Analysis of Land Use Efficiency in Oregon Cities

A Report to the HB 2254 Rules Advisory Committee

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Final Report

Prepared for:

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Department of Land Conservation & Development

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Table of Contents

EXECUTIVE SUMMARY

This report presents analysis of historic land use efficiency in Oregon cities to support development of a simplified land need methodology for use in urban growth boundary (UGB) review. The analysis is intended to address parts of the research requirements stated in House Bill 2254 (codified as ORS 197A) relating to historic land use efficiency.[1]

Overview

In response to the growing complexity of UGB amendment process, the 2013 legislature enacted HB 2254 (codified at ORS 197A) to provide for new, simplified methods for growing cities to evaluate the capacity of their UGBs. The law requires the LCDC to adopt rules to establish these methods before January 1, 2016. LCDC appointed a Rulemaking Advisory Committee (RAC) to assist in development of these rules.

HB 2254 requires that the LCDC produce an administrative rule that implements the legislation. As part of that rulemaking process, the bill requires that the LCDC establish factors for converting forecasted population and employment growth into estimates of land need for housing, employment and other categories of uses. The bill requires the factors in part "be based on an empirical evaluation of the relation between population and employment growth and the rate and trends of land utilization in the recent past in the applicable major region of the state…"

Based on these requirements, DLCD staff identified the following objectives for this research:

1. Determine the historical rate of "land efficiency" and land consumption (per person/acre).
2. Determine past employment growth rates/trends of land utilization.

This research was primarily conducted through analysis of Geographic Information System (GIS) data. The UO research team collected data for as many cities as possible.

For the purpose of this research, we define the *urban area* as areas within city limits that are also inside urban growth boundaries in 216 cities outside of the Portland UGB. We use the annual population estimates from Portland State University as a proxy for urban population (the annual population estimates are for areas within city limits). Because of data availability and population levels and growth rates (described further on page 9), the cities are divided into Tiers. Tier 1 (130 cities) includes all cities outside Portland Metro UGB except cities that are growing by less than 1% in average annual growth rate per year between 2003-2012 with a population under 5,000. Tier 2 (127 cities) includes cities for which

[1] https://www.oregonlegislature.gov/bills_laws/lawsstatutes/2013ors197A.html

ORMAP taxlot data were available. Tier 3 (122 cities) includes cities for which county level assessor's data was obtained.

Findings

Following are key findings of the UO Team's research:

- **Larger cities account for the majority of population growth.** Between 2005 and 2012, nearly 60% of the population growth in cities outside the Portland Metro UGB occurred in cities over 25,000 (11 cities) and 75% occurred in cities over 10,000 (28 cities).

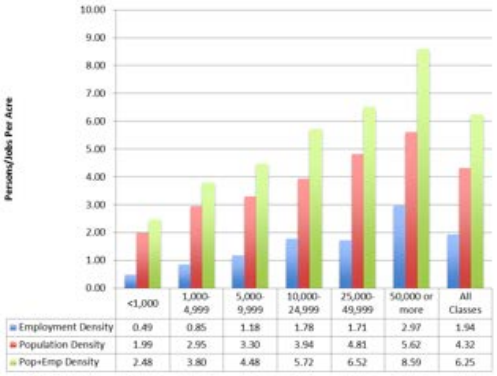
- **Between 2005 and 2012, population increased faster than employment**. Based on covered employment data, the 216 cities outside of the Portland Metro UGB added about 5,900 jobs between 2005 and 2012. Employment grew at a rate much slower than population. Between 2005 and 2012, employment for the 216 cities outside the Portland Metro UGB increased 1.1%; population increased 7.9%. This difference can largely be attributed to the Great Recession.

- **As defined by HB 2254 and by this study, the use of land in cities became more "efficient" between 2005 and 2012.** For the 130 cities outside the Portland Metro UBG included in the study, population density within city limits (total people divided by total acres) increased by 12%. Population density for all land in city limits increased from 3.86 persons per acre (2,474 persons per square mile) to 4.32 persons per acre (2,763 persons per square mile).

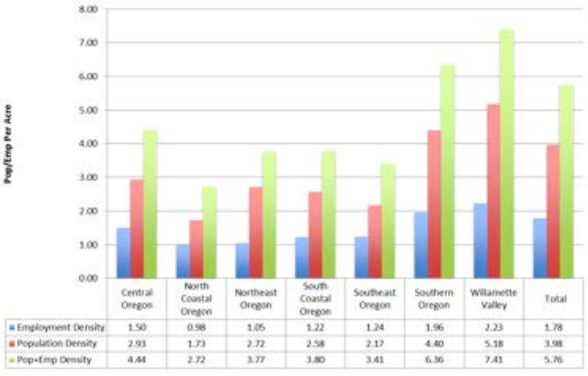
- **Employment densities increased between 2005 and 2012**. For the 130 cities outside the Portland Metro UBG included in the study, employment density within city limits increased by 4%. Employment density for all land within city limits increased from 1.86 employees per acre (1,188 employees per square mile) to 1.94 employees per acre (1,240 employees per square mile). Note that the *density* of employment increased slightly despite the fact that total employment grew slowly.

- **Smaller cities, on average, are less dense than larger cities.** For the 216 cities outside the Portland Metro UGB, cities with populations less than 1,000 averaged 679 persons per acre, while cities over 50,000 averaged 3,202 persons per acre. Figure S-1 shows population and employment density by city size and region.

Figure S-1. Population and Employment Density (persons and jobs per acre) for Tier 1 Cities By City Size and Region, 2012, Non-Prohibitive Acres in City Limits (n=130)



	<1,000	1,000-4,999	5,000-9,999	10,000-24,999	25,000-49,999	50,000 or more	All Classes
Employment Density	0.49	0.85	1.18	1.78	1.71	2.97	1.94
Population Density	1.99	2.95	3.30	3.94	4.81	5.62	4.32
Pop+Emp Density	2.48	3.80	4.48	5.72	6.52	8.59	6.25



	Central Oregon	North Coastal Oregon	Northeast Oregon	South Coastal Oregon	Southeast Oregon	Southern Oregon	Willamette Valley	Total
Employment Density	1.50	0.98	1.05	1.22	1.24	1.96	2.23	1.78
Population Density	2.93	1.73	2.72	2.58	2.17	4.40	5.18	3.98
Pop+Emp Density	4.44	2.72	3.77	3.80	3.41	6.36	7.41	5.76

- **Regional differences exist**. Cities in rural regions generally have lower population and employment densities (as measured in persons or employees per acre). Cities in the Willamette Valley and Southern Oregon region have higher average population and employment densities than other regions.

- **On average, single-family/plex[2] development became more efficient**. For the 120 cities included in the single-family density analysis, the data show a trend of increasing density over time. Average single-family density in the period between 2008-2012 was 22% higher than average density between 1993-1997. Single-family/plex density was 5.22 taxlots per unprohibitive acre[3] in 1993-1997 and increased to 6.38 taxlots per unprohibitive acre in 2008-2012. The trend of increasing single-family and plex densities is seen for all city sizes.

- **Multifamily residential densities are difficult to analyze due to data constraints**. Most assessors do not include counts of multifamily dwelling units in their assessment databases. Multifamily development in the 26 cities the research team had data for averaged about 12 dwelling units per net acre. To supplement the small sample, the research team reviewed Goal 10 housing studies. The weighted average for the 18 cities that included unit counts was 15.3 dwelling units per net acre. Time series data for multifamily residential density was not available.

[2] Oregon Department of Revenue defines Property Classifications. This analysis includes residential (class 100) which includes single family, duplexes, triplexes, and quadplexes. Parcels with 5 or more units are classified as multifamily. Thus, our analysis refers to "single family and plex"

[3] In this analysis, our denominator is the number of Unprohibitive land, which excludes water and floodways. We further describe our methods for considering land on page 12.

- **Employment densities fall within expected ranges**. The analysis of employment density showed an average density of 17.2 employees per net acre for commercial employment, and 8.7 employees per net acre for industrial employment. These results are in the range of those reported in the Goal 9 workbook.

- **Land for roads, parks, and schools accounts for a significant portion of land in city limits.** On average, acreage not in tax lots or on exempt land in governmental uses constitute 29% of acres in city limits. The research team used land not in tax lots in city limits as a proxy for roads. Land not in taxlots averaged 18% for the 180 cities included in the analysis.

- **Statistical analysis shows that no simple relationship exists between city size and density or between region and density**. While average densities increase by city size, simple empirical models show only slight correlation between city size and density because of the high degree of variability in smaller cities.

Implications

A fundamental purpose of HB 2254 is to make the process for adding land to UGBs simpler. One way to make things simpler would have been to find strong relationships between a relatively easily measured or estimated variable (e.g., population) and land use / need.

The results clearly show that cities are becoming more efficient over time. But the relationships are not consistently simple and uniform:

- **Smaller cities, on average, are less dense than larger cities.** This suggests that methodologies that incorporate city size may be appropriate.

- **The density analysis provides baseline data that can inform density thresholds.** No previous studies in Oregon have included such a broad and comprehensive review of land use efficiency.

- **Larger cities account for the majority of population growth**. Between 2005 and 2012, 75% of the state's population growth occurred in cities over 10,000. Because these cities are growing, they are candidates to use the simplified UGB methodology authorized by HB 2254. If the intent of UGB streamlining is to develop simpler methods to estimate land need, methodologies that are focused on larger cities will be most effective in implementing a UGB streamlining process.

- **Regional differences exist, and could be incorporated into a simplified methodology**. The results show that cities in the Willamette Valley and Southern Oregon (and to a lesser extent, Central Oregon) have achieved higher residential and employment densities than other regions. A simplified methodology could recognize these differences and establish density thresholds based on location.

- **Limits to efficiency increases should be recognized and incorporated into the methodology**. Focusing on one element of the analysis—single-family

and plex efficiency—the data clearly show that on average cities are generally becoming more efficient, but there are likely upper bounds of efficiency. Few cities averaged over 8 units per acre for new housing in any time period, and those are outliers.

- **Methodologies for roads and public lands should apply to all lands, not only residential lands**. Current state policy (OAR 660-024) allows cities to use a safe harbor assumption of 25% for roads, schools and parks. The research suggests that these uses do not always occur in residential areas and that a factor applied to all land might provide a more consistent and accurate approach.

- **Simplified methods that use a population or employment factor per improved acre are possible**. Distilling the numbers to a persons per acre for residential land and employees per acre for employment land and then adding land for roads, schools, and parks would be the simplest available method, and should be further analyzed for its effectiveness.

In summary, the analysis presented in this report represents the most comprehensive and accurate analysis possible in the context of the objectives outlined in HB 2254. To the extent the data allow, it provides the foundation to address the requirement that the method:

> *Be based on an empirical evaluation of the relation between population and employment growth and the rate and trends of land utilization in the recent past in the applicable major region of the state.*

CHAPTER 1: INTRODUCTION

This report presents analysis of historic land use efficiency in Oregon cities to support development of a simplified land need methodology for use in urban growth boundary (UGB) review. The analysis is intended to address parts of the research requirements stated in House Bill 2254 (codified as ORS 197A) relating to historic land use efficiency.[4]

Background

With the passage of Senate Bill 100, the Oregon statewide land-use program became law in 1973. Its iconic requirement is that every city have an Urban Growth Boundary (UGB) to (1) protect resource lands outside the boundary, and (2) encourage more efficient (denser) development patterns inside the boundary. Subsequent interpretations and expansions of the UGB and related requirements by the Land Conservation and Development Commission (LCDC), its staff (DLCD), and the courts addressed the pattern of development inside the UBGs (e.g., mixed-use, transit-oriented).

