study reviewed other studies of employment density, compared the way jobs changed categories going from SIC to NAICS, and calculated new assumptions from the old ones using a weighted average. This approach was supplemented by researching the floor area per employee in selected industries like food services, which has the most employees in Snohomish County out of those industries that switched categories going from SIC to NAICS. The results are shown in table 1.

Table 1: Recommended floor area square feet per employee assumptions

Employment Category	Square Feet per Employee
Manufacturing	500
Wholesale, Transportation, and Utilities (WTU)	1,000
Retail	700
Finance, Insurance, and Real Estate (FIRE) (not including mini-storage)	350
Services (not including food services)	400
Government/Education	300
Food Services	200
Mini-storage	20,000

Introduction

Under the Washington State Growth Management Act (GMA), Snohomish County and its cities are required to review and evaluate growth trends and remaining land capacity every five years in the Buildable Lands Report. To measure remaining employment capacity, observed development densities for businesses and industrial uses are multiplied by the remaining buildable lands. Because development is measured based on the amount of square feet of building space permitted, it is assumed that a certain number of people can be employed based on the category of employment and the amount of floor area built. The *floor area square feet per employee by employment category* assumptions are some of the key assumptions used in the Buildable Lands Report.

The floor area per employee assumptions used in the *Snohomish County Tomorrow 2002 Buildable Lands Report* correspond to categories based on the Standard Industrial Classification (SIC) of jobs. In the last few years, agencies in the United States have switched from using SIC codes to the North American Industry Classification System (NAICS).

Purpose

The purpose of this study was to convert the old floor area square feet per employee assumptions over to NAICS categories.

This report summarizes the background of the project, followed by a description of the project design, summary of similar studies, description of the methodology and data used, results, and conclusion.

Background

Use of the floor area square feet per employee assumptions

To measure remaining employment capacity, the Buildable Lands Report uses observed development densities for categories of businesses and industries to determine how much floor area can be built in the remaining buildable land. In order to compare that to expected employment growth, it is assumed that a certain number of people can be employed based on the category of employment use and the amount of floor area that can be built. The floor area square feet per employee by employment category assumptions are key assumptions used in the Buildable Lands Report. The *Snohomish County Tomorrow 2002 Buildable Lands Report* uses the following methodology:

When calculating additional employment capacity, the formula that applied observed densities by plan/zone to vacant, partially-used or redevelopable parcels, was performed on a parcel-by-parcel basis. Any fractional employees that resulted from the parcel-level calculation of additional employment capacity was truncated (dropped). Specifically, the formula works as follows:

$$\text{Additional employment capacity} = (\text{buildable acres} \times \text{employment sector FAR} \times 43560) / \text{square feet per employee}$$

Employment Sector FARs (floor area ratios) are the observed values calculated by plan and zone designation in the development history summary reports. There are distinct FARs for development observed in the following employment sectors:

- Manufacturing (MANU)
- Wholesale, Transportation, Communications, Utilities (WTCU)
- Retail (RET)
- Finance, Insurance, Real Estate, Services (FIRES)
- Government/Education (GOVED)

Buildable acres are converted to square feet in the formula by multiplying by 43560 (the number of square feet in an acre). The result is then divided by the assumed number of square feet per employee by employment sector:

- MANU = 500 square feet per employee
- WTCU = 833 square feet per employee
- RET = 600 square feet per employee
- FIRES = 395 square feet per employee
- GOVED = 300 square feet per employee

These estimates were derived from research previously conducted in Snohomish County, in cooperation with the Snohomish County Economic Development Council (1985 Snohomish County Business and Industrial Land Survey, updated in 1995 as the Employment Land Capacity Analysis for Unincorporated Snohomish County). This information was also compared with recent estimates published by the Institute of Transportation Engineers and was found to compare favorably.

An example of how this formula was performed at the parcel level is shown below. Assume that a parcel (whether vacant, partially-used or redevelopable) has an estimate of buildable area of 3.5 acres. Also, assume that the parcel is located in a commercial zone in which there is an observed FAR of .20 (ratio of usable employment space built to land area built upon) for retail uses during the 1995 – 2000 period.

Additional employment capacity = (buildable acres x employment sector FAR x 43560 / square feet per employee by sector)

Additional employment capacity = (3.5 acres x .20 FAR x 43560 / 600 square feet per retail employee)

Additional employment capacity = 50 employees

Notice that the fractional amount of 0.82 employees is dropped from the additional capacity estimate for the parcel. Also, for redevelopable parcels, any existing employment estimated based on the square footage of existing commercial and industrial structures on the parcel that are assumed to be redeveloped (i.e., assumed to be demolished) are subtracted from the estimate of additional employment capacity using a standard average of 500 square feet per employee.¹

¹ Snohomish County Tomorrow, *2002 Growth Monitoring/Buildable Lands Report* (Everett, WA: Snohomish County Planning and Development Services, 2003), 24-25. That report referred to the assumed “square feet per employee by sector.” For this report, “floor area square feet per employee by employment category” has the equivalent meaning. *Floor area* has been added to specify that it is the floor area built, and not the square feet of buildable land area, which is divided by the square feet per employee assumption to arrive at employment capacity. Other jurisdictions have developed employees per land area assumptions instead. *Employment category* is a generic term here referring to the categories that have been defined for the 2007 Buildable Lands Project. They are based on the *major industrial categories* as defined by the Puget Sound Regional Council, as opposed to *employment sectors* as defined under NAICS. Employment sectors and major industrial categories are shown in tables 2 and 3.

Switch to NAICS Categories

In the last few years, the standard system of categorizing jobs in the United States has switched from using Standard Industrial Classification (SIC) codes to the North American Industry Classification System (NAICS). According to the U.S. Census Bureau:

NAICS is based on a consistent, economic concept. Establishments that use the same or similar processes to produce goods or services are grouped together. The SIC, developed in the 1930s and revised periodically over the past 50 years, was not based on a consistent economic concept. Some industries are demand based while others are production based.

NAICS recognizes the changing and growing services-based economy of the United States and its North American neighbors. NAICS includes 1,170 industries of which 565 are service-based industries. The SIC had 1,004 industries of which 416 were service related industries. Three hundred and fifty eight new industries are recognized in NAICS, 250 of which are services producing industries. There are 20 sectors in NAICS of which 16 are services related. The SIC had ten divisions of which five were service-related. A chart in another article shows the relationship between NAICS sectors and SIC Divisions. [See table 2]

NAICS provides for comparable statistics among the North American countries. In addition, it provides for more comparable information with ISIC [International Standard Industrial Classification.] The SIC did not.²

The floor area square feet per employee assumptions used in the *2002 Buildable Lands Report* correspond to the SIC categories. In order to calculate employment capacity that can be compared to annual employment estimates that are now available only in NAICS categories, the floor area per employee assumptions must be converted over to the NAICS categories as well. The major industrial categories under NAICS:

- Construction and Resources (Const/Res)
- Finance, Insurance, and Real Estate (FIRE)
- Government and Education (Gov/Ed)
- Manufacturing (Manu)
- Retail
- Services
- Wholesale, Transportation, and Utilities (WTU)

Table 2 shows the changes in categories for various industries in going from SIC to NAICS. Table 3 shows how they relate to the major industrial categories that the Puget Sound Regional Council (PSRC) uses for regional estimates and forecasts.

² U.S. Census Bureau, "Development of NAICS," <http://www.census.gov/epcd/www/naicsdev.htm> (February 14, 2007).

Table 2. Relationships between NAICS sectors and comparable SIC divisions

Code	NAICS Sectors	Code	SIC Divisions
11	Agriculture, Forestry, Fishing, and Hunting	01-02, 07-09	Agriculture, Forestry, and Fishing
21	Mining	10, 12-14	Mining
23	Construction	15-17	Construction
31-33	Manufacturing	20-39	Manufacturing
22	Utilities	40-49	Transportation, Communications and Public Utilities
48-49	Transportation and Warehousing		
42	Wholesale Trade	50-51	Wholesale Trade
44-45	Retail Trade	52-59	Retail Trade
72	Accommodation and Food Services		
52	Finance and Insurance		
53	Real Estate and Rental and Leasing	60-65, 67	Finance, Insurance, and Real Estate
51	Information	70, 72-73, 75-76, 78-84, 86-89	Services
54	Professional, Scientific, and Technical Services		
56	Administrative Support; Waste Management and Remediation Services		
61	Educational Services		
62	Health Care and Social Assistance		
71	Arts, Entertainment, and Recreation		
81	Other Services (except Public Administration)		
92	Public Administration		
55	Management of Companies and Enterprises		(parts of all divisions)

Source: U.S. Census Bureau.

Note: These are approximate relationships between the NAICS sectors and the SIC divisions.

Table 3. Major industrial categories reported by Puget Sound Regional Council

NAICS Industry Categories	SIC Industry Categories
Const/Res: 11, 21, 23	Const/Res: 01-02, 07-10, 12-17
FIRE: 52, 53	FIRES: 60-65, 67, 70, 72-73, 75-76, 78-89
Manufacturing: 31-33	Manufacturing: 20-39
Retail: 44, 45	Retail: 52-59
Services: 51, 54-56, 61, 62, 71, 72, 81	WTCU: 40-42, 44-51
WTU: 22, 42, 48, 49	

Source: Puget Sound Regional Council

Employment Categories

Employment categories lump jobs in industries with similar characteristics together in order to picture the broader economy, measure it, and analyze it for decision making. Simply changing the classification scheme can change the way the local economy is perceived. Figure 1 demonstrates the impact of the classification change on 2002 covered employment statistics for Snohomish County. For instance, the services category appears to be a more significant part of the economy under NAICS categories than it did under SIC categories, whereas finance, insurance, and real estate (FIRE), and wholesale, transportation and utilities (WTU), and retail categories appear to make up a much smaller portion of employment. This is a logical consequence of the NAICS focus on better reflecting the importance of service industries in the contemporary economy. In reality, service industry jobs grew over many decades, but changing the classification system makes it appear to change suddenly. This underscores the need to adjust the employment density assumptions or risk a drastic distortion of capacity measures.

The following are descriptions of the major industrial categories, sectors, sub-sectors, and industries used in this study. Where applicable, it is noted how they have been impacted by the switch from SIC to NAICS. Discussions of the relative sizes of major industrial categories are based on the data in figure 1; similar references to divisions, sectors, sub-sectors, or industries within the major industrial categories are based on 2002 Snohomish County covered employment data from the State of Washington Employment Security Department (ESD) as shown in appendix A. 2002 covered employment has been used as the basis for this discussion because it is the most recent year for which employment data is available both with SIC and NAICS codes, and also coincides with the base year for the *2002 Buildable Lands Report*.

Construction and Resource – The Puget Sound Regional Council (PSRC) has defined the construction/resource major industrial category to include jobs related to agriculture, forestry, hunting, fishing, mining, and construction.³ This category is not included in the growth targets or capacity estimates studied in the Buildable Lands Report. Construction jobs have been excluded for local target and capacity measurement purposes because they are not normally tied to a particular location. Most agriculture and resource jobs are expected to locate outside of the urban area of Snohomish County and therefore not relevant to the Buildable Lands Report.

Most of the construction/resource jobs are in the same category under either SIC or NAICS. Categories that moved included veterinarians, pet care, and landscaping, which are now categorized as services. In addition, logging was moved out of manufacturing into construction/resource.⁴

Finance, Insurance, and Real Estate – This category, also known as FIRE, includes jobs related to finance, insurance, and real estate and rental and leasing industries.⁵

³ Puget Sound Regional Council, "Covered Employment Estimates: About the Spreadsheets," <http://www.psrc.org/data/econ/spreadsheets.htm> (February 14, 2007).

