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ECONOMIC OPPORTUNITIES ANALYSIS
(OREGON STATEWIDE PLANNING GOAL 9)

Hillsboro
OREGON

September 30, 2016

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Table of Contents

I. INTRODUCTION 1

III. EXECUTIVE SUMMARY 2

IV. ECONOMIC TRENDS 5

NATIONAL TRENDS 5
Demographic Factors and Labor Force Participation 6
Global Impacts on Migration 7
Shifting Industrial Patterns 8
Global Factors Influencing Growth 8
Other Factors Influencing Growth 8
OREGON TRENDS 9
Economic Risks 11
WASHINGTON COUNTY & HILLSBORO ECONOMIC TRENDS 11
Population Growth 12
Migration 12
Commute Trends 13
Income and Wages 13
Economic Performance 15

V. TARGET INDUSTRY ANALYSIS 17

INDUSTRY CLUSTERS DEFINED 17
DATA SOURCES 19
Quarterly Census of Employment and Wages (QCEW) 19
IMPLAN Input-Output Tables 19
ECONOMIC SPECIALIZATION 19
ECONOMIC DRIVERS 22
TARGET INDUSTRY LINKAGES AND PROFILES 26
Computers and Electronics Manufacturing 27
Software and Media 27
Software and Media 27
Health Sciences and Technology 28
Health Services 28
Data Centers 29
Amenity Retail, Recreation, and Hospitality 29

VI. FORECAST OF EMPLOYMENT AND LAND NEED 30

CITY OF HILLSBORO EMPLOYMENT FORECASTS 30
Overview of Employment Forecast Methodology 30
Scenario 1: Safe Harbor Forecast 31
Scenario 2: Transportation Area Zone Forecast 32

INITIAL DRAFT

Scenario 3: Alternative Employment Forecast ... 32
Summary of Employment Forecast Scenarios ... 34
EMPLOYMENT LAND FORECAST ... 36
Baseline Land Demand Analysis ... 37
Additional Considerations in Land Demand ... 40

VII. BUILDABLE LAND INVENTORY ... 41

OVERVIEW OF TECHNICAL METHODOLOGY ... 42
Constraint Assumptions ... 43
Site Classification Methodology ... 43
Comprehensive Plan Designations for Employment Uses—Total Employment Land ... 44
Total Employment Acreage by Current Development Status ... 46
Vacant and Partially Vacant Land Characteristics ... 47
Partially Vacant Land Classification—Potential Infill and Redevelopment ... 50
Total Potential Redevelopment Capacity on Partially Vacant and Developed Land ... 50
FINAL BUILDABLE LAND ESTIMATES ... 52
Supply of Sites and Employment Acres by Site Size—City of Hillsboro ... 53

VIII. RECONCILIATION OF NEED AND CAPACITY ... 55

Employment Land Need Conclusion ... 57

IX. RECOMMENDATIONS ... 59

X. ECONOMIC DEVELOPMENT GOALS AND POLICIES ... 61

APPENDIX A: SITE REQUIREMENTS ... 66

General Requirements: ... 69
Site Requirements: ... 69
INDUSTRY PROFILES ... 73
A: Computer & Electronic ... 73
B: Software & Media ... 74
C: Multi-Tenant Office ... 74
D: Food Processing ... 75
E: Other Manufacturing ... 75
F: Life/Bioscience Research & Development Campus ... 76
G: Wholesaling ... 76
H: Retail ... 77
I: Data Center ... 77
J: Incubator ... 78

INITIAL DRAFT

I. INTRODUCTION

This report introduces analytical research presenting an Economic Opportunities Analysis (EOA) for the City of Hillsboro. The updated EOA is part of a larger Comprehensive Plan update being undertaken by the City.

Cities are required to reconcile estimates of future employment land demand with existing inventories of vacant and redevelopable employment land within the UGB. The principal purpose of the analysis is to provide an adequate land supply for economic development and employment growth. This is intended to be conducted through a linkage of planning for an adequate land supply to infrastructure planning, community involvement and coordination among local governments and the state.

To this end, this report is organized into six primary sections:

- **Economic Trends:** Provides an overview of national, state and local economic trends affecting Hillsboro, including population projections, employment growth, retail trends and a demographic profile.

- **Target Industries:** Analysis of key industry typologies the City should consider targeted economic opportunities over the planning period.

- **Employment Land Needs:** Examines projected demand for industrial and commercial land based on anticipated employment growth rates by sector.

- **Capacity:** Summarizes the City's inventory of vacant and redevelopable industrial and commercial land (employment land) within the City of Hillsboro's urban services boundary.

- **Reconciliation:** Compares short- and long-term demand for employment land to the existing land inventory to determine the adequacy and appropriateness of capacity over a five and twenty-year horizon.

- **Recommendations:** Summary of findings and policy implications

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III. EXECUTIVE SUMMARY

The City of Hillsboro has an enviable economic base, with a diverse range of firms providing high-quality employment opportunities for local residents, as well as the broader region and state. The City is one of the few areas in the State of Oregon that compete effectively for nationally and internationally competitive sites. This has bolstered the local and regional economy through the attraction of major traded sector employers that also support an extensive number of related firms.

Hillsboro is a net importer of labor, with almost 23,000 more workers commuting into the city than commuting out. Hillsboro employers provide employment opportunities for a broadly distributed workforce, including residents throughout the region. In Hillsboro, roughly 80% of the workforce lives within 25 miles of their job. Hillsboro businesses generally draw labor from eastern Washington County, Bethany/Cedar Mill/Rock Creek, and Portland's Close-In neighborhoods.

Wages in Washington County are significantly higher than the regional average, due in large part to a higher concentration of higher wage industries. However, within sectors local wages are higher as well, indicating a more competitive labor market. The differential between local and regional wage rates is also expanding. The highest wages in the community are paid in the manufacturing, information, and wholesale trade sectors.

The local economy has been robust, but is highly reliant upon computer and electronics manufacturing. This industry accounts for almost a quarter of all employment in Hillsboro. Other major industries in the local economy include information services and health services. The economic performance of most industries locally is consistent with national trends. Notable sectors that have been outperforming national trends during the current expansion cycle include hospitals, computers & electronics, health services, specialty trade contractors, and professional services.

The City has significant strength and potential for growth in several key industries. Identified target industry clusters include:

- *Computers & Electronics Manufacturing*
- *Software & Media*
- *Health Sciences & Technology*
- *Health Services*
- *Data Centers*
- *Amenity Retail, Recreation, & Hospitality*

The twenty-year employment forecast projects average annual employment growth at 2.0%. The forecast anticipates manufacturing growth to continue to outperform national trends, reflecting Hillsboro's active support for traded sector industries and opportunities identified in targeted industries. The outlook in the Information sector is exceedingly positive, reflecting Hillsboro's growing opportunities in Software, Data Processing/Analysis, and Data Centers. This scenario assumes the creation of over 40,000 new jobs over the planning period.

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Forecasted employment was converted into space and land need necessary to accommodate the anticipated growth. The projections identify short-term need for 663 acres and long-term need of 2,952 acres. Roughly 195 acres of this employment is expected to be accommodated on non-employment land.

When physical constraints are removed and employment zoning is considered, there are 2,573 acres of net unconstrained employment land that is potentially available to meet Hillsboro's capacity. This assessment includes an extrapolation of identified expansion sites and parcels with known development. Expansion sites have a dedicated use and are not generally available to the market. Sites with known development will be considered "developed" within the project's base year. Currently just under 5% of net-buildable acreage is currently under development.

FIGURE 3.1: SUMMARY OF NET BUILDABLE EMPLOYMENT ACRES, BLI

Development		Gross Buildable Acres				Net Buildable Employment Acres			
Status	**Taxlots**	**C**	**IN**	**MU/SCPA**	**Total**	**C**	**IN**	**MU/SCPA**	**Total**
Vacant	299	57	1,112	127	**1,295**	37	881	99	**1,016**
Infill	26	1	86	2	**89**	0	43	1	**43**
Rdev(Dev)	392	57	172	92	**321**	27	143	86	**255**
Rdev(Part)	179	44	1,148	85	**1,277**	21	855	60	**937**
Expansion	33	2	204	35	**240**	2	167	33	**201**
Known	15	0	121	3	**124**	0	117	3	**120**
TOTAL	**944**	**160**	**2,843**	**344**	**3,347**	**87**	**2,206**	**281**	**2,573**

Infill and potential redevelopment in already developed areas comprise a small share of buildable land. These low rates are indicative of short-term supply challenges, and suggest that new urban areas will be critical in maintaining a competitive land supply. Redevelopment on partially vacant sites represents almost as much capacity as vacant land.

The reconciliation of projected employment needs and available capacity indicates that the City has an adequate supply of land for industrial uses through 2035 in aggregate, while the capacity for commercial uses is adequate only through 2022. At an aggregate level, comparing overall demand with capacity will inherently understate need, as the aggregate capacity will be an imperfect match to the profile of projected demand. In other words, the full capacity will be realized only if the profile of that capacity is identical to what is demanded.

While the City has a considerable vacant land inventory, that land alone is inadequate to meet the 20-year needs of the community. The City will be reliant upon redevelopment and/or intensification of uses to meet its long-term needs, with capacity from redevelopment and infill representing 46% of all employment capacity by 2035. While there appears to be adequate redevelopment and infill capacity within the City, the availability of this type of space to the market is inherently difficult to forecast.

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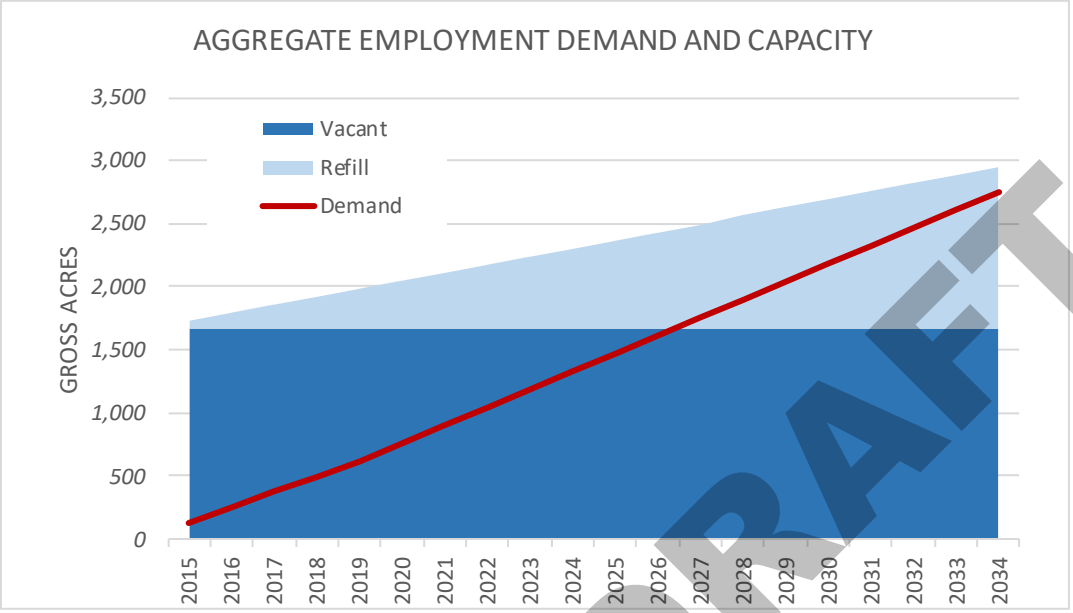
FIGURE 3.2: AGGREGATE EMPLOYMENT DEMAND AND CAPACITY



The heavy reliance upon redevelopment and infill to meet employment needs represents a significant risk, as predicting redevelopment capacity is inherently difficult. Much of this property is in very low intensity uses in the North Hillsboro Industrial Area, and redevelopment is considered quite likely. The City should periodically monitor the magnitude and character of redevelopment and infill activity, and refine its estimated capacity as better data is available.

The City actively seeks to support and expand its economic base going forward. Maintaining an ongoing inventory of available and readily developable sites in a range of sizes, configurations, and locational characteristics is critical to supporting economic development. The City's current site inventory is quite strong, and it has a strong and growing inventory of speculative industrial and commercial space. The ongoing construction of speculative space by the development community serve a vital role in meeting forecasted employment needs.

The implementation measures outlined in this report are intended to encourage effective utilization of the City's potential employment capacity, as well as to assure that the City maintains a competitive position regionally as well as nationally and internationally.

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IV. Economic Trends

This report section summarizes long and intermediate-term trends at the national, state, and local level that will influence economic conditions in Hillsboro over the 20-year planning period. This section is intended to provide an economic context for growth projections and establish a socioeconomic profile of the community. This report's national evaluation has a focus on potential changes in structural socioeconomic conditions both nationally and globally. Our localized analysis considers local growth trends, demographics, and economic performance.

National Trends

The most commonly used measure of economic prosperity is real gross domestic product (GDP) per capita. Real GDP per capita is essentially a measure of national wealth considered on an individual basis, and the increased purchasing power of the population translates into greater investment in health care, education, housing, leisure, and many other factors. U.S. real GDP per capita remains fairly stable. Over the last century, the average annual growth rate has been 1.8%, despite considerable shifts in economic and social conditions—a finding that suggests long-term economic growth is more related to very broad trends, such as population growth and investment in physical and human capital, than temporary economic fluctuations, like the recent Recession and government policy. In other words, monetary, economic, and fiscal policy may influence growth within a given business cycle, but long-term growth is driven by investment, changing population, and global influences.

The Great Recession officially brought six consecutive quarters of negative economic growth in 2008 and early 2009. The depth of and duration of this downturn was the most pronounced since World War II. The recovery and current expansion cycle has been particularly modest to date, as credit markets are more stringent, businesses are more cautious, and housing construction has yet to emerge as a driving catalyst.

While the narrative for labor markets is slightly different, recession-era declines in output growth were less severe locally, a likely product of a high share of traded sector industries. Similar to previous cycles, inflection points in economic cycles continue to lag national trends by several years. For example, local negative output occurred in 2012-2013, not 2008-2009.

Over the near-term, the Congressional Budget Office (CBO) forecasts continued moderate growth in the 3% range, with long-term growth expected to be slightly lower than past expansion cycles[1].

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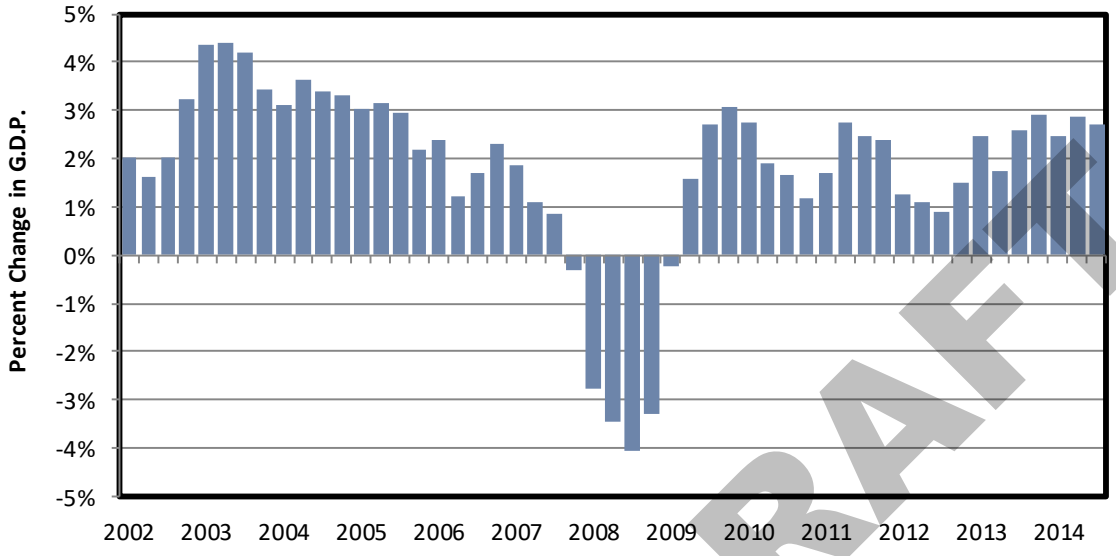
1 Congressional Budget Office, The 2015 Long-Term Budget Outlook (June 2015)

FIGURE 4.01: NATIONAL GROSS DOMESTIC PRODUCT TRENDS



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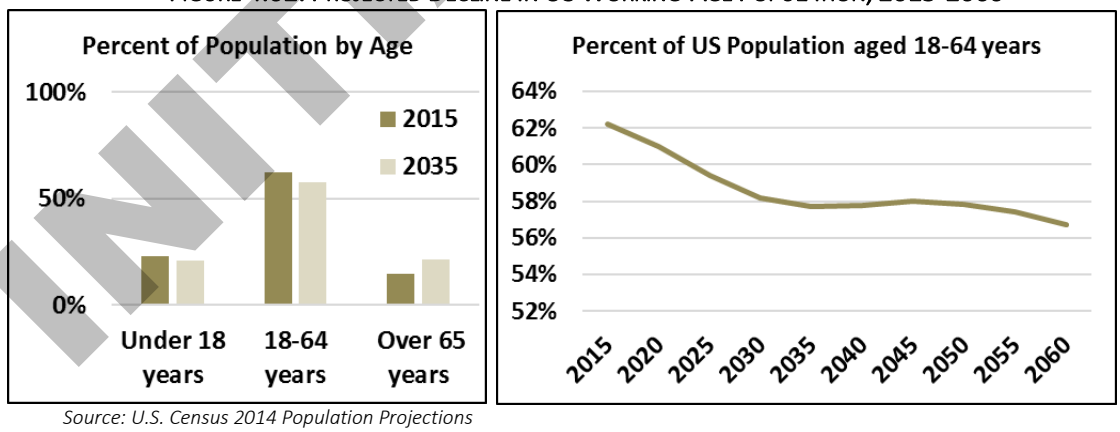
Demographic Factors and Labor Force Participation

The aging of the Baby Boomers into their retirement years will perhaps be the greatest challenge to the U.S. economy over the planning period. By 2035, the share of the population age 65 and over will have grown to 21% from 14.5% today. Despite the fact that an increasing number of Boomers expect to work at least part time past age 65, the impact of this demographic shift on the labor force participation rate, and by extension potential output (goods and services produced), will be considerable. Such a demographic shift will undoubtedly reduce the size of the workforce considerably over the next 20 years.

FIGURE 4.02: PROJECTED DECLINE IN US WORKING-AGE POPULATION, 2015-2060



Source: U.S. Census 2014 Population Projections

Boomers, however, are not the whole story. Labor force participation is also likely to shift within some cohorts. On the positive side, persons aged under 25 years, discouraged in recent years by a dismal labor market, fled to colleges and universities across the country. The enrollment rate for 18 to 24-year-olds

increased from 37.3% to 42.0% between 2006 and 2011[2]. Although the rate has since fallen to 39.9% in 2013, the long-term trend is clear—college enrollment rates have been increasing more rapidly than the college-age population cohort since the 1990s. Between 2003 and 2013, the 18-24 age group grew by 9%, while college enrollment increased by 20%. College-educated workers return with vigor and an enhanced productive capacity from their educational endeavors. However, growth in the labor force participation rate among women in their most productive working years (25-54), a segment that has grown steadily over the last half century, has likely reached its peak. Labor force growth will also be modestly tempered by changes associated with the Affordable Care Act (ACA)—with affordable health care, workers have a slightly diminished incentive to work. However, the 2016-2026 CBO report predicts that the "slack" in the labor market (difference between actual and potential employment) will continue to diminish up through 2020, despite the countervailing forces mentioned above[3].

Over the near-term, an improved economy and higher wages will bring many discouraged workers back into the labor pool, narrowing the gap between actual and potential output. Long-term, an aging workforce will lower the labor force participation rate, leading to slower growth than that observed in previous expansions.

Global Impacts on Migration

Rising globalization has driven growth in emerging economies over the last twenty years, specifically in China, Southeast Asia, India, Latin America and some African countries. This growth has increased incomes and purchasing power in many parts of the world. With incomes in emerging economies expected to grow more quickly than U.S. incomes over at least the next 50 years, the difference between domestic and foreign incomes and standards of living will certainly decrease.

While undoubtedly a positive for reducing poverty and increasing global demand for goods and services (some of which are produced in the United States), the improved economies of emerging countries will lead to higher wages in those countries. Many who otherwise would chose to migrate to the U.S. for better opportunities will find those opportunities at home—resulting in lower rates of international migration to the U.S. Over the last 25 years roughly 35% of population growth in the U.S. was derived from international migration,[4] but it is possible that this share will decrease.

Taking these two factors together, the U.S. labor force could be facing the dual impacts of an aging population *and* lower migration. One estimate suggests these combined factors could result in a reduction of the domestic labor force of 15% by 2060[5]. In this context, to maintain its historical stability, continued growth in per-capita real GDP will be more dependent on gains in productivity, skills, innovation, and technical knowledge. In a way, this shift is will favor U.S. economic strengths, because the recent shift away from manufacturing- and resource-based industries (discussed below) has brought an increased demand for technological innovation, and human capital in the form of education. Assuming that the United States maintains its competitive advantage in education and innovation, the drop in labor force participation will be somewhat balanced out by this economic shift and GDP growth will remain, as ever, stable.

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2 National Center for Education Statistics, Digest of Education Statistics (2014)

3 Congressional Budget Office, The Budget and Economic Outlook: 2016 – 2026 (Jan 2016)

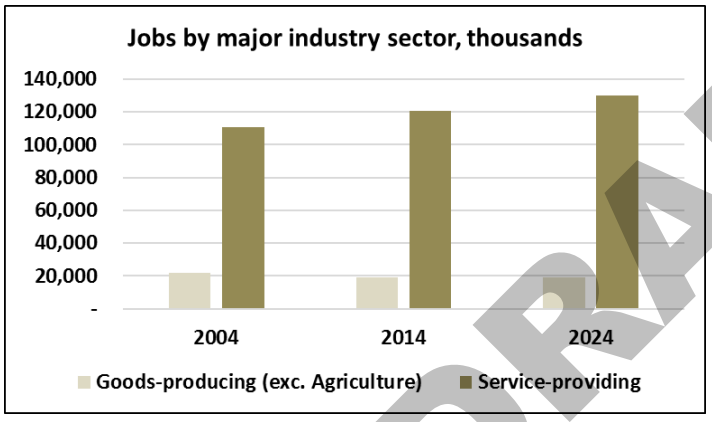
4 Migration Policy Institute tabulation of data from the United Nations, Department of Economic and Social Affairs (2013).

5 OECD (2014), Shifting Gear: Policy Challenges for the next 50 Years", OECD Economics Department Policy Notes, No. 24 July 2014.

Shifting Industrial Patterns

As mentioned above, the United States in in the process of shifting from a goods economy, featuring manufacturing and natural resources, towards a service economy, which emphasizes technological innovation, research, and design. Over the period 2014-2024, service providing industries[6] are expected to account for 94.6% of all jobs added in the United States[7].

FIGURE 4.03: EMPLOYMENT BY TYPE, UNITED STATES



Global Factors Influencing Growth

In addition to changing population and shifting trade dynamics, there are some global factors that may influence growth.

- As emergent economies strengthen, and especially if the Trans-Pacific Partnership is instituted, trade linkages between nations are likely to increase. This will influence global demand for domestic products as well as the balance of trade between the United States and its trading partners.

- This rising global demand is expected to benefit the primary sectors of resource-rich countries to the greatest degree. This bodes well for U.S. energy and agricultural markets, provided the U.S. can keep pace with demand.

- Additionally, a stronger global market lessens the severity of domestic shocks to the economy, which in turn strengthens the global economy further.

Other Factors Influencing Growth

- Increased life expectancy and an aging population will continue to support growth in health care services, but will place additional pressure on the federal government to meet Social Security and Medicare obligations.

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6 The seven service industries are: Professional and Business Services, Education and Health Services, Financial Activities, Trade/Transport/Utilities, Leisure and Hospitality, Financial Activities, Information, and Other Services

7 Bureau of Labor Statistics, Occupational Employment Projections (2014-2024)

- Lower international migration could adversely impact innovation in America. Immigrants are twice as likely to start a business, compared to domestic residents[8]. This is especially the case in the high-tech sector, where 25% of U.S. technology and engineering companies started over the last 20 years had at least one immigrant founder[9].

- Falling domestic energy costs (most notably the price of natural gas), are expected to increase manufacturing competitiveness in some industries. Currently, transport of natural gas is limited, meaning that it cannot be easily traded overseas—a condition that is likely to persist for some time given the location and quantity of domestic reserves. As a result, natural gas is expected to remain a low-cost option, when compared to energy options in other nations. Industries that either use natural gas already, or can easily switch to natural gas, include power generation, fleet transportation, chemicals, and metals. Such industries are in the best position to increase their presence in the global market.

- The negative impacts of the "Great Recession" will be long lasting on potential output. Over the intermediate-term potential output will grow at a rate below average due to deterioration of skills from the long-term unemployed (those out of work for longer than a year).

OREGON TRENDS

Trends in Oregon are likely to parallel national and international trends, with some exceptions. In this section, we examine trends in Oregon that we have previously discussed in the larger context, and consider some new factors as well, where national patterns are less relevant. This section draws explicitly from the Oregon Office of Economic Analysis' most recent economic forecast.[10]

Continued Recovery: Oregon continues to surge ahead of the nation as a whole in recovery from the most recent economic recession. In 2015 and 2016, the state added 5,000 jobs per month, for a growth rate of 3.5%. This rate of job growth is comparable to that observed in the 1990s, during the population boom observed in Oregon during those years, and outpaces the average U.S. state's rate of job growth by a percentage point. Wages have also started to rise, and while they are lower than the U.S. average, they are growing more quickly. Unemployment, at 4.5% statewide, is down below the natural level of 5% (what is expected in a healthy economy due to turnover), and the share of the labor force that is underemployed (working less than they would like to) is down to the pre-Recession level. Strong in-migration in 2014 and 2015 is expected to continue going forward, and while the greatest growth occurs in urban areas, most rural areas are experiencing growth as well, and net in-migration is expected to accelerate[11].