As of 2015, there were 242 incorporated cities and 36 counties in Oregon, with 217 UGBs. We were unable to find data on the number of acres within UGBs in the mid-1980s, after all the UGBs had been adopted and approved. In 2012, there were 570,896 acres in UGBs and 447,400 acres in city limits, not including the Portland Metro UGB.[5]

When the architects of SB100 established UGBs 40 years ago, they had little guidance. Guidance in the bill led to an interpretation that the law required cities to draw a boundary with a supply of buildable land sufficient to accommodate approximately 20 years of development. But cities used different techniques to forecast growth, development, and buildable land; had different goals; and had different interpretations of the requirements in the 10 years after the program started, when almost all of the initial UGBs were established.

Since then many procedures have been standardized by administrative rules. Since UGBs get established only once, those rules are about the process for *amending* UGBs (OAR 660-024 and to a lesser extent, OAR 660-009 and OAR 660-010). While the rules clarified some aspects of UGB amendments, they also had the effect of making the process more complex. This complexity has resulted in many boundary reviews taking five or ten years (current record: almost 20 years and counting) as the process of analysis, findings, review, and adjudication repeats itself. A stated purpose of ORS 197a is that the methods "Become, as a result of reduced costs, complexity and time, the methods that are used by most cities with growing populations to manage the urban growth boundaries of the cities."

[4] https://www.oregonlegislature.gov/bills_laws/lawsstatutes/2013ors197A.html

[5] We do not include the Portland Metro figures here because HB 2254 does not apply to Portland Metro.

UGB requirements are always at the front of critiques of the Oregon land-use program. They were a major impetus for several statewide ballot measures in the 1980s and 1990s to repeal the state's planning program (all unsuccessful), Ballot Measures 7 and 37 (2000 and 2004), the "Big Look" review of the program ten years ago, and DLCD's almost continuous UGB committees for the last seven years. Despite the critique, little has been done to simplify the process.

In response to the growing complexity of UGB amendment process, the 2013 legislature enacted HB 2254 (codified at ORS 197A) to provide for new, simplified methods for growing cities to evaluate the capacity of their UGBs. The law requires the LCDC to adopt rules to establish these methods before January 1, 2016. LCDC appointed a Rulemaking Advisory Committee (RAC) to assist in development of these rules.

Purpose and Methods

HB 2254 requires that the LCDC produce an administrative rule that implements the legislation. As part of that rulemaking process, the bill requires that the LCDC establish factors for converting forecasted population and employment growth into estimates of land need for housing, employment and other categories of uses. The bill requires the factors:

- Be based on an empirical evaluation of the relation between population and employment growth and the rate and trends of land utilization in the recent past in the applicable major region of the state;
- Reflect consideration by the Commission of any significant changes occurring or expected to occur in the markets for urban land uses in that major region of the state;
- Be designed to encourage an increase in the land use efficiency of a city, subject to market conditions; and
- Provide a range of policy choices for a city about the form of its future growth. [6]

Based on these requirements, DLCD staff identified the following objectives for this research:

1. Determine the historical rate of "land efficiency" and land consumption (per person/acre).
2. Determine past employment growth rates/trends of land utilization.

This research was primarily conducted through analysis of Geographic Information System (GIS) data. The UO research team collected data for as many cities as possible. Chapter 2 describes the specific methods in more detail.

[6] The rule also requires other research tasks; our research focuses narrowly on this requirement.

Organization of Report

The remainder of this report is organized as follows:

- **Chapter 2: Framework for Analysis of Land Use Efficiency** presents a description of how the UO research team operationalized the concept of land use efficiency and a list of metrics used to measure land use efficiency.
- **Chapter 3: Characteristics of Land Within City Limits** presents data on various characteristics of land for all cities outside the Portland Metro UGB.
- **Chapter 4: Residential Land Use Efficiency** presents analysis of residential densities by housing type and time period for all cities outside the Portland Metro UGB.
- **Chapter 5: Employment Land Use Efficiency** presents analysis of employment densities by type and time period for all cities outside the Portland Metro UGB.
- **Chapter 6: Conclusions and Implications** summarizes the conclusions of the research and describes the implications for development of a simplified land need methodology for all cities outside the Portland Metro UGB.

This study also contains the following appendices:

- **Appendix A: ORS 197A** presents the codified language of HB 2254 that guided the research presented in this report.
- **Appendix B: List of Cities by Tier** presents a list of all cities included in the study and information about their relationship to counties, regions, city size classes and analysis tiers.
- **Appendix C: Effect of Constraints on Residential Density** presents an analysis of single-family and plex densities on constrained, partially constrained, and unconstrained lands.
- **Appendix D: Additional Data** includes data on City Characteristics, data on Residential Development and Density, and data on Employment Development and Density.

CHAPTER 2: FRAMEWORK FOR ANALYSIS OF LAND USE EFFICIENCY

This chapter presents the framework used by the UO research team for this analysis. It begins with an overview of definitional issues related to implementation of research on land use efficiency. It concludes with a description of metrics evaluated by the UO research team.

What HB 2254 Requires

Following is text from HB 2254 relevant to research on land use efficiency:

> Section 2(2): Encourage, to the extent practicable given market conditions, the development of urban areas in which individuals desire to live and work and that are *increasingly efficient in terms of land uses and in terms of public facilities and services.*

and

> Section 2(4): Encourage cities to *increase the development capacity* within the urban growth boundaries of the cities.

and

> Section 3(5)(a): Evaluate, every five years, the impact of the implementation of sections 4 (2) and 5 (2) of this 2013 Act on *the population per square mile, livability in the area, the provision and cost of urban facilities and services*, the rate of conversion of agriculture and forest lands and other considerations.

and

> Section 4(2)(B)(b) The urban *population per square mile* will continue, subject to market conditions, to increase over time on a statewide basis and in major regions of the state, including that portion of the Willamette Valley outside of Metro.

[emphasis added]

These passages highlight at least one specific indicator (population per square mile) and several other concepts (public facilities service efficiency, development capacity, livability, cost of urban facilities and services). Our scope of work for DLCD was intended to focus narrowly on analysis of land use efficiency; other parts of the analysis are being completed through other studies.

Section 4(2)(B)(b) also refers to "urban" population. In the context of the Oregon land use program, urban has typically been defined as the developed area within a UGB. Our analysis shows that the city limits of many jurisdictions extend outside the UGB. The nature of development in unincorporated areas of UGBs tends to be a mixture of lower density uses. As such, one would expect that the efficiency of land

use in these areas would be lower than in city limits. In short, our interpretation of HB 2254 is that section 4(2)(B)(b) refers to urban in the context of Goal 14 (e.g., developed lands within the UGB).

For the purpose of this research, we define the *urban area* as areas within city limits that are also inside urban growth boundaries. We use the annual population estimates from Portland State University as a proxy for urban population (the annual population estimates are for areas within city limits).

It is essential that we be clear about the operational definition of "efficiency" for the purpose of this research. Our interpretation of the legislative purpose of this part of the HB 2254 research (note that the bill identifies other research tasks) is to develop a simplified methodology for determining land need. This is articulated in Section 4(3)(b) of the bill which requires that the determination of supply and development capacity within UGBs:

> Be based on an empirical evaluation of the relation between population and employment growth and the rate and trends of land utilization in the recent past in the applicable major region of the state.

Thus, we have a numerator (population and employment) and a denominator (land area). **In short, the legislation points to an operational definition that equates measures of land use efficiency to measures of density** (e.g., people or dwelling units per acre)**.** The following section describes how the UO research team operationalized the concept of land use efficiency for the purpose of this study.

Definitions

Central to the idea of empirical research is measurement. In a statistical analysis sense, **measurement** is the assignment of numbers to a phenomenon that one is interested in analyzing. Often the phenomenon of concern is a broad one that does not have any single, accepted measure (e.g., patriotism, altruism, livability). Thus, to do empirical work about important concepts researchers must **operationalize** them: i.e., they must define the process they will use to measure the concepts. Before addressing key definitions for this study, it is useful to revisit definitional linkages in measurement.

- **Concepts** are measured indirectly through **indicators** specified by **operational definitions**

- **Operational definitions** are statements that specify how a concept will be measured

- **Metrics** refer to things that can be measured directly and are linked to a concept through an operational definition. The key concept in HB 2254 that our research addresses is "efficiency." The statute does not define how to measure land use efficiency. Absent an operational definition, one could identify many different measures of efficiency. A logical starting point is the dictionary and common usage: efficiency means either (1) maximizing a

desired output for some given amounts of input, or (2) minimizing inputs for some given amount of output.

Economists think of efficient use of resources as multidimensional: both the desired outputs and the required inputs are many, and efficient production of those benefits requires an optimization, not a simple maximization or minimization. Economists (and the public, for that matter) would typically measure the efficiency of a public policy as the ratio of benefits to costs: a higher ratio means more efficiency.

That notion can be found in Oregon land use law: in Senate Bill 100 and its subsequent interpretation. The LCDC is supposed to balance "conservation and development," and potentially the performance of a plan or program on all the statewide goals.

HB 2254 is focused on just one of those goals (Goal 14). Its definition of efficiency is more narrow, and almost certainly should be interpreted to mean that it is focused on just one of the inputs (land) to one of the desired factors of livability (built space that provides shelter for residential, business, and social purposes).

Operational definitions

That focus suggests various possible operational definitions of *land use efficiency.* Most posit some desired population, employment, land, or built-space outcome (the numerator) relative to some input of land (denominator). Efficiency then means "more output, less input." Since the input (denominator) to be economized is land, any efficiency measure of this type is some form of a measure of *density*.

- Density or intensity of land use
- Density of population or employment (people per area)
- Density of housing (dwelling units per area)
- Density of economic activity (built space per area, business establishments per area, output per area)

There are potentially measures of land use efficiency that are not density based. They would presumably be trying to economize on inputs other than land. For example:

- How well land could be serviced (efficiency means reducing service *costs*)
- How well land development patterns create desirable communities or enhance community livability.

In short, this report operationalizes land use efficiency through a range of density estimates: generally, population per square mile or acre, dwelling units per acre, and employees per acre. Variations on all of these general metrics are possible through use of different numerators and denominators.

Metrics

The measurement of land use efficiency requires a specific set of defined variables or metrics. For the purposes of this study we use the following definitions:

- **Metrics** is a broad term to cover, in general, everything related to collecting, analyzing, interpreting, and benchmarking data.
- **Data** are also defined broadly to mean anything that can be described (preferably and usually, but not necessarily, measured).
- **Indicators** are data that relate in some logical way to a **concept** (as defined above).
- **Benchmarks** or **Targets** are normative judgments about a desirable level for an indicator, now or in the future. Our research does not involve the development of benchmarks or targets—that is the work of the RAC.
- **Measures,** for the purpose of this study, are indicators that relate to land efficiency and density. In other words, we try to limit our use of the term "measurement" to those that are measurements of land efficiency / density.

To obtain measures of efficiency, we rely on a variety of datasets to obtain several potential numerators and denominators that offer numerous measures of efficiency.