⁴ U.S. Census Bureau, "1987 SIC Matched to 2002 NAICS: Agriculture, Forestry, and Fisheries," <http://www.census.gov/epcd/naics02/SICN02A.HTM> (February 14, 2007); U.S. Census Bureau, "1987 SIC Matched to 2002 NAICS Manufacturing, part (SICs 24-29)," <http://www.census.gov/epcd/naics02/SICN02DB.HTM#S24> (February 14, 2007).

⁵ Puget Sound Regional Council, "Covered Employment Estimates: About the Spreadsheets," <http://www.psrc.org/data/econ/spreadsheets.htm> (February 14, 2007).

Figure 1: 2002 Snohomish County covered employment by SIC and NAICS categories compared

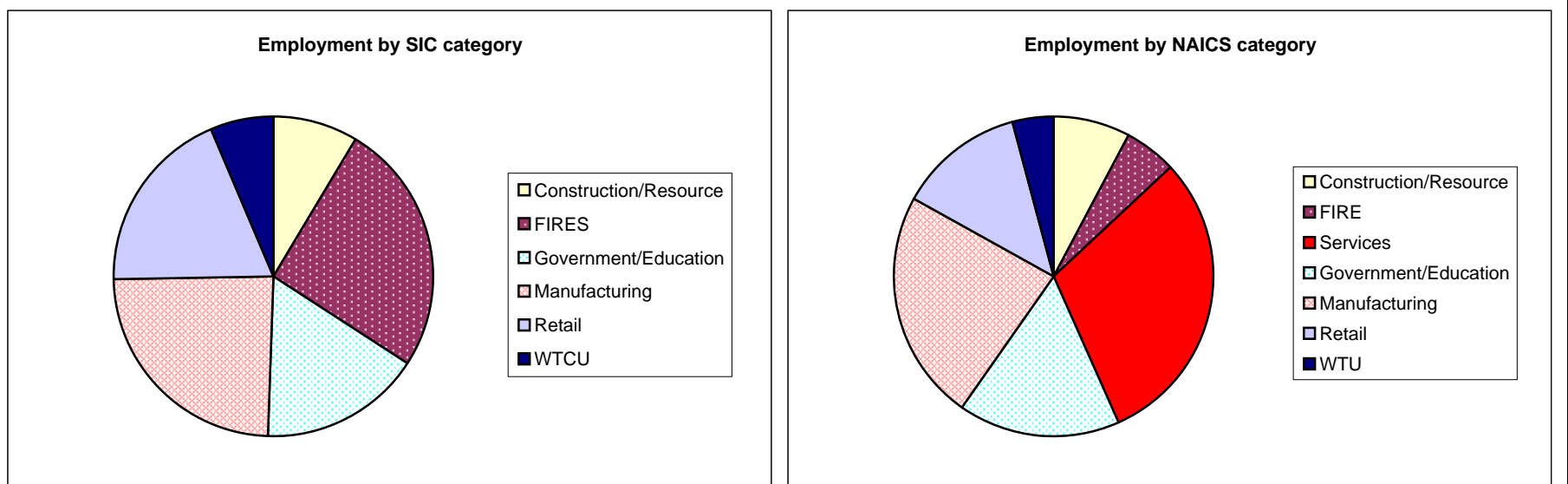


Table 4: 2002 Snohomish County covered employment by SIC and NAICS categories

SIC Category	2002 Covered Employees	NAICS Category	2002 Covered Employees
Construction/Resource	18,057	Construction/Resource	16,162
FIRES	53,511	FIRE	11,396
		Services	63,044
Government/Education	34,215	Government/Education	34,215
Manufacturing	50,045	Manufacturing	48,543
		Boeing	22,527
		Other	26,016
Retail	39,856	Retail	26,718
WTCU	13,244	WTU	8,850
Total	208,928	Total	208,928

Source: Snohomish County Planning and Development Services analysis of Washington State Employment Security Department (ESD) data.

Note: 2002 covered employment statistics shown above may vary from those reported by the Puget Sound Regional Council and ESD due to revisions in the underlying data based on review by Snohomish County staff.

Most FIRE jobs are located in offices or stand-alone bank buildings. The category also includes rental services such as video stores and auto rentals. Nearly all FIRE jobs were broken out of the broader finance, insurance, real estate, and services (FIRES) SIC category. However, mini-warehouse and self-storage (mini-storage) businesses, previously included with regular warehouses in the wholesale, transportation, communications, and utilities (WTCU) category, are now included with FIRE as rental services.⁶

Government and Education – This category includes jobs in government and in schools, school administration offices and related facilities. The PSRC reports these two categories separately, but Snohomish County combines them into a single category. The category is unchanged as a result of the switch from NAICS and therefore has not been studied for this report.

Manufacturing – “The Manufacturing sector comprises establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products.”⁷ Such businesses are commonly described either based on the type of facility, the intensity or scale of manufacturing activity, or the type of products produced. Facility types include industrial parks, mills, and factories. Alternatively, such businesses could be described as light industrial, manufacturing, or heavy industrial. Many times, what are called warehouses could in fact be used for a variety of manufacturing, wholesale trade, or distribution industries, in addition to simply storage.

NAICS categorizes manufacturers into sub-sectors based on the type of products produced. These include such industries as wood products, food, textiles, paper, chemicals, computer and electronics, and transportation equipment. Most of the same industries are included in both the SIC and NAICS manufacturing categories. Some industries that changed from manufacturing were logging, which moved to construction/resource under forestry, and publishing, which moved to services as an information service. Retail bakeries and custom furniture shops moved from retail into manufacturing.⁸

Retail – Retail businesses generally sell products “in small quantities to the general public.”⁹ Many retailers operate out of stores, which can be stand-alone buildings or part of a shopping center or mall. Retail businesses include such things as grocery stores, gas stations, auto dealers, and department stores.

The biggest change to the retail category is that restaurants and other food services moved from retail under SIC to services under NAICS. Restaurants made up a sizable share of retail employment. Another change is that a number of businesses formerly categorized as wholesale in the WTCU category, because they sold mainly to other businesses, have been moved to retail based on the method of sales at the businesses being more like retailers. Other changes include

⁶ U.S. Census Bureau, “1987 SIC Matched to 2002 NAICS: Agriculture, Forestry, and Fisheries,” <http://www.census.gov/epcd/naics02/N2SIC53.HTM> (February 14, 2007).

⁷ U.S. Census Bureau, “2002 NAICS Definitions: 31-33 Manufacturing,” <http://www.census.gov/epcd/naics02/def/NDEF31.HTM#N31-33> (February 14, 2007).

⁸ U.S. Census Bureau, “2002 NAICS Matched to 1987 SIC Manufacturing, part (311-312),” <http://www.census.gov/epcd/naics02/N2SIC31A.HTM> (February 14, 2007); U.S. Census Bureau, “New Sectors in NAICS,” <http://www.census.gov/epcd/www/naicsect.htm#Manufacturing> (February 14, 2007).

⁹ U.S. Census Bureau, “2002 NAICS Definitions: 44-45 Retail Trade,” <http://www.census.gov/epcd/naics02/def/NDEF44.HTM#N44-45> (February 14, 2007).

retail bakeries and custom furniture stores moving to manufacturing, and pawn shops, as lenders, moving to FIRE.¹⁰

Services – Services is now the largest employment category in Snohomish County, as shown in figure 1. The PSRC has defined the major industrial category services as including information, professional, administrative support, educational, health care, entertainment, and other service sectors. Many of these jobs were formerly included as part of the FIRES category.¹¹

Services are commonly discussed in terms of a few sub-categories. Producer services, or business services, are generally those that often serve other businesses. Many were part of the business services SIC industry. Examples include consultants, scientists and researchers, and other professionals, and they are often based in offices or business parks. Consumer services are those that serve the general public, such as dry cleaners, hair stylists, and entertainment, and they are often based in retail-style buildings at shopping centers or in stand-alone buildings. Health services include doctor and dentist offices, nursing homes, and hospitals.

Under NAICS, the former SIC Services division was broken into several sectors, and many jobs were moved into services from other industries. The biggest change was moving restaurants and other food services out of retail and into services. Another major change was to bring communications industries into the information sector under services, instead of WTCU. Other changes include moving veterinary, pet care, and landscaping services into services from construction/resources; moving publishing out of manufacturing and into services, under information services; and moving waste collection, marinas, travel agents and tour operators, and sanitary services out of WTCU into services. In addition, a number of jobs formerly categorized under the SIC Services division were moved to other categories. One industry in particular, dental laboratories, formerly under health services, was moved into manufacturing.¹²

Wholesale, Transportation, and Utilities – This category, also known as WTU, includes the utilities, transportation and warehousing, and wholesale trades sectors.¹³

Wholesale trade makes up most of the employment in this category. Wholesale businesses normally act as intermediaries, buying end products, machinery and equipment, and raw materials from producers or other sources and selling to other businesses. They often operate out of warehouses or offices.¹⁴

The biggest change in this category is that communications industries were moved into information services, under services. In addition, a number of businesses formerly categorized as wholesale, because they sell primarily to other businesses, were moved to retail because their

¹⁰ U.S. Census Bureau, "New Sectors in NAICS," <http://www.census.gov/epcd/www/naicsect.htm#Retail> (February 14, 2007); U.S. Census Bureau, "1987 SIC Matched to 2002 NAICS: Retail Trade," <http://www.census.gov/epcd/naics02/SICN02G.HTM> (February 14, 2007).

¹¹ Puget Sound Regional Council, "Covered Employment Estimates: About the Spreadsheets," <http://www.psrc.org/data/econ/spreadsheets.htm> (February 14, 2007).

¹² U.S. Census Bureau, "New Sectors in NAICS," <http://www.census.gov/epcd/www/naicsect.htm> (February 14, 2007); U.S. Census Bureau, "1987 SIC Matched to 2002 NAICS: Services Industries, part (SICs 80-89)," <http://www.census.gov/epcd/naics02/SICN02IB.HTM#S80> (February 14, 2007).

¹³ Puget Sound Regional Council, "Covered Employment Estimates: About the Spreadsheets," <http://www.psrc.org/data/econ/spreadsheets.htm> (February 14, 2007).

¹⁴ U.S. Census Bureau, "2002 NAICS Definitions: 42 Wholesale Trade," <http://www.census.gov/epcd/naics02/def/NDEF42.HTM#N42> (February 14, 2007).

method of sales was more similar to that of retailers. Other changes included moving mini-storage businesses from warehousing to FIRE under rentals and leasing; moving waste collection, marinas, travel agents and tour operators, and sanitary services out of WTCU and into services; and towing moved from automotive services under FIRES over to WTU under transportation.¹⁵

Project Design

The purpose of this study was to develop floor area square feet per employee assumptions for each of the categories of employment uses that will be used for the Buildable Lands Report. The project followed the following guidelines:

- The assumptions used in the *2002 Buildable Lands Report* were the starting point for developing assumptions for the 2007 Buildable Lands project.

Those assumptions have been used for land use planning in Snohomish County since 1994 as the basis for capacity estimates that have been scrutinized and approved through the public process. In the absence of compelling evidence that those assumptions are no longer valid, the only reason for recalculating the assumptions is that the categories for which they were developed have changed. Therefore the goal was to convert the assumptions used in 2002 from SIC employment categories over to NAICS employment categories in a way that preserves a comparable measure of capacity.

- For those industrial categories where nearly all of the jobs within an SIC category continued to make nearly all of the jobs in a NAICS category, there should be no change to the assumption, unless there is compelling evidence to support a change in the assumption.

The government/education category is literally unchanged by the switch from SIC to NAICS. Therefore this study has not examined that assumption. Similarly, the manufacturing category has been largely unchanged, as shown in appendix A, so the same assumption has been used. To do otherwise would result in a different measure of capacity for the same land areas and same expected development patterns, with no apparent justification.