Housing: Oregon should maintain its competitive advantage in housing and cost of living in relation to other west coast markets such as San Francisco and Seattle. While expectations were that housing

8 Kaufman Index of Entrepreneurial Activity

9 Wadhwa, Vivek, et al. *America's New Immigrant Entrepreneurs, 2007*

10 Oregon Office of Economic Analysis, Oregon Economic and Revenue Forecasts (June 2016).

11 Portland State Population Research Center, Summary of 2015 Estimates Findings (November 2015).

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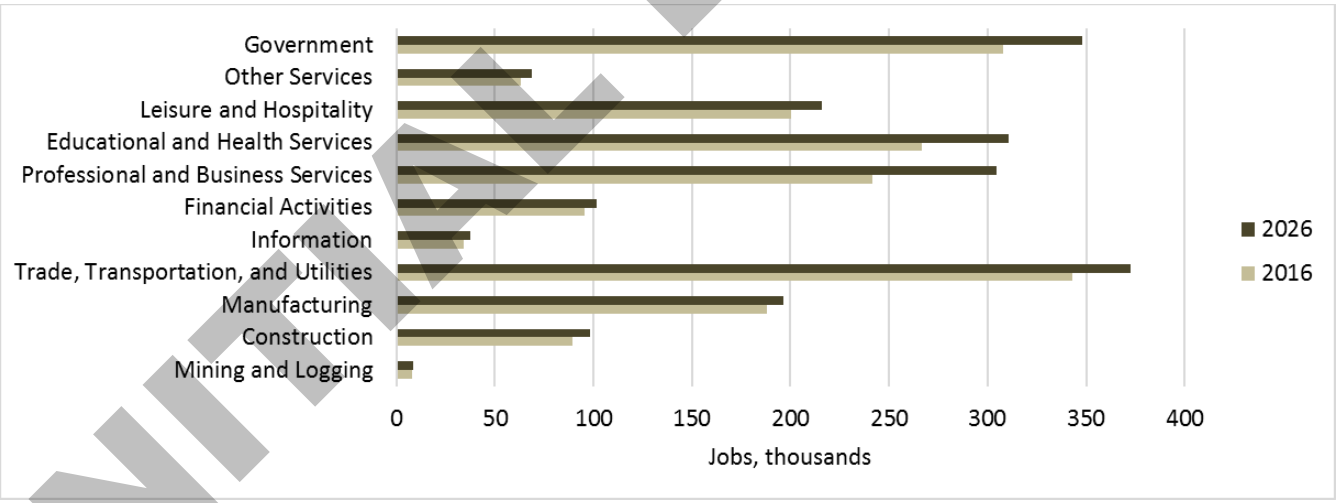
investment and construction would provide a greater contribution to Oregon's emergence from the Great Recession, the housing market has been slow to recover. The sales of existing homes and new construction activity have almost returned to pre-Recession levels, and while foreclosures and long-term delinquency rates remain somewhat elevated, they are thought to be trending downwards.

Even as the housing market recovers, new supply entering the market has not kept up with demand and housing affordability is becoming a larger risk to the outlook. Expectations are that new construction will continue to accelerate to match the increase in demand, alleviating the squeeze on supply and returning prices to the affordable range. Until that gap is bridged, it is expected that rent and home prices will continue to increase, hopefully without outstripping the rate of growth for household income. There is evidence that price growth has started to level off somewhat, but the trend is still upward.[12]

Shifting Industrial Composition: Oregon has experienced a decades-long shift away from natural resource based industries toward more value-added manufacturing activities such as technology, machinery, equipment, and fabricated metals. This trend is expected to continue. Moreover, Oregon should continue to follow the national trend of growth in service-oriented industries outpacing goods production.

FIGURE 4.04: 10-YEAR EMPLOYMENT FORECAST BY INDUSTRY SECTOR, STATE OF OREGON (2016-2026)



SOURCE: Oregon Economic and Revenue Forecast September 2016, Oregon Office of Economic Analysis

Green Technology: Among the strategic opportunities Oregon faces is leading growth in green energy and technology. The initiative to increase energy efficiency, reduce carbon emissions, and develop alternative means of energy have resulted in increased investment across a range of industries. Oregon has a competitive advantage in many of these arenas, including biofuels, wind and wave energy, and solar energy. The extent to which these industries can achieve stabilized competitiveness through scale and/or technological advance will influence local opportunities.

12 Zillow.com, "Portland Home Prices and Values" (August 2016).

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Other Long-Term Advantages: Oregon holds many other long-term competitive advantages on both a national and global scale, including but not limited to its relatively low electricity costs, strategic economic location on the Pacific Rim and proximity to Vancouver B.C., California, and Asia. Relative to these markets, communities in Oregon boast clean water supplies, cost of living advantages, and lower space rents.

Economic Risks

The economic outlook for Oregon is not without risks, particularly over the long-term planning period. Those risks recently identified by the June 2016 OEA forecast include:

Federal Fiscal Policy—While the budget cuts that took place at the federal level in 2013 continue to reverberate through the economy, Oregon has been less exposed to their impacts due to relatively low federal funding. However, Oregon does employ a higher-than-average number of federal workers, and thus is impacted by spending reductions nonetheless.

Housing Market Recovery—Oregon's construction industry is slowly rebounding, with the rate of new starts increasing in response to excess demand. Foreclosures appear to be on the decline, and construction activity is anticipated to continue to rise into 2017.

European Debt—While domestic credit markets are easing, problems in the Eurozone persist, with the threat of financial market contagion not fully abated.

Commodity Prices—While trending downward, commodity prices remain high and any demand driven commodity price inflation would threaten global expansion.
Commodity prices, which recently been relatively high in comparison with historical levels, have started to decrease. However, it is normal for inflation to occur during expansions, so it is uncertain whether they will continue to do so. Rising energy prices would add to such inflation, and while Oregon does enjoy low energy prices, most goods are not produced locally.

Other Global Spillovers—Political instability in the Middle East, Ukraine, and Israel, viral outbreaks or health crises in West Arica, growth in the Chinese economy, and inflation in emerging markets might all impose costs at home.

Wage Legislation—Oregon's recent minimum wage increase, while not anticipated to result in a loss of jobs, will slow employment growth going forwards, until the economy adjusts.

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WASHINGTON COUNTY & HILLSBORO ECONOMIC TRENDS

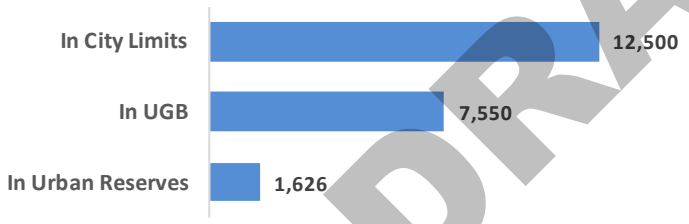
Local economic growth over the planning period will be, in part, functionally representative of demographic and economic trends observed locally and in the region. A review of these conditions provides a useful context for establishing a baseline expectation of future growth in Hillsboro. In this section we consider local demographic and workforce conditions, recent business activity, and the overall performance of the economy in recent years.

Population Growth

Over the next 20-years, the three-county region is expected to add nearly a half-million new residents. The lion's share of growth will be captured in Washington County, representing 44.7% of regional growth (221,600 new residents). This represents a slight acceleration of the 42% capture rate exhibited since 2000.

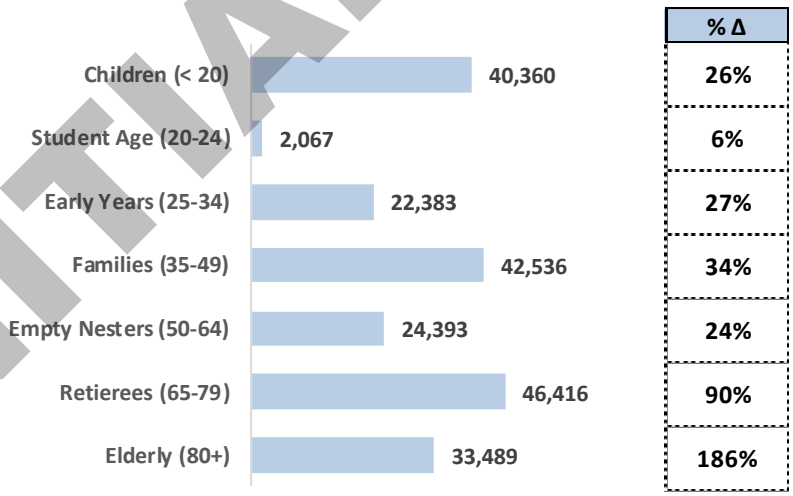
Since the turn of the century, Hillsboro's population has grown by 27,300 residents, an increase of over 38%. According to Hillsboro's recently completed housing needs analysis; the city is expecting household growth of 21,676 new **households** over the planning period. An estimated 58% of growth will occur in existing urban areas and 42% occurring in currently unincorporated or future expansion areas. The size and location of future household growth will impact where demand for future services will occur in the City.

FIGURE 4.05: HILLSBORO PROJECTED POPULATION GROWTH, 2015 THROUGH 2035



Washington County, and by extension the City of Hillsboro, will undoubtedly be older on average in 2035 relative to today. Over 80,000 new residents will be retirees or elderly. The next highest growth segment will be families (34%).

FIGURE 4.06: HILLSBORO POPULATION FORECAST BY AGE, 2015 THROUGH 2035



Hillsboro is becoming increasingly diverse, with 28% of the population now identifying as Hispanic and 9% as Asian.

Migration

Commensurate with economic expansion and increased employment opportunities, migration into Washington County from other regions in the United States and abroad has accelerated rapidly. Since 2010,

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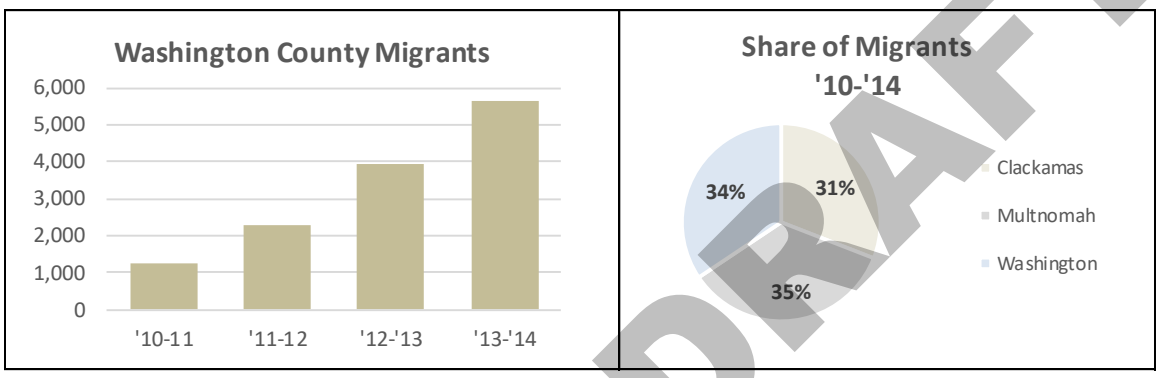
Washington County has accounted for 35% of new migrants to the region and over 17% of all net-new migrants to the state of Oregon.

For much of Oregon, the period from 2000 through 2010 was defined by high rates of net in-migration, averaging between seven and eight persons per 1,000 residents annually at both the local and state level. In the current decade, net in-migration rates in Washington County have exploded to over 10 persons per 1,000 between 2013 and 2014.

FIGURE 4.07: WASHINGTON COUNTY MIGRATION PATTERNS



SOURCE: Internal Revenue Service

Commute Trends

Commuting patterns are an important element in the local economy. They are indicative of the labor shed companies can draw workers from, the extent to which job creation translates into increased demand for housing, goods, and services, and the overall balance of population and employment in the community. Overall, Hillsboro has a broad labor shed, exhibiting an attraction of workers throughout the region. In Hillsboro, roughly 80% of the workforce lives within 25 miles of their job. Hillsboro businesses generally draw labor from eastern Washington County, Bethany/Cedar Mill/Rock Creek, and Portland's Close-In neighborhoods. While an expansive labor shed is a positive for local businesses, at only 21%, Hillsboro has a relatively low share of its workforce residing in the community.

Income and Wages

Incomes of local households define the purchasing power of local residents, and are an indicator of the economic prosperity of a community. Wage levels of the local workforce are determined in the competitive marketplace for labor. All else equal businesses generally prefer locations with lower overall wages, all else equal reducing the cost of conducting business operation. The City of Hillsboro measures above average in both areas in 2014. In 2014, 42%of local households earned greater than $75,000 annually compared to 38% at the regional level. Higher household incomes translate into greater purchasing power, influencing demand for goods and services as well as the types of businesses that are attracted to the community.

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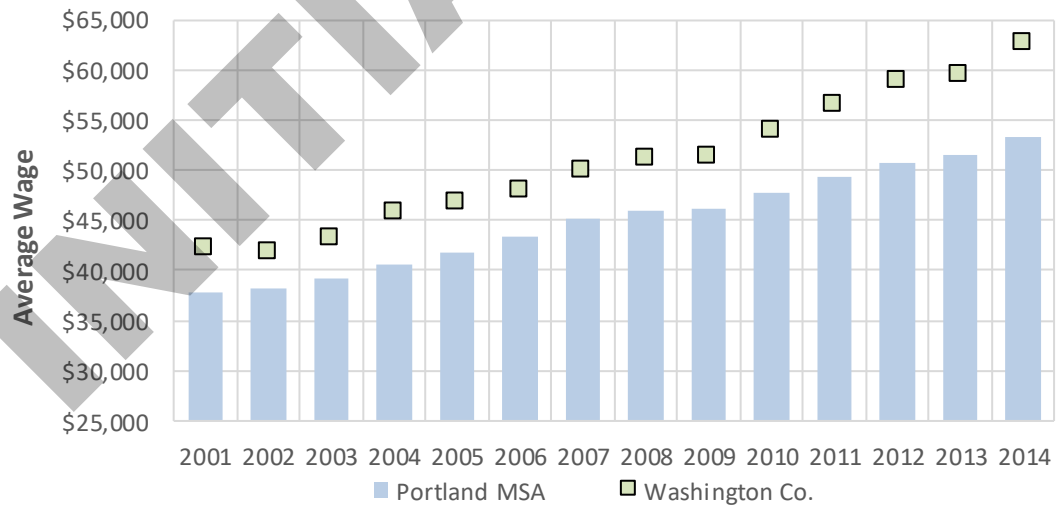
FIGURE 4.08: DISTRIBUTION OF HOUSEHOLDS BY INCOME LEVEL (2014)

Wages in Washington County are structurally higher than the regional average, due in large part to a higher concentration of higher wage industries. However, within sectors local wages are higher as well, indicating a more competitive labor market. The differential between local and regional wage rates is also expanding. The highest wages in the community are paid in the Manufacturing, Information, and Wholesale Trade sectors.

FIGURE 4.09: AVERAGE WAGE LEVELS OVER TIME



Higher resident incomes will continue to drive demand for goods and services. As this trend continues and potentially widens, Hillsboro will increasingly attract higher end retail tenants and amenities. Higher wages relative to the region in some sectors will work against Hillsboro on inter-region business decisions. However,

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wage levels across most sectors remain below comparable west coast markets, contributing to Hillsboro's value proposition as lower cost location for doing business.

Economic Performance

Most counties in Oregon experienced negative employment growth between 2007 and 2010. However, Washington County was more resilient, with declines limited only through 2009. Today, most industries have fully recovered recession employment losses, driven by the manufacturing and administrative services sectors. We find that 90% of net recession job losses were isolated in the manufacturing, administration, retail, and construction sectors. No sector has exhibited sustained losses, but some have been slow to expand, specifically retail, real estate, and transportation.

Across all sectors there are now nearly 11,000 more people employed in Washington County compared to pre-recession levels.

Figure 4.10 illustrates industry sector performance in the Washington County economy during the recent recession (2007-2009) and a five-year recovery period (2009-2014). The x-axis exhibits how an industry performed during the recession, with negative values indicating job losses and positive values indicating job gains. Similarly, the y-axis tracks losses and gains during the two-year recovery (the size of the bubbles indicate the relative size of the sector in terms of employment). By comparing the two axes, we can classify industry sectors into one of four performance quadrants:

> ***Recovery:*** Industries that lost jobs during the recession but have since recovered some of previous losses. Industries above the indicated red line are those that have at least fully recovered from the recession.
>
> ***Continued Losses***: Industries that lost jobs during the recession and have continued on a downward trend during the recovery.
>
> ***Counter-Cyclical:*** Industries that gained jobs during the recession but have since exhibited losses during the recovery.
>
> ***Steady Growth:*** Industries that gained jobs during the recession and have since continued on an upward trend.

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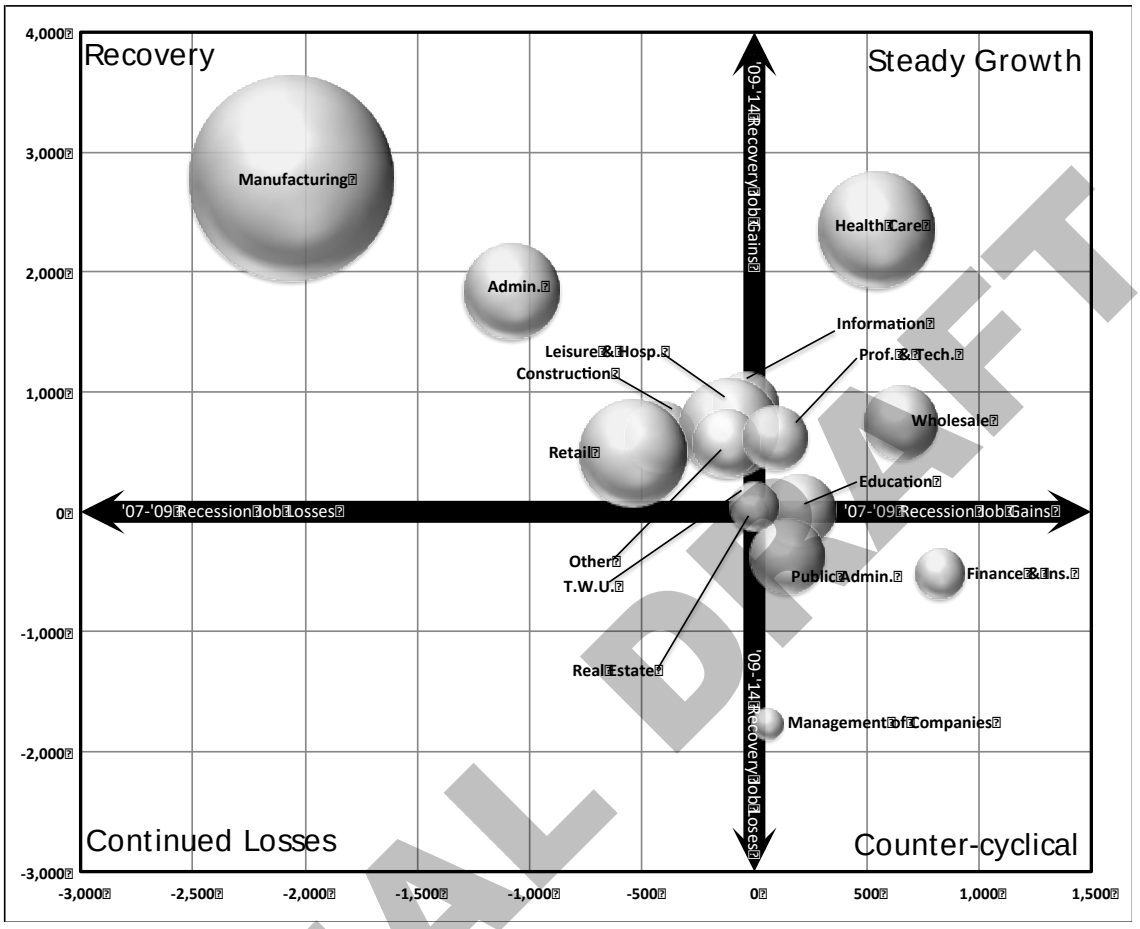
FIGURE 4.10: INDUSTRY SECTOR PERFORMANCE, WASHINGTON COUNTY (2014)



Source: Oregon Employment Department and Johnson Economics

Future downturns are likely to continue to be more moderate in Washington County relative to the region. Steady growth in health care, wholesaling, and professional & technical services is indicative of the resiliency of those sectors. They will continue to drive growth during expansions while softening the net-effect of downturns on local labor markets.

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V. TARGET INDUSTRY ANALYSIS

This report section utilizes a range of analytical tools to assess the economic landscape in Hillsboro toward the determination of industry typologies the City should consider targeted economic opportunities over the planning period. Here, we seek to identify industry anchors and clusters of interrelated industries that have assembled spatially in the community. Where possible, we look to identify the sectors that are likely to drive growth in current and subsequent cycles and to identify opportunities for new, emerging, or relocating sectors.

INDUSTRY CLUSTERS DEFINED

Sound regional economies are best organized around a healthy set of industry clusters—similar and related businesses and industries that are mutually supportive, regionally competitive, attract capital investment, and encourage entrepreneurship. Generally, clusters develop as an agglomeration of businesses in a geography that holds an innate competitive advantage in that industry—whether it is natural resources, human capital, political policies, or geography. For example, Hillsboro's thriving Computers & Electronics (C&E) industry has matured around the historical siting of Tektronics which subsequently attracted a network of suppliers, created a regional knowledge and workforce base, and when combined with land and water/utility resources attracted players such as Intel, TriQuint, and others

While specialization is a critically important factor, it is important for communities to understand that a cluster goes beyond a high concentration of employment or output within a given sector or group of similar sectors. Rather, it is the vertical integration of supply chains, distribution, wholesaling, or even competitively unrelated industries that share common inputs such as materials and trained labor (as has played out in Hillsboro with the Solar industry). Clusters can organize around natural resources, training institutions, or a particular firm or group of firms, among many other factors.

Targeted industries in contrast are subsectors within those clusters where a particular community may have a competitive advantage. For example, an industry that fills an existing gap in the supply chain network, or a completely unrelated industry that has similar labor demands. Further, a targeted industry does not have to be part of an existing cluster network, or even be present in the local economy. In this analysis we identify some "aspirational" industries with emerging opportunities for the City to use its economic development "toolbox" to target.

In our analysis, we attempt to draw inferences about the organization of Hillsboro's clusters across anchor, primary, and ancillary industries, while looking to identify the local characteristics that could encourage growth within this economic ecosystem.

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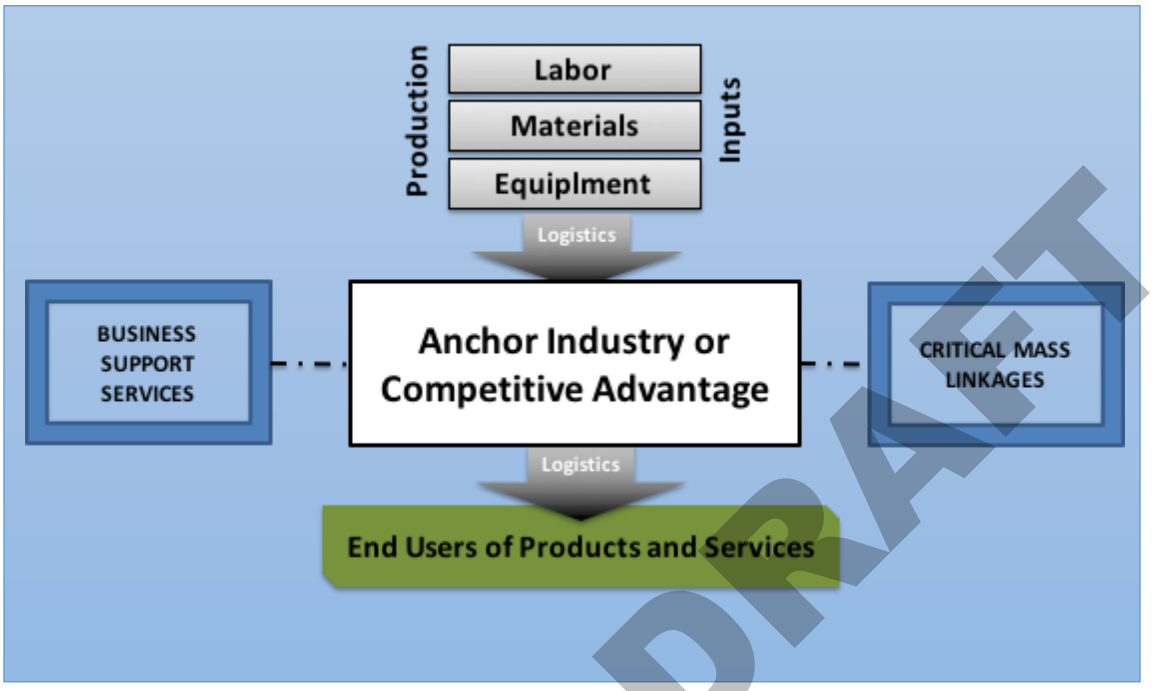
FIGURE 5.1: TYPICAL CLUSTER ORGANIZATION



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The distinction between targeted industries and industry clusters is commonly lost in economic development, with the two terms often used synonymously. We make the distinction here to highlight that cluster analysis is a useful tool in identifying potential target industries, but not all industries in a cluster may be targets

This element of the Economic Opportunities Analysis utilizes analytical tools in combination with anecdotal sources to assess the economic landscape in Hillsboro. The objective of this process is to identify a range of industry typologies that can be considered targeted economic opportunities over the planning period.

In this process, we identify the anchors and clusters of interrelated industries that have already capitalized on Hillsboro's competitive advantages and are operating locally. However, this analysis will also consider how economies and industries are changing, the impact of recent investments in infrastructure, and how exogenous factors may shape future economic growth. In other words, an industry typology does not have to have a large existing presence to be considered a targeted opportunity.

Taken together, the research and analysis in this section and in the previous section represents an evaluation of the likely forces that will drive economic growth, and by extension land need, in coming cycles.

DATA SOURCES

Our evaluation of Hillsboro industry clusters is constructed from two primary sources of empirical information:

Quarterly Census of Employment and Wages (QCEW)

The QCEW data from the Oregon Employment Department provides covered employment and payroll data for Hillsboro firms. The term "covered" refers to employees that are covered by unemployment insurance. Therefore, it does not consider the self-employed and commissioned workers. This data is geocoded at the firm level and provides information on the number of employees, payroll, and industrial NAICS code firms classify as. The use of this dataset has a number of limitations, the most pronounced of which is misclassification of firms by industry. This is particularly problematic for large firms with multiple reporting units, who often misclassify spatially or within a particular industry classification. Other potential limitations include improperly geocoded data and misclassification in NAICS categories. These impacts generally affect a small sample of firms in a community the size of Hillsboro. Where possible, we augment the data based on known factors about major businesses and their operations.

IMPLAN Input-Output Tables

IMPLAN (IMPact for PLANning)[13] datasets are input/output multiplier models that can be used to demonstrate linkages between interrelated industries. Developed by the Forest Service to assist in land and resource management planning, IMPLAN is an economic impact model designed for analyzing the effects of industry activity (employment, income or business revenues) upon all other industries in an economic area. A primary limitation of this data is that we rely on county level data as a proxy for local conditions.

ECONOMIC SPECIALIZATION

The most common analytical tool to evaluate economic specialization is a location quotient analysis. This metric compares the concentration of employment in an industry at the local level to a larger geography. For example, a location quotient of 1.50 for widget manufacturing would indicate that the share of employment in widget manufacturing locally was 50% higher than the national average. Generally, 1.50 is a common threshold indicating a relatively high specialization, which is shown as the red dashed line on Figure 5.2). Large industries are also obviously considerable components of the local economy and should also be considered. When we plot these industries graphically by size, specialization, and sector, we can begin to see some patterns in the data.