Our metrics include indicators and efficiency measures. We classify **indicators** as static (one year of data) or dynamic (change over time) metrics that define the numerator or denominator. **Efficiency measures** are normalized metrics, meaning that we divide a static numerator (population, housing units, or employment) by a static denominator (area.) The rest of this section discusses broad categories of metrics used for this study (in some way related to the concept of land efficiency).

Land characteristics

Land characteristics include basic area metrics (e.g., city limits within UGBs), as well as identification of lands that are not available for development (e.g., water bodies or areas outside of tax lots). These measures also address constrained and unconstrained land (and prohibitive land—land with constraints deemed so binding that no development can occur) based on development constraints including slopes over 25%, floodways, water bodies, and wetlands (using state-level data sources).

Residential Uses

Data from PSU Population Estimates, U.S. Census, and County Property Assessors are used to calculate these indicators. Population may be defined directly as the number of persons or indirectly based on the number of households or housing units. Population, housing units, and residential parcels are used to compute indicators and efficiency measures related to residential uses. These metrics convey the number of persons and housing units within the city limits, providing several potential numerators for calculating efficiency measures.

Non-residential uses

Total employment and establishments from the statewide Quarterly Census of Employment and Wages (QCEW) are used to estimate employees. Data from county assessors are used to estimate the amount of employment and "other" land[7] within city limits. These indicators provide the numerators and denominators for calculating efficiency measures related to employment and "other" uses.

Dimensions of Analysis

This section describes key dimensions of analysis included in the research. This includes study area definitions, dates for time-series data, and constraints.

Units of Analysis and Samples

The unit of analysis for the study is city limits within urban growth boundaries (UGBs) excluding the Portland Metro UGB.[8] The research team selected this geography after consultation with DLCD staff and the Working Group. The emphasis of this research is on measuring efficiency of urban land uses. The research team determined that including unincorporated areas within UGBs would yield unreliable results. Areas within city limits that are outside of UGBs were also excluded; these lands cannot be developed to urban standards because they are outside a UGB.

There are 216 cities in Oregon that are outside the Portland Metro UGB. The study excludes all cities under 5,000 population that had average annual growth rates of less than 1% between 2003 and 2012.[9] That excludes 86 cities. The rationale for excluding these cities is (1) they are not growing and will be unlikely to seek a boundary expansion in the foreseeable future (we note that the legislation focuses on cities that are growing), and (2) they have developed a small number of parcels in recent years. We also excluded a subset of counties for which nearly all cities were below 5,000 in population with average annual growth rates of less than 1% between 2003 and 2012 and for which data was not readily available. These counties included: Gilliam, Grant, Harney, Lake, Sherman, Wallowa, and Wheeler.

That exclusion leaves 130 cities for evaluation. For these cities, the research team did three types of analysis (which it called "tiers"):

- Tier 1: Analysis by city limit (130 cities). This is the coarsest level of analysis and provides metrics using city limit boundaries, PSU Population Estimate data and Census data. Tier 1 analysis includes static (point in time) and dynamic (trend) analysis.

[7] "Other" land includes public and institutional uses such as parks, schools, religious institutions, nonprofit groups, etc. In property assessor's databases, it is designated as "exempt."

[8] Metro is explicitly excluded in HB 2254 and will not be eligible to use a simplified review methodology.

[9] Some larger cities may not be included in the final study due to data availability. The final report will list all of the cities included in the study by Tier.

- Tier 2: Static Analysis of tax lots within city limits (127 cities). This is based on ORMAP taxlot data from the Oregon Geospatial Data Service Center, and supplemented with select county assessor's data that are not available in ORMAP. ORMAP allows a fine level of analysis at the tax lot level, but does not include key attributes such as year built that allow analysis of trends.

- Tier 3: Dynamic analysis of tax lots within city limits (122 cities). This is based on county level tax assessor's GIS data that allows detailed analysis of residential densities over time.

Analysis presented within this report uses Tier 1, 2 and 3 data. We took the approach of including as many cities as possible for each table based on available data. Each figure and table identifies the number of cities and tier of data used. Map 2-1 shows cities outside of the Metro UGB that were included in the Tier 1 analysis. Appendix C provides a list of the cities by tier.

Map 2-1. Cities included in the land use efficiency analysis (Tier 1)

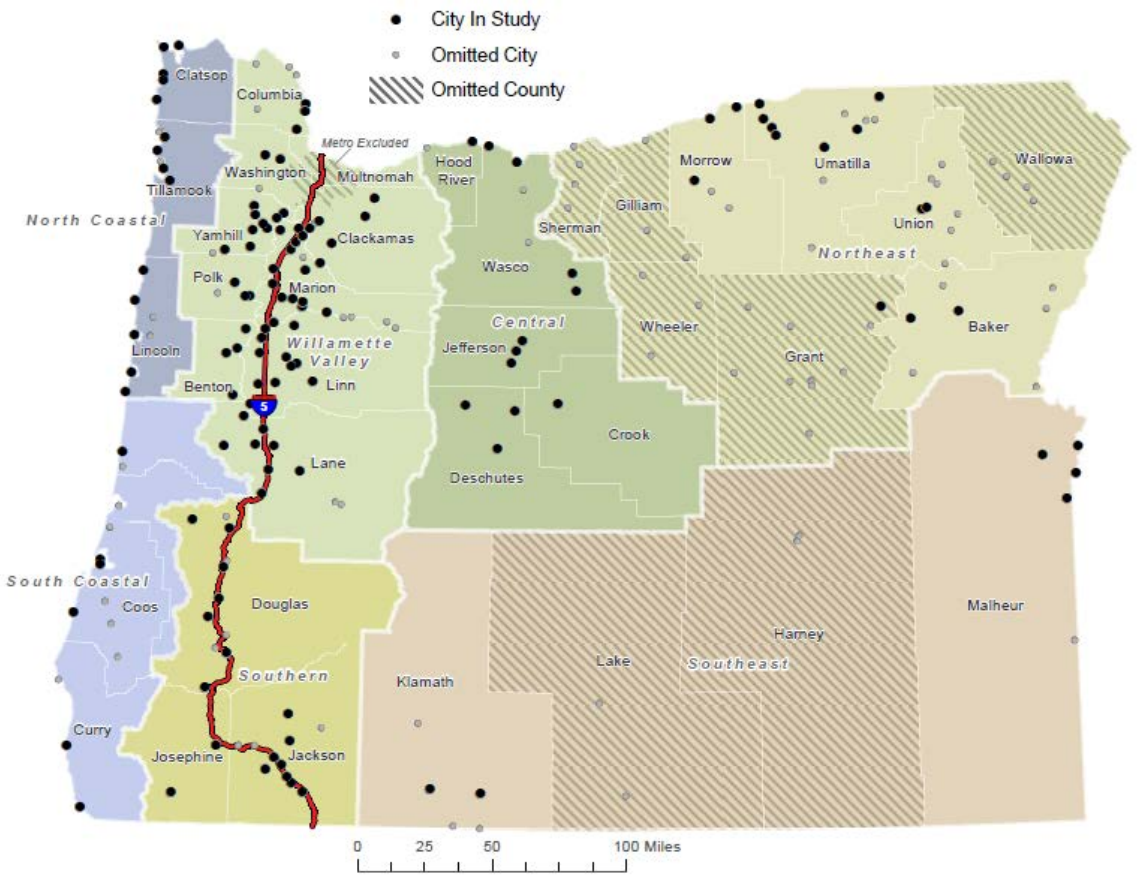
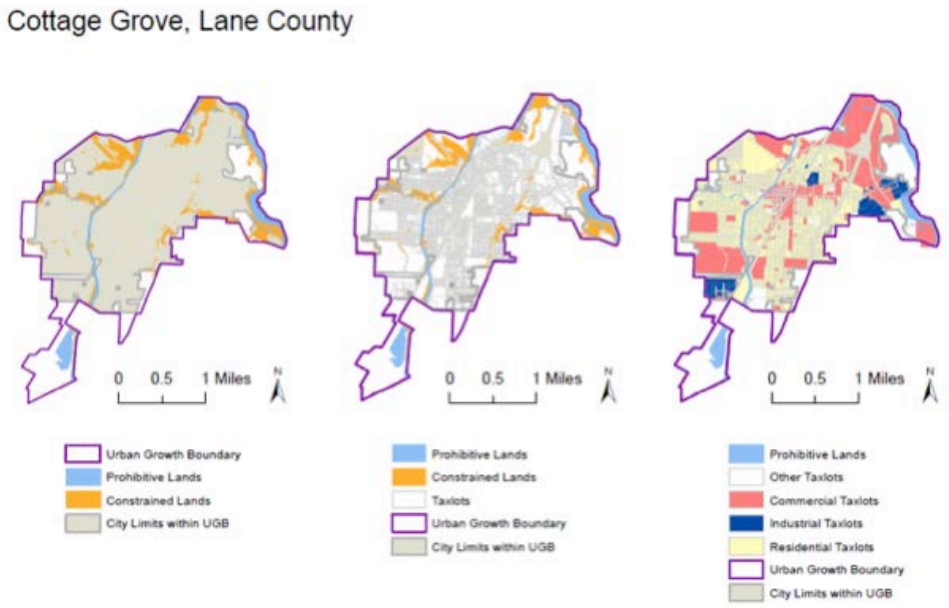


Figure 2-1 provides a conceptual overview of the way the research team approached the tiered analysis. The image on the left in Figure 2-1 shows a Tier 1

analysis – all land in the city limit within the UGB. Tier 1 efficiency measures include population and employment per non-prohibitively constrained acre.[10] The middle image shows tax lots in the city limit (Tier 2). Key indicators are the number of employees and population on tax lots or on tax lots with improvements. The image on the right shows tax lots by property classification (Tier 3). Key indicators include the size of tax lots with improvements and the density of single-family/plex housing

Figure 2-1. Sample Tier Analysis



Geography and City Size

The research team also conducted analysis by geographic region and city size, as directed by the statute which discusses different rules for cities greater and less than 10,000, and discusses key trends in “major" regions of the state. Table 2-1 shows cities by size class and tier. The total number of incorporated cities outside the Metro UGB is 216. A total of 130 cities are included in Tier 1, 127 in Tier 2, and 122 in Tier 3. The number of cities in each size class decreases as population increases.

[10]Figure 2-1 shows constrained lands to illustrate the location. The Research Team conducted a separate analysis of constrained lands.

Table 2-1. Cities by Size Class and Tier

City Size	Number of Cities			
	Total Cities	Tier 1 Cities	Tier 2 Cities	Tier 3 Cities
<1,000	81	26	25	23
1,000-4,999	79	48	46	44
5,000-9,999	28	28	28	27
10,000-24,999	17	17	17	17
25,000-49,999	4	4	4	4
50,000 or more	7	7	7	7
Total	**216**	**130**	**127**	**122**

Table 2-2 shows cities by region and tier. The research team used seven regions for most of the analysis; we collapse these regions for the purpose of some of the statistical analysis included in Chapter 6. The region with the most cities is the Willamette Valley.