- Changes to assumptions should reflect those cases where industries with substantial levels of employment in Snohomish County switch from an SIC category into a NAICS category with a set of other industries that previously had a significantly different square footage per employee assumption. Changes to assumptions should also reflect those cases where a sub-set of industries from an SIC category remains in a similar NAICS category, but other industries with substantial levels of employment moved into other NAICS categories with significantly different average square feet per employee assumptions.

Short of research measuring actual average employees to actual building square feet, weighted averaging is the best approach for ensuring that the new assumptions do not distort capacity measures. Assuming that the old assumptions were valid, weighting according to existing

¹⁵ U.S. Census Bureau, "New Sectors in NAICS," <http://www.census.gov/epcd/www/naicsect.htm> (February 14, 2007); U.S. Census Bureau, "1987 SIC Matched to 2002 NAICS: Services Industries, part (SICs 70-79) <http://www.census.gov/epcd/naics02/SICN02IA.HTM#S75> (February 14, 2007)

employment levels in various industries should be effective. For example, if half of the employees in a NAICS category came from a SIC category with an average employees per square feet assumption of 395 square feet, and the other half from a category with an assumption of 833 square feet, assuming that the subject industries were generally representative of the SIC categories that they came from, one would expect that the new category should have an average square feet per employee of roughly 600 square feet, the new average.

- Where possible, research examining the actual number of employees per square feet in specific industries should be performed, and the results used as the basis for the new assumptions.

Research for this report should take advantage of existing data sources. Research should focus on samples where employee counts can be confidently matched to building square footage. Priority should be placed on those industries that have significant levels of employment relative to their SIC and NAICS categories. Priority should also be placed on those industries that switch from a SIC category into a NAICS category with a set of industries from a different SIC category with a significantly different square footage per employee assumption, suggesting the old floor area square feet per employee assumption is no longer valid. Alternatively, priority should be placed on those industries where there is reason to suspect that the average square feet per employee in that industry is not similar to other industries in the SIC or NAICS category for that industry. These criteria led to targeting food services and mini-storage businesses for survey research.

The project proceeded with the following steps:

- Review of past studies
- Comparison of SIC and NAICS employment statistics
- Determine methodology and data to be used
- Floor area square feet per employee research for selected industries
- Apply findings to develop new floor area square feet per employee by employment category assumptions

Review of Past Studies

Six counties were required to prepare buildable lands reports in 2002. At that time, each county found their own way of calculating the number of employees that could be accommodated in their remaining land capacity. Below is a summary of each county's approach to employment density, followed by a summary of the studies that have provided floor area square feet per employee information.

Snohomish County

The *Snohomish County Tomorrow 2002 Buildable Lands Report* relied on floor area square feet per employee research from the 1985 *Snohomish County Business and Industrial Land Survey*, updated in 1995 as the *Employment Land Capacity Analysis for Unincorporated Snohomish County*. In that study, the assumptions that were used in the *2002 Buildable Lands Report* were calculated through a weighted averaging of more detailed categories of assumptions from the 1985

study. The assumptions used in the 2002 report are shown for each of the categories of employment relevant to this study in appendix B below.¹⁶

Clark County

The Clark County 2002 *Buildable Lands Report* used employees per acre assumptions for two employment categories. Their report compared the assumptions from their 1994 comprehensive plan, 12 employees per acre for commercial and 9 employees per acre for industrial, to observed values, stating that the 1994 assumption seemed low relative to observed employment densities at employment sites constructed between 1995 and 2000. They note that due to the proprietary nature of employment data, their observed values may not be reliable. They were also higher because they were based on net acres rather than gross acres.¹⁷

King County

The King County *Buildable Lands Evaluation Report 2002* drew on Snohomish County's assumptions, as well as a City of Kent study of business license data from 1999, the PSRC's 1998 *Industrial Land Supply and Demand in the Central Puget Sound Region*; and the Institute of Transportation Engineers (ITE), *Trip Generation*, 5th Edition (1991). Each jurisdiction in King County used slightly different assumptions, based on only two land use categories, commercial and industrial. The assumptions ranged from 200-400 sq ft for commercial/office in Pacific, Washington up to 800 to 2,500 sq ft per employee for industrial/warehouse in Auburn, Washington.¹⁸

Kitsap County

The *Kitsap County Buildable Lands Analysis 1995-1999* relied on floor area square feet per employee assumptions from their 1998 *Comprehensive Plan*. The report assumed 500 sq ft per employee for commercial uses and 969 sq ft per employee for industrial uses.¹⁹

The 1998 plan states that the floor area square feet per employee assumptions were based on a survey of assumptions that other jurisdictions were using.²⁰

Pierce County

Pierce County's 2002 *Buildable Lands Report* did not use floor are square feet per employee assumptions. Instead, it relied on employee per gross acre assumptions for commercial, industrial, and government employment. They used the same assumptions for most jurisdictions, but different assumptions for the downtown Tacoma area. Assumptions ranged from 11.2 employees

¹⁶ Snohomish County Tomorrow, *2002 Growth Monitoring/Buildable Lands Report* (Everett, WA: Snohomish County Planning and Development Services, 2003), 24-25.

¹⁷ Clark County, *Buildable Lands Report* (Vancouver, WA: Clark County Department of Community Development, 2002), 2-3, 11-12.

¹⁸ Michael Hubner, *Development Capacity: Addendum to Template for Local Government Reports*, Buildable Lands Program in King County (Kent, WA: Suburban Cities Association, 2001); King County, *Buildable Lands Evaluation Report 2002* (Seattle: King County Budget Office, 2002), 18-19 and app. C.

¹⁹ The Shea Group, *Kitsap County Buildable Lands Analysis 1995-1999* (Bremerton, WA: Kitsap County, Department of Community Development, 2002), 70-71.

²⁰ Kitsap County, "Part 1-A Land Use Plan," in *Comprehensive Plan*, amended October 25, 2004 (Bremerton, WA: Kitsap County, Department of Community Development, 2005), 104.

per acre for industrial uses outside downtown Tacoma, up to 318 employees per acre for employment uses in downtown Tacoma. Assumptions were based on samples of employers in each category. The smallest sample was for industrial uses, 50 businesses on 35 properties, and the largest was for commercial uses, 131 businesses on 56 properties. Average employees per acre for each category were calculated by summing the total number of employees in the sample and dividing that by the total acres in the sample.²¹

In November 2006, a new Employment Density Survey was done for Pierce County to update the employees per acre assumptions. The methodology was similar to the original approach, except that median values were calculated in addition to average values. The study recommended using the most conservative values out of the 1999 findings and the average and median values found in the 2004 study. They ranged from 11.15 employees per acre for manufacturing/warehousing (formerly industrial) up to 235.59 employees per acre in downtown Tacoma.²²

Thurston County

Thurston County's 2002 *Buildable Lands Report* relied on assumed employees per 1,000 square feet calculated for three categories of employment: resource, commercial, and industrial. Those assumptions were calculated from averages based on year 2000 employment estimates by detailed employment category, and the 2000 inventory of employment uses in square feet that was also used for their parcel inventory and development of FAR assumptions. Employees per 1,000 square feet averages ranged from 0.25 for resource industries up to 2.56 for commercial businesses. Their findings were similar to averages in the 1991 ITE *Trip Generation* manual.²³

Other studies

The ITE's June 2004 *Trip Generation Handbook* summarized findings from the study, "Travel Characteristics at Large-Scale Suburban Activity Centers," by JHK & Associates. It included employment and square feet of employment floor area for downtown Bellevue, Washington. A summary of the relevant findings is included below.

Here is a summary of the studies cited above as they relate to the floor area per employee by employment category assumptions.

Snohomish County Business and Industrial Land Survey

Snohomish County's *Business and Industrial Land Survey* (BILS), prepared in 1985, compared projected employment growth to land available for business and industrial lands, taking marketability into account. In order to measure land needs for employment uses, the study applied assumed employee per floor area square feet assumptions as part of the calculations. The technical advisory committee chose higher rather than lower assumptions in order to avoid underestimating the amount of land needed to accommodate projected growth.

²¹ Pierce County, *Buildable Lands Report* (Tacoma, WA: Pierce County, Planning and Land Services Department, 2002), 14.

²² Pierce County, *Buildable Lands Program Employment Density Survey*, Draft (Tacoma, WA: Pierce County, Planning and Land Services Department, 2006).

²³ Thurston Regional Planning Council, "Buildable Lands Technical Documentation," app. A in *Regional Benchmarks for Thurston County* (Olympia, WA: Thurston Regional Planning Council, 2003), 40, 57-71.

The floor area square feet per employee assumptions for manufacturing uses were, according to a footnote, taken from *The Inside Report* from Conway Data, Inc. published in 1984. Some of the assumptions were adjusted by the technical advisory committee working on BILS. Separate assumptions were used for fifteen categories of manufacturing employment, ranging from 300 sq ft per employee for electrical machinery manufacturing, up to 1,400 sq ft per employee for pulp and paper manufacturing. It was noted that, based on the 1984 *Puget Sound Area High-Tech Survey* by the National Association of Industrial and Office Parks, future square footage needs per employee in high-tech sectors would likely be much lower than the assumptions used in BILS.

Square foot per employee assumptions for the WTCU, retail, services, government, and construction industries used in BILS were drawn from *Trip Generation Intensity Factors* published by the Arizona Department of Transportation. The year of publication of that data is not shown. Again, the assumptions were adjusted in some cases by the BILS technical advisory committee. Assumptions were provided for twelve different categories of employment, ranging from 300 sq ft per employee for a number of categories up to 1,300 sq ft per employee in the wholesale trade sector.²⁴

Selected BILS square feet per employee assumptions related to categories of employment relevant to this study are shown in appendix B.

Institute of Transportation Engineers, Trip Generation, 5th Edition

The ITE *Trip Generation, 5th Edition*, published in 1991, was intended to allow transportation planners to estimate traffic generated by a particular land use. The 5th Edition was the last ITE manual to include floor area square feet per employee assumptions.

103 different non-residential land use categories are described in the manual, not all of which have an average square feet per employee provided. The assumptions were provided in the form employees per 1000 sq ft, and ranged from 0.05 to 14.25 for categories that are used in this study.²⁵

Selected *Trip Generation* employees per 1,000 sq ft assumptions related to categories of employment relevant to this study are shown in appendix B, translated into square feet per employee. For the sake of comparison, in some cases, the average employees per square foot for a type of building provided in the ITE manual was assigned to a category of employment. Business services and professional services were assigned general office building, and consumer services and many retail uses were assigned specialty retail center (strip mall). Note that the ITE shows an average of 20,000 square foot per employee for mini-storage. This lies outside the range of any assumptions from other studies, and prompted research into mini-storage employment density in Snohomish County.

²⁴ Snohomish County, *Business and Industrial Land Survey*, rev. ed. (Everett, WA: Snohomish County Department of Planning and Development Services, 1986), 89-90.

²⁵ Institute of Transportation Engineers, *Trip Generation, 5th ed.* (Washington, DC: Institute of Transportation Engineers, 1991).

Snohomish County Employment Land Capacity Analysis

The *Employment Land Capacity Analysis* was used to determine whether there would be sufficient capacity in proposed unincorporated urban growth areas to accommodate the 2012 employment targets. It largely used the same methodology as the BILS project. However, it employed the SIC major industrial categories defined by the PSRC. In order to develop square feet per employee assumptions, the assumptions for the more detailed categories used in the 1985 BILS study were combined using weighted averages. The assumptions were the same ones used in the *Snohomish County Tomorrow 2002 Buildable Lands Report*.²⁶

Snohomish County 1994 Employment Survey

The *1994 Employment Survey* was designed to supplement state employment data in small cities in Snohomish County and to test assumptions used in the employment land capacity analysis for Snohomish County's first comprehensive plan under GMA. Several areas of the county were studied using a two-step survey. The first step was to field check the areas and have a staff member visually collect data about the employers. This was then augmented by calling the employers and asking for more information, including number of employees, and by matching up other geographic data with the employer records for the survey. Incorporated areas sampled were Sultan, Gold Bar, Index, and part of Arlington. The survey results were used to calculate a number of statistics, including distribution of employment types, average lot coverage, and square footage per employee.