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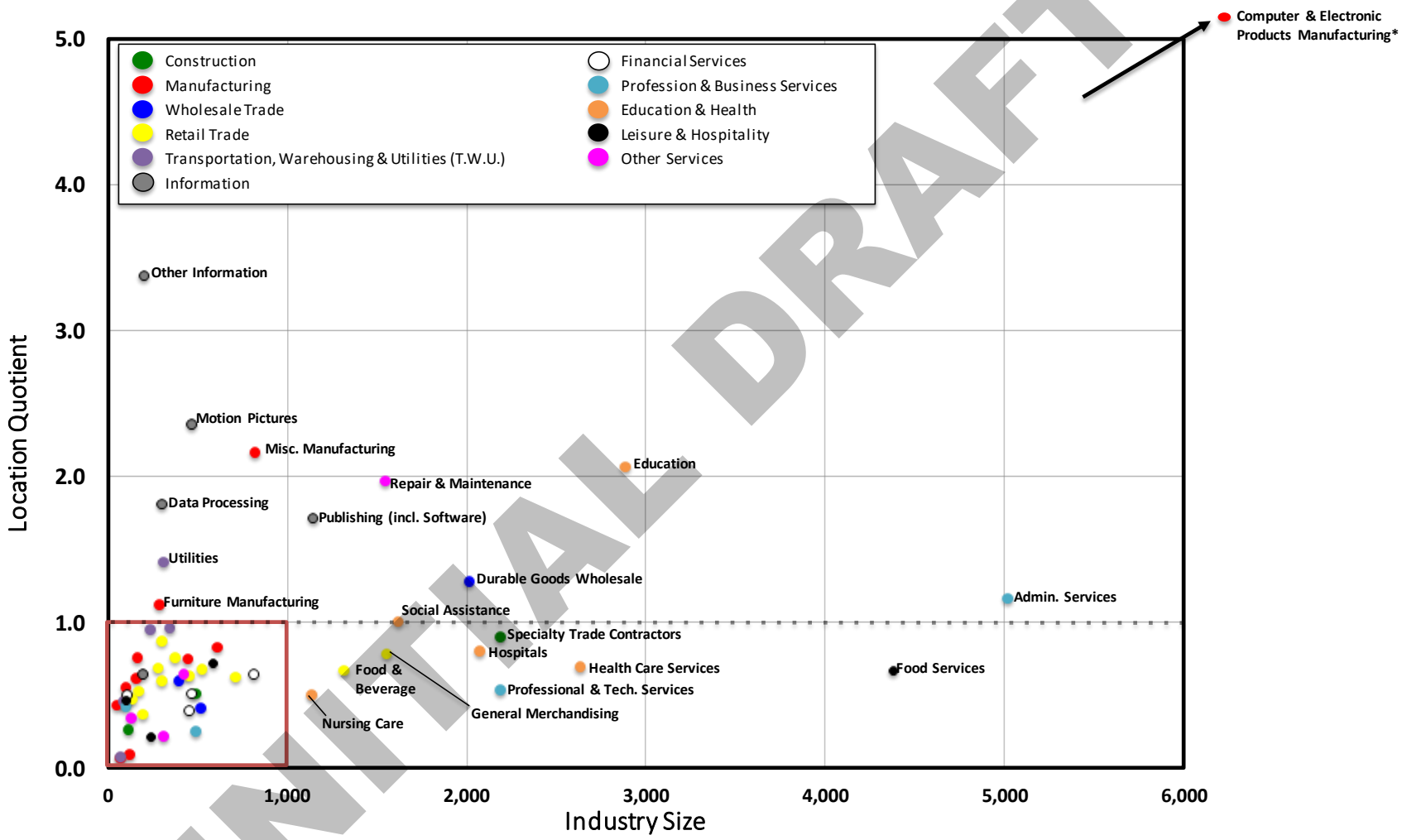
[13] Minnesota IMPLAN Group (MIG), Stillwater, Minnesota

FIGURE 5.2: INDUSTRY SECTOR SPECIALIZATION ANALYSIS, CITY OF HILLSBORO, 2014[14]

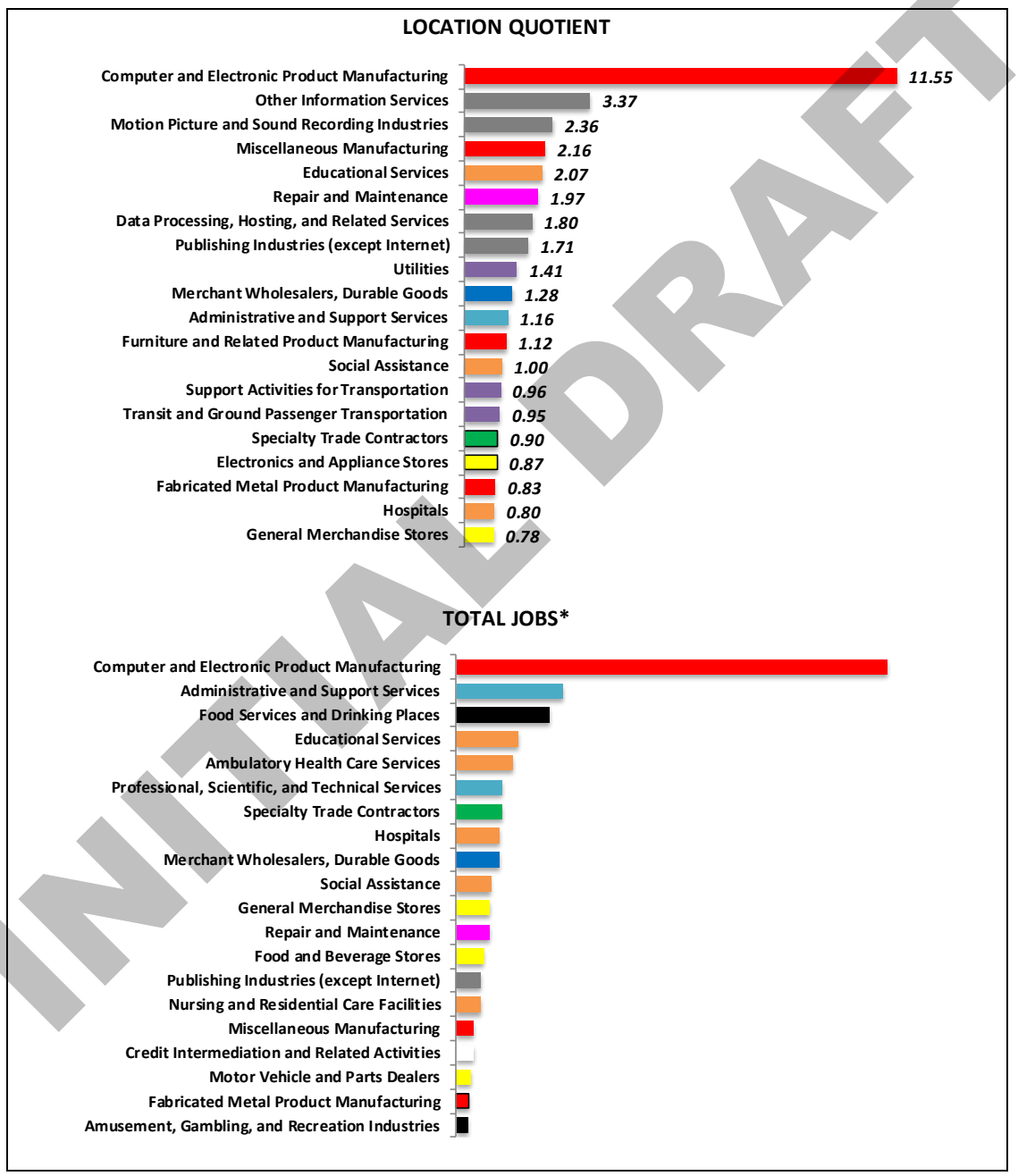


INITIAL DRAFT

14 QCEW Data, Annual Average 2014 Data

We see groupings of industries within specific sectors by size and specialization, with outliers that have exceedingly high specialization, are among the largest industries in the local economy, or both. Industries or groups of industries with these features are the best candidates for our cluster anchors.

FIGURE 5.3: INDUSTRY SECTOR SPECIALIZATION DETAIL, CITY OF HILLSBORO, 2014[15]



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15 QCEW Data, Annual Average 2012 Data

From Figures 5.2 and 5.3 we can derive that that Hillsboro economy is highly specialized in a few fundamental sectors. Some key findings:

- The 20 most specialized industries (highest location quotient) in the study area account for over 63% of all employment in the economy.
- It is well known that Computers and Electronics manufacturing is the heart of the Hillsboro economy. Specialization in this industry is over 11 times the national average with this subsector alone employing well over one in four workers in Hillsboro.
- Many of the location quotients for Hillsboro's most specialized industries are somewhat skewed by the size of the Computers and Electronics industry. However, this is also a true indication that Hillsboro's economy lacks diversity.
- For example, many other highly specialized industries in Hillsboro exist in large part as ancillary services or providers to the Computers and Electronics industry. As we'll present in greater detail later in this section, these industries include wholesaling, repair & maintenance, specialty trade contractors, metals, and subsectors in information services.
- Information services and health services are clearly important sectors of the economy. Half of the eight most specialized subsectors are information services with three of the eight largest subsectors represented by health services.
- The 20 largest subsectors in the Hillsboro economy account for 80% of all employment.

ECONOMIC DRIVERS

The identification of the unique and shifting economic drivers of a local or regional economy are critical in informing the character and nature of future employment, and by extension land demand over a planning cycle. To this end, we employ a shift-share analysis of the local economy emerging out of the current expansion cycle[16]. A shift-share analysis is an analytical procedure that measures local effect of economic performance within a particular industry or occupation. The process considers local economic performance in the context of national economic trends—indicating the extent to which local growth can be attributed to unique regional competitiveness or simply growth in line with broader trends. For example, consider that Widget Manufacturing is growing at a 1.5% rate locally, about the same rate as the local economy. On the surface we would consider the Widget Manufacturing industry to be healthy and contributing soundly to local economic expansion. However, consider also that Widget Manufacturing is booming across the country, growing at a robust 4% annually. In this context, local widget manufactures are struggling, and some local or regional condition is stifling economic opportunities.

16 Measured from the trough of recent recession to 2014, the most recent period available for local employment data.

INITIAL DRAFT

We can generally classify industries, groups of industries, or clusters into four groups:

> **Growing, Outperforming:** Industries that are growing locally at a rate faster than the national average. These industries are the true drivers of the expansion and have characteristics locally leading them to be particularly competitive.
>
> **Growing, Underperforming:** Industries that are growing locally but slower than the national average. These industries generally have a sound foundation but some local factor is limiting growth.
>
> **Contracting, Outperforming:** Industries that are declining locally but slower than the national average. These industries have structural issues that are impacting growth industry wide. However, local firms are leveraging some local or regional factor that is making them more competitive than other firms on average.
>
> **Contracting, Underperforming**: Industries that are declining locally at a rate faster than the national average. These industries have structural issues that are impacting growth industry wide. However, some local or regional factor is making it increasingly tough on local firms. These are industries in the local economy at the great risk.

In association with our knowledge of specialized industrial composition, these metrics help policy makers craft targeted programs and policies to both facilitate the expansion of outperforming industries as well as support those exhibiting risk of deterioration. Hillsboro's economic drivers are considered in Figure 5.4:

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FIGURE 5.4: INDUSTRY SECTOR SHIFT SHARE ANALYSIS, CITY OF HILLSBORO (2010 – 2014)

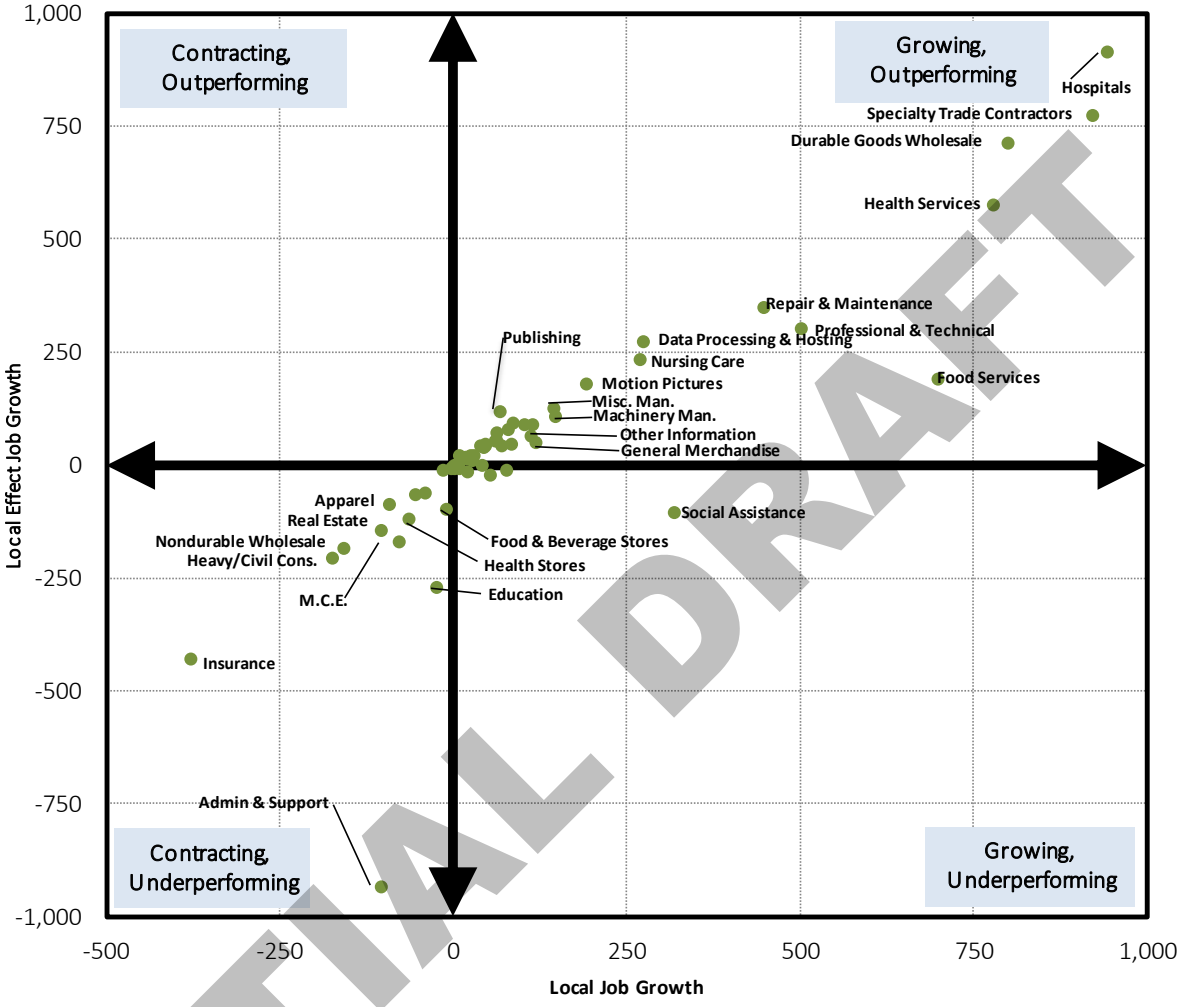

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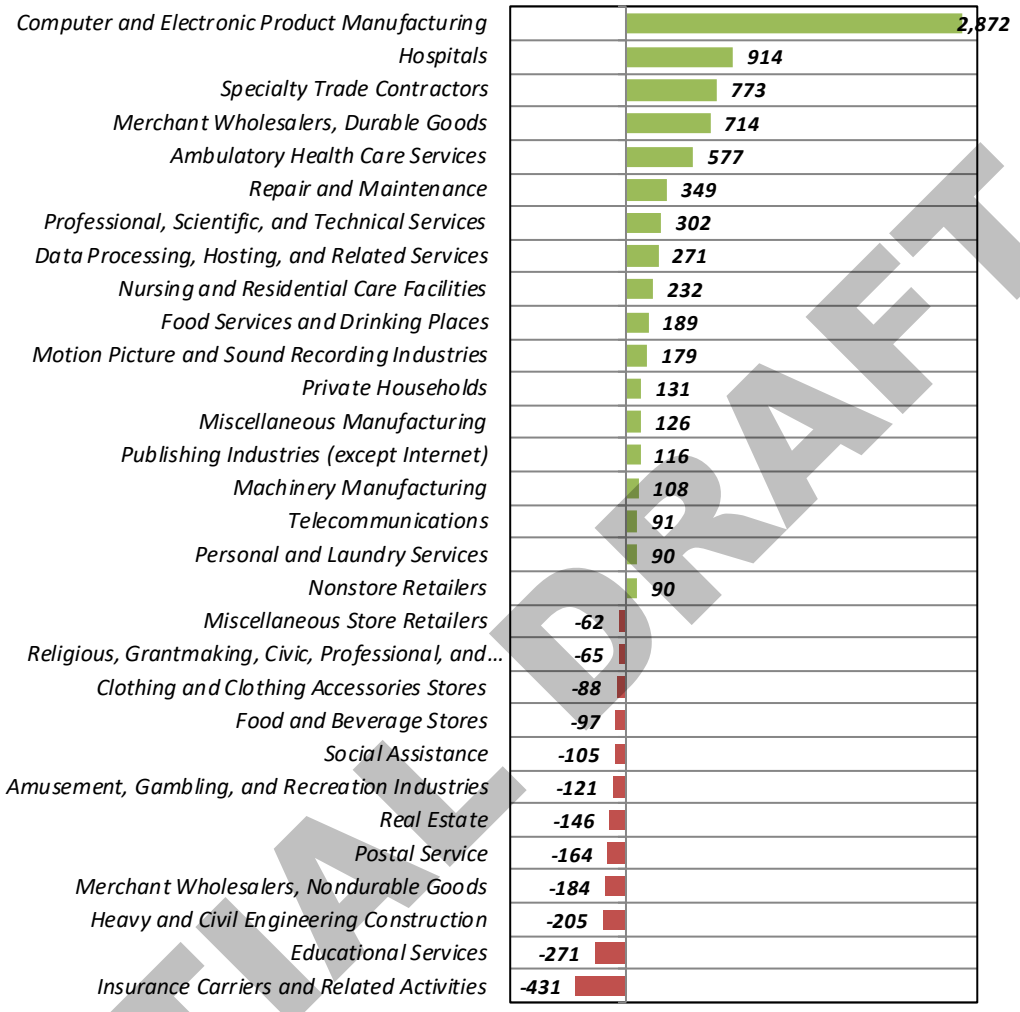
FIGURE 5.5: LOCAL EFFECT JOB GROWTH, CITY OF HILLSBORO (2010 – 2014)



From Figures 5.4 and 5.5 we can consider the industries that are both driving the local economic expansion as well as those industries at risk of becoming increasingly less competitive. Some key findings:

- With the exception of a select few industries (social assistance, fabricated metals), the economic direction of most industries locally is running in line with national trends. Not a single industry is contracting locally but performing better than the national average.

- The balance between industries that are outperforming and underperforming sectors locally represents net economic expansion during the cycle. Champions are pulling the economy forward while challenging industries are drawing growth down. Challenging sectors can reverse course over the duration of a cycle and turn positive, but champions are finding local competitive advantages in a growth market.

- This analysis demonstrates the degree to which the Hillsboro economy is trending relative to the national benchmark. Of the 62 subsectors in Hillsboro with measurable private sector employment, 38 are outperforming. Local effect job growth has totaled nearly 4,700 jobs above and beyond the "expected" status quo.

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- Several dominating sectors including hospitals, computers & electronics, health services, specialty trade contractors, and professional services are clear champions in the current cycle.

- The primary challenging sectors of the economy include insurance, education, heavy construction, nondurable wholesale, and real estate. The good news is that these sectors are somewhat dispersed, and challenges cannot be attributed to some shared fundamental flaw in the local economy.

TARGET INDUSTRY LINKAGES AND PROFILES

In addition to the previous metrics, we took a more granular look at the composition of industry sectors and the local businesses that operate within them. This is an essential exercise when forecasting industrial growth, as changes in a particular "foundational" industry are likely to permeate through other related businesses within a cluster. For example, if widget manufacturing is expected to exhibit strong growth, then local firms related to widget manufacturing (i.e. widget wholesaling & distribution, packaging & labeling of widgets, construction & maintenance of widget making machinery, etc.) are also likely to grow.

We find in economic cluster analysis that industries are linked in a variety of ways. Specifically, we have identified five general categories of linkage by which firms and industries agglomerate spatially or are fundamentally interrelated, although others likely exist.

Source of Demand: Firms or populations that support the demand for goods or services within a particular cluster. The "end user" of a good or service. Examples include population centers, foreign markets, or industries that utilize a particular good or service.

Source of Production Inputs: Firms or industries that supply inputs to the production process of another industry. Examples include raw materials, software, equipment, or components for assembly.

Distribution Activity: Firms or industries facilitate the processing, transportation, distribution, or wholesale of goods and services. The intermediary between sourcing or end users. Examples include food packaging and labeling, trucking/distribution, and wholesale trade brokers.

Ancillary/Business Support: Firms or industries that provide services that support the business operations of populations or other businesses in the economy. These firms generally exist in part or on whole due to the presence of other businesses, industries, & clusters. Examples include legal and accounting services, payroll services, and building maintenance.

Unrelated/Labor Pool or Sourcing: Sectors that are unrelated to each other but have agglomerated in the same geography due to a sharing of value chain or labor force. Examples include industries that utilize a common raw material or skill set in the workforce.

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Computers and Electronics Manufacturing

The Computers & Electronics (C&E) cluster in Hillsboro is arguably the most well organized agglomeration of businesses, suppliers, and support industries in Oregon. Collectively branded as the "Silicon Forest", the industry catalyzed out of the location decisions of large firms such as Tektronix and Intel. The primary industries in the C&E industry are generally organized into four tiers, including; (1) assembly, packaging, and testing, (2) manufacturing & etching, (3) components & machinery, and (4) raw materials[14]. The industry produces a broad range products ranging from semiconductors and machinery to electromedical devices, wiring, and batteries. The industry anchored in Hillsboro accounts for the vast majority of all Oregon exports.

The following are key industry trends:

- Microelectronics will continue to proliferate into seemingly every industry, including robotics, medicine, processing networks, Internet of Things, and automotive products.
- Slowing of Moore's law and persistent pressure for increased productivity will keep product life-cycles low, impacting facility investment cycles.
- Industry will be slow to convert to 450mm.
- Increases in capital utilization and automation will increase demand for high skill workers but lower employment densities overall.
- Assembly has increasingly moved overseas, leading to C&E employment declines nationally. This employment trend has not held true in Hillsboro.

Software and Media

The Greater Portland 2020 initiative defined this cluster into two tiers; (1) firms that develop, customize, and implement software and include all activities related in information technology services, and (2) media that can be produced, disseminated, and consumed on computers and electronic devices, including video, audio, software, and video games[15]. This definition largely characterizes the structure in Hillsboro. However, we deviate slightly by removing data centers from this definition due to differences in land need.

In Hillsboro, software and media employment has grown by 50% since 2010, driven by growth within firms in addition to large additions like Salesforce.com. Large firms dealing in business-to-business functions characterize the nature of software in Hillsboro, as opposed to smaller to medium sized "creative" software firms.

The following are key industry trends:

- Trend toward software as a service and cloud computing.
- Mobile devices and app development creating entirely new segments.
- Big data and integration into mechanical and manufacturing processes (mechatronics) represents a significant growth segment.
- Growing disinvestment from established software hubs as institutional scale firms look for lower cost west coast outposts. The Portland MSA has emerges as a strategic alternative to Seattle, and Salt Lake.

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Health Sciences and Technology

Unlike many of the other clusters in this analysis that are well established, Health Science & Technology is not a mature well organized cluster in Hillsboro or the Portland Metropolitan area for that matter. This cluster is typically organized around two segments. As defined in the by the Greater Portland 2020 initiative; (1) The medical devices (technology) niche covers the development and manufacture of instruments, implants, and other devices that help diagnose, manage, and treat disease conditions. (2) The biotechnology niche includes sectors that cover firms involved in the development and production of pharmaceuticals, biological products, and in vitro diagnostics substances.

To a certain extent, both of these cross-segments draw on existing established economic functions in Hillsboro, including health services and microelectronics competencies.

The following are key industry trends in this sector:

- Consolidation of development functions (research, design, manufacturing, marketing).
- Cross integration with microelectronics and other sectors (wearables, micro sensors, smart clothing, nanomedicine.)
- Additive manufacturing changing supply chains and response times.
- Integration and overlap with agriculture and food science research.
- Shifting funding sources away from public in research. Strong growth in capital markets.
- Utilization of software, big data, mobile health.

Health Services

Health Services in Hillsboro is among the largest sectors of the economy, accounting for one out of every 10 jobs. The cluster locally is anchored around institutional scale assets including Tutality Community Hospital, Kaiser, and Pacific University's College of Health Professionals. The cluster is well balanced across subsectors, with considerable employment in hospital, health services, and continuing care. Hillsboro has a specialized niche in rehab specialists. Health Services in Hillsboro is among the fastest growing segments of the local economy, growing by 42% since 2010 and accounting for 26% of all job creation over this period.

Looking forward, demographics and policy will continue to drive need for these types of health services, specifically continuing care.

The following are key industry trends:

- Emphasis on leveraging cost advantages.
- Strong growth in utilization of mobile health systems, software, and access to information.

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- Emerging care models (i.e. Zoomcare).
- Virtual appointments.
- The Affordable Care Act (ACA) is broadly expected to lead to market consolidation in the hospital and insurance industry.
- An estimated 5 to 8% of Boomers will age in multi-family retirement and care facilities.

Data Centers

By NAICS definition, Data Centers are classified under NAICS 5182: Data Processing, Hosting, and Related Services. We consider them separately from other "information and software" activates because the land and utility needs are far different. Over the just the last five years, unprecedented growth in demand for data hosting has developed an entirely new segment of the industrial landscape in Oregon and specifically Hillsboro—attracted to a generally temperate climate, low overall disaster risk, low utility rates from renewable sources, and abundant water.

The growth outlook for data centers is strong, as high growth rates for streaming, software as a service (SaaS), and big data across industry creates an accelerating need for hosting services. Global data center demand is expected to grow threefold over just the next five years[17]. With edge markets like Portland/Hillsboro in the path of growth, the extent that Hillsboro will permit data center expansion on prime greenfield sites will be an important near-term policy decision.

The following are key industry trends:

- Increases in software management and automation will reduce employment densities even further.
- An increasing demand for renewable energy sources for colocation facilities.
- Enterprise consolidation in colocation facilities.
- Acceleration in Edge data center markets like Portland/Hillsboro.
- Data centers will continue to try to emulate the architecture and efficiency of by larger single application centers like Amazon, Apple, and Facebook.
- Growing demand for private networks.