Table 2-2. Cities by Region and Tier

Region	Number of Cities			
	Total Cities	Tier 1 Cities	Tier 2 Cities	Tier 3 Cities
Central Oregon	15	12	12	9
North Coastal Oregon	19	14	14	12
Northeast Oregon	56	15	12	12
South Coastal Oregon	13	6	6	6
Southeast Oregon	14	6	6	6
Southern Oregon	24	17	17	17
Willamette Valley	75	60	60	60
Grand Total	**216**	**130**	**127**	**122**

Based on input from the Rulemaking Advisory Committee (RAC), we conducted analysis by fewer regions (two variations: Coast, Central, Eastern, I-5 and Coast; Central/Eastern, I-5) and size classes (Under 10,000 population and Above 10,000).

Time Series

A key objective of this research is to analyze *trends* in land use efficiency. By definition, trend analysis requires time-series data. As a baseline, the research team needed a clean and consistent UGB and city limit boundary layer for the same year. We obtained the data from Oregon Explorer and determined that 2005 was as far back as we could go and still have reliable data. The research team used 2012 as the most recent year because that is the most recent year that the Quarterly Census of Employment and Wage (QCEW) data are available. Thus, time series analysis for most of the metrics is for the 2005-2012 time period. The analysis of single-family and plex densities is for the 1993-2012 period.

Constraints

Constraints play a role in land use efficiency. The research team hypothesized that development on constrained lands would be less efficient than on unconstrained lands.

As a starting point for our analysis, we used the direction provided in the Goal 9 and 10 administrative rules to select constraints. Because the analysis is statewide, data sets that are consistent across the state were required.

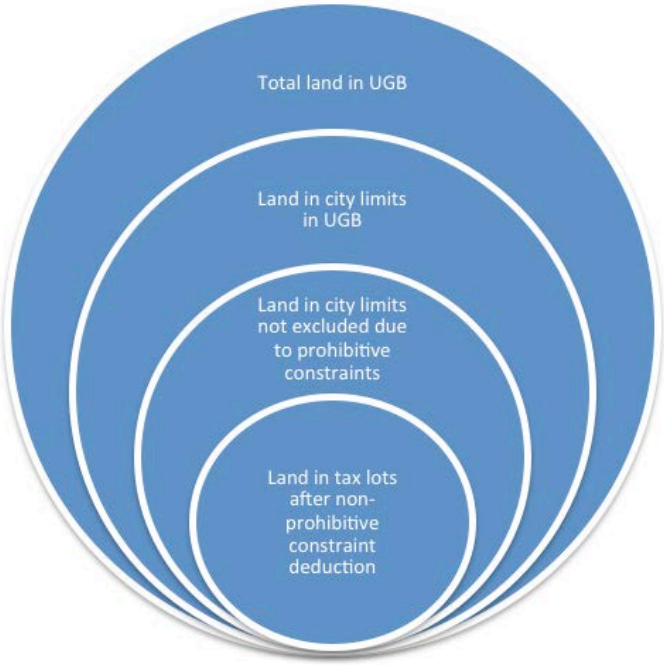
To calculate constrained and prohibitive lands for the city limits the research team, in consultation with DLCD staff, included water features, floodways, 100-year flood zone, wetlands, and slopes greater than 25% as constraints. Not all constraints, however, have the same impact on land use efficiency. The research team hypothesized that areas in water, for example, have very little development potential. To recognize this fact, we classified constraints as either (1) completely prohibitive, or (2) constrained:

> **Completely Prohibitive**: The water features and floodways were clipped to the city limits, merged, and calculated to determine the land area completely unavailable for development.
>
> **Constrained**: The 100-year flood zone, wetlands, and slopes greater than 25% were clipped to the city limits, merged, and the prohibited areas subtracted out to accurately calculate the percent and acres constrained within each city.

Completely prohibitive lands were removed from all density calculations. The research team analyzed the effect of constrained lands on land use efficiency for single-family and plex housing, as discussed further in appendix C.

Figure 2-2 shows how different land areas can be used as denominators for density calculations. At the broadest level, densities could be calculated on all land within UGBs, acreage within city limits, and acres available for development (e.g., non-prohibitive acres in city limits).

Figure 2-2. Potential Denominators for Density Calculations Based on Land Area



CHAPTER 3: CHARACTERISTICS OF LAND WITHIN CITY LIMITS

This chapter summarizes data describing general characteristics of Oregon cities outside the Metro boundary. The intent is to provide context for the detailed analysis of residential and employment density presented in chapters four and five. Portions of the analysis presented in this chapter are also responsive to the HB 2254 requirement that speak to land use efficiency in terms of increased population per square mile over time (e.g., the Tier 1 analysis). We look at city limits inside UGBs and ignore the 28 cities for which city limits extend beyond UGBs. **All depictions of land and density inside the city limit exclude area outside UGBs.**

Chapter 2 described how the research team sorted cities into tiers, depending on the availability of information. This chapter includes analysis for all cities outside the Metro UGB, Tier 1 cities, and Tier 2 cities. To ease confusion, section headings, tables and charts are labeled with the tier that corresponds with the data. The remainder of this chapter is divided into five subsections, with the corresponding tiers used for analysis in parentheses:

- Population and Employment Density (all cities)
- Housing Mix (all cities)
- Public Land and Roads (ORMAP cities)
- Constrained & Prohibited Lands (Tier 1 cities)
- Summary of Findings

Population and Employment Density (All Cities)

Table 3-1 displays the total acres within UGBs in Oregon for 2012, sorted by city size. The data show that Oregon cities outside the Metro UGB had a total of 571,030 acres within their UGBs in 2012. The data show that the number of cities by size class decreases as population increases.

Oregon remains a relatively rural state, with 160 of the 216 (75%) cities having a population of less than 5,000 residents, but accounting for 27% of the total acres within UGBs. Conversely, 11 cities have a population over 25,000 people, and represent a combined 34% of acreage within UGBs. Cities with populations between 5,000 and 25,000 contain 40% of the acreage in UGBs.

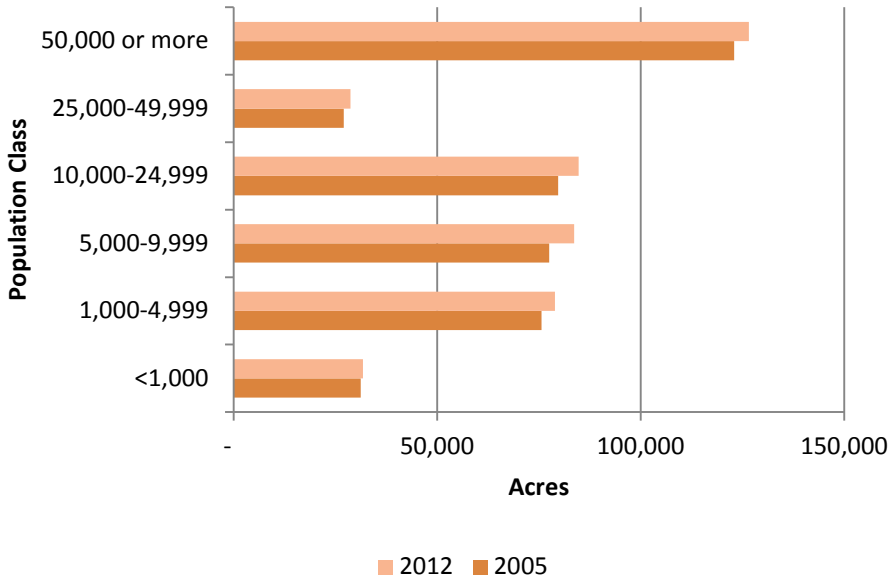
Table 3-1. Acres in UGB by City Size, all non-Metro cities, 2012 (n=216)

City Size	Number of Cities	Percent of Cities	Acres in UGB	Percent of Acres
<1,000	81	38%	38,253	7%
1,000-4,999	79	37%	112,271	20%
5,000-9,999	28	13%	111,008	19%
10,000-24,999	17	8%	117,974	21%
25,000-49,999	4	2%	33,234	6%
50,000 or more	7	3%	158,290	28%
Total	**216**	**100%**	**571,030**	**100%**

Note: Percents may sum to more than 100 due to rounding error

Figure 3-2 presents the total acreage within city limits and within UGBs for 2005 and 2012 by city size. In 2005, the 216 cities outside the Metro UGB had a total of 414,259 acres within city limits and UGBs. In 2012, that number was 434,490 acres.[11] Thus, non-Metro cities added 20,231 acres between 2005 and 2012 through annexation or UGB expansion—an increase of 4.9%. The largest change in acres within city limits was for cities with a population between 5,000 and 25,000 residents. Cities with less than 1,000 residents saw the smallest increase in acreage within their city limits.

Figure 3-2. Acres in City Limits within UGBs by City Size, all non-Metro cities 2005 and 2012 (n=216)



[11] In 2012, Non-Metro cities had 793 acres in city limits that were outside of the UGB.

Table 3-3 shows population change between 2005 and 2012 for all non-Metro cities. The smallest cities (less than 1,000 residents) saw a decrease in population while all other cities saw at least a 6.5% growth in population. While cities of 50,000 or more saw the highest number of new residents (coinciding with nationwide trends), cities between 25,000 and 50,000 saw the highest increase as a percentage of city population.

Nearly 60% of the population growth in the state occurred in cities over 25,000 and 75% occurred in cities over 10,000. Seventy-one percent of the 2012 population was in cities over 10,000. In this sense, those cities are growing faster on a per unit basis (for example, more residents per 1,000 existing residents).

Table 3-3. Population Change, 2005-2012, by City Size, all Non-Metro cities (n=216)

City Size	Number of Cities	2005	2012	2005-12 Change	2005-12 Percent Change	Share of Total Growth
<1,000	79	34,550	33,772	-778	-2.3%	-1%
1,000-4,999	81	170,460	181,620	11,160	6.5%	10%
5,000-9,999	28	201,795	218,885	17,090	8.5%	16%
10,000-24,999	17	268,645	285,375	16,730	6.2%	15%
25,000-49,999	4	110,850	130,255	19,405	17.5%	18%
50,000 or more	7	588,975	633,395	44,420	7.5%	41%
Total	**216**	**1,375,275**	**1,483,302**	**108,027**	**7.9%**	**100.0%**

Table 3-4 shows population change for all non-Metro cities between 2005 and 2012 by region. Central Oregon had the highest percentage change in population, while the Willamette Valley accounted for the highest total population increase. The Willamette Valley accounted for 61% of the non-Metro population growth between 2005 and 2012. Southern Oregon also experienced significant growth, with a slightly higher growth rate than the Willamette Valley (but a much lower share of statewide growth).

Table 3-4. Population Change, 2005-2012, by Region, all Non-Metro Cities (n=216)

Region	Number of Cities	2005	2012	2005-12 Change	2005-12 Percent Change	Share of Total Growth
Central Oregon	15	130,175	148,015	17,840	13.7%	17%
North Coastal Oregon	19	58,435	60,910	2,475	4.2%	2%
Northeast Oregon	56	101,876	104,362	2,486	2.4%	2%
South Coastal Oregon	13	60,515	61,355	840	1.4%	1%
Southeast Oregon	14	47,747	48,195	448	0.9%	0%
Southern Oregon	24	205,982	224,510	18,528	9.0%	17%
Willamette Valley	75	770,545	835,955	65,410	8.5%	61%
Total	**216**	**1,375,275**	**1,483,302**	**108,027**	**7.9%**	**100.0%**

Population increased at a faster rate (7.9%) than acres in city limits (4.9%) between 2005 and 2012. This suggests that cities became more efficient in terms of population per acre—in fact, population density measured in persons per square mile increased 2.8% between 2005 and 2012 (Table 3-5). Increases in population density did not occur uniformly during this period—cities less than 1,000 showed a

decline in population density, while larger cities generally experienced an increase in population density. Cities between 25,000 and 49,000 showed the greatest increase in population density between 2005 and 2012: 10.9%.