The results show average square feet per employee by plan designation and some jurisdictions. These range from 4,199 sq ft per employee in the unincorporated business park designation when including mini-storage facilities, to 359 sq ft per employee in Index businesses. Because the square feet per employee averages are not based on employer type, the results can not be easily compared to other studies and do not appear in appendix B. However, there were some interesting findings:

- Mini-storage facilities skewed the data in those areas where they existed. In the Business Park designation with 4,199 sq ft per employee, there were two mini-storage facilities with over 20,000 square feet per employee. After removing those from the sample, the average for the Business Park designation was only 523 sq ft per employee. A similar result was found for other designations that included mini-storage. Of all employers with over 20,000 sq ft per employee in the sample, five of six were mini-storage facilities. Researchers decided to publish unincorporated averages both with and without mini-storage facilities included.
- Areas with more industrial uses generally had higher average sq ft per employee ratios than areas with more commercial uses. However, this finding does not hold for Business Park, which has most of the unincorporated manufacturing employment in the sample, after removing mini-storage. In fact, at 523 sq ft per employee it then has a lower average ratio than the commercial designation, which had 565 square feet per employee after removing mini-storage from the sample.

²⁶ Snohomish County, Planning, *Employment Land Capacity Analysis for Unincorporated Snohomish County*, rev. ed. (Everett, WA: Snohomish County, Planning, 1995), 3.

- Most employers had less than 600 square feet per employee. However, average square feet per employee for the entire unincorporated area, even without mini-storage facilities, was 917 sq ft, and in incorporated areas the average was 1,655 square feet per employee. That latter figure is dominated by manufacturing employment in Arlington, where there was an average of 2,625 sq ft per employee.²⁷

Puget Sound Regional Council, Industrial Land Supply and Demand in the Central Puget Sound Region

PSRC staff worked with the University of Washington Center for Community Development and Real Estate to produce this study of industrial land and uses in the region. The purpose was to compare supply of industrial zoned land with demand in the region, similar to BILS. In order to collect some of the data necessary, in 1997 a survey form was sent to employers and property management firms. The survey form was returned by 409 respondents representing about one thousand buildings and 600 firms. Most were manufacturing firms, as well as service sector jobs in high-tech or bio-tech industries. Construction, Wholesale, Transportation/Communications/Utilities, and retailers in industrial zones were also surveyed. The study added an extra level of complexity by grouping employment locations based on industry type as well as building type. Data collected was used to calculate a number of statistics, including average lot coverage and mean square feet per employee by employment category.

The study developed mean square feet per employee assumptions for 11 categories of employment, though the sample used was weighted heavily toward four industrial categories: construction, manufacturing, wholesale, and transportation/communications/ utilities. Assumptions for those categories ranged from 577 sq ft per employee for construction to 1,121 sq ft per employee for wholesale. In addition, the assumptions for non-industrial uses in industrial areas ranged from 325 sq ft per employee for most categories of uses up to 1,742 sq ft per employee for retail uses in industrial areas.²⁸

Selected square feet per employee assumptions from the PSRC report that are related to categories of employment relevant to this study are shown in appendix B below. As is clear in that table, the 1,742 square feet per employee assumption for retail uses is quite high relative to other studies. It is perhaps only relevant to the types of retail uses found in industrial zones. It also may not be reliable since the survey was not targeted to retail employers and they accounted for a small number of the completed surveys.

City of Kent Analysis of Business License Data

The City of Kent 1999 analysis of business license data findings were summarized in a technical support document for the King County 2002 *Buildable Lands Evaluation Report*. The study used two categories of employment based on city zoning. It found an average of 1012 floor area square feet per employee in industrial zoned land, and 545 floor area square feet per employee in commercial zones.²⁹

²⁷ Snohomish County, *1994 Employment Survey* (Everett, WA: Snohomish County Public Works, 1995), 19-21.

²⁸ Puget Sound Regional Council and University of Washington Center for Community Development and Real Estate, *Industrial Land Supply and Demand in the Central Puget Sound Region* (Seattle, WA: Puget Sound Regional Council, 1998), 37-47, 64-65.

²⁹ Michael Hubner, *Development Capacity: Addendum to Template for Local Government Reports*, Buildable Lands Program in King County (Kent, WA: Suburban Cities Association, 2001).

Institute of Transportation Engineers, Trip Generation Handbook, 2nd Edition

The ITE's June 2004 *Trip Generation Handbook* summarized findings from the 1990 study, "Travel Characteristics at Large-Scale Suburban Activity Centers," by JHK & Associates. It included employment and square feet of employment floor area for downtown Bellevue, Washington. It showed 12,880 office employees occupying 4.7 million sq ft of gross floor space. That translates to roughly 365 sq ft per employee. It also showed 3 million square feet of gross leaseable retail space and 6,150 employees, translating to 488 sq ft per employee.³⁰

Key findings from comparison of past studies

In general, average/assumed square feet per employee by job category are similar across the various studies and reports. Reports with fewer categories tend to have a more narrow range in averages than those with more detailed assumptions. The smallest average square feet per employee is the ITE's averages for food services, less than 100 square feet per employee. The highest is the ITE's average for mini-storage, at 20,000 square feet per employee. The main findings:

- The former communications sector, now included in information services, has generally been found or assumed to have a lower average square feet than the 833 square feet per employee assumption used in the *Snohomish County Tomorrow 2002 Buildable Lands Report*, while wholesale generally had a higher average than what was used in the 2002 report.
- The average for retail is abnormally high in the *Puget Sound Industrial Land Supply and Demand* report. This is likely because it is meant to apply only in industrial zones, whereas the other averages/assumptions apply to retail uses more generally.
- The ITE manual is the only study that separates food services out from retail uses, and it shows much lower square feet per employee averages for food services than the other studies have. For that reason, and because food services has switched major categories under NAICS, food services was selected for further research to determine the average for Snohomish County food service employers.
- Similarly, the ITE manual is the only one that separates mini-storage out from other warehouse uses, and it shows a much higher average square feet per employee than the other studies have. For that reason, and because mini-storage switched major categories under NAICS, that industry was selected for further research to determine the average for Snohomish County mini-storage employers.

Comparison of 2002 covered employment statistics by SIC and NAICS categories

This analysis was based on the data presented in appendix A of this report. The table in appendix A lists SIC major industrial categories and selected divisions and industries and shows the NAICS categories to which those industries now belong. The level of detail is based in most cases on

³⁰ JHK & Associates, "Travel Characteristics at Large-Scale Suburban Activity Centers," NCHRP Report 323 (1990), summarized in *Trip Generation Handbook*, 2nd ed. (Washington, DC: Institute of Transportation Engineers, 2004), 140-41.

using the broadest category of jobs that remained together in the same grouping in both SIC and NAICS. In some cases, it was not possible to show the level of detail desired due to the confidential nature of the data set from the Washington State Employment Security Department. No grouping displayed in this report can have fewer than three employers, or one employer that makes up more than 80% of employment within that grouping. In some cases, this meant that categories were combined into more generalized categories sharing the same SIC and NAICS major industrial categories, and in other cases it meant that the jobs were tossed into “miscellaneous” groupings. When necessary, data was suppressed to protect confidentiality.

Appendix A shows the number of covered employees in each grouping in 2002 in Snohomish County. 2002 data was used as the basis for comparison because it is the most recent year for which SIC codes were available. It also coincides with the base year for the *2002 Buildable Lands Report*.

This data was analyzed to highlight which changes in going from SIC to NAICS had the most impact for how Snohomish County jobs are categorized. Table 5 provides a summary of the information in appendix A.

Key findings from analysis of 2002 covered employment data

- 12% of jobs classified construction/resource under SIC are now in the services category. Because construction/resource jobs were not included in the *2002 Buildable Lands Report* employment capacity figure, these jobs required special handling in calculating new square feet per employee assumptions for the NAICS categories.
- 36% of jobs classified as retail under SIC are now included in the services category. Food services accounts for nearly the entire change, as shown in appendix A. In terms of the number of jobs, this change is by far the biggest re-categorization that occurred in going from SIC to NAICS. Services, as a part of FIRES in the 2002 report, had a lower square footage per employee assumption than retail, at 395 square feet per employee versus 600 square feet per employee. In fact, the Institute of Transportation Engineer’s (ITE’s) *Trip Generation* showed much lower average square feet per employee figures than the retail category as a whole, ranging from 70 to 134 square feet per employee, as shown in appendix B. This suggested that, even though 94% of the jobs in the retail category under NAICS are jobs that were also categorized retail under SIC, the square footage per employee assumption needed to be analyzed carefully. One could deduce that, if the average square feet per employee for food services was lower than 600 square feet per employee, then the average square feet per employee for the remaining businesses must be higher than 600 square feet per employee. Therefore both food services and remaining retail were treated with special attention in this study.
- 23% of jobs classified as WTCU under SIC are now included in the services category. Approximately two-thirds are communications jobs, which made up 16% of the WTCU category and are now under information services, as shown in appendix A. This presents the same type of issue as the movement of food services out of retail. The square footage per employee assumption for services, as part of FIRES, was lower than that for WTCU, which was 833 square feet per employee. The Snohomish County Business and Industrial Lands Survey (BILS) used an assumption of 300 square feet per employee to

communications industries, as shown in appendix B. If the average square feet per employee for communications is indeed lower, closer to 395 square feet per employee, then the average square feet per employee for the remaining WTU industries must be higher than 833 square feet per employee. In fact, wholesale trade, which made up over two-thirds of the remaining WTU jobs, as shown in appendix A, had average square feet per employee values of over 1,000 square feet per employee in most of the studies shown in appendix B. Therefore, both communications and remaining WTU were treated specially in this study.

- 98% of construction resource jobs under NAICS were also construction/resource jobs under SIC. Therefore no further analysis was needed for that category, which does have a square footage per employee assumption.
- 99% of FIRE jobs came from the FIRES category. FIRE had made up 21% of the jobs in that category. However, 131 mini-storage jobs moved from WTCU into FIRE. Based on the analysis of information in appendix B, and findings in the *1994 Employment Survey*, mini-storage businesses are likely to have a much higher average square footage per employee than other jobs in the FIRE category. Therefore, they required special handling to ensure that capacity for FIRE jobs in general is not under-estimated.
- The services category is made up of a mixture of jobs from various SIC categories. 66% came from FIRES, 23% from retail, and 5% from WTCU. Most of the retail jobs that moved are food services jobs, and most of the jobs from WTCU are in communications. It was the examination of this mixed category that first led to developing a weighted averaging approach for calculating a square footage per employee assumption for services, which became the basis for the main calculation of all of the new floor area square footage per employee assumptions. This approach is described in the methodology section below.
- 98% of manufacturing under NAICS were also in manufacturing under SIC, where they made up 93% of the category. Therefore it was decided that the assumption for the category should remain 500 square feet per employee.
- 94% of retail jobs under NAICS were also retail jobs under SIC. However, as described above, the category required special handling because of the large number of food services jobs moved out of the category and into services.
- 97% of WTU jobs under NAICS came out of the WTCU category. However, as described above, the category required special handling because of the large number of communications jobs moved out of the category and into services. In addition, as described above, mini-storage was moved out of WTCU into FIRE. Mini-storage businesses were identified for special treatment because past studies have shown them to have a much different average square feet per employee than other WTU or FIRE industries.