Amenity Retail, Recreation, and Hospitality

Quality retail, restaurant, recreation, and hospitality tenants make a community an attractive place to live and work. Studies have shown that amenity-related supportive uses have a positive impact on housing values and attract residents and businesses alike. This is a growing phenomenon in the context of emerging consumer preferences observed across Millennial and Boomer generations. Attraction of these types of businesses offers Hillsboro the opportunity to raise its amenity profile, revitalize strategic target areas and work toward becoming a true 18-hour community where people gather to work as well as recreate. These uses provide opportunities for entrepreneurs and small business owners, and facilitate gathering of people and organizations to share ideas, build community, and foster innovation.

The following is an inventory of prospective uses that are considered positive urban amenities. The City's economic development strategy should contain policies to nurture and support amenity based uses.

INITIAL DRAFT

VI. Forecast of Employment and Land Need

City of Hillsboro Employment Forecasts

Goal 9 requires that jurisdictions plan for a 20-year supply of commercial and industrial capacity. Because employment capacity is the physical space necessary to accommodate new workers in the production of goods and services, employment need forecasts typical begin with a forecast of employment growth in the community. The previous analysis of economic trends and targeted industries set the context for these estimates. This analysis translates those influences into estimates of employment growth by broad industry. Forecasts are produced at the sector or subsector level (depending on available information), and subsequently aggregated to two-digit NAICS sectors. Estimates in this analysis are intended for long-range land planning purposes, and are not designed to predict or respond to business cycle fluctuation.

The projections in this analysis are built on an estimate of employment in 2015, the commencement year for the planning period. Employment growth will come as the result of net-expansion of businesses in the community, new business formation, or the relocation/recruitment of new firms. Forecast scenarios consider a range of factors influencing growth, as well as consideration of third-party estimates from both public and private sources.

Long-range forecasts typically rely on a macroeconomic context for growth. Inflections in business cycles or the impact of a major shift in employment (i.e. a major unknown recruitment) are not considered. However, the "Alternative Forecast Scenario" produced by Johnson Economics does consider known expansions/development expected over a short-term horizon.

Overview of Employment Forecast Methodology

The first analytical step of the analysis is to update covered employment to the 2015 base year. Our foundational Hillsboro specific QCEW dataset provides covered employment by industry through 2014. To update these estimates, we use observed industry specific growth rates for Washington County between 2014 and 2015 (summary level county employment data is released on more timely basis than place level detailed data).

The second step in the analysis is to convert "covered"[18] employment to "total" employment. Covered employment only accounts for a share of overall employment in the economy. Specifically, it does not consider sole proprietors or commissioned workers. In Washington County. Non-covered workers have averaged 16% of the employment base over the last five years. The differential is obviously most common in real estate, where commissioned workers comprise an unusably large share jobs. Taken together, the assumed 2015 total employment base for Hillsboro is 85,407 jobs.

[18] The Department of Labor's Quarterly Census of Employment and Wages (QCEW) tracks employment data through state employment departments. Employment in the QCEW survey is limited to firms with employees that are "covered" by unemployment insurance.

INITIAL DRAFT

FIGURE 6.01: CONVERSION OF COVERED TO TOTAL EMPLOYMENT

Major Industry Sector	2014 Employment	'14-'15 County[1]	2015 Update	Total Emp. Conversion[2]	2015 Estimate
Construction	2,786	-2.3%	2,721	81%	3,346
Manufacturing	23,258	4.5%	24,296	98%	24,918
Wholesale Trade	2,922	-0.4%	2,910	89%	3,278
Retail Trade	6,301	1.4%	6,388	88%	7,297
T.W.U.	1,298	1.7%	1,320	70%	1,893
Information	2,337	2.8%	2,403	88%	2,720
Finance & Insurance	1,313	-4.0%	1,260	72%	1,753
Real Estate	589	3.8%	611	36%	1,701
Professional & Technical Services	2,185	2.6%	2,242	69%	3,248
M.C.E.	491	9.3%	537	97%	554
Administration Services	5,120	2.2%	5,233	84%	6,225
Education	2,886	4.4%	3,012	56%	5,342
Health Care	7,455	4.3%	7,775	85%	9,095
Leisure & Hospitality	5,384	6.4%	5,731	87%	6,580
Other Services	2,406	5.5%	2,540	58%	4,374
Government	2,991	3.0%	3,082	100%	3,082
TOTAL	**69,723**	**3.4%**	**72,061**	**84%**	**85,407**

1 Oregon Employment Department, Washington County. Imputed at lowest NAICS and aggregated to sectors

2 Bureau of Economic Analysis. Calculated as a five-year average between 2010 and 2014

T.W.U. = Transportation, Warehousing, & Utilities
M.C.E. = Management of Companies and Enterprises

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Scenario 1: Safe Harbor Forecast

The Goal 9 statute does not have a required method for employment forecasting. However, OAR 660-024-0040(9)(a) outlines several safe harbor methods. The most applicable for Hillsboro is 660-024-0040(9)(a)(A), which recommends reliance on the most recent regional forecast published by the Oregon Employment Department. This method applies industry specific growth rates for the Portland Metro Workforce Region (Washington and Multnomah County) to the 2015 Hillsboro base. This method results in an average annual growth rate of 1.5%, with total job growth of 28,906 jobs.

FIGURE 6.02: SUMMARY OF SAFE HARBOR FORECAST

			20-Year Forecast			2015-2035	
Industry	2015	2020	2025	2030	2035	#	AAGR
Construction	3,346	3,803	4,323	4,914	5,585	2,239	2.6%
Manufacturing	24,918	25,983	27,094	28,251	29,459	4,540	0.8%
Wholesale Trade	3,278	3,492	3,719	3,961	4,218	940	1.3%
Retail Trade	7,297	7,711	8,150	8,613	9,102	1,805	1.1%
T.W.U.	1,893	1,990	2,092	2,200	2,313	420	1.0%
Information	2,720	2,880	3,048	3,227	3,416	696	1.1%
Finance & Insurance	1,753	1,847	1,945	2,049	2,159	405	1.0%
Real Estate	1,701	1,819	1,945	2,080	2,225	524	1.4%
Professional & Technical Services	3,248	3,637	4,073	4,561	5,108	1,860	2.3%
M.C.E.	554	607	665	729	798	244	1.8%
Administration Services	6,225	6,994	7,859	8,830	9,922	3,697	2.4%
Education	5,342	5,783	6,260	6,776	7,335	1,993	1.6%
Health Care	9,095	10,140	11,305	12,604	14,053	4,958	2.2%
Leisure & Hospitality	6,580	7,125	7,716	8,355	9,048	2,468	1.6%
Other Services	4,374	4,705	5,062	5,445	5,858	1,484	1.5%
Government	3,082	3,229	3,383	3,545	3,714	632	0.9%
TOTAL	**85,407**	**91,746**	**98,639**	**106,141**	**114,312**	**28,906**	**1.5%**

In recent years, it has been customary for employment forecasts in Economic Opportunities Analyses to consider refill rates in across the first five years of the employment forecast. Thousands of jobs were lost

during the great recession. While jobs and companies declined, by-and-large, the space they occupied did not. Projections with a base year in the post-recession recovery needed to consider that a share of employment growth in the near-term would locate in existing space (refill). In the current environment, real estate vacancies are below market equilibrium. Therefore, refill was not considered in all scenarios presented in this analysis.

Scenario 2: Transportation Area Zone Forecast

Hillsboro is currently working with Metro to update its long-range forecasts of employment and housing by Transportation Area Zone (TAZ). These estimates will be finalized in mid-2016. At the time of this draft, the most recent 2015-2035 TAZ forecast estimated 2.2% average annual growth across the entire urban area[3]. However, estimates are produced individually across 102 different TAZ areas. Beginning with the allocation of employment growth by industry specified in the Safe Harbor Forecast, Johnson Economics used Geographic Information Systems (GIS) software to identify the industries in high growth TAZ areas. We combined this analysis to develop a TAZ based forecast scenario. This approach yields average annual growth of 2.2% over the planning period and the creation of 46,459 jobs. Robust growth is expected in service-oriented industries including professional & technical services, health care, and administration services. More measured growth is expected across manufacturing, T.W.U. and government sectors.

FIGURE 6.03: SUMMARY OF TAZ BASED FORECAST

						2015-2035	
Industry	**2015**	**2020**	**2025**	**2030**	**2035**	**#**	**AAGR**
Construction	3,346	4,040	4,877	5,888	7,108	3,762	3.8%
Manufacturing	24,918	26,507	28,196	29,993	31,905	6,987	1.2%
Wholesale Trade	3,278	3,598	3,948	4,333	4,755	1,477	1.9%
Retail Trade	7,297	7,917	8,589	9,319	10,111	2,814	1.6%
T.W.U.	1,893	2,038	2,195	2,363	2,544	651	1.5%
Information	2,720	2,959	3,218	3,500	3,807	1,087	1.7%
Finance & Insurance	1,753	1,893	2,044	2,207	2,383	630	1.5%
Real Estate	1,701	1,878	2,073	2,289	2,528	827	2.0%
Professional & Technical Services	3,248	3,837	4,532	5,353	6,323	3,075	3.4%
M.C.E.	554	634	725	829	949	394	2.7%
Administration Services	6,225	7,389	8,772	10,413	12,361	6,136	3.5%
Education	5,342	6,004	6,749	7,585	8,525	3,182	2.4%
Health Care	9,095	10,674	12,528	14,703	17,256	8,161	3.3%
Leisure & Hospitality	6,580	7,399	8,321	9,357	10,522	3,943	2.4%
Other Services	4,374	4,871	5,425	6,042	6,729	2,355	2.2%
Government	3,082	3,302	3,537	3,789	4,059	977	1.4%
TOTAL	**85,407**	**94,939**	**105,728**	**117,964**	**131,865**	**46,459**	**2.2%**

Scenario 3: Alternative Employment Forecast

The final forecast scenario is closely influenced by the research and analysis conducted in the EOA. This scenario formulates an employment growth trajectory based on identified trends, the growth outlook for targeted industries, and input from the project technical advisory committee. Further, the alternative scenario recognizes that the city's policy direction has influence over realized growth in targeted sectors. This scenario considers the influence of known or anticipated development over a near and medium-term horizon. Considering Hillsboro's unique comparative advantages, the following identified factors which are expected to influence growth informed the forecast

Location

Hillsboro's location within the region will continue to influence the mix of employment uses it will attract. For example, Hillsboro's location off of "thru" arterials will continue to challenge downtown for a range

INITIAL DRAFT

of industries and hinder marketability for distribution and logistics uses. Conversely, while increasing congestion is lengthening travel times, the City will continue to draw from a broad Portland central city labor shed. The location relative to globally scaled manufacturers and educational institutions (PCC, Pacific University) will also benefit the community.

Household Growth

Growth in many sectors, including retail, hospitality, banking, and real estate, among others, is a direct function of population and households in a community. Forecasts of employment and land need in these sectors are influenced by household growth forecasts identified in the city's Housing Needs Analysis.

Available Land

On a regional scale, Hillsboro has a superior supply of marketable employment land. The recent industrial development boom in Hillsboro and inter-regional expansions in Hillsboro (i.e. Reser's) is indicative of Hillsboro's growing role to accommodate regional growth pressure. This role is arguable elevated to a statewide scale in the context of large-lot designations in the North Hillsboro Industrial Area.

Local Policy, Economic Development, and Infrastructure

Hillsboro has a sophisticated economic development program that has expanded its "toolbox" to successfully attract and support new and expanding businesses. The recently adopted North Hillsboro Industrial Urban Renewal Area provides an immediate mechanism to responsively provide right-sized infrastructure for the new urban employment area. Growing urban renewal resources in Downtown, the use of S.I.P and Enterprise Zones, and targeted programs in other Subareas (Tanasbourne, AmberGlen, South Hillsboro) will also influence growth patterns.

Statewide Policy

The outcome of statewide policy initiatives will have direct influence over the growth trajectory of some sectors in the economy. The adoption of statewide minimum wage increases looks inevitable, and is expected to place downward pressure on growth in service industries. The adoption of a proposed gross receipts tax is less certain. The general sentiment from the project's Technical Advisory Committee is that this initiative would adversely impact Hillsboro's recruitment successes on the margin.

The Alternative Forecast is presented in the context of Hillsboro's recent 5-year growth pattern. Since 2010, Hillsboro has grown at a robust 3.3% annual rate. Leading growth sectors include Health Care (+8.6% AAGR), Information (+8.4%), Other Services (+7.5%), Construction (+6.9%), and Professional & Technical Services (+5.9%).

INITIAL DRAFT

FIGURE 6.04: SUMMARY OF ALTERNATIVE EMPLOYMENT FORECASTS

	Total Employment[4]		'10-'15 Growth		20-Year Forecast				2015-2035	
Industry	2010	2015	#	AAGR	2020	2025	2030	2035	#	AAGR
Construction	2,402	3,346	944	6.9%	3,794	4,303	4,879	5,533	2,187	2.5%
Manufacturing	21,227	24,918	3,691	3.3%	27,134	28,969	31,929	34,025	9,106	1.6%
Wholesale Trade	2,545	3,278	733	5.2%	3,829	4,158	4,767	5,159	1,880	2.3%
Retail Trade	6,680	7,297	617	1.8%	7,831	8,249	8,828	9,293	1,996	1.2%
T.W.U.	1,783	1,893	110	1.2%	2,027	2,170	2,323	2,487	594	1.4%
Information	1,819	2,720	901	8.4%	3,512	4,261	5,359	6,483	3,763	4.4%
Finance & Insurance	2,310	1,753	-557	-5.4%	1,932	2,130	2,348	2,588	835	2.0%
Real Estate	1,907	1,701	-206	-2.3%	1,819	1,945	2,080	2,224	523	1.4%
Professional & Technical Services	2,437	3,248	811	5.9%	3,865	4,599	5,473	6,513	3,265	3.5%
M.C.E.	588	554	-33	-1.2%	615	682	756	838	284	2.1%
Administration Services	6,213	6,225	12	0.0%	6,790	7,407	8,081	8,815	2,590	1.8%
Education	5,161	5,342	181	0.7%	5,795	6,286	6,819	7,397	2,054	1.6%
Health Care	6,019	9,095	3,076	8.6%	10,254	11,561	13,785	15,447	6,352	2.7%
Leisure & Hospitality	5,261	6,580	1,319	4.6%	7,607	8,063	8,548	9,065	2,486	1.6%
Other Services	3,043	4,374	1,331	7.5%	4,737	5,129	5,554	6,015	1,641	1.6%
Government	3,329	3,082	-247	-1.5%	3,259	3,445	3,643	3,851	769	1.1%
TOTAL	**72,725**	**85,407**	**12,682**	**3.3%**	**94,801**	**103,358**	**115,172**	**125,732**	**40,326**	**2.0%**

4 Both 2010 and 2015 estimates have been converted to total employment consistent with the methodology outlined in this analysis.

Taken together, the 20-year forecast in this scenario averages 2.0% average annual growth. Our outlook for Manufacturing is slightly more optimistic than macroeconomic forecasts indicate—a function of known future expansion's, Hillsboro's policy direction to support traded sector industries, and opportunities identified in targeted industries. The forecast for population serving sectors is generally in-line with other scenarios, with the exception of retail, which considers the build-out of South Hillsboro's Village Center; and Leisure & Hospitality, which factors the negative effects of new minimum wage rates as well as development planned or under construction (TopGolf, Hotels, etc.). The outlook in the Information sector is exceedingly positive, reflecting Hillsboro's growing opportunities in Software, Data Processing/Analysis, and Data Centers. This scenario assumes the creation of over 40,000 new jobs over the planning period.

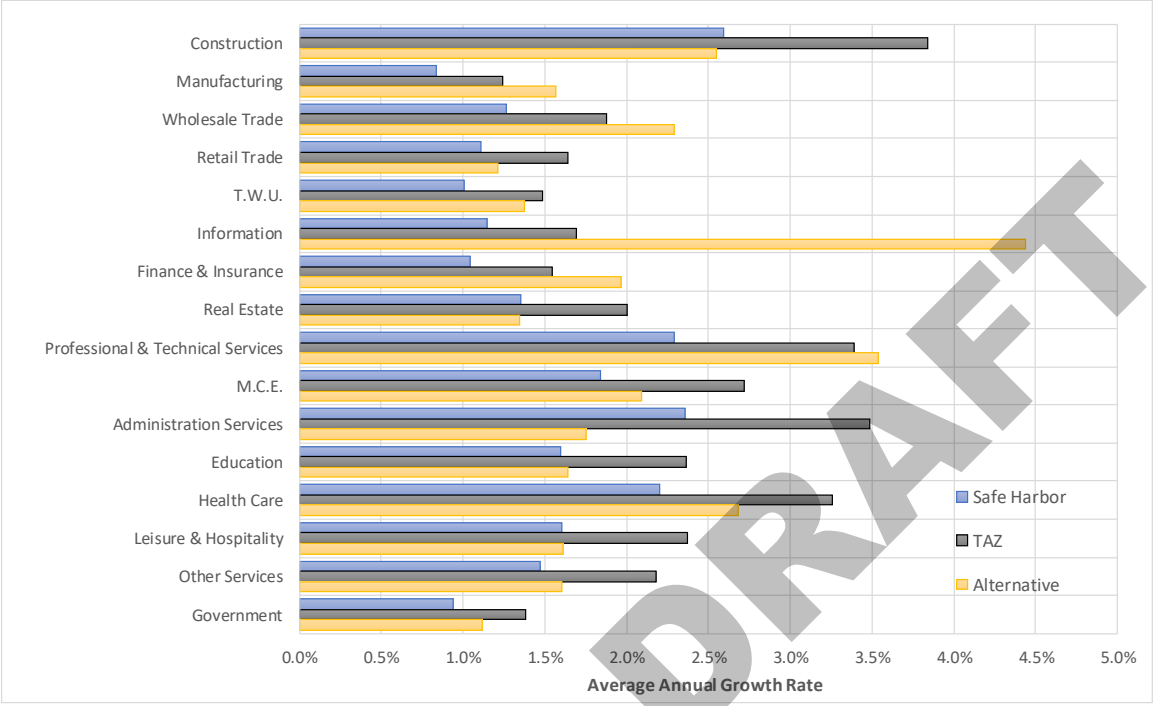
Summary of Employment Forecast Scenarios

The three forecast scenarios in this analysis range from 1.5% average annual growth to 2.2%. Job growth estimates range from 28,906 to 46,459 jobs. The summary estimates here consider the rates at which different sectors utilize varying space/land typologies (Office, Retail, Institutional, Industrial). This aggregation was developed consistent with methods outlined in the 2014 Urban Growth Report[5].

Both the Safe Harbor and TAZ based forecasts assume growth on the margin will increasingly trend toward service-oriented employment uses, whereas the Alternative Forecast assumes the allocation across uses will remain more stable (predicting small increases in office and institutional uses offset by small decreases in industrial and retail).

INITIAL DRAFT

FIGURE 6.05: PROJECTED AVERAGE ANNUAL GROWTH RATES BY SECTOR AND SCENARIO



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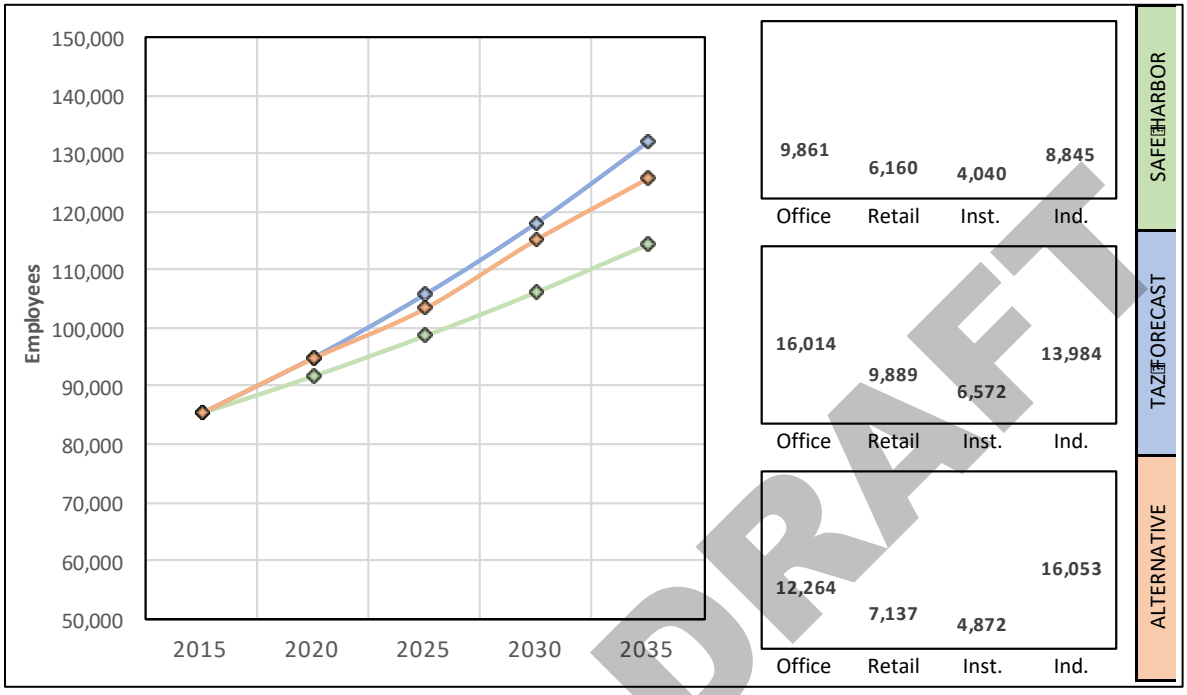
The estimates in the preceding analysis are useful in creating a baseline understanding of macroeconomic growth prospects. These are common and broadly accepted approaches when looking at large geographic regions, and is similar to the methodology used to produce the employment forecasts in Metro's Urban Growth Report. However, forecasts grounded in broad based economic variables do not account for the realities of local businesses and trends among evolving industries. Industries continually evolve and new opportunities arise. Just ten years ago data centers barely existed in the Northwest, e-commerce business models such as Amazon were still being questioned as viable, social media was in its infancy, commercial aerial drones didn't exist, and the first smart phones were just being designed. Five years ago app development wasn't even an industry and most macro forecasts had the information sector (includes software publishing) declining or exhibiting flat growth. Any long-term forecast is inherently uncertain, and should be updated on a regular basis to reflect more current information.

The following graphic summarizes the three alternative forecasts, and their implications at a broad level for space and land requirements. While the rates of growth are similar, the composition of forecasted growth implies a somewhat different land use pattern. Under the trended safe harbor approach, office space utilizing employment sectors account for a greater proportion of new demand. This pattern is continued in the TAZ based forecast, while the alternative forecast anticipates a relatively greater need for industrial space and land.

FIGURE 6.06: SUMMARY OF FORECAST SCENARIOS



While either of the three forecast scenarios is supported by the best available information and methodologies as required by OAR 660-024-0040(1), the employment land forecast is based on the alternative employment forecast scenario.

EMPLOYMENT LAND FORECAST

The next analytical step in our analysis is to convert projections of employment into forecasts of land demand over the planning period. The generally accepted methodology for this conversion begins by allocating employment by sector into a distribution of building typologies those economic activities usually locate in. As an example, insurance agents typically locate in traditional office space, usually along commercial corridors. However, a percentage of these firms locate in commercial retail space adjacent to retail anchors. Cross-tabulating this distribution provides an estimate of employment in each typology.

The next step converts employment into space using estimates of the typical square footage exhibited within each typology. Adjusting for market clearing vacancy we arrive at an estimate of total space demand for each building type.

Finally, we can consider the physical characteristics of individual building types and the amount of land they typically require for development. The site utilization metric commonly used is referred to as a "floor area ratio" or F.A.R. For example, assume a 25,000 square foot general industrial building requires roughly two acres to accommodate its structure, setbacks, parking, and necessary yard/storage space. This building would have an F.A.R. of roughly 0.29.

INITIAL DRAFT

The forecast treats retail trade and food services separately. Demand for these services is more closely correlated to households, and more specifically household spending growth.

Baseline Land Demand Analysis

To demonstrate the methodological process used and underlying assumptions, this report will develop land need estimates in a step-by-step process, clearly presenting underlying assumptions.

In this analytical step we allocate employment growth into standard building typologies. The building typology matrix was developed for the 2014 Urban Growth Report, and represents the share of sectoral employment that locates across various building types. Johnson Economics added a category for Data Centers, which varies broadly from any category in the Metro matrix. Further, retail trade and food services have been removed from the forecast. However, demand for retail space driven by other sectors still exists in this analysis because firms outside of retail trade utilize retail space (beauty salons, banking, couriers, day care, insurance, real estate, etc.).

Under the employment forecast scenario, employment housed in industrial space (flex, general industrial, warehouse and data centers) accounts for the greatest share of growth, followed by employment housed in office space and institutional uses (hospitals, schools, government facilities). The full spectrum of retail demand is not included in this portion of the analysis, and is considered separately.

FIGURE 6.07: CONVERSION OF EMPLOYMENT GROWTH TO BUILDING TYPOLOGY

	'15-'35	Building Typology Matrix						
Industry	Growth	Office	Institutional	Flex/BP	Gen. Ind.	Warehouse	Data Center	Retail
Construction	2,187	14%	0%	18%	40%	18%	0%	10%
Manufacturing	9,106	8%	0%	24%	60%	8%	0%	0%
Wholesale Trade	1,880	8%	0%	22%	20%	40%	0%	10%
T.W.U.	594	15%	0%	12%	13%	55%	0%	5%
Information	3,763	20%	0%	20%	30%	0%	20%	10%
Finance & Insurance	835	72%	1%	5%	1%	1%	0%	20%
Real Estate	523	72%	1%	5%	1%	1%	0%	20%
Professional & Technical Services	3,265	72%	1%	5%	1%	1%	0%	20%
M.C.E.	284	79%	5%	8%	0%	0%	0%	8%
Administration Services	2,590	72%	1%	5%	1%	1%	0%	20%
Education	2,054	30%	53%	5%	1%	1%	0%	10%
Health Care	6,352	30%	53%	2%	0%	0%	0%	15%
Leisure & Hospitality	2,486	20%	1%	7%	1%	1%	0%	70%
Other Services	1,641	72%	1%	5%	1%	1%	0%	20%
Government	769	43%	35%	5%	1%	1%	0%	15%
TOTAL	**38,329**	**Employment Growth by Typology**						
		Office	**Institutional**	**Flex/BP**	**Gen. Ind.**	**Warehouse**	**Data Center**	**Retail**
		11,976	**4,852**	**4,724**	**8,062**	**2,342**	**753**	**5,620**

Employment growth estimates by building type are then converted to demand for physical space. This conversion assumes the typical space needed per employee on average. This step also assumes a market clearing vacancy rate, acknowledging that equilibrium in real estate markets is not 0% vacancy. We assume a 10% vacancy rate for office, retail, and flex uses, as these forms have high rates of speculative multi-tenant usage. A 5% rate is used for general industrial and warehouse—these uses have higher rates of owner occupancy that lead to lower overall vacancy. Other uses assume 0% vacancy.