Table 3-5. Population Density (persons per square mile), 2005-2012, by City Size, all Non-Metro cities, all Land Within City Limits in UGBs (n=216)

City Size	Number of Cities	Population Density (persons/sq mi) 2005	2012	Percent Change 2005-2012
<1,000	79	709	679	-4.1%
1,000-4,999	81	1,442	1,473	2.2%
5,000-9,999	28	1,666	1,674	0.5%
10,000-24,999	17	2,156	2,155	0.0%
25,000-49,999	4	2,618	2,904	10.9%
50,000 or more	7	3,065	3,202	4.5%
Total	**216**	**2,125**	**2,185**	**2.8%**

Table 3-6 shows changes in population density did not occur uniformly by region. The Northeast and Southeast Oregon regions both show decreases in population density. These regions both experienced net population increases, thus annexations occurred at a rate faster than population growth. The remaining regions show population density increases of between 0.3% (South Coastal Oregon) and 4.4% (Central Oregon).

Table 3-6. Population Density (persons per square mile), 2005-2012, by Region, all Non-Metro Cities, all Land Within City Limits in UGBs (n=216)

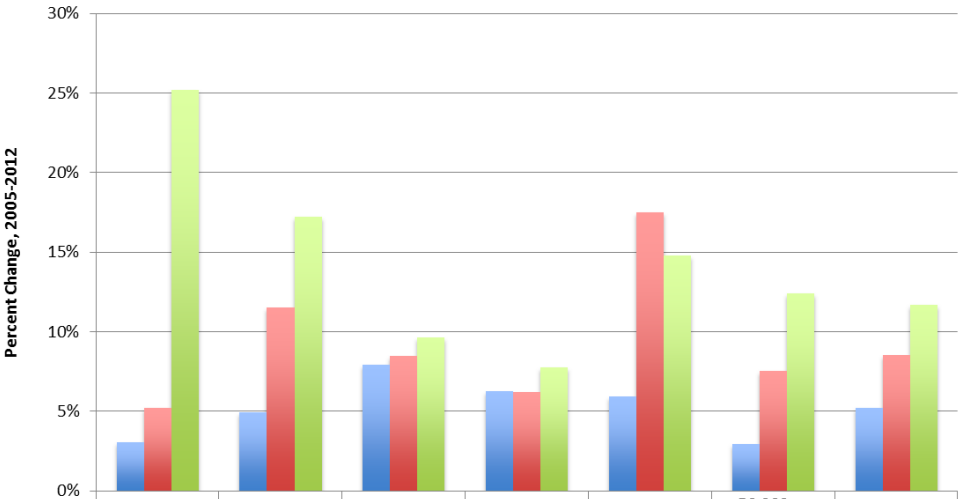
Region	Number of Cities	Population Density (persons/sq mi) 2005	2012	Percent Change 2005-2012
Central Oregon	15	1,676	1,749	4.4%
North Coastal Oregon	19	930	953	2.5%
Northeast Oregon	56	1,328	1,297	-2.4%
South Coastal Oregon	13	1,206	1,209	0.3%
Southeast Oregon	14	1,240	1,175	-5.3%
Southern Oregon	24	2,576	2,658	3.2%
Willamette Valley	75	2,947	3,055	3.7%
Total	**216**	**2,125**	**2,185**	**2.8%**

Tables 3-5 and 3-6 show population density for all acres within city limits. To further refine this analysis, the research team calculated density using non-prohibitive acres within city limits (e.g., lands not in water or floodways). The results (Figure 3-3) show that excluding prohibitive areas impacts density.

Overall, cities in Oregon are increasing in population, but adding land to their city limits slower than population. In short, they are becoming denser. Figure 3-3 shows a 12% increase in population density between 2005 and 2012 statewide with the

highest gains seen in cities with less than 5,000 residents, and more than 25,000 residents. It should be noted that fewer overall residents are needed to increase the density in smaller cities compared to larger cities. This is evidenced by the decrease in both population and people per square mile for cities less than 1,000 (Tables 3-4 and 3-5), but increase in density shown in Figure 3-3.

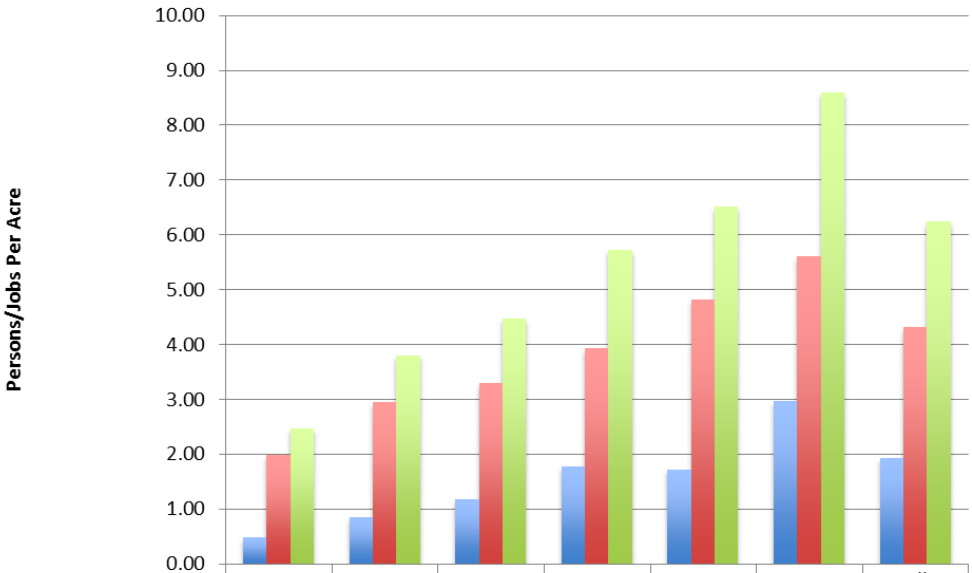
Figure 3-3. Acres, Population and Population Density Change for Tier 1 Cities by City Size, 2005-2012, all non-Metro cities, Non-Prohibitive Acres in City Limits in UGB (n=130)



	<1,000	1,000-4,999	5,000-9,999	10,000-24,999	25,000-49,999	50,000 or more	All Classes
Acres	3%	5%	8%	6%	6%	3%	5%
Pop	5%	11%	8%	6%	18%	8%	9%
Pop Den	25%	17%	10%	8%	15%	12%	12%

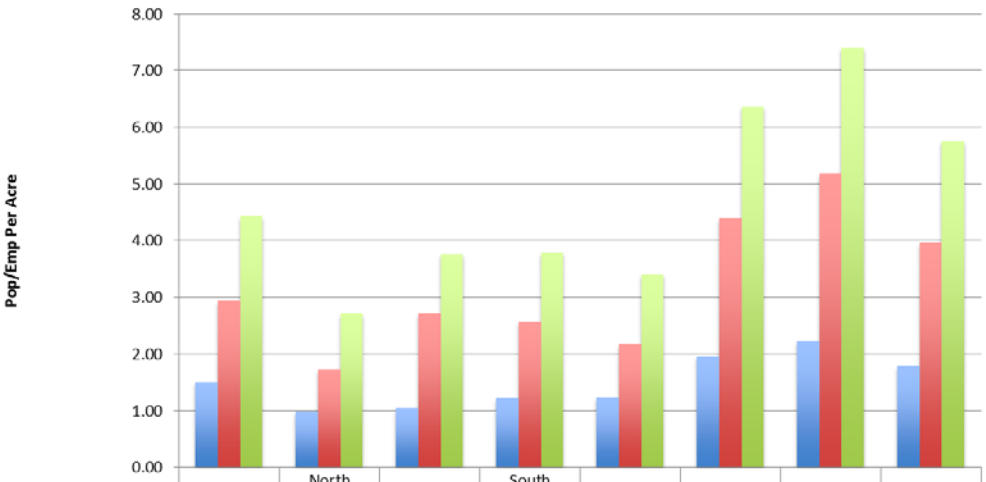
Figure 3-4 shows the population and employment density by city size, while Figure 3-5 shows it by region. Both population and employment density are highest in cities with 50,000 or more residents. Overall, Oregon had a population density of 4.3 people and 1.9 jobs per acre in 2012. The Willamette Valley has the highest density of people and jobs followed by Southern Oregon.

Figure 3-4. Population and Employment Density (persons and jobs per acre) for Tier 1 Cities By City Size, 2012, Non-Prohibitive Acres in City Limits in UGB (n=130)



	<1,000	1,000-4,999	5,000-9,999	10,000-24,999	25,000-49,999	50,000 or more	All Classes
Employment Density	0.49	0.85	1.18	1.78	1.71	2.97	1.94
Population Density	1.99	2.95	3.30	3.94	4.81	5.62	4.32
Pop+Emp Density	2.48	3.80	4.48	5.72	6.52	8.59	6.25

Figure 3-5. Population and Employment Density for Tier 1 Cities By Region, in City Limits in UGB, 2012 (n=130)



	Central Oregon	North Coastal Oregon	Northeast Oregon	South Coastal Oregon	Southeast Oregon	Southern Oregon	Willamette Valley	Total
Employment Density	1.50	0.98	1.05	1.22	1.24	1.96	2.23	1.78
Population Density	2.93	1.73	2.72	2.58	2.17	4.40	5.18	3.98
Pop+Emp Density	4.44	2.72	3.77	3.80	3.41	6.36	7.41	5.76

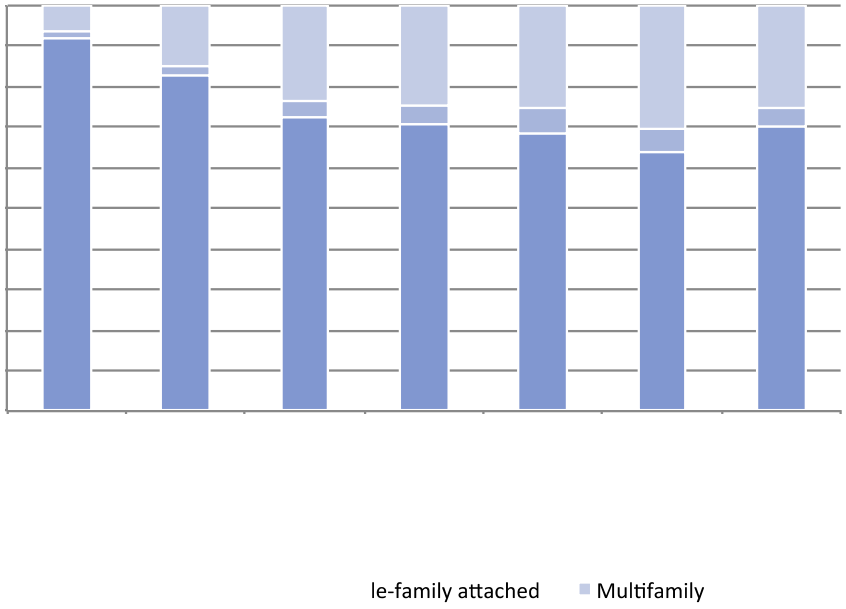
Housing Mix (All Cities)

A key consideration for determining land need is housing mix (percent of housing by type). Moreover, housing mix plays prominently in Goal 10 and the Goal 10 Administrative Rule (OAR 660-010). The key relationship from a land need perspective is that single-family detached housing will have significantly lower density than multifamily housing types.