Table 5: 2002 Snohomish County covered employment by SIC category and destination NAICS category

SIC Category	2002 Covered		Destination NAICS Category	NAICS Category	2002 Covered		Source SIC Category
	Employment	Percent of Total			Employment	Percent of Total	
Construction/Resource	15,815	87.6%	Construction/Resource	Construction/Resource	15,815	97.9%	Construction/Resource
	0	0.0%	FIRE		197	1.2%	FIRES
	2,233	12.4%	Services		144	0.9%	Manufacturing
	*		* Manufacturing		*		* Retail
	*		* Retail		*		* WTCU
	*		* WTU				
Total	18,057	100.0%		Total	16,162	100.0%	
FIRES	197	0.4%	Construction/Resource	FIRE	0	0.0%	Construction/Resource
	11,230	21.0%	FIRE		11,230	98.5%	FIRES
	41,660	77.9%	Services		*		* Manufacturing
	170	0.3%	Manufacturing		*		* Retail
	*		* Retail		131	1.1%	WTCU
	*		* WTU				
Total	53,511	100.0%		Total	11,396	100.0%	
Manufacturing (non-Boeing)	144	0.5%	Construction/Resource	Services	2,233	3.5%	Construction/Resource
	*		* FIRE		41,660	66.1%	FIRES
	1,759	6.4%	Services		1,759	2.8%	Manufacturing
	25,597	93.0%	Manufacturing		14,310	22.7%	Retail
	0	0.0%	Retail		3,082	4.9%	WTCU
	*		* WTU				
Total	27,518	100.0%		Total	63,044	100.0%	
Retail	*		* Construction/Resource	Manufacturing (non-Boeing)	*		* Construction/Resource
	*		* FIRE		170	0.7%	FIRES
	14,310	35.9%	Services		25,597	98.4%	Manufacturing
	208	0.5%	Manufacturing		208	0.8%	Retail
	25,191	63.2%	Retail		*		* WTCU
	112	0.3%	WTU				
Total	39,856	100.0%		Total	26,016	100.0%	
WTCU	*		* Construction/Resource	Retail	*		* Construction/Resource
	131	1.0%	FIRE		*		* FIRES
	3,082	23.3%	Services		0	0.0%	Manufacturing
	*		* Manufacturing		25,191	94.3%	Retail
	1,450	10.9%	Retail		1,450	5.4%	WTCU
	8,543	64.5%	WTU				
Total	13,244	100.0%		Total	26,718	100.0%	
				WTU	*		* Construction/Resource
					*		* FIRES
					*		* Manufacturing
					112	1.3%	Retail
					8,543	96.5%	WTCU
				Total	8,850	100.0%	

* - Value suppressed to protect confidentiality of ESD data.

Source: Snohomish County Planning and Development Services analysis of Washington State Employment Security Department (ESD) data.

Notes: 2002 covered employment statistics shown above may differ from those reported by the Puget Sound Regional Council and ESD due to revisions in the underlying data based on review by Snohomish County staff.

Methodology

Based on the guidelines set forth in the project design and findings of past research and a comparison of 2002 covered employment data by SIC and NAICS, a two part methodology was developed.

Employment density research for targeted industries

First, research was done to measure the average square feet per employee in two industries in Snohomish County – food services and mini-storage. Those industries were targeted for the following reasons:

- Both categories could be easily researched using available data sources, employment figures from ESD and building square feet from Snohomish County Assessor data. Unlike many other job categories that we might have wanted to research, it is a straightforward process to match the employment data points up to building square footage figures in the assessor data for large samples relative to the total number of employers and employees in those categories in the county. For more information on difficulties doing this for other industries, see the data description below.
- Based on an analysis of information from past studies shown in appendix B, both categories were expected to have average square footage per employee that were significantly different than the assumption for their broader SIC category or NAICS category.
- In terms of numbers of jobs, the food services change from retail to services was the most significant re-categorization that occurred with the switch to NAICS.

In order to create a sample, first, ESD data points for 2002 covered employment were matched to parcels. Next, points were matched to building square footage in the Snohomish County assessor database on the corresponding parcels coded to the corresponding uses for the targeted industries. In cases where no match was found in the first attempt, points were manually matched to the proper square footage by checking that the point was in the proper parcel, and then verifying the square footage using the assessor's online property information system. In many cases, food services square footage was coded as general retail. In some cases, square footage for fast food restaurants had to be measured and added using a simple ArcGIS measurement tool and aerial photographs. In other cases, it was necessary to estimate the portion of a larger retail building occupied by the food service by dividing the retail square footage by the number of retail businesses in the ESD data. Restaurants in large retail malls could not be matched to corresponding square footage and were excluded from the sample out-right. For mini-storage, an additional step was to check phone listings for mini-storage businesses and check whether some of them existed in the ESD data with different NAICS coding. Finally, samples representing a large proportion of the total employers and total employees for both categories were assembled where points were matched to square footage.

Once the samples were assembled, the employee figures from the years 2000 through 2005 for the same businesses were added to the records by joining the tables based on employer account and serial numbers.

Next, the average number of employees for each business was calculated based on the available years of data. This was done to get a better picture of how square footage was used over time, rather than simply in the first quarter of 2002. This reduced the likelihood that individual business performance or regional economic conditions would bias the data.

Finally, the total square footage for the sampled businesses was divided by the sum of the average employees per business, to arrive at the average square feet per employee.

Weighted averaging of SIC category assumptions

Weighted averages were used to develop square footage per employee assumptions for the major industrial categories using the 2002 Snohomish County covered employment in appendix A. This was an iterative process.

Iteration 1 – For each grouping of jobs listed in appendix A, the square footage per employee assumption used in the *2002 Buildable Lands Report* was assigned based on SIC categories. That square footage value was multiplied by the number of employees for each grouping, and then the results were summed based on the NAICS categories to which they belonged. The sum for each NAICS category was then divided by the total number of employees in that NAICS category. That result is the weighted average square feet per employee by NAICS category.

Iteration 2 – The same process was done again, except with a few changes. Food services and mini-storage were isolated into their own categories. Communications jobs, based on the findings from other past studies, were assigned a different square feet per employee assumption, based on the results for services from iteration 1. The 833 square feet per employee assumption seems unrealistically high for communications when separated out from other WTCU jobs, when both the *Business and Industrial Land Survey* and the *Industrial Land Supply and Demand* reports used lower estimates, meaning that using that figure would likely lead to an overly high estimate of square feet per employee for services after averaging – and iteration 4 would ensure that the changed square footage would be compensated for in the WTU assumption. Finally, the jobs that moved from construction/resource under SIC to other categories under NAICS were handled specially. They were assigned square footage per employee assumptions based on the results of iteration 1 for their NAICS category. This corrected for a problem in iteration 1 where the construction jobs were divided from the weighted total of square footage assumptions, but did not contribute any square footage to those categories, leading to slightly lower (less conservative) results.

Iteration 3 – Same process as iteration 2, except the results from iteration 2 were used for the substitutions described above, rather than the results from iteration 1.

Iteration 4 – Perhaps not literally an iteration, but rather a next step. The goal was to revisit those jobs groupings that did not really change categories in going from SIC to NAICS, the “no change” jobs. Those are jobs in the same category under both SIC and NAICS. WTCU jobs that ended up in WTU were treated as “no change.” For FIRES, separate calculations were done for jobs that went into FIRE and those that went into Services.

Given that the SIC assumptions used in the 2002 report were originally weighted averages across industries that made up that category, and knowing the results for the other job categories from

iteration 3, the implied average square feet per employee for the groupings that remained in the “no change” groups was calculated by substituting in the iteration 3 square footage averages for the groupings that did change, multiplying each by the number of employees in that grouping, summing the results, subtracting that from the SIC category square footage average multiplied by the total employees in that SIC category, then dividing the result of that subtraction by the number of employees in the no-change group.

The equation was set up as follows:

$$\begin{aligned} \text{SIC Category Assumption} \times \text{Jobs in SIC Category} = & \quad (\text{NAICS Category 1 Average} \times \text{Jobs from SIC Category now in NAICS Category 1}) \\ & + (\text{NAICS Category 2 Average} \times \text{Jobs from SIC Category now in NAICS Category 2}) \\ & + (\text{NAICS Category 3 Average} \times \text{Jobs from SIC Category now in NAICS Category 3}) \\ & + (\text{NAICS Category 4 Average} \times \text{Jobs from SIC Category now in NAICS Category 4}) \\ & + (\text{NAICS "No Change" Category Average} \times \text{Jobs from SIC Category now in NAICS} \\ & \quad \text{"No Change" Category}) \end{aligned}$$

Then solved for the “no change” category assumption:

$$\begin{aligned} \text{NAICS "No Change" Category Average} = & \quad \frac{((\text{SIC Category Assumption} \times \text{Jobs in SIC Category}) - \\ & ((\text{NAICS Category 1 Average} \times \text{Jobs from SIC Category now in NAICS Category 1}) \\ & + (\text{NAICS Category 2 Average} \times \text{Jobs from SIC Category now in NAICS Category 2}) \\ & + (\text{NAICS Category 3 Average} \times \text{Jobs from SIC Category now in NAICS Category 3}) \\ & + (\text{NAICS Category 4 Average} \times \text{Jobs from SIC Category now in NAICS Category 4})))}{\text{Jobs from SIC Category now in NAICS "No Change" Category}} \end{aligned}$$

Iteration 5 – Same as iteration 3, using the results of iteration 3 for the substitutions described in iteration 2, except that the results from iteration 4 have been substituted for the “no change” category assumptions. The results of iteration 5 were then rounded to provide conservative estimates and to avoid implying a level of precision that is greater than the methodology of weighted averages is capable of producing.

Data Sources

Covered employment data for the years 2000 through 2005 came from the Washington State Employment Security Department ES-202 data, which is confidential. The data was in pointfiles prepared by the Puget Sound Regional Council, and has been reviewed and revised by Snohomish County staff. Building square feet data was based on a May 2006 database extract from the Snohomish County Assessor’s Office.

Data Limitations

ESD covered employment data

ES-202 covered employment is intended as a complete count of all employees covered by unemployment insurance. However, there is some variation in how businesses with multiple locations report employment. In some cases, they are grouped at a single location in the region, and in other cases reported by location. PSRC and Snohomish County have reviewed the data regularly and every attempt has been made to show employment by location, but this process is

on-going. In addition, because only covered employment is included, proprietors and self-employed and certain other exempt employees are not included. PSRC estimates that covered employment makes up 85%-90% of total employment. Also, the data represents a snapshot of employment in the spring of the year reported, and counts part- and full-time workers, not FTEs.³¹

In examining mini-storage records, it was found that records for some nation-wide chains were not present in the Snohomish County data-set. It is expected that average employment density at those locations would be similar to those in the sample.

Assessor building square feet records

Assessor data for building square feet is not categorized by tenant, and categories are not defined to match to NAICS employment categories. As a result, it can be difficult to match employee records to square footage in multi-tenant buildings.

For this reason, research into actual square feet per employee was limited to two industries where it is expected that the sample of employers in stand-alone buildings or where square footage could be matched to employers is representative of the population. For other significant industries, this assumption did not seem to hold.

Results

Food services

The results of the research into average square feet per employee for food services are summarized in table 6. This is the most detail that can be provided due to the confidential nature of the ESD data. As shown, the sample represents approximately a third of all food services employers in the county, and nearly two-thirds of 2002 employees. The sample is therefore considered representative of the industry as a whole in Snohomish County. Based on a calculated average of 180.9 square feet per employee, the recommended assumption for the 2007 Buildable Lands project is 200 square feet per employee.