INITIAL DRAFT

Demand for space is then converted to net acres using a standard floor area ratio (FAR) for each development form. Higher ratios for retail and office uses indicate an expectation that these uses will locate in station areas or mixed-use space at a higher rate on the margin. These calculations indicate a 20-year need of 1,343 net-developable acres across all development forms for the Safe Harbor Forecast.

The combined space and FAR assumptions further provide estimates indicated of job densities, determined on a per net-developable acre basis.

FIGURE 6.08: NET ACRES REQUIRED BY BUILDING TYPOLOGY, NON RETAIL

	General Use Typology							
	Office	Institutional	Flex/BP	Gen. Ind.	Warehouse	Data Center	Retail	Total
Employment Growth	11,976	4,852	4,724	8,062	2,342	753	5,620	38,329
Average sq. ft. per Employee	350	600	990	600	1,850	5,000	500	718
Floor Area Ratio (F.A.R.)	0.40	0.25	0.25	0.25	0.25	0.35	0.35	
Market Vacancy	10%	0%	10%	5%	5%	0%	10%	
Net Acres Required	265	267	472	466	418	247	203	2,338
Implied Employment Density (jobs per net acre)	49.8	18.2	11.0	18.2	5.9	3.0	30.5	16.4

Commercial office and retail densities are 50 and 30 jobs per acre, respectively. Industrial uses range from 18 for general industrial to 3 jobs per acre for data centers.

The methodology in this report treats retail and food service driven demand differently than other uses. These uses are more directly correlated with growth in households, consumer spending power, and established non-resident spending patterns.

- *Household growth estimates are coordinated with the City's recently completed Housing Need Analysis.*
- *The analysis assumes zero real income growth, leading to inherently conservative estimates.*
- *Average spending per household by retail sector is provided by a third party data service.*[18]
- *The existing rate of non-resident retail support is assumed to remain constant at 13%.*
- *Net calculated retail acres are allocated to building typologies consistent with the non-retail methodology.*

Combined growth in household and non-resident spending is expected to support an additional 190 net acres. The majority of support will go to commercial retail building typologies. Combined, economic growth over the next 20-years is expected to support 2,530 net developable acres of employment land.

FIGURE 6.09: TOTAL NET ACRES REQUIRED BY BUILDING TYPOLOGY

	Net Acres by Building Typology							
	Office	Institutional	Flex/BP	Gen. Ind.	Warehouse	Data Center	Retail	Total
Non-Retail Demand	265	267	472	466	418	247	203	2,338
Allocation of Retail by Type	*12%*	*1%*	*6%*	*0%*	*7%*	*0%*	*73%*	*100%*
Retail Demand	23	2	12	1	13	0	139	191
Total Net Acres Required	**288**	**269**	**485**	**467**	**431**	**247**	**343**	**2,530**

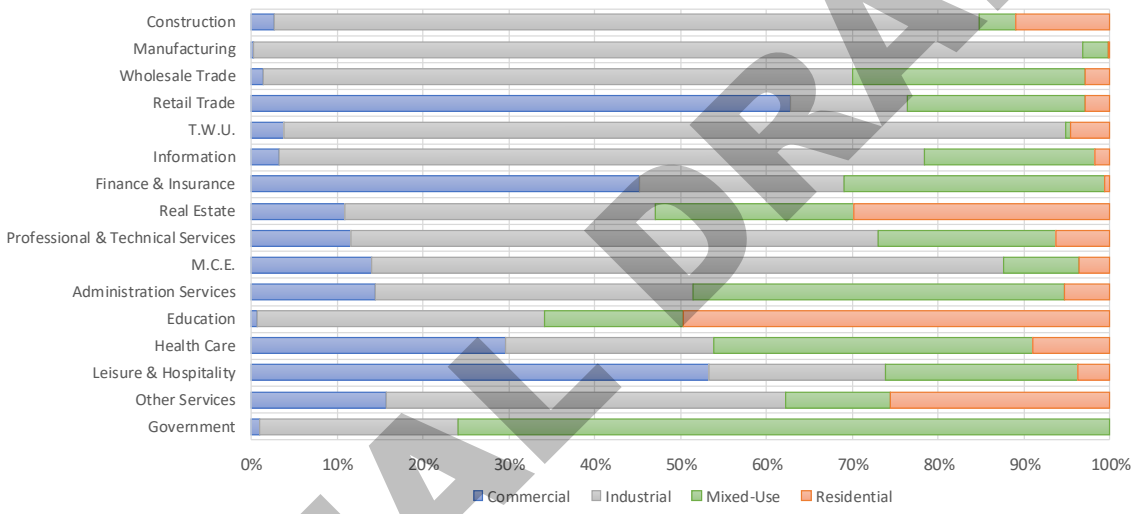
18 Claritas

INITIAL DRAFT

The Buildable Lands Inventory in the Economic Opportunities Analysis inventoried vacant, partially vacant, and potentially redevelopable land by broad land use category. To facilitate a direct comparison, a similar aggregation of demand is required (as allowed under OAR 660-009-0015(2)). To make this determination, Johnson Economics used G.I.S. analysis to determine the share of employment by sector that is located in broad land use categories.

Cross tabulating this analysis with supportable acreage by typology and industry, we developed a land allocation matrix. This calculation assumes that on the margin employment uses will locate across land types consistent with the historical pattern. Conversion of net acreage to broad land use categories is achieved via an established matrix of existing employment allocation trends.

FIGURE 6.10: DISTRIBUTION OF EXISTING EMPLOYMENT BASE BY BROAD LAND USE CATEGORY



The final analytical step of this analysis is to adjust demand estimates to account for future infrastructure. The state defines net buildable acres as being absent future right-of way, indicating that gross land need is greater than net-buildable. For this analysis, we assume a 15% gross-to-net ratio for commercial and mixed-use areas. Industrial areas assume a 25% ratio because Hillsboro's new industrial areas have a higher likelihood of requiring additional right-of-way, open space and public services.

These calculations result in a gross land need determination of 3,065 acres over the 20-year planning period for Alternative Forecast Scenario. The greatest land need will be for industrial sites (1,949 acres), followed by Mixed-Use (471 acres), and Commercial (441 acres). It is assumed that 203-acres worth of need will be absorbed in currently designated residential areas.

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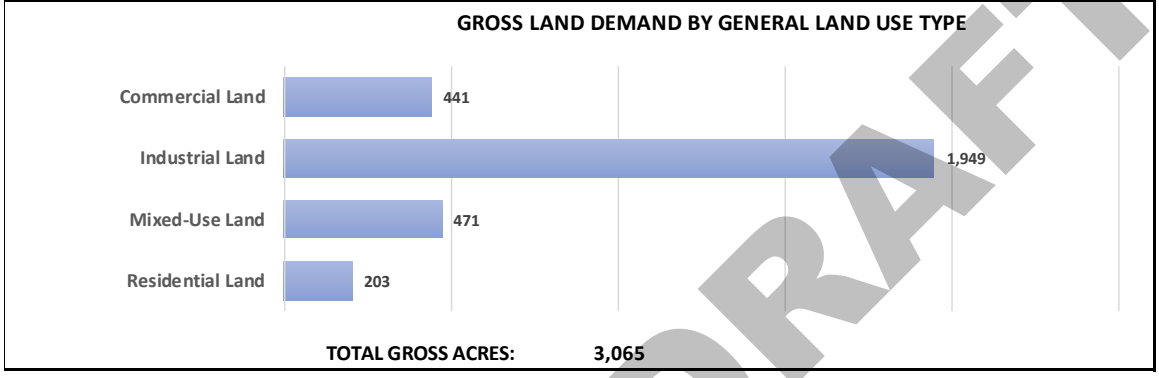
FIGURE 6.11: CONVERSION OF NET TO GROSS ACREAGE

	Net Acres						
	Office	Institutional	Flex/BP	Gen. Ind.	Warehouse	Data Center	Retail
Total Net Acres Demanded	**288**	**269**	**485**	**467**	**431**	**247**	**343**
	Matrix of Land Type Allocation						
Commercial Land	17%	20%	10%	2%	11%	0%	52%
Industrial Land	43%	27%	70%	89%	71%	100%	15%
Mixed-Use Land	29%	33%	14%	6%	12%	0%	26%
Residential Land	11%	19%	6%	3%	5%	0%	8%



Additional Considerations in Land Demand

Beyond a consideration of gross acreage, there is a significantly broader range of site characteristics that industries would require to accommodate future growth. We summarize some key findings here:

- Industrial buildings are generally more susceptible to slope constraints due to larger building footprints. For a site to be competitive for most industrial uses, a 5% slope is the maximum for development sites. Office and commercial uses are generally smaller and more vertical, allowing for slopes up to 15%.

- Most industries require some direct access to a major transportation route, particularly manufacturing and distribution industries that move goods throughout the region and beyond. A distance of 10 to 20 miles to a major interstate is generally acceptable for most manufacturing activities, but distribution activities require 5 miles or less and generally prefer a direct interstate linkage. Visibility is highly important to most commercial activities and site location along a major commercial arterial is commonly required.

- Access and capacity for water, power, gas, and sewer infrastructure is more important to industrial than commercial operations. Water/sewer lines of up to 10" are commonly required for large manufacturers. Appendix A details utility infrastructure requirements by typology.

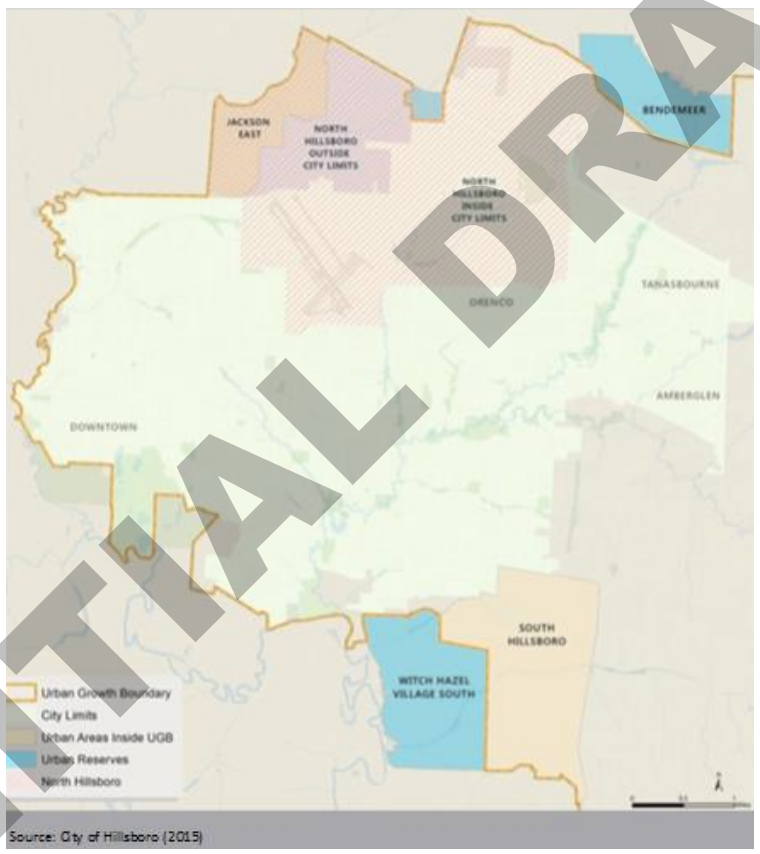
- Fiber telecommunications networks are likely to be increasingly required in site selection criteria for many commercial office and manufacturing industries. Medical, high-tech, creative office, research & development, and most professional service industries will prefer or require strong fiber access in the coming business cycles.

INITIAL DRAFT

VII. BUILDABLE LAND INVENTORY

As part of the 2014 Urban Growth Report (UGR), The City of Hillsboro developed an inventory of buildable lands in the Urban Growth Boundary (UGB) to inform Metro's regional forecast. This analysis identified vacant and redevelopable employment land within the City to meet future estimated demand. As a part of Hillsboro's Economic Opportunities Analysis (EOA) and Comprehensive Plan Update, the City of Hillsboro revised this inventory to account for new development and growth opportunities within the UGB and identified urban reserves areas. Throughout this document, these areas will be referred to as "Hillsboro".

FIGURE 7.01: BUILDABLE LAND INVENTORY STUDY AREA



Source: City of Hillsboro (2015)

While Metro's methodology provided a foundation for preparing the analysis, the consultant team of Johnson Economics and Mackenzie was worked to address deficiencies in the methodological approach used by Metro that are inherent in conducting a region-wide analysis. Technical adjustments to methodologies are detailed in this chapter. Further, consistent with the approach employed in the UGR, this analysis includes manual overrides and revisions to methodologically derived results that "…reflect local knowledge about specific properties"[20]. Combined, these refinements yield an inventory that is better aligned with real market-driven development capacity.

[20] Metro Urban Growth Report (2014), Appendix 2 Page 1

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Overview of Technical Methodology

The buildable lands inventory (BLI) is a parcel-based analysis that identified development potential on vacant land by identifying vacant areas on each lot, environmental and physical constraints, and applies current or future zoning.

The City of Hillsboro and Metro provided the technical parameters necessary to make these determinations and other adjustments for constraints identified in the following analysis. Definitions for each classification and development status division are presented here.

Land Classifications and Development Status Definitions

For This Analysis, The Following Definitions Are Used:

Land Classifications

Vacant Land:

- Parcels that are > 95% vacant, or
- Parcels with < 2,000 SF in developed area that comprises less than 10% of total gross acreage.

Developed Land (Parcels):
Parcels that are > 95% developed and do not meet redevelopment criteria.

Partially Vacant Land:
Parcels classified in baseline inventory that do not meet criteria as vacant or developed.

Potential Infill Land:
A subset of partially vacant land. Parcels that are partially developed that do not meet redevelopment criteria but have greater than 1.0 acre of vacant unconstrained land.

Expansion:
A subset of potential infill. Parcels with infill potential that have been anecdotally identified as being land banked for future expansion by a known entity.

Known Development:
Parcels that have been anecdotally identified as having development activity underway or commencing in the next 12 months.

Development Status

Developed Land (Area)
Land (acres) on parcels that is developed and is not suitable to meet future employment except through potential redevelopment.

Gross Buildable Land:
Gross vacant (or redevelopable) land (acres) on parcels that could potentially meet future employment land need. Constraints have not been removed.

Constrained Land:
Land (acres) on parcels that is constrained by slope, right of way, or environmental conditions which make the portion of the parcel undevelopable.

Net Unconstrained Buildable Land:
Gross Buildable Land (acres) on parcels that has had constraints removed.

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The definition of vacant land used in this analysis and in Metro's BLI methodology is more stringent than the definition provided in OAR 660-009-0005(14) which classifies vacant employment land as a lot or parcel:

- *Equal to or larger than one half-acre not currently containing permanent building s or improvements; or*

- *Equal to or larger than five acres where less than one half-acre is occupied by permanent buildings or improvements.*

Constraint Assumptions

Parcels with development constraints prohibiting the ability to accommodate employment capacity were adjusted through two filters. First, at the parcel level, exempt parcels were removed based on the following criteria. These parcels are considered "Excluded".

- Tax exempt parcels including schools, churches, social organizations and other publicly-owned property (excluding the Port of Portland)
- Small tax lots (less than 1,000 SF)
- Rail properties
- Private streets
- Parks and open space

Secondly, land with physical or regulatory constraints limiting the development potential of a site or portion of a site was removed based on the following criteria. This land is considered "Constrained"

- Floodways (100%), 100-year floodplains, and wetlands
- Slopes greater than 7%
- Title 3 (Nature in Neighborhoods) and Title 13 (Water Quality and Flood Management) land by Metro RLIS and updated with Hillsboro's most recent environmental inventory, including the latest Significant Natural Resources Overlay (SNRO) info.
- Utility and transportation right of way (ROW)

The methodology used included a slope constraint threshold of 7%, lower than the 25%W threshold used in Metro's inventory. While 25% is an appropriate threshold for residential uses, larger industrial and commercial buildings cannot locate on sites with a slope greater than 7%. Elevation changes are too great and mitigation is cost prohibitive.

Site Classification Methodology

Utilizing the technical data produced by the City of Hillsboro, Johnson Economics refined the land classification of all employment parcels within the study area in accordance with the following approach. Terms previously defined are identified in **BOLD CAPS**.

- Lots evaluated were those zoned for employment use, excluding those parcels with tax exempt uses, publicly-owned parcels, or open space.
- An initial filter into DEVELOPED, VACANT, AND PARTIALLY VACANT classifications.
- **VACANT** parcels are added to the BLI. Constraints are removed to identify what portion of vacant lots are developable. No further action is needed.
- Redevelopment criteria are applied to **DEVELOPED** parcels resulting in a determination of **DEVELOPED** or **POTENTIALLY REDEVELOPABLE**.
- Identified **POTENTIALLY REDEVELOPABLE** parcels are added to the BLI and no further action is needed.
- Redevelopment criteria are applied to **POTENTIALLY VACANT** parcels. Identified **POTENTIALLY REDEVELOPABLE** parcels are added to the BLI.
- Remaining **POTENTIALLY VACANT** parcels are further screened for classification as **POTENTIAL INFILL**.
- **PARTIALLY VACANT** parcels that are not classified as either **POTENTIAL INFILL** or **POTENTIALLY REDEVELOPABLE** are considered **DEVELOPED** and no further action is needed.

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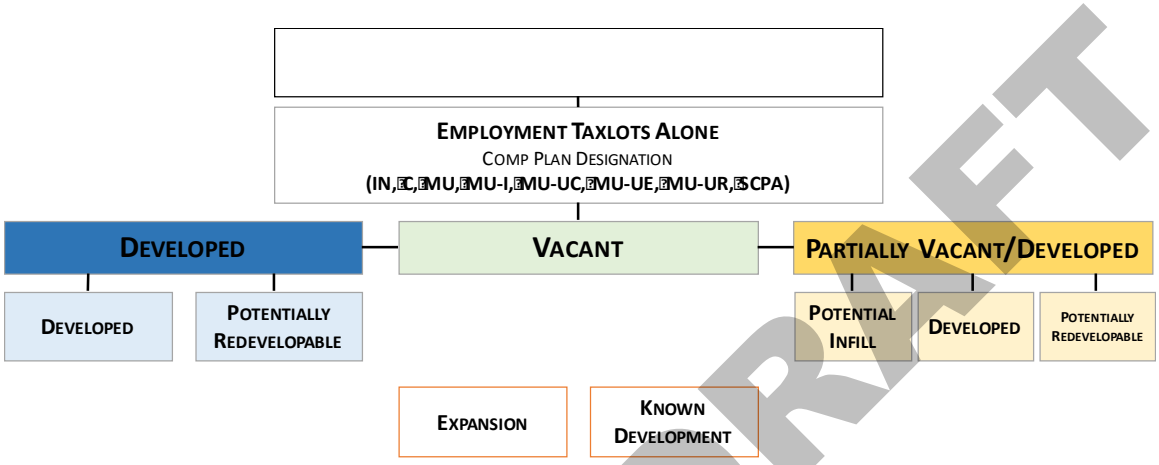
- Manual overrides are applied to the final inventory to account for sites that have been identified for possible EXPANSION by an existing entity or have a KNOWN DEVELOPMENT underway or commencing in the next 12 months.

FIGURE 7.02: PROCESS OVERVIEW FLOW CHART



Hillsboro's land base is unique due in part to the nature of how industrial land is utilized by large establishments and also by the current timing of the development cycle. We found that a significant share of vacant infill was held by an existing entity for future development. Because potential infill land with existing urban services is a large share of short-term inventory, this condition could be limiting Hillsboro's ability to maintain a market ready inventory of sites.

Hillsboro is also in the midst of an unprecedented development cycle with up to several hundred acres under development or planned over the next 12-months. This development will not be appropriately reconciled using inventory and demand methods. This analysis used public information, input from City staff, and work sessions with its advisory committee to separately identity potential expansion and development parcels.

Comprehensive Plan Designations for Employment Uses—Total Employment Land

The BLI analysis is conducted using Geographic Information Systems (GIS) and utilizes parcel level data in aggregate. The results are aggregated by comprehensive plan designations[21]. This BLI of employment land includes the following comprehensive plan designations:

- Industrial (IN)
- Commercial (C)
- Mixed Use (MU)
- Mixed Use Institutional (MU-I)
- Mixed Use Urban Commercial (MU-UC)
- Mixed Use Urban Employment (MU-UE)
- Mixed Use Urban Residential (MU-UR)
- Station Community Planning Area (SCPA)

[21] Consistent with requirements in OAR 660-009-0015

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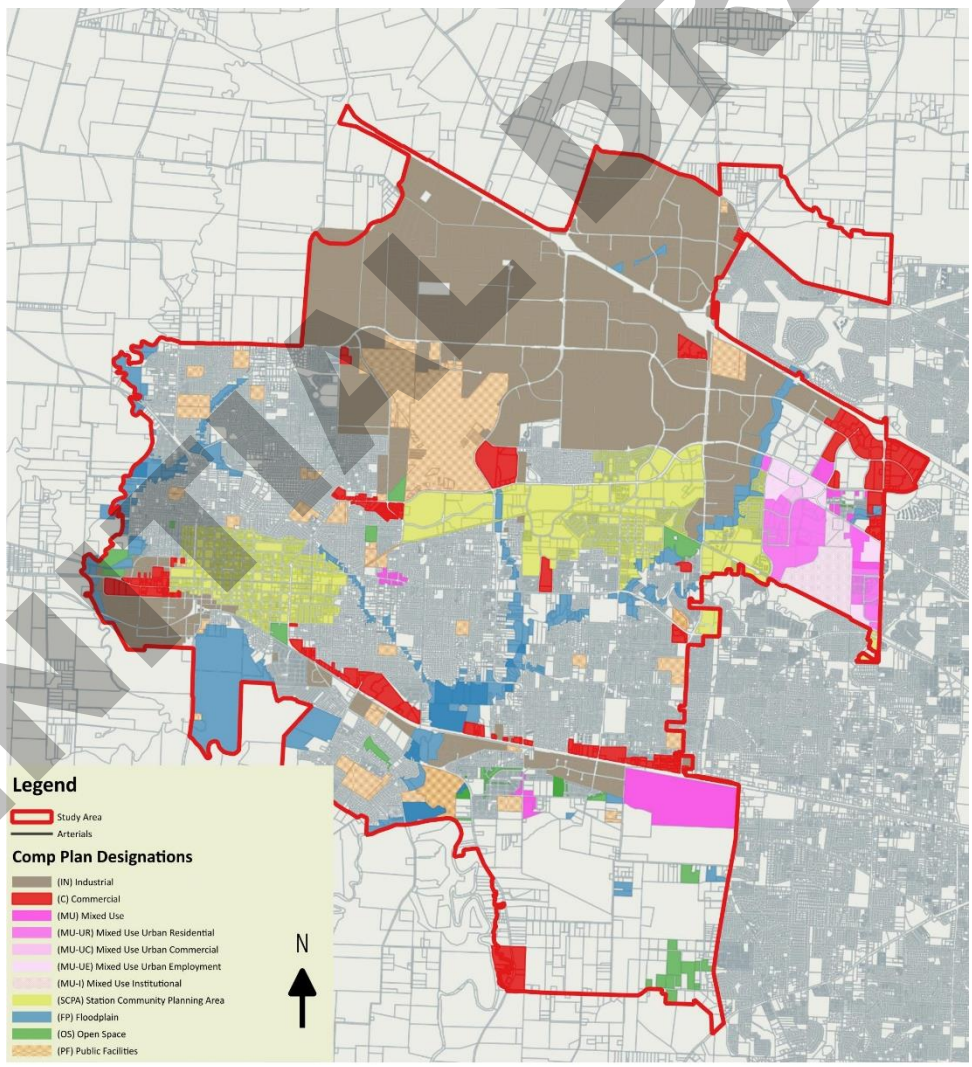
Within the study area, Hillsboro has 8,247 total acres of land in employment designations. Roughly 4,897 acres of land is industrial, 666 acres is commercial, and 2,683 acres is in mixed-use designations.

FIGURE 7.03: TOTAL EMPLOYMENT ACRES BY COMP PLAN DESIGNATION

Comp Plan Designation	Total Acres	
(C) Commercial	**666**	
(IN) Industrial	**4,897**	
	Total	**Employment**
(MU) Mixed Use*	318	111
(MU-I) Mixed Use Institutional	189	66
(MU-UC) Mixed Use Urban Commercial	10	4
(MU-UE) Mixed Use Urban Employment	96	34
(MU-UR) Mixed Use Urban Residential	288	101
(SCPA) Station Community Planning Area	1,782	624
Mixed Use Total	*2,683*	*939*
TOTAL of ALL AREAS	**8,247**	**6,502**



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Total Employment Acreage by Current Development Status

Of the 8,247 acres in employment plan designations (including mixed use and station community planning areas), 3,523 acres is located on "Developed" parcels (44%). Remaining lands are classified as either vacant (1,787 acres, 23%) or partially vacant (2,623 acres, 33%). Remaining land is "Excluded". The vast majority of undeveloped land is located in new urban areas, specifically in North Hillsboro outside of the City limits and Jackson East. Over 65% of all land and 72% of vacant or partially vacant land is industrial land.

Note that partially vacant land in these exhibits is not entirely vacant. These lands may have significant existing development, but enough vacant area to potentially accommodate future employment growth on the existing parcel.