Figures 3-6 and 3-7 display the housing mix by city size and region, respectively, for all 216 cities outside the Portland Metro UGB. As shown in Figure 3-6, as city size increases, the share of multifamily units increases. In cities of 50,000 or more residents, multifamily comprises 30% of dwelling units. The statewide average is 27%.

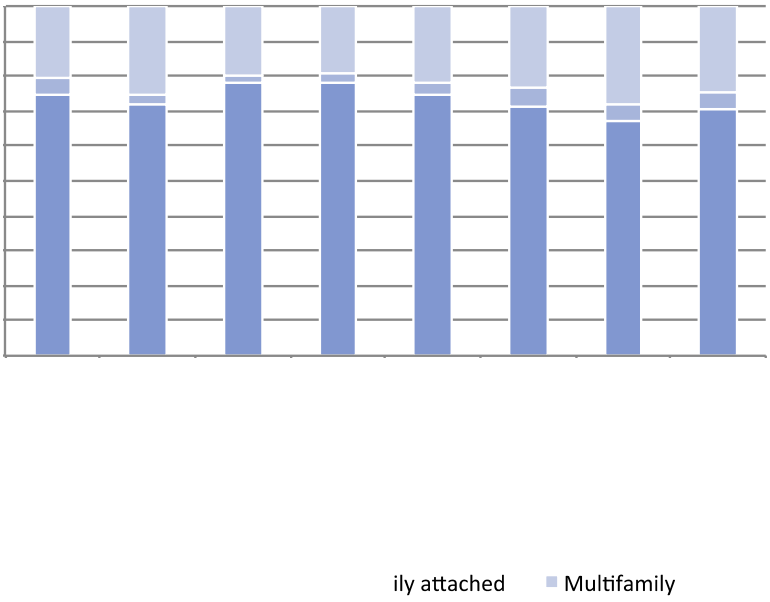
The amount of single-family attached dwellings remains the smallest share across Oregon, and never accounts for more than 10% of overall units.

Figure 3-6. Housing Mix by City Size, all Non-Metro Cities, 2012 (n=216)



When summarized by region, the amount of multifamily units shows more variation across the state. Not surprisingly, the Willamette Valley has the lowest share of single family detached housing among all regions because a higher share of the Willamette Valley lives in larger cities which have a higher share of multifamily housing.

Figure 3-7. Housing Mix by Region, all Non-Metro Cities, 2012 (n=216)



Public Lands and Roads (ORMAP Cities)

An additional consideration is developing factors to account for land needed for roads or public and semi-public uses. This section includes analysis of lands that are either (1) classified as exempt (from property taxation), or (2) outside of tax lot boundaries. Most counties do not include water, roads and other rights-of-way such as railroads in tax lot coverages. Property assessors include classification codes that identify whether exempt land is publicly or privately held. The Division 24 rule outlines a safe harbor assumption for public lands and roads:

> (10) As a safe harbor during periodic review or other legislative review of the UGB, a local government may estimate that the 20-year land needs for streets and roads, parks and school facilities will together require an additional amount of land equal to 25 percent of the net buildable acres determined for residential land needs under section (4) of this rule, and in conformance with the definition of "Net Buildable Acre" as defined in OAR 660-024-0010(6).

Many cities have chosen not to use this assumption and in most instances an empirical analysis of these uses has shown a higher percentage of land in public and semi-public uses. Two elements to this exist: roads (which are generally not included in taxlots) and other public and semi-public uses. Note that the safe harbor only accounts for public uses.

Note also that the safe harbor focuses on residential land. Using the available data sources, there is no simple way of separating out residential lands (we do not have reliable zoning or plan designation data). Moreover, property classifications are

specific to uses and not zoning or plan designation. Thus the analysis that follows is based on all land within city limits.

To develop estimates of how much land is in roads, parks, and schools, we used ORMAP taxlot data and property classifications. Of the 130 Tier 1 cities, 105 had data that allowed analysis of exempt lands.

Roads

Most GIS databases do not include polygons for roads, however, the research team developed a methodology that provides a reasonable proxy for lands in roads. The first step was to subtract the area in taxlots from the area in city limits, yielding a detailed estimate of land not in taxlots. The second step was to subtract areas in mapped waterbodies from areas not in taxlots. This provides an accurate estimate of areas that are right-of-ways. The limitation is that some right-of-ways are not public. This includes areas used for railroads and other transportation or energy transmission uses (note that most powerlines and pipelines have easements and are therefore included in the taxlot base). The research team conducted this "area not in tax lots" analysis on 180 of the 216 cities.

Water and other undevelopable areas present complications in analyzing land not in taxlots. Table 3-7 shows the total amount of land not in taxlots and the total amount of land in city limits. In other words, the data do not exclude areas with prohibitive constraints—which are considerable in some cities, particularly cities with ports. The results show that, on average, about 64% of land in city limits is in tax lots. Note that the figures in Table 3-7 include areas in cities that are in water or floodways (e.g., prohibitive acres).

Table 3-7. Analysis of land not in tax lots inside city limits, by city size, ORMAP cities, 2012 (n=180)

			Land in Tax Lots and Not in Water				
City Size	Number of Cities	Acres in City Limit	Acres	Average Percent	High Percent	Low Percent	Standard Dev Percent
<1,000	55	22,743	15,468	67%	95%	26%	17%
1,000-4,999	70	93,006	53,680	62%	95%	22%	17%
5,000-9,999	27	107,173	65,999	63%	83%	27%	14%
10,000-24,999	17	117,974	71,218	64%	97%	40%	14%
25,000-49,999	4	32,969	24,145	74%	82%	66%	7%
50,000 or more	7	163,021	104,009	64%	82%	42%	13%
All Cities	**180**	**536,886**	**334,520**	**64%**	**97%**	**22%**	**16%**

Source: Oregon Explorer; county tax lot and assessment data; analysis by University of Oregon

Table 3-8 shows the amount of land not in taxlots excluding water by city size class in 2012. The sample includes 180 Tier 2 cities (e.g., cities that the UO Team has data for). The results are considerably different than those presented in Table 3-7 and show that the average percentage of land in city limits not in taxlots excluding water is 18%. The results are surprisingly consistent across city size; the values range from 15% for cities with populations between 5,000 and 9,999 to 19% for

cities less than 1,000. Smaller cities tend to show more variability as expressed by the standard deviation of percentages.

Table 3-8. Analysis of land not in tax lots excluding mapped waterbodies, by city size, ORMAP cities, 2012 (n=180)

			Land in Tax Lots and Not Water				
City Size	Number of Cities	Acres in City Limit	Acres	Average Percent	High Percent	Low Percent	Standard Dev Percent
<1,000	55	18,181	15,091	81%	96%	67%	7%
1,000-4,999	70	60,827	50,759	83%	95%	57%	6%
5,000-9,999	27	69,970	59,665	85%	95%	73%	4%
10,000-24,999	17	78,425	67,851	83%	95%	74%	5%
25,000-49,999	4	28,031	23,680	84%	87%	82%	2%
50,000 or more	7	121,453	100,195	82%	84%	80%	1%
All Cities	**180**	**376,888**	**317,241**	**82%**	**96%**	**57%**	**6%**

Source: Oregon Explorer; county tax lot and assessment data; analysis by University of Oregon

Public and semi-public uses

Public and semi-public uses include lands owned by government agencies such as parks, public buildings, and land for other types of infrastructure. Semi-public uses include uses like churches and fraternal organizations. The research team used property classifications in the 900 series (lands that are exempt from taxation) to develop an estimate of public and semi-public land use. Of the 180 cities shown in Tables 3-7 and 3-8, the UO research team had taxlot data for 105.

Table 3-9 shows that in the 105 Tier 2 cities a total of 42,979 acres in 14,381 taxlots are classified exempt—14% of the 308,032 acres within city limits. The results also show considerable variation by city size. For example, cities with populations over 50,000 had 6% of the total city area in exempt classifications, while cities with populations between 5,000 and 9,999 had 26% of the land in their city limits classified exempt.

Note that we used area in city limits rather than area in taxlots as the denominator for this analysis. We chose acres in city limits because it is consistent with the analysis in Tables 3-7 and 3-8 and the analysis is looking at roads and public uses.

Table 3-9. Analysis of exempt land (property class 9xx), by city size, non-prohibitive acres in city limits and tax lots, ORMAP cities, 2012 (n=146)

			Exempt Taxlots		
City Size	Number of Cities	Non-Prohibitive Acres in City Limit	Taxlots	Non-prohibitive Acres in Taxlots	Percent of Total Acres in City limits
<1,000	45	5,730	365	1,178	21%
1,000-4,999	58	33,967	1,845	3,999	12%
5,000-9,999	20	58,097	4,308	14,862	26%
10,000-24,999	15	60,754	4,037	12,486	21%
25,000-49,999	3	28,031	1,022	3,436	12%
50,000 or more	5	121,453	2,804	7,018	6%
All Cities	**146**	**308,032**	**14,381**	**42,979**	**14%**

Source: Oregon Explorer; county tax lot and assessment data; analysis by University of Oregon
Note: Clackamas, Lane and Marion have no land coded as property class "9XX"

The data in Table 3-9 raise questions about why cities in the 5,000 to 9,999 population range have such a high percentage of land in exempt classifications. Further review by the UO research team found that several cities in the Coastal regions had significant areas platted into estuaries or the Pacific Ocean.

Table 3-10 shows exempt land by region. The results show much higher percentages of exempt land in coastal regions. The North Coast Region has 37% of the area in exempt and the South Coast 29%. Further analysis by city shows that Astoria has 58% of its land area in exempt classifications, Coos Bay 48% and Newport 38%. A closer review of data from Newport indicates that 85% of exempt land is government owned.

Table 3-10. Analysis of exempt land (property class 9xx), by region, Tier 2 cities, 2012 (n=146)

			Exempt Land (Property Class 9XX)		
Region	Cities	Acres in City Limits	Tax Lots	Acres	Percent of Total Acres
Central Oregon	12	45,826	1,273	7,827	17%
North Coastal Oregon	14	28,316	3,666	10,587	37%
Northeast Oregon	32	9,516	469	1,680	18%
South Coastal Oregon	11	13,863	934	3,994	29%
Southeast Oregon	10	17,797	1,005	3,261	18%
Southern Oregon	24	35,540	2,557	4,819	14%
Willamette Valley	43	157,174	4,477	10,811	7%
Total	**146**	**308,032**	**14,381**	**42,979**	**14%**

Source: Oregon Explorer; county tax lot and assessment data; analysis by University of Oregon
Note: Clackamas, Lane and Marion have no land coded as property class "9XX"

Property classifications allow further disaggregation of uses; the 900 property classification has codes that are specific to government (local, state, and federal), schools, and other exempt uses such as government-assisted housing, cemeteries, etc.