Table 6: Results summary, average floor area square feet per employee in food services industry in Snohomish County

	Establish- ments	2002 covered employees	Sum of average employment, 2000 to 2005	Sum of building square footage	Average square feet per employee	Recommended square feet per employee assumption
Countywide food services total	969	14163				
Sample	350	8,730	8,552.4	1,547,289	180.9	200
Share of countywide total	36.1%	61.6%				

Source: Snohomish County Planning and Development Services analysis of Washington State Employment Security Department (ESD) data.

Note: 2002 covered employment statistics shown above may differ from those reported by the Puget Sound Regional Council and ESD due to revisions in the underlying data based on review by Snohomish County staff.

³¹ Puget Sound Regional Council, "Covered Employment Estimates," http://www.psrc.org/data/econ/employment_est.htm (February 20, 2007)

Mini-storage

The results of the research into average square feet per employee for mini-storage businesses are summarized in table 7. This is the most detail that can be provided due to the confidential nature of the ESD data. As shown, the sample represents a significant share of mini-storage establishments in the county. It was possible to match three-quarters of employees identified in the ESD data as mini-storage employees. However, it was discovered that a number of mini-storage locations for nation-wide self-storage companies were not included in the ESD data for Snohomish County. It is estimated based on phone listings that there are approximately 54 mini-storage businesses in the county, some for which employment data was not included in the data-set. Still, the sample is representative of the industry as a whole in Snohomish County. Based on a calculated average of 18,198.4 square feet per employee square feet, the recommended assumption for the 2007 Buildable Lands project is 20,000 square feet per employee.

Table 7: Results summary, average floor area square feet per employee in the mini-warehouse and self-storage industry in Snohomish County

	Establish- ments	2002 covered employees	Sum of average employment, 2000 to 2005	Sum of building square footage	Average square feet per employee	Recommended square feet per employee assumption
Countywide mini-storage total	54*	131				
Sample	31	100	104.0	1,893,235	18,198.4	20,000
Share of countywide total	57.4%	76.3%				

Source: Snohomish County Planning and Development Services analysis of Washington State Employment Security Department (ESD) data.

Note: 2002 covered employment statistics shown above may differ from those reported by the Puget Sound Regional Council and ESD due to revisions in the underlying data based on review by Snohomish County staff.

* - Estimate, includes mini-storage establishments listed in phone directories but not included in the ESD data set. The 131 employees comes from the ESD data, as revised, and does not correspond to all 54 establishments.

Major category weighted averages

Results of the calculations of weighted averages for the other employment categories are summarized in table 8. The detailed calculations are available from Snohomish County upon request. The covered employment figures in those calculations are subject to confidentiality requirements, so some of the values would be suppressed in any publicly released version of calculations by replacing actual numbers with asterisks.

Conclusion/Recommendations

The recommended assumptions for the 2007 Buildable Lands project are shown in the far right column of table 8.

It is also recommended that in the future, additional research be done to measure the actual average square feet per employee for additional categories of employment in Snohomish County.

Table 8: Weighted averaging results by iteration, floor area square feet per employee by employment category

Employment Category	"No change" Groupings	Iteration 1	Iteration 2	Iteration 3	Iteration 4	Iteration 5	Recommended
Construction/Resource		N/A	N/A	N/A		N/A	N/A
FIRE	Const/Res/Const/Res				N/A		
		400.66	396.91	396.91		337.70	350
Services	FIRES/FIRE				329.45		
		451.88	413.49	410.04		406.56	400
Manufacturing	FIRES/Services				391.79		
		500.35	503.29	503.29		509.39	500
Retail	Manu/Manu				505.94		
		612.05	612.05	612.05		713.27	700
WTU	Retail/Retail				708.03		
		820.61	821.18	821.18		1013.43	1000
Food Services	WTCU/WTU				1031.38		
			200	200		200	200
Mini-storage			20,000	20,000		20,000	20,000

Source: Snohomish County Planning and Development Services analysis of Washington State Employment Security Department (ESD) data.

Notes: See the methodology section for a description of how the iterations were calculated. The detailed calculations are available by request from Snohomish County Planning and Development Services. Some values in those calculations must be suppressed to protect the confidentiality of the data.

Appendix A: 2002 Snohomish County private sector, non-Boeing employment by SIC categories and equivalent NAICS categories

SIC Major Industrial Category	SIC Codes	Division/Industry	2002 Covered Employees	Percent of SIC Major Category NAICS Codes	NAICS Employment Category	NAICS Sector/Industry
Construction/Resource						
	01-02, 07	Agriculture	898	5.0% 111-112	Construction/Resource	Agriculture
	0741-0742	Veterinary Services	631	3.5% 541940	Services	Professional Services
	0751	Animal Slaughtering	*	* 311611	Manufacturing	Food and Beverage Manufacturing
	Some 0752	Pet Care Services	180	1.0% 812910	Services	Personal Services
	0781, 0782	Landscaping Services	1289	7.1% 541320, 561730	Services	Professional, Administrative Support Services
	08-09	Forestry and Fishing, Hunting and	99	0.5% 113-115	Construction/Resource	Resource
	10-14	Mining	233	1.3% 21	Construction/Resource	Resource
	15-17	Construction	14585	80.8% 23	Construction/Resource	Construction
	Some 1799	Asbestos and Lead Paint Removal	*	* 562910	Services	Administrative Support Services
		Misc. Construction/Resource Retail	*	*	Retail	Various
		Misc. Construction/Resource Services	*	*	Services	Various
		Misc. Construction/Resources WTU	*	*	WTU	Various
Total Construction/Resources			18057			
Percent of SIC Major Industrial Category				Percent of NAICS Category		NAICS Major Industrial Category Total Covered Employment
		87.6%	15815	97.9%	Construction/Resource	16162
		0.0%	0	0.0%	FIRE	11396
		12.4%	2233	3.5%	Services	63044
		*	*	*	Manufacturing	26016
		*	*	*	Retail	26718
		*	*	*	WTU	8850
Finance, Insurance, Real Estate, and Services (FIRES)						
Finance, Insurance, and Real Estate						
	60-64	Finance and Insurance	8100	15.1% 52	FIRE	Finance and Insurance
	65	Real Estate	2062	3.9% 53	FIRE	Real Estate and Rental and Leasing
	Some 6531	Condominium Associations	14	0.0% 813990	Services	Grantmaking, Civic, Professional and Similar Organizations
	6552	Land Subdivision	168	0.3% 237210	Construction/Resource	Construction
	67	Other Investment Offices	26	0.0% 5239, 5259, 533110	FIRE	Other Finance, Insurance, and Real Estate
	6712, 6719	Holding Companies	5	0.0% 551111, 551112	Services	Management Services
	6732	Education, Religious, and Charitable	4	0.0% 813211	Services	Grantmaking, Civic, Professional and Similar Organizations
		Misc. FIRE Services	450	0.8%	Services	Various
Service Industries						
	70	Accommodations	819	1.5% 721	Services	Accommodations and Food Services
	72	Personal Services	1840	3.4% 812	Services	Personal Services
	7217	Carpet and Upholstery Cleaning	164	0.3% 561740	Services	Administrative Support Services
	7221	Photography Studios	186	0.3% 541921	Services	Professional Services
	7291	Tax Preparation	143	0.3% 541213	Services	Professional Services
	Some 7299	Formal Wear and Costume Rentals	15	0.0% 532220	FIRE	Real Estate and Rental and Leasing
	73	Business Services	4139	7.7% Some 51, 54, 55, and 56	Services	Information, Professional, Management, Admin. and Support Services
	7352	Medical Equipment Rentals	21	0.0% 532291	FIRE	Real Estate and Rental and Leasing
	7353	Heavy Construction Equipment Rentals	404	0.8% 532412	FIRE	Real Estate and Rental and Leasing
	Some 7359, some misc.	Consumer Goods Rentals	64	0.1% 5322	FIRE	Real Estate and Rental and Leasing
	Some 7359, 7377	General, Commercial/Industrial Equipment Rentals	152	0.3% 5323, 5324	FIRE	Real Estate and Rental and Leasing
	7372, 7374-5	Software Publishing, Data Processing, Internet Services	306	0.6% 511210, 516, 518	Services	Information Services
	7378	Computer Repairs	17	0.0% 811212	Services	Repair and Maintenance Services
	7384	Photofinishing Labs	75	0.1% 81292	Services	Personal Services
	Some 7389	Post Office Contract Service	16	0.0% 491110	WTU	Transportation and Warehousing
	75	Automotive Services	1878	3.5% 8111, 812930	Services	Repairs and Maintenance, Personal Services/Parking
	751	Automotive Rental and Leasing	52	0.1% 5321	FIRE	Real Estate and Rental and Leasing
	7549	Towing	143	0.3% 488410	WTU	Transportation and Warehousing
	76	Repair Services	337	0.6% 811	Services	Repairs and Maintenance
	Some 7699	Picture Framing Shops	38	0.1% 442299	Retail	Furniture and Home Furnishing Stores
	Some 7699	Locksmiths	36	0.1% 561622	Services	Administrative and Support Services
	Some 7699, some misc.	Building, Septic/Sewer System Maintenance	100	0.2% 561790, 562991, 562998	Services	Administrative and Support Services
	78	Motion Pictures	28	0.1% 5121	Services	Information Services
	7832	Movie Theaters	453	0.8% 512131	Services	Information Services
	7841	Video Rentals	334	0.6% 532230	FIRE	Real Estate and Rental and Leasing
	79	Amusement and Recreation	2576	4.8% 71	Services	Arts, Entertainment, and Recreation
	7911	Dance Studios	92	0.2% 611610	Services	Education Services
	Some 7999	Sports Instruction	376	0.7% 611620	Services	Education Services

Appendix A: 2002 Snohomish County private sector, non-Boeing employment by SIC categories and equivalent NAICS categories