FIGURE 7.04: TOTAL ACRES BY DEVELOPMENT STATUS

Comp Plan	Developed	Partially Vacant	Vacant	Total	% of Total
C	518	75	57	**650**	*8%*
IN	1,588	2,008	1,280	**4,876**	*61%*
MU	62	6	250	**318**	*4%*
MU-I	0	173	16	**189**	*2%*
MU-UC	5	3	3	**11**	*0%*
MU-UE	51	33	12	**96**	*1%*
MU-UR	120	65	76	**261**	*3%*
SCPA	1,179	260	93	**1,532**	*19%*
TOTAL	**3,523**	**2,623**	**1,787**	**7,933**	**100%**

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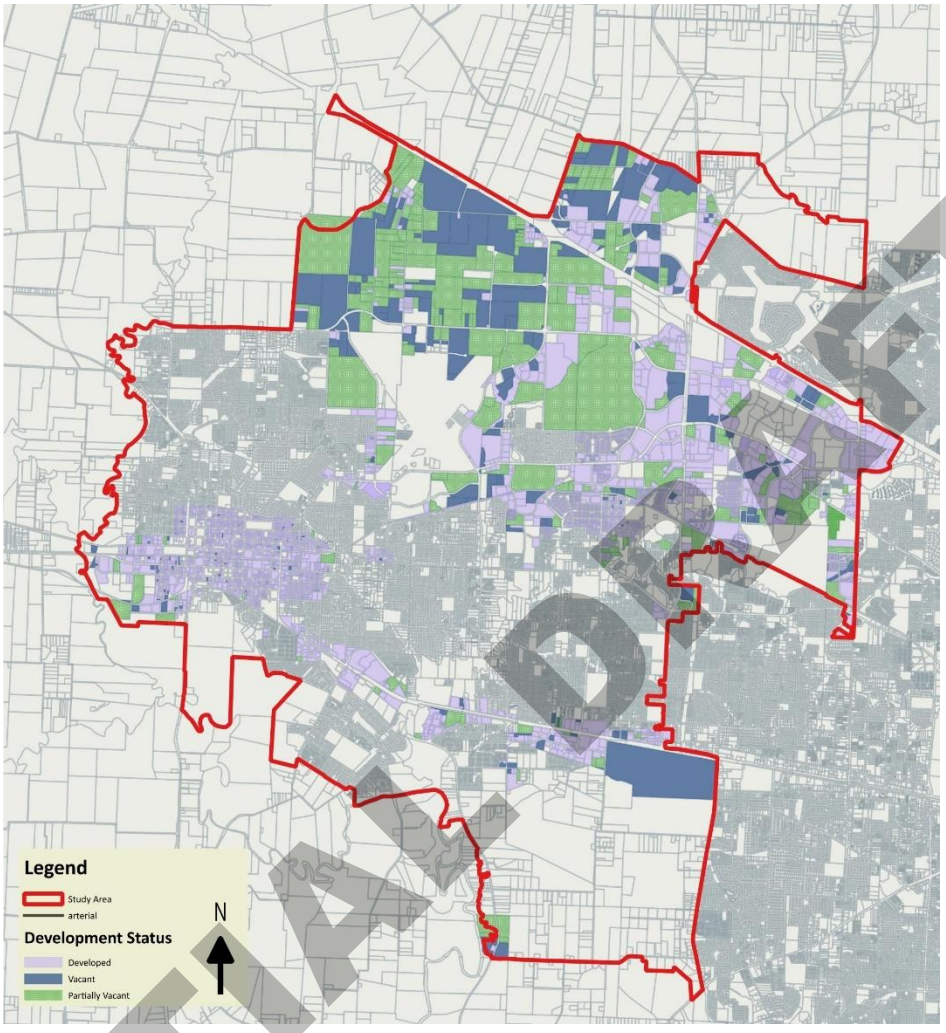
FIGURE 7.05: TOTAL ACRES BY DEVELOPMENT STATUS



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Vacant and Partially Vacant Land Characteristics

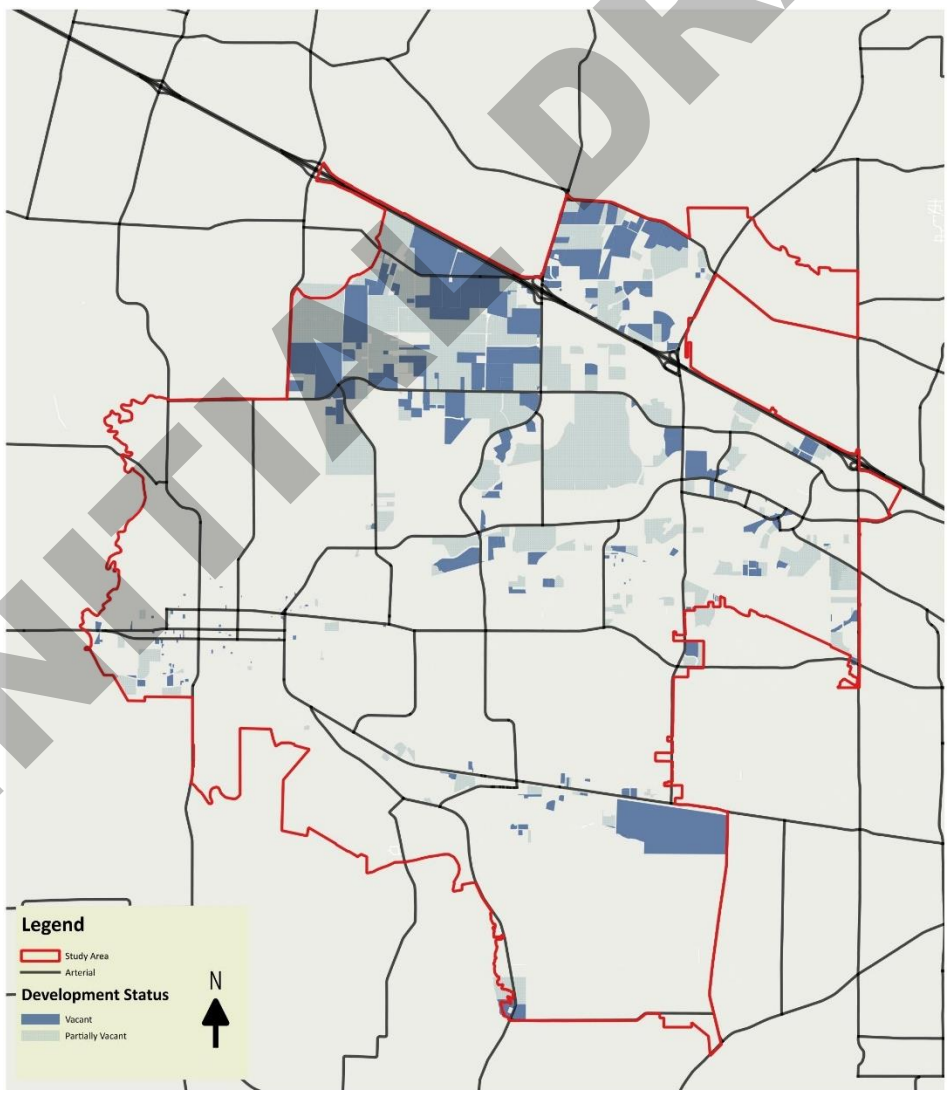
Of the vacant and partially vacant land in the study area, roughly 28% has existing development—mostly on partially vacant parcels. The remaining 3,400 acres can be considered potentially suitable for development, but this land is not without considerable physical constraints. Over 800 acres has likely development prohibiting constraints. When we extrapolate the share of mixed use and Station Community Planning Area (SCPA) land that can accommodate employment uses, we find an estimated 1,756 acres of net unconstrained buildable vacant and partially vacant land in the study area.

Note, henceforth in this analysis all reported acreages for mixed use and SCPA designations reflect a 35% share applicable to employment uses. For the MU designation, both net and gross employment land in South Hillsboro is estimated at 19.1 acres, consistent with the South Hillsboro Community Plan.

FIGURE 7.06: VACANT AND PARTIALLY VACANT LAND

		LAND (Acres)					
Comp Plan	Taxlots	Total	Developed Area	Gross Buildable	Constrained	Net Buildable	
C	50	132	31	103	43	60	
IN	318	3,193	900	2,597	608	1,989	
						Total	Employment
MU	15	256	9	256	44	212	74
MU-I	2	19	6	19	14	6	2
MU-UC	2	5	0	5	1	5	2
MU-UE	7	45	28	35	15	20	7
MU-UR	20	86	47	86	26	61	21
SCPA	161	333	146	317	64	253	89
TOTAL	**575**	**4,068**	**1,166**	**3,419**	**814**	**2,604**	**2,243**

FIGURE 7.07: MAP OF VACANT AND PARTIALLY VACANT LAND



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REDEVELOPMENT METHODOLOGY

As a part of our analysis, we used the BLI information to assess the extent to which properties would be plausible candidates for redevelopment. This analysis was based on an assumed threshold strike-price, which would be reflective of the market value of the underlying property under a new development scenario. The Real Market Value (RMV) from the assessor's office is attached to each parcel, and divided by size of the developable property to arrive at a determination of RMV per square foot. This metric was compared to the assumed threshold price identified for each generalized use category. Properties where RMV/sq. ft. fell below the threshold value were designated as having redevelopment potential.

Threshold rates used in this analysis are highly generalized, but allow for the identification of parcels that have the potential to redevelop with a higher intensity use. Identification of a parcel as having redevelopment potential indicates a higher likelihood of redevelopment, and that these parcels have the potential to provide additional capacity to meet future need. In this analysis, we further added a qualitative clarifier to indicate parcels with a "higher likelihood" of redevelopment. Such parcels were identified as having a RMV/sq. ft. greater than 20% below the assumed threshold.

The methodology developed by Metro and utilized by the City of Hillsboro classifies vacant land (for large sites) as having 95% or greater vacant area according to Metro's inventory of vacant land. For most parcels, this adequately represents green-field development potential. However, Hillsboro's land base includes a considerable number of large parcels with limited, low value development that ***exceeds*** 5% of total site area. This is especially common in North Hillsboro. Under the adopted methodological approach, these parcels are classified as partially vacant". These parcels are then subjected to redevelopment and infill determination criteria; and, due to their low value to size ratio, are eventually classified as redevelopment properties. However, redevelopment is inherently more challenging than green-field development. As a matter of interpretation, these parcels will be treated as green-field sites from the perspective of the market. While the approach eventually captures these properties in the BLI, this condition may skew one's interpretation of the results, particularly when considering the share of the City's capacity met by refill[23]. Future iterations of this inventory may "override" this classification with a manually derived categorization on this subset of properties.

FIGURE 7.08: ASSUMED THRESHOLD STRIKE PRICES[22]

Generalized Use	Minimum Size	Threshold Strike-Price
Industrial	1.0 acre	$6.50/sq. ft.
Commercial	0.25 acres	$15.00/sq. ft.
Commercial (corridors/town centers)	0.25 acres	$18.00/sq. ft.
Mixed-Use/SCPA	0.25 acres	$28.00/sq. ft.

[23] Refill is the share of capacity that is to be met by the combination of infill and redevelopment opportunities.

[22] Johnson Economics review of market transactions (CoStar), Metro BLI assumptions, and recent market research in Hillsboro.

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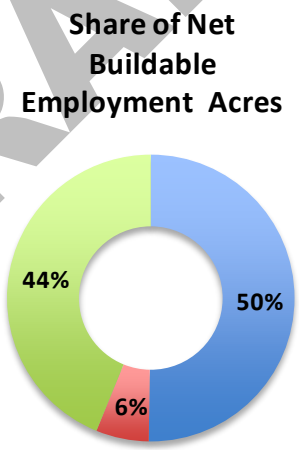
Partially Vacant Land Classification—Potential Infill and Redevelopment

Employment capacity in Hillsboro will be met in large part by vacant and potentially redevelopable parcels with considerable vacant land. Infill generally accounts for a negligible share of development in all categories except Industrial, and only about 7% of net buildable employment acres in all.

Potentially redevelopable land on partially vacant properties accounts for 43% of vacant supply; however, recall that many of these properties will be treated as vacant by the market (500 net acres or more)[23]. Taken together, Industrial land accounts for 88% of net-buildable employment acreage, with commercial, mixed-use, SCPA areas combining for 169 acres to meet commercial and other employment capacity.

FIGURE 7.09: VACANT AND PARTIALLY VACANT LAND, STRATIFIED BY INFILL AND REDEVELOPMENT

		COMP PLAN			
	Development Status	C	I	MU	SCPA
	VACANT				
	Gross Buildable	56.5	1,224.7	99.8	30.9
	Net Buildable Emp.	36.9	987.2	77.8	24.8
PARTIALLY VACANT	**INFILL**				
	Gross Buildable	2.8	205.0	0.9	1.3
	Net Buildable Emp.	1.6	131.3	0.5	0.0
	POTENTIALLY REDEVELOPABLE				
	Gross Buildable	43.7	1,167.3	39.9	78.6
	Net Buildable Emp.	21.4	870.5	27.6	63.7



Total Potential Redevelopment Capacity on Partially Vacant and Developed Land

Redevelopment potential is classified into two sub categories:

Redevelopment on Partially Vacant Land:

Land that has considerable vacant area but has a sufficiently low value so that the entire site could theoretically redevelop (as opposed to only the vacant/infill portion). This division accounts for 983 net buildable employment acres, or 75% of the redevelopment total. Most of this land is located in North Hillsboro and the South Downtown Industrial Area.

Redevelopment on Developed Land:

Land that is currently fully developed but has a sufficiently low value that the entire (unconstrained) site could theoretically redevelop. This division accounts for 330 net buildable employment acres or 25% of the redevelopment total. Most of this area is located on smaller parcels in AmberGlen and in Downtown SCPA areas.

23 Based on a cursory overview of critical properties

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FIGURE 7.10: POTENTIALLY REDEVELOPABLE LAND ON DEVELOPED AND PARTIALLY DEVELOPED PARCELS

Comp Plan	From Developed		From Partially Vacant	
	Gross Buildable	Net Buildable	Gross Buildable	Net Buildable
C	57.2	26.8	43.7	21.4
I	246.1	216.5	1,167.3	870.5
MU	6.8	6.6	2.1	1.8
MU-I	0.0	0.0	6.7	1.9
MU-UC	1.7	1.5	1.0	0.9
MU-UE	8.9	7.6	7.2	6.2
MU-UR	18.2	16.4	22.9	16.7
SCPA	57.0	54.1	78.6	63.7

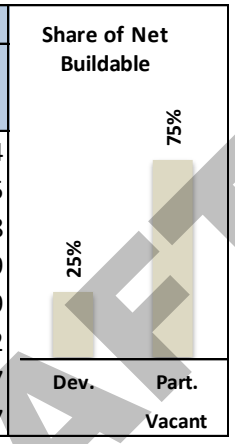
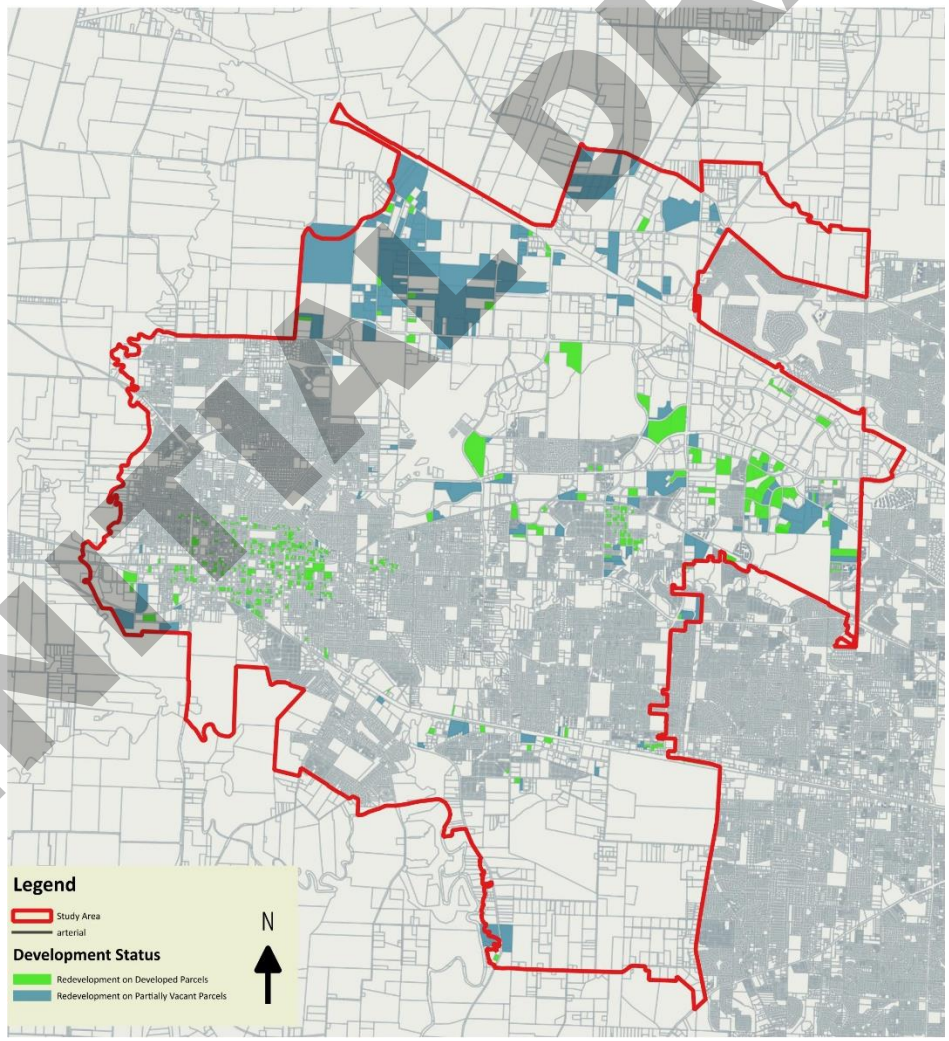


FIGURE 7.11: MAP OF REDEVELOPABLE AND PARTIALLY DEVELOPED PARCELS



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FINAL BUILDABLE LAND ESTIMATES

Across all land classifications, we find roughly 3,347 gross buildable acres within the study area. When physical constraints are removed and employment zoning is considered, there are 2,573 acres of net unconstrained employment land that is potentially available to meet Hillsboro's capacity.

This assessment includes an extrapolation of identified expansion sites and parcels with known development. Expansion sites have a dedicated use and are not generally available to the market. Sites with known development will be considered "developed" within the project's base year. Currently roughly 5% of net-buildable acreage is currently under development.

Infill and potential redevelopment in already developed areas comprise a small share of buildable land (9% of industrial, 39% of commercial, mixed-use/SCPA). These low rates are indicative of short-term supply challenges and suggest that service improvement in new urban areas will be critical in maintaining a competitive land supply.

FIGURE 7.12: GROSS AND NET BUILDABLE EMPLOYMENT LAND BY GENERAL USE AND DEVELOPMENT STATUS

Development Status	Taxlots	Gross Buildable Acres				Net Buildable Employment Acres			
		C	IN	MU/SCPA	Total	C	IN	MU/SCPA	Total
Vacant	299	57	1,112	127	**1,295**	37	881	99	**1,016**
Infill	26	1	86	2	**89**	0	43	1	**43**
Rdev(Dev)	392	57	172	92	**321**	27	143	86	**255**
Rdev(Part)	179	44	1,148	85	**1,277**	21	855	60	**937**
Expansion	33	2	204	35	**240**	2	167	33	**201**
Known	15	0	121	3	**124**	0	117	3	**120**
TOTAL	**944**	**160**	**2,843**	**344**	**3,347**	**87**	**2,206**	**281**	**2,573**

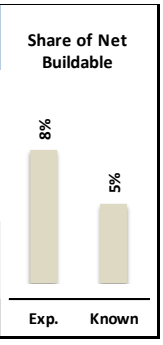

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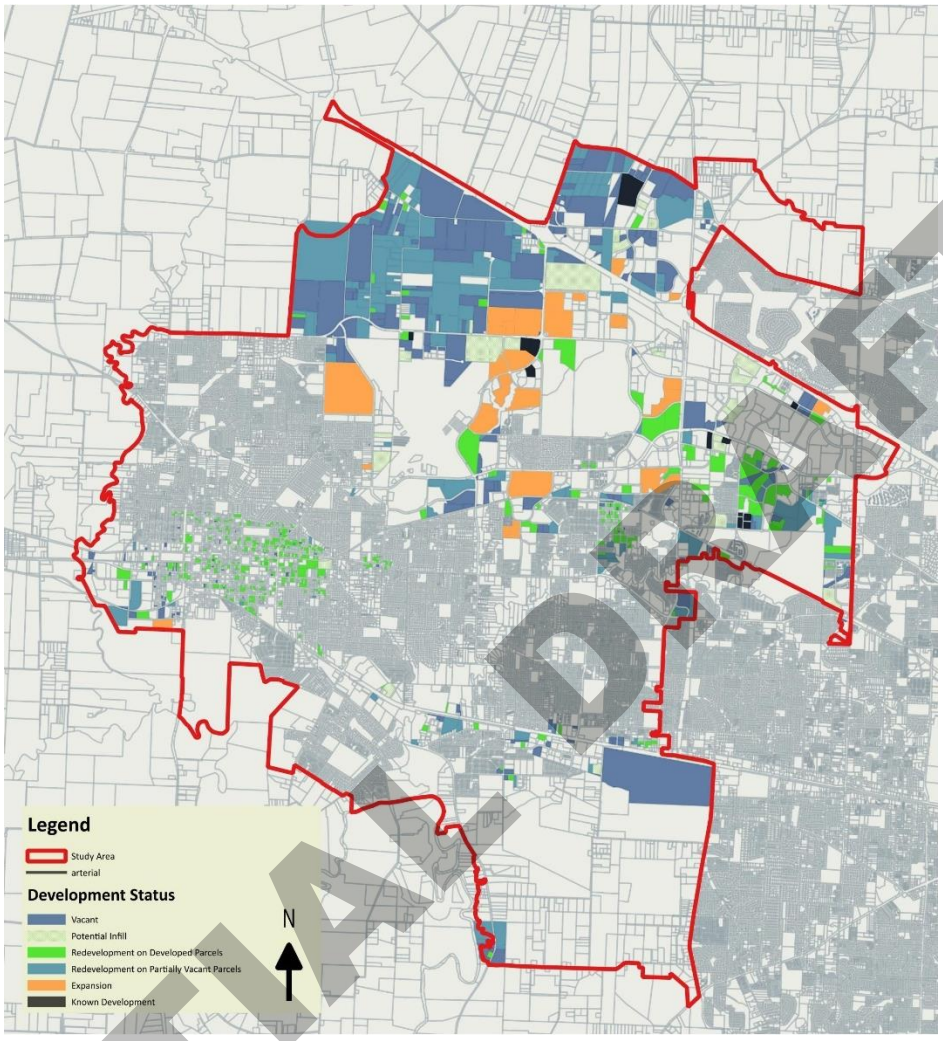
FIGURE 7.13: MAP OF FINAL BUILDABLE EMPLOYMENT LANDS INVENTORY



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Supply of Sites and Employment Acres by Site Size—City of Hillsboro

A competitive supply of employment land will include an ample and diverse supply of appropriately sized and served sites. The City has 341 small (0.25 to 1.00 acre) commercial and mixed-use/SCPA sites as well as 100 medium (1.0 to 5.0 acres) and large sites (> 20 acres), totaling 688 net employment acres. This represents relatively well balanced mix of parcels, and the City has a considerable advantage vis-à-vis other jurisdictions within the Portland metropolitan area in terms of the quality and range of developable lot supply.

The City maintains a large number (162 sites) of medium sized (2.0 to 10.0 acres) industrial sites totaling 618 acres. Large industrial sites in excess of 20-acres are less common (35 sites), and given their location in new urban areas are more likely to have service deficiencies. Only 17 large industrial sites are classified as vacant with an additional 17 coming from potential redevelopment of partially vacant sites.

Across all Comprehensive Plan designations, 17% of all sites and 76% of net buildable acreage is on sites greater than five-acres. Larger sites are generally desired due to flexibility to meet a range of users and subdivision is typically easier than aggregation. This advantage is lost when land use restrictions prohibit the subdivision of larger sites, which is the case in portions of North Hillsboro.

FIGURE 7.14: SUMMARY OF EMPLOYMENT LAND INVENTORY BY SIZE, COMP PLAN DESIGNATION, AND STATUS

		# of TAXLOTS by PARCEL SIZE								
	Comp Plan	< .25	.25 - .50	.50 - 1.00	1.00 - 2.00	2.00 - 5.00	5.00 - 10.00	10.00 - 20.00	20.00 - 50.00	> 50.00
COMP	C	7	13	13	17	9	2	3	1	0
COMP	IN	11	13	11	79	112	50	31	28	7
COMP	MU	9	17	11	12	25	10	5	0	1
COMP	SCPA	91	229	58	24	26	12	3	2	1
STATUS	Vacant	116	28	21	43	60	23	12	14	5
STATUS	Infill	0	0	0	21	10	5	2	3	0
STATUS	Rdev(Dev)	2	240	62	35	38	10	3	3	1
STATUS	Rdev(Part)	0	4	10	33	64	36	25	11	3
	Total	118	272	93	132	172	74	42	31	9
	% of Total	13%	29%	10%	14%	18%	8%	4%	3%	1%

		POTENTIAL GROSS BUILDABLE ACRES by PARCEL SIZE								
	Comp Plan	< .25	.25 - .50	.50 - 1.00	1.00 - 2.00	2.00 - 5.00	5.00 - 10.00	10.00 - 20.00	20.00 - 50.00	> 50.00
COMP	C	1	5	10	23	31	16	42	32	0
COMP	IN	2	4	9	119	378	341	438	890	663
COMP	MU	1	6	8	17	83	67	77	0	244
COMP	SCPA	7	75	41	37	86	80	42	58	53
STATUS	Vacant	10.5	9.4	15.7	62.3	192.9	168.4	159.7	470.5	565.2
STATUS	Infill	0.0	0.0	0.0	33.0	28.8	37.6	27.4	87.3	0.0
STATUS	Rdev(Dev)	0.5	79.4	43.8	48.5	132.8	66.0	43.7	79.3	73.9
STATUS	Rdev(Part)	0.0	1.4	7.7	52.5	222.9	232.2	368.3	343.9	320.8
	Total	11	90	67	196	577	504	599	981	960
	% of Total	0%	2%	2%	5%	14%	13%	15%	25%	24%

		POTENTIAL NET BUILDABLE ACRES by PARCEL SIZE								
	Comp Plan	< .25	.25 - .50	.50 - 1.00	1.00 - 2.00	2.00 - 5.00	5.00 - 10.00	10.00 - 20.00	20.00 - 50.00	> 50.00
COMP	C	4.9	9.7	1.4	21.0	16.5	17.4	2.6	13.2	
COMP	IN	3.4	6.9	1.1	92.3	334.8	283.4	683.4	287.6	512.6
COMP	MU	5.8	6.5	0.6	10.0	50.7	69.4	0.0	50.4	201.1
COMP	SCPA	71.9	37.2	6.9	24.5	38.5	63.9	45.0	72.6	46.9
STATUS	Vacant	9.4	7.5	13.6	46.3	131.1	136.6	114.5	394.4	463.8
STATUS	Infill	0.0	0.0	0.0	17.2	25.3	30.2	21.5	40.2	0.0
STATUS	Rdev(Dev)	0.5	77.3	40.8	41.8	115.7	59.8	35.1	44.9	73.9
STATUS	Rdev(Part)	0.0	1.4	5.9	42.4	162.1	197.2	269.4	251.4	222.8
	Total	86	60	10	148	441	434	731	424	761
	% of Total	3%	2%	0%	5%	14%	14%	24%	14%	25%

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VIII. Reconciliation of Need and Capacity

The last step of the analysis is to compare the long-term demand for industrial and commercial land from the land need forecast with the existing supply of industrial and commercial acreage as identified through the Buildable Lands Inventory (BLI). The purpose of the reconciliation is (1) to assess whether the City of Hillsboro has an adequate supply of suitable employment land to satisfy economic expansion demands over the short-term (5 years) and long-term (20-years). The reconciliation serves as a basis to determine whether employment forecasts are supportable, as well as information to develop policy measures to increase the available employment land supply and/or increase the intensity of marginal development.