Table 3-11 shows the exempt land from Tables 3-9 and 3-10 broken down by government, school, and semi-public uses. The Division 24 safe harbor specifically references parks and schools; however, property classifications are not specific to the type of government use. The results show that two-thirds of the exempt lands are classified as government or school uses.

Table 3-11. Total acres of exempt land (property class 9xx) by use and by city size, non-prohibitive land in tax lots, Tier 2 cities, 2012 (n=146)

		Government		School		Semi-Public		All Exempt	
City Size	Number of Cities	Tax Lots	Acres	Tax Lots	Acres	Tax Lots	Acres	Tax Lots	Acres
<1,000	45	255	966	44	155	66	58	365	1,178
1,000-4,999	58	1,327	2,714	148	763	370	521	1,845	3,999
5,000-9,999	20	3,333	12,915	228	972	747	975	4,308	14,862
10,000-24,999	15	2,800	10,006	270	1,482	967	998	4,037	12,486
25,000-49,999	3	601	2,450	112	665	309	321	1,022	3,436
50,000 or more	5	1,941	5,127	153	1,019	710	872	2,804	7,018
All Cities	**146**	**10,257**	**34,179**	**955**	**5,056**	**3,169**	**3,745**	**14,381**	**42,979**
Average Percent of Acres			**80%**		**12%**		**9%**		**100%**

Source: Oregon Explorer; county tax lot and assessment data; analysis by University of Oregon
Note: Clackamas, Lane and Marion have no land coded as property class "9XX"

Roads, government use, and schools

The UO research team combined the results of Tables 3-7 and 3-10 to develop an estimate of the amount of land in city limits that is used for "public" uses. Table 3-12 shows that about 29% of the non-prohibitive land in the Tier 2 city sample could be considered as roads, government uses, or schools. Some variability exists by city size, but with the exception of cities in the 5,000 to 9,999 population class, the results are remarkably consistent.

The research team looked more closely at the exempt land; following are some of the key findings:

- Federal lands within city limits accounts for less than 1% of all exempt land
- Land owned by government entities (city, county, state and federal, but not schools) accounts for 87% of all exempt land
- Land owned by city governments accounts for 43% of all example lands
- Schools accounted for 18% of all exempt land
- Ports account for 26% of all exempt land; more in cities that have ports
- Semi-public uses (cemeteries, churches, fraternal organizations, and student housing) accounted for 13% of all exempt land

Table 3-12. Analysis of land not in tax lots and exempt land classified as government and school by city size, non prohibitive land in city limits and tax lots, Tier 2 cities, 2012 (n=146)

		Non Prohibitive Land				
City Size	Number of Cities	Acres in City Limit	Acres not in tax lots (roads)	Gov/ School Acres	Est Road/Public Total Ac	Percent of Acres in City Limits
<1,000	45	5,730	966	1,121	2,087	36%
1,000-4,999	58	33,967	5,332	3,478	8,810	26%
5,000-9,999	20	58,097	8,760	13,887	22,647	39%
10,000-24,999	15	60,754	9,490	11,488	20,978	35%
25,000-49,999	3	28,031	4,351	3,115	7,466	27%
50,000 or more	5	121,453	21,258	6,146	27,404	23%
All Cities	**146**	**308,032**	**50,157**	**39,235**	**89,391**	**29%**

Source: Oregon Explorer; county tax lot and assessment data; analysis by University of Oregon

Constrained and Prohibited Lands (Tier 1 Cities)

The amount of land within a UGB, or within the city limits, is not equal to the amount of land available for development, and can thereby affect density calculations. Chapter 2 outlined the two classifications used in this study to refine the amount of available land, constrained, and prohibited. Prohibited land is, simply, unbuildable. This includes water features and floodways. Constrained lands *may* be buildable, but would be difficult to develop. This includes 100-year flood zones, wetlands, and slopes greater than 25%.

Table 3-13 shows acres in city limits by constraint status for the 130 Tier 1 cities.

Table 3-13. Acres in city limits by size class and constraint status, Tier 1 Cities, 2012 (n=130)

				Unprohibitive Land			Unprohibitive/ Unconstrained Land	
City Size	Number of Cities	Acres in City Limits	Prohibitive Acres	Unprohibitive Acres	Percent Unprohibitive Acres	Prohibitive+ Constrained Acres	Acres	Percent of Acres in City Limits
<1,000	26	10,021	420	9,602	2%	2,248	7,773	78%
1,000-4,999	48	59,483	3,377	56,106	12%	10,438	49,045	82%
5,000-9,999	28	111,008	10,580	100,428	22%	27,867	83,141	75%
10,000-24,999	17	117,974	6,329	111,645	24%	18,633	99,341	84%
25,000-49,999	4	28,369	673	27,697	6%	2,309	26,060	92%
50,000 or more	7	163,021	5,141	157,880	34%	18,948	144,073	88%
Total	**130**	**489,876**	**26,519**	**463,357**	**100%**	**80,442**	**409,434**	**84%**

Source: Oregon Explorer; analysis by University of Oregon

The results do not show any clear pattern of constraints by city size. A similar analysis by region is shown in Table 3-14. The results show that coastal areas have higher portions of their city limits in constrained areas than other regions of the state. The North Coast Region shows 52% of land is unconstrained; the South Coast

Region shows 71% is unconstrained. The other regions show less variation—from 85% to 91%.

Table 3-14. Acres in city limits by region and constraint status, Tier 1 Cities, 2012 (n=130)

Region	Number of Cities	Acres in City Limits	Prohibitive Acres	Unprohibitive Land		Prohibitive+ Constrained Acres	Unprohibitive/ Unconstrained Land	
				Unprohibitive Acres	Percent Unprohibitive Acres		Acres	Percent of Acres in City Limits
Central Oregon	12	57,578	1,296	56,282	12%	4,931	52,646	91%
North Coastal Oregon	14	43,353	8,207	35,146	8%	20,886	22,467	52%
Northeast Oregon	15	46,108	816	45,292	10%	4,331	41,778	91%
South Coastal Oregon	6	32,956	5,361	27,595	6%	9,489	23,467	71%
Southeast Oregon	6	32,603	690	31,913	7%	3,738	28,865	89%
Southern Oregon	17	62,094	1,567	60,527	13%	9,174	52,920	85%
Willamette Valley	60	215,185	8,583	206,602	45%	27,894	187,291	87%
Total	**130**	**489,876**	**26,519**	**463,357**	**100%**	**80,442**	**409,434**	**84%**

Source: Oregon Explorer; analysis by University of Oregon

CHAPTER 4: RESIDENTIAL LAND USE EFFICIENCY

This chapter presents an analysis of land use efficiency on residential lands. The analysis generally reports residential densities in taxlots per unprohibitive acre, though some data are reported as housing units per acre.[12]

Findings

The core of the HB 2254 research is related to "land use efficiency" which is measured through density. This Chapter presents analysis of residential densities for the 120 Tier 3 cities[13]. This sample represents cities from counties for which we could obtain taxlot data with necessary fields: year built, improvement value, and property classification.

Using Tier 3 cities, the research team was able to analyze changes in residential density over time for all land within city limits. In this section of the report, we show static data for 2012 or data in five year increments between 1993 and 2012.

Single-Family and Plex Density

Table 4-1 shows average density of single-family and plex units by city size for four five-year periods (e.g., each period represents the average density of all dwellings for that period). We include all taxlots in the Residential (100) Property Classification that are considered improved (with improvement value greater than $10,000) and land classification code of improved. We exclude parcels greater than 0.5 acres in size in order to capture residential development at urban densities.

For all cities, the data show a trend of increasing density, from 5.22 taxlots per unprohibitive acre in 1993-1997 to 6.38 taxlots per unprohibitive acre in 2008-2012. The trend of increasing single-family and plex densities is seen for all city sizes.

In terms of trends, the results show that densities for all cities increased an average of 22% over the analysis periods, or 1.16 dwelling units per net acre. Average density increases by size class ranged from a low of 10% for cities in the 25,000-49,999 class to 29% in the 50,000 or more and 5,000-9,999 size classes.

Using averages, the data generally show that single-family and plex densities increase as city size increases. Cities under 1,000 population (for the 2008-2012 period) averaged 4.84 dwelling units per net acre while cities over 50,000 averaged 6.79 dwelling units per net acre.

[12] In this sense, parcels per acre equates to net residential density. None of the analysis included in this chapter assesses public and semi-public uses in residential areas.

[13] Waterloo and Sodaville are in Tier 3 counties but do not contain any land classified as Residential (Property Class=100,) so these cities do not appear in data analyses.

Table 4-1. Improved Single Family and Plex Average Density by City Size, by five-year periods, Tier 3 cities (n=120)

		Improved Single Family & Plex Parcels/Unprohibited Acres				Change 1993-97 to 2008-12	
City Size	Number of Cities	1993-1997	1998-2002	2003-2007	2008-2012	DU/Acre	Percent
<1,000	20	4.22	4.59	5.55	4.84	0.62	15%
1,000-4,999	45	5.02	5.30	5.59	5.51	0.50	10%
5,000-9,999	27	5.01	5.39	6.49	6.46	1.45	29%
10,000-24,999	17	5.31	5.81	6.36	6.23	0.91	17%
25,000-49,999	4	5.42	5.62	5.90	6.02	0.60	11%
50,000 or more	7	5.26	5.71	6.43	6.79	1.53	29%
All Cities	**120**	**5.22**	**5.61**	**6.25**	**6.38**	**1.16**	**22%**

Source: Oregon Explorer; county tax lot and assessment data; analysis by University of Oregon
Description: Count of Parcels (Residential Class 100)/Unprohibitive Acres. Data is filtered on Yr Built, Improved and General Land Classification. The Yr Built Filter excludes Null and 0. Improved: property classification code improved AND assessed improved value >$10,000. The Generalized Land Classification filter keeps Residential, which includes structures with <5 units. Parcels >0.5 acres are excluded.

Variability among cities is a key consideration related to simplified methods. More variation makes developing simplified methods more difficult. Table 4-2 shows central tendency data (e.g., averages, maximum, minimum, and standard deviation) for improved single-family and plex densities in the 120 sample cities for 2008-2012. The results are interesting: cities over 25,000 show considerably less variability than cities below 25,000. This may be, in part, due to a smaller number of cities, but it suggests that cities tend to get more similar in terms of single-family and plex density as they get bigger.

Table 4-2. Central tendencies, Improved Single Family and Plex Average Density by City Size, 2003-2007, Tier 3 cities (n=120)

		2003-2007			
City Size	Number of Cities	Average	Maximum	Minimum	Standard Deviation
<1,000	20	4.80	8.29	2.90	1.53
1,000-4,999	45	5.32	8.44	2.06	1.29
5,000-9,999	27	6.46	15.54	3.83	2.22
10,000-24,999	17	6.10	9.38	3.81	1.60
25,000-49,999	4	6.05	6.56	5.68	0.39
50,000 or more	7	6.49	7.17	5.98	0.37
All Cities	**120**	**5.71**	**15.54**	**2.06**	**1.67**

Source: Oregon Explorer; county tax lot and assessment data; analysis by University of Oregon
Description: Count of Parcels (Residential Class 100)/Unprohibitive Acres. Data is filtered on Yr Built, Improved and General Land Classification. The Yr Built Filter excludes Null and 0. Improved: property classification code improved AND assessed improved value >$10,000. The Generalized Land Classification filter keeps Residential, which includes structures with <5 units. Parcels >0.5 acres are excluded.