SIC Major Industrial Category	SIC Codes	Division/Industry	2002 Covered Employees	Percent of SIC Major Category	NAICS Codes	NAICS Employment Category	NAICS Sector/Industry
FIRES - Service Industries (continued)							
	80	Health Services	14464	27.0%	621-2, some 623	Services	Health Care
	8072	Dental Labs	111	0.2%	339116	Manufacturing	Misc. Manufacturing
	81	Legal Services	664	1.2%	541110	Services	Professional Services
	82	Educational Services (Private)	847	1.6%	61	Services	Education Services
	83	Social Services	1838	3.4%	624	Services	Social Assistance
	8351	Daycare	1152	2.2%	624410	Services	Social Assistance
	8361	Residential Care	1270	2.4%	Some 623	Services	Health Care
	8399	Social Service Organizations	60	0.1%	Some 813	Services	Grantmaking, Civic, Professional and Similar Organizations
	84	Museums, Art Galleries, Gardens and Zoos (Private)	14	0.0%	712	Services	Arts, Entertainment, and Recreation
	86	Membership Organizations	1413	2.6%	Some 813	Services	Grantmaking, Civic, Professional and Similar Organizations
	87	Engineering and Management Services	3847	7.2%	Some 541	Services	Professional Services
	Some 8741	Construction Management	29	0.1%	Some 236	Construction/Resource	Construction
	8741	Management Services	122	0.2%	561110	Services	Administrative Support Services
	88	Domestic Employees	1887	3.5%	814110	Services	Domestic Employees
	Some 89	Misc. Services - Misc. Professional Services	27	0.1%	Some 541	Services	Professional Services
	Some 89	Misc. Services - Independent Artists	17	0.0%	711510	Services	Arts, Entertainment, and Recreation
		Misc. Services Manufacturing	59	0.1%	*	Manufacturing	Various
		Misc. Services Retail	*	*	*	Retail	Various
		Misc. Services WTU	*	*	*	WTU	Various
Total FIRES			53511				
		Percent of SIC Major Industrial Category		Percent of NAICS Category			NAICS Major Industrial Category Total Covered Employment
		0.4%	197	1.2%	Construction/Resource		16162
		21.0%	11230	98.5%	FIRE		11396
		77.9%	41660	66.1%	Services		63044
		0.3%	170	0.7%	Manufacturing		26016
		*	*	*	Retail		26718
		*	*	*	WTU		8850
Manufacturing							
	20	Food and Beverage Manufacturing	1344	4.9%	311	Manufacturing	Food and Beverage Manufacturing
	22-23	Textiles and Apparel Manufacturing	318	1.2%	313-316	Manufacturing	Textiles and Apparel Manufacturing
	24-26	Wood Products, Furniture, and Paper Products	4460	16.2%	321, 337, 322	Manufacturing	Wood Products, Furniture, and Paper Products
	2411	Logging	144	0.5%	113310	Construction/Resource	Resource
	27	Printing and Publishing	795	2.9%	323	Manufacturing	Printing
	2711-2741	Publishing	1137	4.1%	5111	Services	Information Services
	28-29	Chemical and Petroleum Products	314	1.1%	325, 324	Manufacturing	Chemical and Petroleum Products
	30	Rubber and Plastic Products	532	1.9%	326	Manufacturing	Plastic and Rubber Products
	31	Leather Products	46	0.2%	316	Manufacturing	Leather Products
	32	Stone, Clay, Glass and Concrete Products	689	2.5%	327	Manufacturing	Nonmetallic Mineral Products
	33	Primary Metal Industries	135	0.5%	331, Some 332	Manufacturing	Primary Metal Manufacturing, Fabricated Metal Products
	34	Fabricated Metal Products	1964	7.1%	332	Manufacturing	Fabricated Metal Products
	35	Industrial Machinery and Equipment	1399	5.1%	333, Some 3341, Some 332	Manufacturing	Machinery, Computer and Electronic Products, Fabricated Metal Products
	Some 3599	Machine Shops	879	3.2%	332710	Manufacturing	Fabricated Metal Products
	36	Electrical and Electronic Equipment	489	1.8%	335	Manufacturing	Electrical Equipment and Appliances
	3651-3679	Electronic Equipment	1660	6.0%	334	Manufacturing	Computer and Electronic Products
	37	Transportation Equipment (Non-Boeing)	5650	20.5%	336	Manufacturing	Transportation Equipment (Non-Boeing)
	Some 3732	Boat Repair	21	0.1%	811490	Services	Repair and Maintenance
	38	Instruments Manufacturing	4359	15.8%	3345	Manufacturing	Computer and Electronic Products
	3821, 3841-3, 3851	Medical Instruments Manufacturing	223	0.8%	3391	Manufacturing	Misc. Manufacturing/Medical Equipment
	39	Miscellaneous Manufacturing	341	1.2%	3399	Manufacturing	Miscellaneous Manufacturing
		Misc. Manufacturing FIRE	*	*	*	FIRE	Various
		Misc. Manufacturing Services	601	2.2%	*	Services	Various
		Misc. Manufacturing WTU	*	*	*	WTU	Various
Total Manufacturing			27518				
		Percent of SIC Major Industrial Category		Percent of NAICS Category			NAICS Major Industrial Category Total Covered Employment
		0.5%	144	0.9%	Construction/Resource		16162
		*	*	*	FIRE		11396
		6.4%	1759	2.8%	Services		63044
		93.0%	25597	98.4%	Manufacturing		26016
		0.0%	0	0.0%	Retail		26718
		*	*	*	WTU		8850

Appendix A: 2002 Snohomish County private sector, non-Boeing employment by SIC categories and equivalent NAICS categories

SIC Major Industrial Category	SIC Codes	Division/Industry	2002 Covered Employees	Percent of SIC Major Category	NAICS Codes	NAICS Employment Category	NAICS Sector/Industry
Retail							
Retail	52	Building Material, Hardware, Garden Supply Stores	2017	5.1%	444	Retail	Building Material and Garden Equipment and Supplies Dealers
	5271	Mobile Home Sales	29	0.1%	453930	Retail	Misc. Stores/Manufactured Home Dealers
	53	General Merchandise Stores	4515	11.3%	452	Retail	General Merchandise Stores
	54	Food Stores	5323	13.4%	445	Retail	Food and Beverage Stores/Supermarkets/Groceries/Misc.
	Some 5411	Convenience Stores	191	0.5%	445120	Retail	Food Stores/Convenience Stores
	Some 5411	Convenience Stores with Gas	631	1.6%	447110	Retail	Gas Stations
	Some 5461	Bakeries with Retail Sales	92	0.2%	311811	Manufacturing	Food and Beverage Manufacturing
	Some 5461	Baked Goods Stores	35	0.1%	445291	Retail	Food and Beverage Stores
	Some 5461	Snack Bars (Retail Bakeries)	73	0.2%	722213	Food Services	Food Services
	Some 5499	Food Supplement Stores	32	0.1%	446191	Retail	Health and Personal Care Stores
	55	Automotive Dealers	2973	7.5%	441	Retail	Motor Vehicle and Parts Dealers
	5531	Auto Supplies	902	2.3%	4413	Retail	Motor Vehicle and Parts Dealers
	5541	Gas Stations	874	2.2%	447	Retail	Gas Stations
	56	Apparel and Accessories Stores	1118	2.8%	448	Retail	Clothing and Accessories Stores
	57	Furniture and Home Furnishings Stores	687	1.7%	442	Retail	Furniture and Home Furnishings Stores
	Some 5712	Custom Furniture/Cabinetry	116	0.3%	3371	Manufacturing	Furniture Manufacturing
	5722, Some 5731, 5734	Appliance and Electronics Stores	664	1.7%	443	Retail	Electronics and Appliance Stores
	Some 5731	Auto Radio Stores	59	0.1%	441310	Retail	Motor Vehicle and Parts Dealers
	5735, 5736	Recorded Music and Musical Instrument Stores	89	0.2%	451220, 451140	Retail	Sporting Goods, Hobby, Book and Music Stores
	59	Miscellaneous Retail	2437	6.1%	453, 454	Retail	Misc. Stores, Nonstore Retail
	5912	Drug Stores	910	2.3%	446110	Retail	Health and Personal Care Stores
	5921	Liquor Stores (Private)	11	0.0%	445310	Retail	Liquor Stores
	Some 5932	Pawn Shops	35	0.1%	522298	FIRE	Finance and Insurance
	5941, 5942, 5945, 5949	Sporting Goods, Book, Hobby and Toy, Sewing Supply Stores	1222	3.1%	451110, 451211, 451120, 451130	Retail	Sporting Goods, Hobby, Book and Music Stores
	5944	Jewelry Stores	205	0.5%	448310	Retail	Clothing and Accessories Stores
	5946	Camera Shops	68	0.2%	443130	Retail	Electronics and Appliance Stores
	5995, Some 5999	Optical Goods, Cosmetic Supply, Hearing Aids Stores	195	0.5%	446130, 446120, 446199	Retail	Health and Personal Care Stores
	Some 5999	Misc. Electronics Stores	4	0.0%	443112	Retail	Electronics and Appliance Stores
		Misc. Retail Const/Res	*	*	*	Construction/Resource	Various
		Misc. Retail FIRE	*	*	*	FIRE	Various
		Misc. Retail Services	145	0.4%	*	Services	Various
		Misc. Retail WTU	112	0.3%	*	WTU	Various
Food Services							
	58	Eating and Drinking Places	7232	18.1%	722	Food Services	Food Services and Drinking Places/Restaurants and Misc.
	Some 5812	Management Offices for Food Service Corporations	8	0.0%	551114	Services	Management Services
	Some 5812	Limited Service (Fast Food)	5324	13.4%	722211	Food Services	Food Services and Drinking Places/Fast Food
	Some 5812	Snack Bars, Espresso Stands	1105	2.8%	722213	Food Services	Food Services and Drinking Places/Snack Bars, Espresso Stands
	5813	Drinking Places	423	1.1%	722410	Food Services	Food Services and Drinking Places/Drinking Places
		Total Retail	39856				
		Percent of SIC Major Industrial Category		Percent of NAICS Category			NAICS Major Industrial Category Total Covered Employment
		*	*	*		Construction/Resource	16162
		*	*	*		FIRE	11396
		0.4%	153	0.2%		Services	63044
		35.5%	14157	22.5%		Food Services	
		0.5%	208	0.8%		Manufacturing	26016
		63.2%	25191	94.3%		Retail	26718
		0.3%	112	1.3%		WTU	8850

Appendix A: 2002 Snohomish County private sector, non-Boeing employment by SIC categories and equivalent NAICS categories

SIC Major Industrial Category	SIC Codes	Division/Industry	2002 Covered Employees	Percent of SIC Major Category NAICS Codes	NAICS Employment Category	NAICS Sector/Industry
Wholesale, Transportation, Communications, and Utilities (WTCU)						
	41-47	Transportation	2161	16.3% 48-49	WTU	Transportation and Warehousing
	Some 4212	Waste Collection Services	84	0.6% 56211	Services	Administrative Support Services
	Some 4225	Miniwarehouses	131	1.0% 531130	Miniwarehouse	FIRE, Real Estate and Rental and Leasing
	4493	Marinas	44	0.3% 713930	Services	Arts, Entertainment, and Recreation
	4724-5	Travel Agencies and Tour Operators	265	2.0% 56151-2	Services	Administrative Support Services
	48	Communications	2093	15.8% 515, 517	Services	Information Services
	49	Utilities (Private)	88	0.7% 22	WTU	Utilities
	Some 495	Sanitary Services	166	1.3% Some 561, 562	Services	Administrative Support Services
	50-51	Wholesale Trade	6294	47.5% 42	WTU	Wholesale Trade
	Some 5013	Auto Parts/Tire Sales	123	0.9% Some 44131-2	Retail	Motor Vehicle and Parts Dealers
	Some 5015	Used Parts Sales (Wrecking Yards)	58	0.4% Some 441310	Retail	Motor Vehicle and Parts Dealers/Wrecking Yards
	Some 5023	Floorcoverings Sales	25	0.2% Some 442210	Retail	Furniture and Home Furnishings Stores
	Some 5031	Lumber Sales	62	0.5% Some 444110	Retail	Building Material and Garden Equipment and Supplies Dealers
	Some 5032	Brick, Stone, Related Building Materials Sales	19	0.1% Some 444190	Retail	Building Material and Garden Equipment and Supplies Dealers
	Some 5033	Roofing, Siding, Insulation Sales	93	0.7% Some 444190	Retail	Building Material and Garden Equipment and Supplies Dealers
	Some 5044	Office Equipment Sales	103	0.8% Some 453210	Retail	Misc. Stores
	Some 5045	Computer and Software Sales	45	0.3% Some 443120	Retail	Electronics and Appliance Stores
	Some 5047	Medical Equipment and Supply Sales	98	0.7% Some 446199	Retail	Health and Personal Care Stores
	Some 5063	Electrical Building Materials Sales	22	0.2% Some 444190	Retail	Building Material and Garden Equipment and Supplies Dealers
	Some 5065	Electronic Parts and Equipment Sales	69	0.5% Some 443112	Retail	Electronics and Appliance Stores
	Some 5072	Hardware Sales	77	0.6% Some 444130	Retail	Building Material and Garden Equipment and Supplies Dealers
	Some 5083	Garden Equipment Sales	42	0.3% Some 444210	Retail	Building Material and Garden Equipment and Supplies Dealers
	Some 5099	Misc. Durable Goods Sales	20	0.2% Some 444, 451	Retail	Various
	Some 5112	Stationery and Office Supply Sales	57	0.4% Some 453210	Retail	Misc. Stores
	Some 5122	Drug and Supplement Sales	30	0.2% Some 446	Retail	Health and Personal Care Stores
	Some 5141	General Grocery Sales	22	0.2% Some 445110	Retail	Food and Beverage Stores
	Some 5149	Misc. Grocery Sales	12	0.1% Some 445299	Retail	Food and Beverage Stores
	Some 5191	Farm Supply Sales	91	0.7% Some 444220	Retail	Building Material and Garden Equipment and Supplies Dealers
	Some 5199	Gift, Novelty, Souvenir Sales	19	0.1% Some 453220	Retail	Misc. Stores
		Misc. WTCU Construction/Resource	*	*	Construction/Resource	Various
		Misc. WTCU Manufacturing	*	*	Manufacturing	Various
		Misc. WTCU Retail	363	2.7%	Retail	Various
		Misc. WTCU Services	430	3.2%	Services	Various
Total WTCU			13244			
				Percent of NAICS Category		NAICS Major Industrial Category Total Covered Employment
		Percent of SIC Major Industrial Category	*	*	Construction/Resource	16162
		0.0%	0	0.0%	FIRE	11396
		1.0%	131	1.1%	Mini-storage	
		23.3%	3082	4.9%	Services	63044
		*	*	*	Manufacturing	26016
		10.9%	1450	5.4%	Retail	26718
		64.5%	8543	96.5%	WTU	8850
Grand Total 2002 Covered Employment			152186			

Source: Snohomish County Planning and Development Services analysis of Washington State Employment Security Department (ESD) data.