In this section we compared the existing supply of buildable industrial, commercial, and mixed use acreage over the planning period for the assumed growth scenario. **It is important to remember that the different categories of employment land are not (necessarily) substitutable.** For instance, a shortage of 10 acres of commercial land, and a surplus of 10 acres of industrial land do not cancel each other.

For the purposes of this analysis, we use what has previously been referred to as Scenario 3: Alternative Forecast for our most likely employment scenario. Figure 7.1 shows the findings of land need for commercial, industrial, and mixed-use land based on the employment growth scenario. Under the assumed employment growth scenario, the capacity within the study area is in aggregate sufficient to accommodate the projected twenty-year needs for industrial and mixed-use needs. The capacity for commercial is insufficient, but some of this need can be met on land zoned for mixed-use and industrial uses.

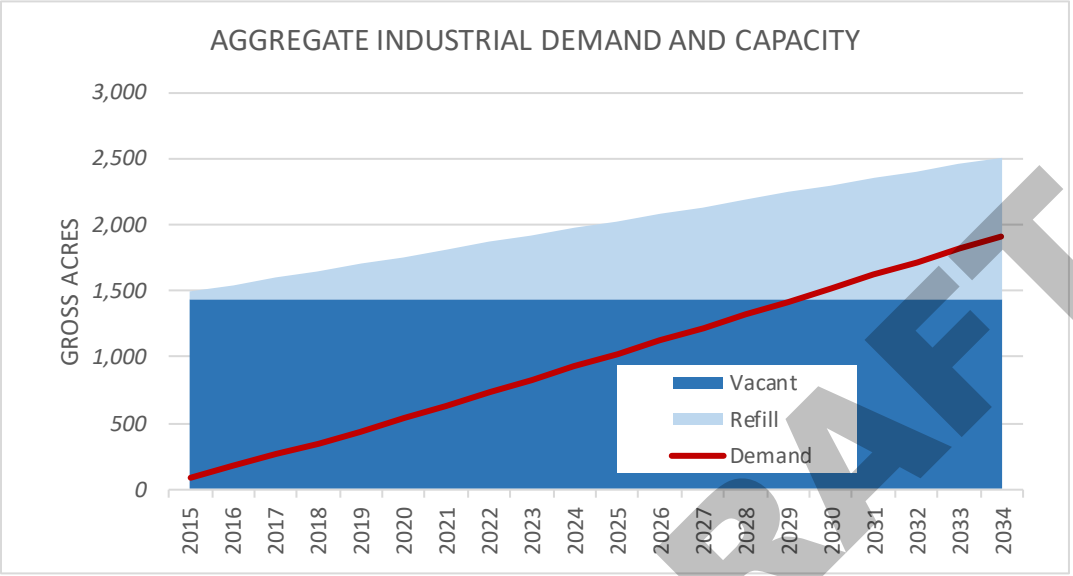
Figure 8.1: Reconciliation of Projected 5- and 20-Year Land Need and Existing Supply

	Acres by General Use Type			Total
	Commercial	MU/SCPA	Industrial	Employment
CAPACITY (ACRES)				
Vacant	57	127	1,112	1,295
Infill	1	2	86	89
Rdev(Dev)	57	92	172	321
Rdev(Part)	44	85	1,148	1,277
Rdev Loss	(25)	(44)	(330)	(399)
Expansion	2	35	204	240
Known	0	3	121	124
Total	135	299	2,513	2,947
DEMAND (ACRES)				
5-Year	87	97	437	621
20-Year	400	446	1,912	2,757

The preceding table shows an assumed 25% loss in net capacity for redeveloped property, reflecting employment displaced by redevelopment. As shown in the following graph, the demand for industrial land can be met using the refill assumptions outlined.

INITIAL DRAFT

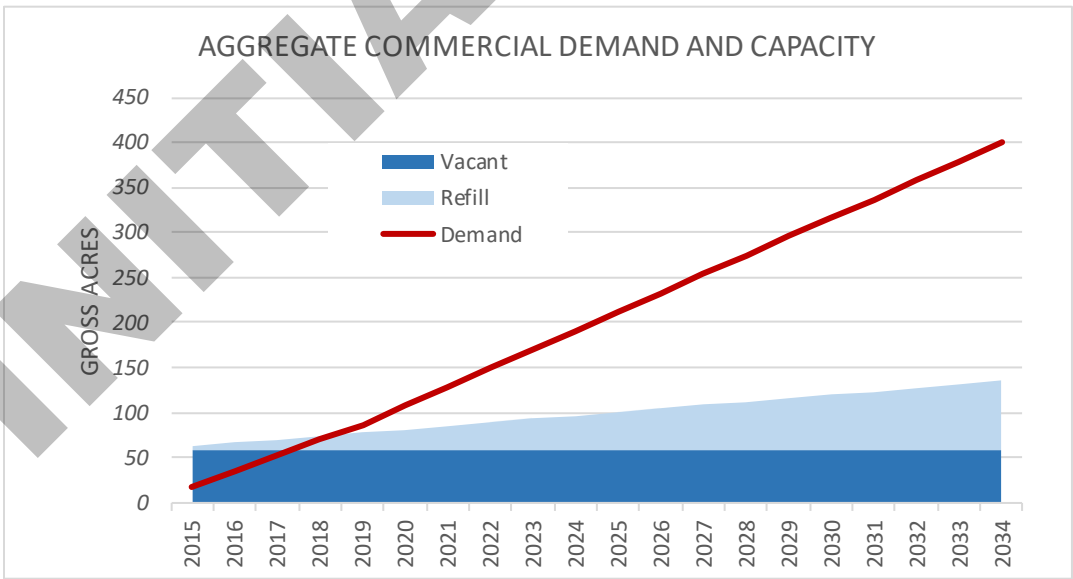
FIGURE 8.2: AGGREGATE INDUSTRIAL DEMAND AND CAPACITY



While Hillsboro has a significant supply of vacant and developable property in aggregate, the nature of firms in the area tend to support usage patterns such as land banking, which limits the supply of sites on the market. In addition, the City's inventory includes sites with entitlement limitations that greatly reduces their flexibility to meet demand.

The City's capacity for commercial development is approximately five years.

FIGURE 8.3: AGGREGATE COMMERCIAL DEMAND AND CAPACITY



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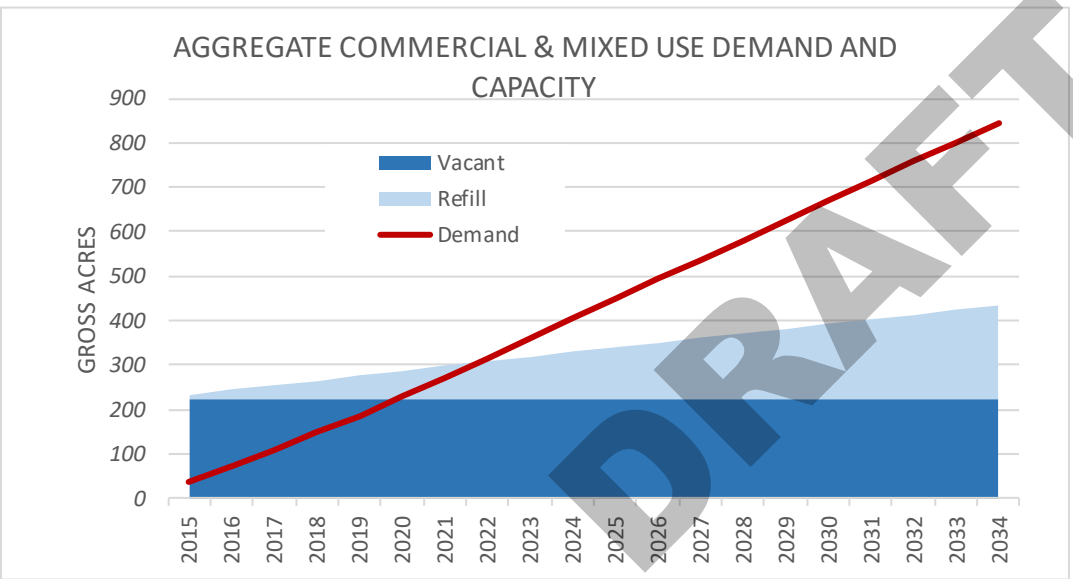
Additional commercial capacity is largely within property zoned for mixed-use, which would be largely expected to be commercial in nature. The overall combined capacity of commercial and mixed-use properties is below the projected twenty-year need, with demand exceeding supply roughly 8 years out (2023).

FIGURE 8.4: AGGREGATE COMMERCIAL AND MIXED-USE DEMAND AND CAPACITY



The proceeding charts assume that all vacant property is available, and that redevelopment capacity will be realized over time during the planning horizon. Redevelopment capacity is often not counted in determining short-term needs, as this property is often difficult to develop and not readily available. Excluding redevelopment capacity indicates a short-term supply shortage for commercial land, but more than adequate capacity if combined with mixed-use land.

Redevelopment is difficult to project, and subject to a number of property specific variables. These include owner disposition, lease restrictions, and market factors.

Employment Land Need Conclusion

The reconciliation of projected employment needs and available capacity indicates that the City has an adequate supply of land for industrial uses through 2035 in aggregate, while the capacity for commercial uses is adequate only through 2023. This shortage is likely understated, as the aggregate capacity will be an imperfect match to the profile of projected demand. In other words, the full capacity will be realized only if the profile of that capacity is identical to what is demanded.

The City of Hillsboro enjoys an enviable position within the region, with a relatively large supply of vacant industrial land. In addition, the City has planned infrastructure to serve this property, as well as funding mechanisms in place that have the potential to pay for the infrastructure. Nonetheless, there are significant limitations on some of these parcels, which could impact their flexibility in meeting future needs. The most notable of these is the large lot requirements on a significant portion of the industrial land inventory. This represents a highly significant constraint, as is greatly reduces flexibility in the inventory to respond to shifting

INITIAL DRAFT

market requirements. The large lot requirement largely removes these sites from the available supply, with the exception of a highly limited range of prospective new tenant types.

While the City has a considerable vacant land inventory, that land alone is inadequate to meet the 20-year needs of the community. The City will be reliant upon redevelopment and/or intensification of uses to meet its long-term needs. While there appears to be adequate redevelopment and infill capacity within the City, the availability of this type of space to the market is inherently difficult to forecast. Modeling of infill and redevelopment patterns is relatively new, with little historical tracking. As this is a critical piece of the City's estimated employment capacity, the actual utilization and net employment yield of this space should be closely monitored over time.

The nature of the local employment base, which includes a disproportionate amount of well capitalized technology firms, has a tendency to support an ongoing strategy of land banking by firms for future expansion. The cost of capital improvements for these firms are high relative to land values, and the industries are dynamic and firms value flexibility. As a result, the marginal cost of controlling property for future expansion is relatively low. While our analysis recognizes that many sites have remaining capacity, there is a high likelihood that firms will want to continue to maintain capacity within their sites, and will want to retain capacity. This would increase the need for land associated with employment, as firms will continue to control more property than they need to maintain flexibility.

Of greater importance to realizing economic development objectives is the extent to which an adequate inventory of appropriate sites and/or space is available within the market during any period. Maintaining an ongoing inventory of available and readily developable sites in a range of sizes, configurations, and locational characteristics is critical to supporting economic development. The City's current site inventory is quite strong, and should be monitored over time to assure that the City maintains a competitive and appropriate inventory.

The City has a strong and growing inventory of speculative industrial and commercial space, which provides readily available options for large firms as well as the space necessary to accommodate smaller firms or firms that are not seeking to build or own their own space. The provision of speculative space by the development community serve a vital role in meeting forecasted employment needs.

Appendix A of this report includes a matrix of site needs by category, as well as industry profiles for the City's target industries.

INITIAL DRAFT

IX. RECOMMENDATIONS

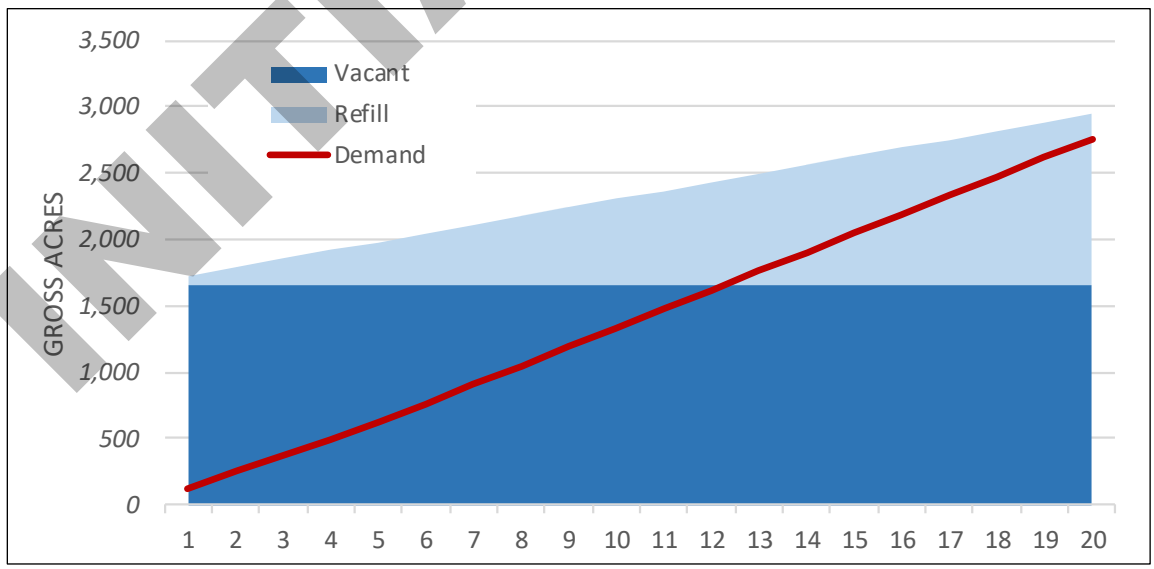
The City of Hillsboro has an enviable economic base, with a diverse range of firms providing high-quality quality employment opportunities for local residents, as well as the broader region and state. The City has significant strength and potential for growth in several key industries. Identified target industry clusters include:

- *Computers & Electronics Manufacturing*
- *Software & Media*
- *Health Sciences & Technology*
- *Health Services*
- *Data Centers*
- *Amenity Retail, Recreation, & Hospitality*

The City actively seeks to support and expand its economic base going forward. Implementation measures to realize the City's economic development objectives involve maximizing the available inventory and capacity to accommodate current future employment, and sustaining a business environment that is supportive of the needs of current and future employers.

The City's ability to accommodate employment needs will be heavily reliant upon redevelopment of properties, with capacity from redevelopment and infill representing 46% of all employment capacity by 2035. The City's policies should actively encourage redevelopment and/or reinvestment in established business and industrial parks, with an objective of intensifying the usage of these economic resources over time.

FIGURE 9.1: AGGREGATE EMPLOYMENT DEMAND AND CAPACITY



The heavy reliance upon redevelopment and infill to meet employment needs represents a significant risk, as predicting redevelopment capacity is inherently difficult. The City should periodically monitor the

INITIAL DRAFT

magnitude and character of redevelopment and infill activity, and refine its estimated capacity as better data is available.

The following is a summary list of implementation measures to encourage effective utilization of the City's employment capacity.

Capacity

- Ongoing planning and infrastructure investments in the North Hillsboro Industrial Area
- Maintain and expand infrastructure necessary to support employers and realize the City's development capacity
- Support additional investment in existing employment areas, including programs supporting adaptive re-use
- Review current zoning and entitlements to ensure they are supportive of desired development outcomes
- Evaluate parking management programs where appropriate to potentially free up additional property and/or allow for intensification of employment densities
- Seek increased flexibility in site usage requirements, to better match demand and supply over time.
- Monitor land consumption and usage patterns within the City over time, and periodically update need forecasts
- Periodically update identified target industries, and match industry needs with local siting options
- Maintain a competitive and suitable inventory of readily available sites and space for a wide range of current and prospective employers
- Work at a regional and statewide level to assure that the City's available land assets are adequate for both short- and long-term needs

Business Environment

- Workforce
  - Maintain and quality educational institutions
  - Facilitate collaboration between employers and institutions
- Regulatory Climate
- Encourage the maintenance and development of local housing options for workforce and executive needs
- Support ongoing development of downtown Hillsboro and the Tanasbourne/AmberGlen area to provide urban amenity concentrations
- Encourage self-help methods and programs for business districts, including support for and formation of business associations and self-assessment districts

Recruitment/Retention

- Work with local, regional, and statewide economic development, business organizations, and major employers to coordinate economic development efforts

INITIAL DRAFT

X. Economic Development Goals and Policies

The City of Hillsboro has developed a series of economic development goals and policies. These goals and policies are intended to clarify and codify the City's commitment to economic development.

GOAL 1 Diversify and expand the economy to give Hillsboro, the region, and the state a competitive advantage.

POLICY 1.1 **Competitive advantage**. Maintain and strengthen the city's competitive economic advantages including access to a highly-skilled workforce, robust local workforce development, business diversity, competitive business climate, quality educational institutions, a diverse supply of developable employment land of varying sizes, and globally-competitive utilities, public facilities and services.

POLICY 1.2 **Diverse range of employment opportunities**. Foster a diverse range of employment opportunities to benefit Hillsboro, the region, and the state.

POLICY 1.3 **Employment-land supply.** Pursue an ample employment land supply to benefit Hillsboro, the region, and the state.

POLICY 1.4 **Traded-sector and target industry retention, expansion and recruitment.** Sustain the ongoing vitality of the city's traded-sector* and targeted industries by aligning plans and investments to retain, expand, and recruit employers and investment in Hillsboro.

POLICY 1.5 **Business Innovation**. Facilitate scale-up* and business innovation opportunities where new or incubating companies* can create a sense of place and benefit from co-location, proximity to transit, affordable space, mentorship, and shared services.

POLICY 1.6 **Partnerships.** Leverage program and resource partnerships with local, regional, and statewide stakeholders, such as governments, educational institutions, economic development and business organizations, and major employers, to attract and retain employment and investment.

POLICY 1.7 **Economic resiliency**. Pursue collaborative and innovative approaches to strengthen and sustain Hillsboro, the region, and the state's economic resiliency*.

POLICY 1.8 **Energy, water, and climate change challenges**. Reduce the vulnerability of Hillsboro, the region, and the state's economies to energy, water and climate change challenges.

GOAL 2 Catalyze economic development through high-quality utilities, public facilities and services.

POLICY 2.1 **High-quality utilities.** Maintain existing public utility assets and invest in the expansion of high-quality utilities* to catalyze economic development.

POLICY 2.2 **High-quality public facilities and services**. Maintain and invest in expansion of high-quality public facilities and services* to catalyze economic development.

POLICY 2.3 **Multi-modal transportation.** Develop safe, well connected, and efficient multi-

INITIAL DRAFT

modal* transportation facilities that improve access to employment areas while facilitating freight movement capabilities.

POLICY 2.4 **Hillsboro Airport.** Facilitate the long-term viability of the Hillsboro Airport facility.

POLICY 2.5 **Coordination of utilities, public facilities and services**. Coordinate the type, design, timing, and location of utilities, public facilities and services with other public agencies, utilities, the private sector, and property owners to move employment land closer to development-ready* status.

POLICY 2.6 **Financing of utilities, public facilities and services.** Adopt additional funding methodologies, as needed to fund the necessary extension of utilities, public facilities and services.

GOAL 3 Manage land supply to meet short and long-term economic development needs of Hillsboro, the region, and the state.

POLICY 3.1 **Supply of developable employment sites and flexibility.** Sustain a supply of developable employment sites and adequate flexibility to meet the short and long-term needs of Hillsboro, the region, and the state.

POLICY 3.2 **Employment land designation.** Adopt land use designations in a manner that accommodates projected employment growth.

POLICY 3.3 **Employment land lot sizes.** Manage employment land to provide a range of available and developable lot sizes to accommodate a variety of uses, industry clusters*, and emerging market opportunities.

POLICY 3.4 **Higher-density employment land.** Pursue development of higher employment densities employment in areas with planned or existing enhanced transportation connectivity, access to transit, and utilities, public facilities and services.

POLICY 3.5 **Health and education campuses.** Promote the stability and growth of health and education campuses* as essential service providers, centers of innovation, workforce development providers, and major employers that can also provide amenities to the surrounding neighborhoods.

POLICY 3.6 **Revitalization and reinvestment.** Support additional investment in existing Employment Areas*, Regional Centers*, Town Centers*, and along targeted Corridor* areas, such as assembly of existing small employment parcels for redevelopment, programs supporting adaptive reuse, and identification of options to mitigate and/or redevelop sites and structures.

POLICY 3.7 **Employment-land supply.** Pursue additional employment land when the Hillsboro Planning Area* will not accommodate the 20-year projected demand to meet local, regional, and state needs.

GOAL 4 Promote economic development opportunities for individuals and small and emerging businesses to ensure equitable access to resources.

POLICY 4.1 **Individual training.** Encourage collaboration between local K-12 schools, trade schools, colleges, and employers to facilitate individuals' access to cutting-edge career development, workforce programs, technology, and other high-quality educational opportunities.

INITIAL DRAFT

POLICY 4.2 **Entrepreneurial opportunities.** Expand opportunities for small business and business development across our diverse community.

POLICY 4.3 **Mitigating gentrification**. Create strategies to mitigate the effects of gentrification* on individuals, small and emerging businesses, and neighborhoods.

GOAL 5 Develop and sustain a vibrant city to support economic development.

POLICY 5.1 **High-quality public realm.** Plan, develop, and enhance a high-quality public realm* that complements adjacent development and uses.

POLICY 5.2 **Development impacts.** Ensure architectural and site designs that limit impacts on surrounding neighborhoods and that respect the fundamental characteristics of applicable Hillsboro design type designations*.

POLICY 5.3 **Innovative architecture and site design.** Facilitate innovative architectural and site designs that complement and enhance the public realm, particularly at the edges of development sites, to enhance their integration into adjacent uses.

POLICY 5.4 **Distribution of commercial areas.** Disperse the types and sizes of commercial opportunities throughout the city in proportion to the needs of the area.

POLICY 5.5 **Shopping, dining, entertainment, and recreation options.** Facilitate and disperse an array of shopping, dining, entertainment, and recreation options throughout the City that help attract and retain major employers.

POLICY 5.6 **Locational compatibility.** Focus economic development in Employment Areas, Regional Centers, Town Centers, Neighborhood Centers*, and along Corridors.

POLICY 5.7 **Innovation economy.** Plan for new and innovative economic trends, such as the sharing economy*.

POLICY 5.8 **Environmental sustainability**. Pursue environmental sustainability* actions that aim to preserve natural resources and reduce environmental impacts.

INITIAL DRAFT

DEFINITIONS

(Notes in parentheses indicate definitions from CDC or other Comp Plan sections)

Corridors – Major streets that may accommodate higher densities and intensities and feature a high-quality pedestrian environment and convenient access to transit. Corridors provide critical connections to centers, and serve as major multi-modal transportation routes for people and goods. (Design & Development Design Type Definitions)

Development-Ready – Lands available for development within 180 days, with appropriate zoning to allow industrial or traded-sector uses. (Definition adapted from Business Oregon)

Economic Resiliency – Reducing the vulnerability of economies to crises and strengthening their capacity to absorb and overcome severe economic shocks while supporting strong growth.

Employment Areas – Areas that serve as hubs for regional commerce. They include industrial land for high tech, business parks, manufacturing, and other business uses. These areas should include limited supporting commercial and retail uses to serve employees. These areas should contain multi-modal commuting options and good connectivity to regional transportation facilities for the movement of goods and cargo. (Design & Development Design Type Definitions)

Environmental Sustainability – Meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Gentrification – An under-valued area that becomes desirable, resulting in rising property values and changes to demographic and economic conditions of the neighborhood. These changes sometimes include a shift from lower-income to higher-income households, and often there is a change in racial and ethnic make-up of the neighborhood's residents and businesses.

Health and Education Campuses – Essential healthcare and education service providers in a defined geographic area that serve as a major sources of jobs, workforce development, and innovation.

Hillsboro Design Type Designations – See descriptions in Design and Development Goals and Policies.

Hillsboro Planning Area – Hillsboro city limits as well as unincorporated areas where the City is ultimately responsible for comprehensive planning and implementing regulations to govern future development per the urban planning intergovernmental agreement and other intergovernmental agreements with Washington County.

Incubating Companies – New and start-up companies that require an array of business support resources and service to develop, such as physical space, capital, coaching, common services, and networking connections.

Industry Clusters – Groups of similar and related firms in a defined geographic area that share common markets, technologies, worker skill needs, and which are often linked by buyer-seller relationships.

Multi-Modal – Transportation facilities or programs designed to serve many or all methods of travel, including all forms of motor vehicles, public transportation, bicycles and walking. (Metro RTFP)

Neighborhood Centers – Areas with a mix of retail and services to meet day-to-day living needs of the immediate neighborhood with less density and intensity than Regional or Town Centers. These areas have a high level of connectivity to the immediate neighborhood by walking or biking, with the potential for transit access nearby. (Design & Development Design Type Definitions)

INITIAL DRAFT

Public Facilities and Services – Facilities and services provided by government agencies, service districts, or other public entities to meet the health, safety and welfare needs of the public, including but not limited to police and fire protection, recreation facilities and services, transportation system and services, energy and communication services, health and education services, zoning and subdivision control, and local government services.

Public Realm – The system of publicly-accessible spaces made up of streets, pathways, right of ways, parks, open spaces and public and civic buildings and facilities, and publicly-accessible spaces in private development (including lobbies and courtyards).

Regional Centers – Compact hubs of high density housing, employment, and commercial uses supported by high quality transit, multi-modal street networks, and supportive amenities and services. (Design & Development Design Type Definitions)

Scale-Up – Companies looking to expand in terms of market access, revenues, added value or number of employees.

Sharing Economy – An economic model in which individuals borrow, rent, or trade goods, services, space, and other resources from each other typically via the internet.

Town Centers – Areas comprised of medium to high intensity mixed use development containing housing, commercial, retail and civic uses. These areas are well served by transit, have supportive amenities, and are accessible by the surrounding neighborhood by walking or biking. (Design & Development Design Type Definitions)

Traded Sector – Industries and firms that produce goods and services sold outside the region.

Utilities – Fundamental services necessary to support community health, well-being, and economic function, including but not limited to electricity, natural gas, water, sewer, telecommunications, and waste management services.

INITIAL DRAFT

APPENDIX A: SITE REQUIREMENTS

The following series of tables summarize key site requirements for a range of prospective tenant types.[24]

Industrial Development Competitiveness Matrix

	CRITERIA	PROFILE	A	B	C	D	E	F	G	H	I	J
			Computer & Electronic Manufacturing (High-Tech R&D)	Software & Media	Multi-Tenant Office	Food Processing	Other Manufacturing	Life/Bioscience R&D Campus	Wholesaling	Retail	Data Center	Incubator
	GENERAL REQUIREMENTS		Use is permitted outright, located in UGB or equivalent and outside flood plain; and site (NCDA) does not contain contaminants, wetlands, protected species, or cultural resources or has mitigation plan(s) that can be implemented in 180 days or less.									
	PHYSICAL SITE											
1	TOTAL SITE SIZE*	Competitive Acreage**	5 - 100+	5 - 15	5 - 20	5 - 25+	5 - 15+	20 - 100+	10 - 25	5 - 20	10 - 25+	5 - 25+
2	COMPETITIVE SLOPE:	Maximum Slope	0 - 5%	0 - 7%	0 - 7%	0 - 5%	0 - 5%	0 - 7%	0 - 3%	0 - 7%	0 - 7%	0 - 5%
	TRANSPORTATION											
3	TRIP GENERATION:	Average Daily Trips per Acre	40 - 60	80 - 200[1]	120 - 240[2]	50 - 60	40 - 50	60 - 150	50 - 60[3]	400 - 500[4]	20 - 30	40 - 50
4	MILES TO INTERSTATE OR FREIGHT ROUTE:	Miles	w/in 10	w/in 5	w/in 5	w/in 30	w/in 20	w/in 5	w/in 5	w/in 5	w/in 30	N/A
5	MILES TO FREQUENT TRANSIT SERVICE (15 MIN OR LESS)	Miles	0.6	0.5	0.8	< 0.1	0.2	0.1	0.3	< 0.1	0.1	< 0.1
6	RAILROAD ACCESS:	Dependency	Preferred	Not Required	Not Required	Preferred	Preferred	Preferred	Preferred	Avoid	Avoid	N/A
7	PROXIMITY TO MARINE PORT:	Dependency	Preferred	Not Required	Not Required	Preferred	Preferred	Preferred	Preferred	Not Required	Not Required	N/A
8	PROXIMITY TO INTERNATIONAL/ REGIONAL AIRPORT:	Dependency	Competitive	Required	Preferred	Preferred	Preferred	Required	Not Required	Not Required	Competitive	N/A
		Distance (Miles)	The City of Hillsboro enjoys a competitive advantage that all industries within Hillsboro are located within 5 miles of an international airport (Hillsboro International Airport)									

INITIAL DRAFT

24 Mackenzie

APPENDIX A: SITE REQUIREMENTS

		PROFILE	A	B	C	D	E	F	G	H	I	J
		CRITERIA	Computer & Electronic Manufacturing (High-Tech R&D)	Software & Media	Multi-Tenant Office	Food Processing	Other Manufacturing	Life/Bioscience R&D Campus	Wholesaling	Retail	Data Center	Incubator
	UTILITIES											
9	WATER:	Min. Line Size (Inches/Dmtr)	12" - 16"	6" - 8"	8" - 10"	12" - 16"	6" - 10"	8" - 12"	6" - 10"	8" - 12"	16"	4" - 8"
		Min. Fire Line Size (Inches/Dmtr)	12" - 18"	8" - 10"	8" - 12"	10" - 12"	8" - 10"	8" - 12"	8" - 10"	8" - 12"	10"-12"	6" (or alternate source)
		High Pressure Water Dependency	Required	Not Required	Not Required	Required	Not Required	Preferred	Not Required	Not Required	Required	Not Required
		Flow (Gallons per Day per Acre)	5,200	1,200	1,500	3,150	1,850	2,450	1,200	1,800$_s$	50 - 200†	1,200
10	SEWER:	Min. Service Line Size (Inches/Dmtr)	12" - 18"	6" - 8"	8" - 10"	10" - 12"	6" - 8"	10" - 12"	6" - 8"	6" - 10"	8"- 10"	4" - 6" (or on-site source)
		Flow (Gallons per Day per Acre)	4,700	1,000	2,000	2,600	1,700	2,000	1,000	1,500$_s$	1,000‡	1,000
11	NATURAL GAS:	Preferred Min. Service Line Size (Inches/Dmtr)	6"	4"	4"	4"	4"	6"	4"	4" - 6"	4"	N/A
		On Site	Competitive	Preferred	Competitive	Preferred	Competitive	Competitive	Preferred	Competitive	Preferred	Preferred
12	ELECTRICITY:	Minimum Service Demand	4 - 6 MW	1 - 2 MW	0.5 - 1 MW	2 - 6 MW	0.5 MW	2 - 6 MW	0.5 MW	0.5 - 1 MW	5 - 25 MW	1 MW
		Close Proximity to Substation	Competitive	Competitive	Preferred	Not Required	Preferred	Competitive	Not Required	Preferred	Required, could be on site	Not Required
		Redundancy Dependency	Preferred	Preferred	Preferred	Not Required	Not Required	Competitive	Not Required	Preferred	Required	Not Required
13	TELECOMMUNICATIONS:	Major Communications Dependency	Required	Required	Required	Preferred	Required	Required	Preferred	Required	Required	Preferred
		Route Diversity Dependency	Required	Required	Required	Not Required	Not Required	Required	Preferred	Preferred	Required	Not Required
		Fiber Optic Dependency	Required	Required	Required	Preferred	Preferred	Required	Competitive	Preferred	Required	Not Required

INITIAL DRAFT

APPENDIX A: SITE REQUIREMENTS

	PROFILE / CRITERIA	A	B	C	D	E	F	G	H	I	J
		Computer & Electronic Manufacturing (High-Tech R&D)	Software & Media	Multi-Tenant Office	Food Processing	Other Manufacturing	Life/Bioscience R&D Campus	Wholesaling	Retail	Data Center	Incubator
14	**SPECIAL CONSIDERATIONS:**	Acreage allotment includes expansion space (often an exercisable option). Very high utility demands in one or more areas common. Sensitive to vibration from nearby uses.	[1]: Research & Development @ 80 ADTs per acre on the low end, estimated 200 ADTs per acre for general office on the high end. Location specific.	[2]: Range represents FAR 0.25 - 0.5 of office uses Location to other cluster industries.	May require high volume/supply of water and sanitary sewer treatment. Often needs substantial storage/yard space for input storage. Onsite water pre-treatment needed in many instances.	Adequate distance from sensitive land uses (residential, parks) necessary. Moderate demand for water and sewer. Higher demand for electricity, gas, and telecom.	High diversity of facilities within business parks. R&D facilities benefit from close proximity to higher education facilities. Moderate demand on all infrastructure systems.	[3]: General warehousing rates	[4]: Based on discount warehouse @ 0.25 FAR [5]: Dependent on use, i.e., brewery vs. restaurant Location to cluster industries.	Larger sites may be needed. The 25 acre site requirement represents the more typical site. Power delivery, water supply, and security are critical. Surrounding environment (vibration, air quality, etc.) is crucial. May require high volume/supply of water and sanitary sewer treatment.	Often established by municipalities and have symbiotic relationships with colleges and/or universities.

Terms:

More Critical ↑ Less Critical	**'Required'** factors are seen as mandatory in a vast majority of cases and have become industry standards.
	'Competitive' significantly increases marketability and is *highly recommended by Business Oregon*. May also be linked to financing in order to enhance the potential reuse of the asset in case of default.
	'Preferred' increases the feasibility of the subject property and its future reuse. Other factors may, however, prove more critical.
	'Not Required' does not apply for this industry and/or criteria.
	'Avoid' factors act as deterrents to businesses in these industries because of negative impacts.

*Total Site: Building footprint, including buffers, setbacks, parking, mitigation, and expansion space.

**Competitive Acreage: Acreage that would meet the site selection requirements of the majority of industries in this sector.

† Data Center Water Requirements: Water requirement is reported as gallons per MWh to more closely align with the Data Center industry standard reporting of Water Usage Effectiveness (WUE).

‡ Data Center Sewer Requirements: Sewer requirement is reported as 200% of the domestic usage at the Data Center facility. Water and sewer requirements for Data Centers are highly variable based on new technologies and should be reviewed on a case-by-case basis for specific development requirements.

INITIAL DRAFT

The 13 site requirements listed on the matrix provide a basis for establishing a profile of the physical and other site needs of the identified industry. The site requirements are intended to address the typical needs of each of the industry categories, and it is recognized that there will likely be unique or non-typical needs of a specific user that will need to be evaluated by OECDD staff on a case-by-case basis.

The following describes a few general requirements that apply to *all* industry type categories under consideration and then an overview of the 13 site requirements listed on the matrix.

General Requirements:

- The underlying zoning on the site must allow the use outright within the identified category. For example, no zone change, conditional use and/or similar land use review is necessary. Many jurisdictions typically require a design or development review which is acceptable, since the timeframe for obtaining such design-related approvals will be addressed in the State's rating system.
- The site under consideration must be located geographically within a UGB.
- The site is not located within a 100-year floodplain as mapped by FEMA, although sites with approved FEMA map amendments (e.g., LOMA & LOMR) are acceptable.
- The net contiguous developable area (NCDA) of the site not include hazardous contaminants as verified by a Level 1 Environmental Report, or a Level 2 Report that has received a No Further Action approval from DEQ; or existing wetlands or other natural features which are regulated at the State, Federal or local level; or federally endangered species.
- The NCDA does not contain any cultural or historical resources that have been identified for protection at the State, Federal or local level.
- The NCDA does not have mitigation plans that can be implemented in 180 days or less.

Site Requirements:

1. **Total Site Size:** The site size is taken to mean the size of the building footprint and includes buffers, setbacks, parking, mitigation, and expansion space.
2. **Competitive Slope:** Most industrial uses require relatively large building footprints that do not accommodate steps in floor slabs, and sloping topography will require extensive excavation and retaining systems that increase development cost over flat sites. The figures given are the preferred maximum average slope across the developable portion of the site, recognizing that sites with additional area outside the building, or developments with multiple building pads, generally will have lower slope earthwork costs than sites with limited space outside the building footprint.
3. **Trip Generation:** Sites are frequently limited by a jurisdiction to a specified total number of vehicle trips entering and exiting the site. This site requirement is an estimate of the minimum number of average daily trips per acre (based on the range of building coverage) that should be available for each of the industrial categories based on the Institute of Traffic Engineers (ITE) Manual-Ninth Edition. The following table lists the ITE codes used to estimate average trips for the industry profiles represented in the matrix.

INITIAL DRAFT

Industrial Profile	ITE Code	Trip Generation[25] (trips per acre)
Computer & Electronic Manufacturing (High-Tech R&D)	110, 120	40-60
Software & Media	710, 714, 715	80-200
Multi-Tenant Office	710	120-240
Food Processing	110	50-60
Other Manufacturing	110, 140	40-50
Life/Bioscience R&D Campus	720, 760	60-150
Wholesaling	857, 860	50-60
Retail	820, 850, 875	400-500
Data Centers	160	20-30
Incubator	710, 760	40-50

4. **Miles to Interstate or Freight Route:** With few exceptions, access to major freeways or freight routes is critical for the movement of goods. This site requirement indicates the typical maximum range of distance, in miles, from the site to the freeway or highway access. The roadways/intersections between the site and freeway/highway must generally operate at a level of service 'D' or better in accordance with the Highway Capacity Manual methodologies and general engineering standards.

5. **Miles to Frequent Transit Service:** Businesses located walking distance (within one-quarter of a mile) to a bus stop that is serviced by a frequent bus line enjoy a competitive advantage over others that are more limited in transportation access options.[26] This holds especially true in Hillsboro, as the town is linked to the larger Portland MSA through the TriMet MAX and bus lines.

6. **Railroad Access:** The need for access to railroad for the movement of goods within each industrial category is dependent upon individual users, so the site requirements are identified as either "Preferred," "Not Required," or "Avoid" in some cases where the presence of rail may actually be considered a deterrent to business.

7. **Proximity to Marine Port:** The need for access to a marine port for the movement of goods within each industrial category is dependent upon individual users.

8. **Proximity to International/Regional Airport:** The need for access to a regional airport for the movement of goods or business travel within each industrial category is dependent upon individual users. With the proximity of the Hillsboro Airport, it is highly likely that a prospective site within the Hillsboro vicinity will fall within a 5-mile radius of the airport, as indicated on the matrix.

9. **Availability of Water:** This requirement indicates the minimum sizes of domestic water and fire lines immediately available to the site. In certain rural cases, a comparable supply from an on-site water system (i.e., well or reservoir with available water rights) may be acceptable. In addition to lines sizes, preference for high-pressure water capabilities and average flow demand in gallons per day is specified for each industry type.

   Water flow per day was calculated by multiplying the site size by the building coverage (see table below) to determine the building square footage. The building square footage was then divided by the number of employees per 1,000 square feet (see table below) to determine the total number of employees. The total

25 A formal traffic analysis might be necessary when a specific user has been identified.

26 We have defined "frequent bus line" as one with service occurring in no longer than 15 minute intervals.

INITIAL DRAFT

number of employees was then multiplied by 30 gallons (the average usage per employee per day) to calculate the total gallons used per day for all employees. A percentage of this total was added to account for process water usage to determine the total gallons per day for the specified industry.

INDUSTRY TYPE	SITE COVERAGE	SF/EMPLOYEE*
Heavy Industrial/Manufacturing	40%	470
General Manufacturing	40%	400
Food Processing	40%	630
High-Tech Manufacturing/Processing	30%	450
Campus Industrial/Electronic & Comp. Assembly	35%	400
Warehouse/Distribution	50%	1,400
Call Center/Business Services	35%	300

*Note: employment density numbers were obtained using a combination of the following Metro source: *Urban Growth Report Update (*1997), *Employment Density Study (*1999), Telephone conversations with Staff (7/02).

Using the employee density numbers above with estimates for process water demand, the total water use for industrial sites can be calculated on a per-acre basis. The following table summarizes our findings.

Industrial Profile	Employee Water Demand (gpd/ac)	Process Water Demand (gpd/ac)	Total Water Demand (gpd/ac)
Heavy Industrial / Manufacturing	1,200	400	1,600
High-Tech / Clean-Tech Manufacturing	900	4,300	5,200
Food Processing	900	1,250	2,150
Advanced Manufacturing	1,200	1,500	2,700
General Manufacturing	1,400	450	1,850
Business Services / Administration	1,600	-	1,600
Research Campus, R&D, Industrial Business Park	1,400	1,750	3,150
Regional Warehousing, Distribution, Logistics	500	-	500
Local Warehousing, Distribution, Logistics	500	-	500
UAV Manufacturing / Research	1,200	400	1,600
Data Centers	500	Varies	Varies
Specialized / Grassroots Industrial	800	400	1,200

INITIAL DRAFT

Recently updated water system master plans were used to validate these water demands against public utility planning methodologies used across the state.

10. **Availability of Sanitary Sewer:** This requirement indicates the minimum size of public sanitary sewer service line immediately available to the site. In certain rural cases, an on-site subsurface system providing a comparable level of service may be acceptable. Sewer flow requirements were determined by calculating a percentage of the water flow for each industry type, as summarized in the following table.

Industrial Profile	Percent of Water Discharged to Sanitary Sewer	Estimated Sanitary Demand (gpd/ac)
Heavy Industrial / Manufacturing	90%	1,500
High-Tech / Clean-Tech Manufacturing	90%	4,700
Food Processing	80%	2,600
Advanced Manufacturing	90%	2,500
General Manufacturing	90%	1,700
Business Services / Administration	100%	1,600
Research Campus, R&D, Industrial Business Park	80%	2,600
Regional Warehousing, Distribution, Logistics	100%	500
Local Warehousing, Distribution, Logistics	100%	500
UAV Manufacturing / Research	80%	1,300
Data Centers	100%	500
Specialized / Grassroots Industrial	80%	1,000

11. Natural Gas: This requirement indicates the minimum size natural gas line that is immediately available to the site. It is assumed that the pressure demand for all industry categories is 40-60 psi.
12. **Electricity:** This requirement indicates the minimum electrical demand readily available to each industry and where close proximity to a substation and redundancy dependency rank on the continuum of less critical to more critical. Estimated demand is based on review of existing usage from local utility providers, referencing industrial NAICS codes for the various profiles.
13. **Telecommunications:** This requirement indicates whether the availability of telecommunication systems are readily available, and where major commercial capacity, route diversity and fiber optic lines rank on the continuum of less critical to more critical. All sites are assumed to have a T-1 line readily available.

Special Considerations: This section addresses unique or otherwise special requirements that should be considered for sites in each industrial category.

INITIAL DRAFT

INDUSTRY PROFILES

The following provides supplemental information for the attached Industrial Development Profile Matrix. The preceding matrix (completed March 2, 2016) identifies 10 industry type categories (labeled A-J on the matrix) and 13 "site needs" which will assist in evaluating selected sites using the criteria of a given industry type. This will allow the City of Hillsboro to evaluate sites according to a specific category of industrial use.

The industry categories have been established based primarily on OECDD information (including input from various state agencies), as well as the industrial experience of Mackenzie. Due to the wide range and constantly evolving characteristics of uses, borderline and/or non-typical applications will likely arise and will be evaluated on a case-by-case basis. It should be noted that certain industry types might have unique requirements, such as proximity to an international airport, which may require an additional category. It should also be noted that the industry types represent the primary use of the industry, and exclude secondary/accessory uses (e.g., training facilities, etc.) at this level. The following is a brief description of the industry types listed on the matrix.

A: Computer & Electronic

a) *Description:*
The Computers & Electronics (C&E) cluster in Hillsboro is arguably the most well organized agglomeration of businesses, suppliers, and support industries in Oregon. Collectively branded as the "Silicon Forest," the industry catalyzed out of the location decisions of large firms such as Tektronix and Intel. The primary industries in C&E are generally organized into four tiers:
(1) assembly, packaging & testing
(2) manufacturing & etching
(3) components & machinery
(4) raw materials.[27]
The industry produces a broad offering of products ranging from semiconductors and machinery to electromedical devices, wiring, and batteries. The industry anchored in Hillsboro accounts for the vast majority of all Oregon exports.

b) *Representative Industry Types:*
- Semiconductor & related device manufacturing
- Semiconductor machinery manufacturing
- Electronic computer manufacturing (and other electronic components)
- Printed circuit assembly
- Analytical laboratory instrument manufacturing
- Computer and computer peripheral equipment and software merchant wholesalers

c) *Representative Companies:*
- Tektronix
- SolarWorld
- JIREH
- Planar Systems
- Intel
- IBM

[27] Fitz Gibbon, Beth. Powering the Future of Advanced Manufacturing with Advanced Manufacturing in Computers & Electronics (June 2014).

INITIAL DRAFT

- Sun Microsystems

B: Software & Media

a) *Description:*

The Greater Portland 2020 initiative defined this cluster as comprised of two tiers:

(1) firms that develop, customize, and implement software and include all activities related to information technology services; and

(2) media that can be produced, disseminated, and consumed on computers and electronic devices, including video, audio, software, and video games.[28]

This definition largely characterizes the structure in Hillsboro. However, we deviate slightly by removing data centers from this definition due to differences in land need.

In Hillsboro, software and media employment has grown by 50% since 2010, driven by growth within firms as well as large additions like Salesforce. Big firms dealing in business-to-business functions characterize the nature of software in Hillsboro, as opposed to smaller to medium sized "creative" software firms.

b) *Representative Industry Types:*

- Computer systems design
- Software publishing
- Custom computer programming
- Computer facilities management (and other computer-related services)
- Data processing & hosting
- Motion picture & video production

c) *Representative Companies:*

- Salesforce
- LAIKA
- NVIDIA
- Synopsis
- Corillian
- ENLI
- Serena
- Xerox

C: Multi-Tenant Office

a) *Description:*

Speculative Office is developed without a single user identified for utilization of a variety of office uses with sub-dividable space. As such, the closest comparison of how the space will be used once the office is constructed is general multi-tenant office buildings.

b) *Representative Industry Types:*

- Financial services
- Legal consulting
- Professional office

c) *Representative Examples:*

- ExecuTech Suites
- 3000 Office Building LLC
- Adams Crossing

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28 Market Street Services. Target Business Analysis and Marketing Review. Greater Portland 2020. (December 2014).

D: Food Processing

a) *Description:*
Generally, this category includes industries that manufacture or process foods and beverages for human or animal consumption. Although this category has similar siting characteristics as Other Manufacturing, the unique needs associated with food processing, such as high volume water and/or pressure demand, warrant this separate category. Broadly, there are two types of food processing categories:
(1) raw materials; and
(2) assembling.
Additionally, there is a packaging and warehousing component to these facilities.

b) *Representative Industry Types:*
- Production foods/goods (e.g., bakeries)
- Fruits and vegetables
- Breweries and wineries
- Dairy
- Bottling/beverages

c) *Representative Companies:*
- Ajinomoto (Portland)
- Beaverton Foods Inc. (Hillsboro)
- Cabroso (Medford)
- Rogue Creamery
- Hermiston Foods (Hermiston)
- Nancy's Yogurt (Eugene)
- Reser's Foods (Beaverton)
- Norpac (Salem and Stayton)
- Tillamook Dairy (Tillamook)
- Coca Cola bottling (state wide)
- Pepsi bottling (statewide)
- Full Sail Brewing (Hood River)
- Hood River Juice Company (Hood River)

E: Other Manufacturing

a) *Description:*
This category is intended to include industries that utilize relatively less intensive manufacturing processes, more assembly activities, and direct transfer to wholesale and domestic consumers. Typically, these facilities are freestanding, devoted to a single use, and emphasize manufacturing space over office space. Generally, these non-high tech industries may be located on individual sites or in business/industrial parks and have less effect on surrounding uses. This category also includes some industrial service uses that are engaged in serving other businesses, such as an industrial laundry facility.

b) *Representative Industry Types:*
- Electronic assembly support
- Wood products
- Automobile products
- Steel/metals
- Building materials fabrication and processing

c) *Representative Companies:*
- Warn Industries (Clackamas)
- JV Northwest (Canby)
- Hartung Glass (Wilsonville)

INITIAL DRAFT

- Oregon Iron Works (Clackamas)
- Daimler Trucks North America (Portland)
- Maxim Integrated (Beaverton and Hillsboro)
- Oregon Steel Mills (Portland)

F: Life/Bioscience Research & Development Campus

a) *Description:*
This category includes several different types of industrial or industrial related facilities focused on life science and bioscience research and development. These are characterized by a combination of manufacturing, service, and research activities and facilities that seek to apply knowledge of the way in which plants, animals, and humans function.
Hillsboro contains 14 bioscience companies, several of which are listed below, and together they provide local employment for approximately 1,800 professionals.

b) *Representative Industry Types:*
- Medical device design and manufacturing
- Pharmaceuticals
- Research & development
- Clinical trials
- Healthcare services

c) *Representative Parks/Campuses:*
- Acumed LLC
- Acute Innovations
- Cascade Tek
- Chemica Technologies
- Daverci LLC[29]

G: Wholesaling

a) *Description:*
The wholesale industry comprises companies involved in wholesaling merchandise and other goods such as mining, agriculture, manufacturing, and certain information industries. This industry typically represents an intermediate step in the production and distribution of goods and merchandise, as wholesalers generally sell goods intended for resale by a retailer. In some cases, users and customers may purchase these goods directly from a wholesaler with a retailer.

b) *Representative Industry Types:*
- Automobile and Other Motor Vehicle Merchant Wholesalers
- Furniture Merchant Wholesalers
- Office Equipment Merchant Wholesalers
- Hardware Merchant Wholesalers
- Farm and Garden Machinery and Equipment Merchant Wholesalers
- Sporting and Recreational Goods and Supplies Merchant Wholesalers

c) *Representative Companies:*
- Cascade Wholesale Hardware
- Costco Wholesale
- Pearlier Auto Wholesale

INITIAL DRAFT

29 The City of Hillsboro Economic Development Department has identified 7 more bioscience companies, which are not listed in the body of the report to save space. The other companies are: FEI Company, Gaffney Technology, Genentech, Kryptiq Corp., Modo Inc., Oregon National Primate Research Center, R&D Plastics, Senju Laboratory of Oscular Sciences, and Symbio Corp.

H: Retail

b) *Description:*
This industry contains businesses that sell merchandise, largely without any transformation of the good, with services largely being ancillary to the sale of said merchandise. The businesses usually receive goods from wholesalers, and typically do not transform the good before its final sale to the user or customer. There are sixty-nine subsectors of retail trade, some of which are reflected in the bulleted list below.

c) *Representative Industry Types:*
- Specialty food/grocery
- Coffee shops/cafes
- Theater/recreation/entertainment
- Brew pub/wine or bottle shops
- Full service local restaurants
- Food car pods
- Bookstores and boutiques
- Wellness and spa services
- Hotel & hospitality
- Niche manufacturing (bike, bakery, outdoor, etc.)

d) *Representative Companies:*
- New Seasons
- Dutch Bros. Coffee
- McMenamins Cornelius Pass Roadhouse
- P.F. Chang's
- Barnes & Noble
- Align Wellness Center
- Embassy Suites
- Orenco Station Cyclery

I: Data Center

a) *Description:*
Data centers are classified under NAICS 5182: Data Processing, Hosting, and Related Services. We consider them separately from other "information and software" activates because the land and utility needs are far different. Over the just the last five years, unprecedented growth in demand for data hosting has developed an entirely new segment of the industrial landscape in Oregon and specifically Hillsboro—attracted to a generally temperate climate, low overall disaster risk, low utility rates from renewable sources, and abundant water.
The growth outlook for data center siting is strong, as high growth rates for streaming, software as a service (SaaS), and big data across the industry creates an accelerating need for hosting services. Global data center demand is expected to grow threefold over just the next five years.[30] With edge markets like Portland and Hillsboro in the path of growth, the extent that Hillsboro will permit data center expansion on prime greenfield sites will be an important near-term policy decision.

b) *Representative Companies:*
- ViaWest
- T-5
- Adobe

30 Cisco Global Cloud Index (2015).

INITIAL DRAFT

J: Incubator

a) *Description:*
This industry type is often established by local municipalities and has a symbiotic relationship with colleges and universities within the vicinity. Diogenensis defines business incubators as a "unique and highly flexible combination of business development processes, infrastructure and people designed to nurture new and small businesses by helping them to survive and grow through the difficult and vulnerable early stages of development."

b) *Representative Industry Types:*
- Not applicable for this industry type, as the incubators serve as cultivating space for a number of uses to grow in their nascent business stages.

c) *Representative Companies:*
- Microenterprise Investors Program of Oregon (Portland)
- BESThq (Beaverton)
- Forge Portland
- WeWork (Portland)

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