Notes: 2002 covered employment statistics shown above may differ from those reported by the Puget Sound Regional Council and ESD due to revisions in the underlying data based on review by Snohomish County staff.

* - Value suppressed to protect confidentiality.

Appendix B: Floor area square feet per employee assumptions from major previous studies and this study's recommendations

Employment Category	BILS	TG, 5th Ed.	ILSD	2002 BLR	Recommended
<i>Agriculture</i>	N/A	N/A	N/A	N/A	N/A
<i>Resource</i>					
Forestry, Fishing and Hunting					
Logging	650	535	587	500	N/A
All other Forestry, Fishing and Hunting	N/A	N/A	N/A	N/A	N/A
Mining	N/A	N/A	N/A	N/A	N/A
<i>Construction</i>					
Construction Management Services	300	304	325	395	N/A
Land Subdivision	300	304	325	395	N/A
All other Construction	300	N/A	577	N/A	N/A
<i>Finance, Insurance, and Real Estate</i>					
Finance and Insurance					
Banks	300	262	325	395	350
Pawn Shops	600	654	1,742	600	350
All other Finance and Insurance	300	304	325	395	350
Real Estate and Rental and Leasing					
Miniwarehouses	300	20,000	625	833	20,000
Consumer Goods Rental and Leasing	600	549	325	395	350
Medical Equipment Rental and Leasing	300	N/A	325	395	350
Commercial/ Industrial Machine and Equipment Rentals	300	N/A	325	395	350
All other Real Estate and Rental and Leasing	300	304	325	395	350
<i>Services</i>					
Information Services					
Publishing	700	463	587	500	400
Software, Movie, Record Distribution	300	463	587	500	400
Movie Theaters	600	N/A	325	395	400
Radio and Television Broadcasting	300	304	625	833	400
Telecommunications	300	304	625	833	400
All other Information Services	300	304	325	395	400
Professional Services					
Landscape Architecture Services	N/A	304	N/A	N/A	400
Research and Development/Bio-Tech/High-Tech	300	405	325	395	400
Veterinary Services	N/A	207	N/A	N/A	400
All other Professional Services	300	304	325	395	400
Management Services	300	304	325	395	400
Administrative and Support Services					
Travel Agents and Tour Operators	300	304	625	833	400
Landscaping Services	N/A	304	N/A	N/A	400
Waste Management and Remediation Services	300	N/A	625	833	400
All other Administrative/Support Services	300	304	325	395	400
Educational Services (private)					
Schools - See Government/Education	N/A	N/A	N/A	N/A	N/A
Other Education Services	600	N/A	325	395	400
Health Care					
Medical/Dental Offices or Clinics	500	207	500	395	400
Ambulance Services	300	N/A	625	833	400
Hospitals	500	330	500	395	400
Nursing and Residential Care Facilities	500	870	500	395	400
All other Health Care Services	500	207	500	395	400
Social Assistance (private/non-profit)					
Daycare	600	333-439	325	395	400
All other Social Assistance	600	N/A	325	395	400
Arts, Entertainment, and Recreation					
Marinas	300	N/A	625	833	400
All other Arts, Entertainment, and Recreation	600	N/A	325	395	400
Accommodations	600	N/A	325	395	400

Appendix B: Floor area square feet per employee assumptions from major previous studies and this study's recommendations
(continued)

Employment Category	BILS	TG, 5th Ed.	ILSD	2002 BLR	Recommended
<i>Services (continued)</i>					
Food Services					
Quality Restaurants	600	134	1,742	600	200
High-Turnover (Sit-Down) Restaurants	600	101	1,742	600	200
Fast Food Restaurants w/o Drive-Throughs	600	70	1,742	600	200
Fast Food Restaurants w/ Drive-Throughs	600	92	1,742	600	200
Drinking Places	600	N/A	1,742	600	200
Espresso Stands	600	N/A	1,742	600	200
All other Food Services	600	N/A	1,742	600	200
Repair and Maintenance					
Automotive Repair and Maintenance	600	N/A	325	395	400
Auto Tire Service Stations	600	1,064	325	395	400
Boat Repair	450	549	587	500	400
All other Repair and Maintenance Services	600	N/A	325	395	400
Personal and Laundry Services					
Personal Care Services	600	549	325	395	400
Coin-operated Laundries and Drycleaners	600	549	325	395	400
Pet Care Services	N/A	N/A	N/A	N/A	400
Parking Garages	N/A	N/A	N/A	N/A	N/A
All other Personal and Laundry Services	600	N/A	325	395	400
Grantmaking, Civic, Professional, and Similar Organizations					
Religious Organizations/Churches	600	N/A	325	N/A	N/A
Grantmaking Organizations	300	N/A	325	395	400
Condominium Associations	300	N/A	325	395	400
All other Civic, Professional, and Similar Organizations	600	N/A	325	395	400
Private Households - Domestic Employment	N/A	N/A	N/A	N/A	N/A
<i>Manufacturing</i>					
Food and Beverage Manufacturing					
Animal Slaughtering	N/A	N/A	N/A	N/A	500
Retail Bakeries	600	N/A	1,742	600	500
All other Food and Beverage Manufacturing	775	535	587	500	500
Textile, Apparel, and Leather Product Manufacturing	575	535	587	500	500
Wood Product Manufacturing/Lumber Mills	650	535	587	500	500
Paper Product Manufacturing	1,400	535	587	500	500
Printing	700	463	587	500	500
Petroleum/Coal/Chemical/Plastic Product Manufacturing					
Pharmaceutical and Medicine Manufacturing/Bio-Tech	1,000	463	587	500	500
All other Petroleum/Coal/Chemical/Plastic Product Manufacturing	1,000	535	587	500	500
Nonmetallic Mineral Product Manufacturing	775	535	587	500	500
Primary Metal Manufacturing	900	535	587	500	500
Fabricated Metal Product Manufacturing	700	535	587	500	500
Machinery Manufacturing	550	549	587	500	500
Computer and Electronic Product Manufacturing	300	463	587	500	500
Electrical Equipment and Appliance Manufacturing	300	535	587	500	500
Transportation Equipment Manufacturing					
Aerospace	450	549	587	500	500
Ship and Boat Building	450	549	587	500	500
All other Transportation Equipment Manufacturing	450	549	587	500	500
Furniture Manufacturing					
Custom Furniture Shops/Cabinetry	600	2,326	1,742	600	500
All other Furniture Manufacturing	400	535	587	500	500
Miscellaneous Manufacturing					
Medical Equipment Manufacturing	400	463	587	500	500
Dental Laboratories	500	207	500	395	500
All other Misc. Manufacturing	400	535	587	500	500

Appendix B: Floor area square feet per employee assumptions from major previous studies and this study's recommendations (continued)

Employment Category	BILS	TG, 5th Ed.	ILSD	2002 BLR	Recommended
<i>Retail</i>					
Motor Vehicle and Parts Dealers					
Automobile/Vehicle Dealers	600	N/A	1,742	600	700
Automotive Parts and Accessories	600	N/A	1,742	600	700
Wrecking Yards/Used Parts Retailers	1,300	N/A	625	833	700
Tire Stores	600	1,064	1,742	600	700
Furniture and Home Furnishings Stores					
Picture Framing Shops	600	N/A	325	395	700
All other Furniture Stores	600	2,326	1,742	600	700
Electronics and Appliances Stores	600	549	1,742	600	700
Building Material and Garden Equipment and Supplies Dealers					
Hardware/Paint Stores	600	1,042	1,742	600	700
Building Materials/Lumber Stores	600	806	1,742	600	700
Nurseries	600	N/A	1,742	600	700
Food and Beverage Stores					
Supermarkets/Grocery Stores	600	N/A	1,742	600	700
Convenience Stores	600	294	1,742	600	700
Specialty Food and Liquor Stores	600	549	1,742	600	700
Health and Personal Care Stores					
Drug Stores	600	654	1,742	600	700
All other Health and Personal Care Stores	600	549	1,742	600	700
Gas Stations					
Gas Stations with Convenience Stores	600	294	1,742	600	700
All other Gas Stations	600	N/A	1,742	600	700
Clothing/Accessories Stores	600	549	1,742	600	700
Sporting Goods, Hobby, Book and Music Stores	600	549	1,742	600	700
General Merchandise Stores					
Department/Discount/Warehouse Clubs/Super Stores	600	654	1,742	600	700
All other General Merchandise Stores	600	549	1,742	600	700
Miscellaneous Stores					
Manufactured Home Dealers	600	N/A	1,742	600	700
All other Misc. Stores	600	549	1,742	600	700
Non-Store Retailers/Direct Sales	600	N/A	1,742	600	700
<i>Wholesale, Transportation, and Utilities</i>					
Utilities (private)	300	N/A	625	833	1,000
Wholesale Trade	1,300	781-1,213	1,121	833	1,000
Transportation and Warehousing					
Towing	600	N/A	325	395	1,000
Post Office Contract Service	300	230	325	395	1,000
Warehousing	300	781	1,121	833	1,000
Truck Terminals	300	427	625	833	1,000
All other Transportation (private)	300	N/A	625	833	1,000
<i>Government and Education</i>					
Government Office Buildings	300	233	325	300	300
Libraries	300	1,087	325	300	300
Post Offices	300	230	325	300	300
Schools	N/A	N/A	N/A	N/A	N/A
School Admin. Bldgs/Other Facilities	300	N/A	325	300	300
All other public sector employment	N/A	N/A	N/A	300	300

Sources: Snohomish County, *Business and Industrial Land Survey*, rev. ed. (Everett, WA: Snohomish County Department of Planning and Development Services, 1986), 89-90; Institute of Transportation Engineers, *Trip Generation*, 5th ed. (Washington, DC: Institute of Transportation Engineers, 1991); Puget Sound Regional Council and University of Washington Center for Community Development and Real Estate, *Industrial Land Supply and Demand in the Central Puget Sound Region* (Seattle, WA: Puget Sound Regional Council, 1998), 37-47, 64-65; Snohomish County Tomorrow, *2002 Growth Monitoring/Buildable Lands Report* (Everett, WA: Snohomish County Planning and Development Services, 2003), 24-25.

Notes: Employment categories are based on NAICS major industrial categories, sectors, sub-sectors, and industries. Square footage per employee assumptions shown are based on how those employment categories listed would have been categorized in the four studies, but they may have used different category names. The ITE category Specialty Retail Center has been shown for many retail and consumer services categories, and general office for most FIRE and business/professional services. For explanations of the employment categories, see the discussion in the Background section of this report.