Tables 4-1 and 4-2 include single-family and plex units combined. Table 4-3 disaggregates the densities for 51 cities where the research team had data that allowed separation of single-family and plex units. The results show that plex densities are typically higher than single-family densities. They also show a general trend of increasing density by city size. Because one-unit single family parcels are dominant, using parcels to convey density rather than units illustrates that single family density and single family+plex density using parcels are very similar.

Table 4-3. Improved Single Family and Plex Average Density by City Size, 2012, Cities in Clackamas, Coos, Deschutes, Jackson, Linn, Polk, Washington, Yamhill (n=51)

		Coos, Clackamas, Deschutes,Hood River, Jackson, Josephine, Lane, Linn, Washington, Yamhill			
City Size	Number of Cities	Single Family	Single Family+ Plex (Using Units)	Single Family + Plex (Using Parcels)	Plex
<1,000	2	3.59	3.65	3.59	9.01
1,000-4,999	24	3.30	3.37	3.24	5.89
5,000-9,999	11	4.62	4.83	4.60	10.03
10,000-24,999	6	4.92	5.14	4.88	9.53
25,000-49,999	3	4.17	4.39	4.22	9.73
50,000 or more	5	4.40	4.89	4.43	11.25
All Cities	**51**	**4.33**	**4.68**	**4.35**	**10.34**

Source: Oregon Explorer; county tax lot and assessment data; analysis by University of Oregon
Description: Count of Parcels (Residential Class 100)/Unprohibitive Acres. Data is filtered on Yr Built, Improved and General Land Classification. The Yr Built Filter excludes Null and 0. Improved: property classification code improved AND assessed improved value >$10,000. The Generalized Land Classification filter keeps Residential, which includes structures with <5 units. Parcels >0.5 acres are excluded. Includes cities in counties with address point or unit count data.

Table 4-4 shows average density of single-family and plex units by region for four five-year periods (e.g., each period represents the average density of all dwellings for that period). The results show that more variability exists in single-family/plex densities by region than by city size. As a result, the predictive value of regions is less useful.

Table 4-4. Improved Single Family and Plex Average Density by Region, by five-year periods, Tier 3 cities (n=120)

		Improved Single Family & Plex Parcels/Unprohibited Acres				Change 1993-97 to 2008-12	
City Size	Number of Cities	1993-1997	1998-2002	2003-2007	2008-2012	DU/Acre	Percent
Central Oregon	9	4.77	5.19	6.27	6.48	1.70	36%
North Coastal Oregon	12	5.92	5.55	7.65	6.20	0.28	5%
Northeast Oregon	12	4.51	4.80	4.73	4.86	0.36	8%
South Coastal Oregon	6	4.60	4.49	5.71	5.53	0.93	20%
Southeast Oregon	6	4.44	4.46	4.42	4.92	0.49	11%
Southern Oregon	17	5.34	5.41	6.14	6.01	0.67	12%
Willamette Valley	58	5.35	6.01	6.34	6.69	1.34	25%
All Cities	**120**	**5.22**	**5.61**	**6.25**	**6.38**	**1.16**	**22%**

Source: Oregon Explorer; county tax lot and assessment data; analysis by University of Oregon
Description: Count of Parcels (Residential Class 100)/Unprohibitive Acres. Data is filterd on Yr Built, Improved and General Land Classification. The Yr Built Filter excludes Null and 0. Improved: property classification code improved AND assessed improved value >$10,000. The Generalized Land Classification filter keeps Residential, which includes structures with <5 units. Parcels >0.5 acres are excluded.

Table 4-5 shows central tendency data (e.g, averages, maximum, minimum, and standard deviation) for improved single-family and plex densities in the 120 sample cities for 2008-2012. Cities in Southeast Oregon show less variation than other regions. Cities in North Coastal Oregon show the greatest variation.

Table 4-5. Central tendencies, Improved Single Family and Plex Average Density by Region, 2008-12, Tier 3 cities (n=120)

		2008-2012			
City Size	Number of Cities	Average	Maximum	Minimum	Standard Deviation
Central Oregon	9	6.45	10.08	3.90	2.03
North Coastal Oregon	12	6.67	14.88	3.99	2.90
Northeast Oregon	12	4.68	6.88	2.97	1.27
South Coastal Oregon	6	4.97	7.16	2.99	1.39
Southeast Oregon	6	4.60	5.20	4.16	0.51
Southern Oregon	17	5.41	7.98	3.48	1.40
Willamette Valley	58	6.06	13.98	2.06	1.75
All Cities	**120**	**5.80**	**14.88**	**2.06**	**1.85**

Source: Oregon Explorer; county tax lot and assessment data; analysis by University of Oregon
Description: Count of Parcels (Residential Class 100)/Unprohibitive Acres. Data is filtered on Yr Built, Improved and General Land Classification. The Yr Built Filter excludes Null and 0. Improved: property classification code improved AND assessed improved value >$10,000. The Generalized Land Classification filter keeps Residential, which includes structures with <5 units. Parcels >0.5 acres are excluded.

Multifamily Density

Multifamily densities present an analytical challenge. Most assessors do not include counts of multifamily dwelling units in their assessment databases. We present two levels of data: multifamily counts from assessor's data and address files when available (Tables 4-6 and 4-7) and Goal 10 Housing studies (Table 4-8s and 4-9.)

Due to data limitations, the tax assessor's sample represents 26 cities from counties for which we could obtain taxlot data with necessary fields: improvement value, property classification, and number of units or addresses associated with each taxlot. Table 4-6 shows that multifamily development for all developments in the 26 cities averaged about 12 dwelling units per net acre. Density was highest in cities 10,000-24,999 and cities over 50,000.

Table 4-6. Average density of multifamily housing by city size, 2012 (n=26)

City Size	Number of Cities	Number of Units	Density (DU/Net Ac)
<1,000	0	na	na
1,000-4,999	11	1,260	5.34
5,000-9,999	8	2,963	6.36
10,000-24,999	3	3,172	11.58
25,000-49,999	1	1,560	7.94
50,000 or more	3	31,717	14.47
Total	26	40,672	12.09

Source: Oregon Explorer; county tax lot and assessment data; analysis by University of Oregon

Table 4-7 shows multifamily density for 26 cities in four regions. Several regions have very small samples, making it difficult to generalize about trends in densities. Of regions with more than one observation, density was highest in the Willamette Valley.

Table 4-7 Average density of multifamily housing by region, 2012 (n=26)

City Size	Number of Cities	Number of Units	Density (DU/Net Ac.)
Central Oregon	1	213	3.65
North Coastal Oregon			
Northeast Oregon			
South Coastal Oregon	1	558	14.36
Southeast Oregon			
Southern Oregon	10	7,110	8.13
Willamette Valley	14	32,791	13.70
All Cities	**26**	**40,672**	**12.09**

Source: Oregon Explorer; county tax lot and assessment data; analysis by University of Oregon

To supplement the small sample size in Tables 4-6 and 4-7, the research team reviewed Goal 10 housing studies. We reviewed about 30 studies completed since 2000; 22 of those studies included analysis of multifamily densities. Consistent with the definition of needed housing types in ORS 197.303, the results presented in the following tables include all forms of multifamily housing (duplexes, other plexes, multifamily units, etc.).

While the analysis shown in Table 4-6 and Table 4-7 suggests that densities increase as population increases, the size of the samples do not allow any reliable conclusions to be drawn based on city size or region. Our assessment is that the Goal 10 studies provide more reliable results than the tax lot analysis. Our rationale is that those studies used more rigorous review of the data for quality. That said, we believe the average densities from both methods provide a reasonable basis for development assumptions for incorporation into a simplified land need method.

Table 4-8 shows the results of our review of these studies. We included the number of units and density, the time period for the analysis, and whether the city was in the original pool of 26 cities. The results show an unweighted average density of 13.3 dwelling units per net acre. Because the number of units varied considerably by city, and some studies did not include a unit count, we also calculated a weighted average for those cities with unit counts. The weighted average for the 18 cities that included unit counts was 15.3 dwelling units per net acre.

Table 4-8. Average Density of multifamily housing as reported in Goal 10 studies (n=22)

City	Units	Density (DU/net ac)	Time Period	In Tier 3 Analysis
Albany	1,321	15.3	1990-2001	N
Ashland	167	9.3	1990-2001	Y
Aumsville		8.0	1986-1996	N
Bend		17.7	1998-2008	N
Columbia City	16	6.7	1992-2000	N
Eugene	2,029	14.1	2001-2008	Y
Grants Pass	740	10.0	1999-2006	N
Harrisburg	67	9.3	all housing	N
Hermiston		15.3	1999-2004	N
Independence		9.9	1987-1999	N
Junction City	76	17.5	2000-2008	Y
La Grande	385	14.6	1990-2000	N
Medford	2,564	16.6	1996-2009	Y
Monmouth	231	12.6	1990-2000	N
Newberg	516	15.7	1990-2003	N
Newport	226	18.7	2000-2010	N
Ontario	65	12.1	1996-2004	N
Redmond	533	8.8	2000-2004	N
Salem	2,506	18.3	1999-2009	N
Keizer	2,833	17.8	1999-2009	N
Sandy	672	11.0	1998-2006	Y
Springfield	1,051	11.1	1999-2008	Y
Average	**889**	**13.2**		
Weighted Average (for cities with unit counts)		**15.3**		
Minimum		6.7		
Maximum		18.7		
St.Dev.		3.8		

Source: City Goal 10 Housing Needs Analysis Studies collected by DLCD and the UO research team
NOTE: These averages do not separate medium- and high-density residential development, so the averages reported in this table reflect all multifamily housing units. The inconsistent categorization in Goal 10 studies made separation infeasible.

To better understand relationships between density and city size and region, we cross-tabulated the data from the 18 studies that included unit counts. Table 4-9 presents data from the studies by city size. While the sample size is small for each size class, the results follow the general pattern of increasing density with more population that we observed with single-family densities. Densities for cities over 10,000 persons averaged very close to 15 dwelling units per net acre.

Table 4-9, Density of multifamily housing as reported in Goal 10 studies, by city size (n=18)

Population	Number of Cities	Units	Weighted Density (DU/net ac)
<1,000	0	-	na
1,000-4,999	2	83	8.8
5,000-9,999	3	979	11.9
10,000-24,999	5	1,359	14.9
25,000-49,999	3	4,106	15.2
50,000 or more	5	9,471	15.7
Total/Average	**18**	**15,998**	**15.3**

Source: City Goal 10 Housing Needs Analysis Studies collected by DLCD and the UO research team

Because 14 of 18 Goal 10 housing studies were located in the Willamette Valley, we have limited variation among regions and refrain from reporting regional data on multifamily housing from Goal 10 studies.

The results of our review of multifamily densities reported in Goal 10 studies shows that the studies generally reported densities higher than what we found in the taxlot analysis. This could be explained by the fact that most Goal 10 studies use building permits for the density analysis and go through a more rigorous review than we have conducted to date. The results of the studies are in line with our expectations: densities increase with city size; larger cities average around 15 dwelling units per net acre.

The tax lot level analysis of 26 cities resulted in an average multifamily density of 12 dwelling units per net acre. The 18 Goal 10 studies show an average weighted density of about 15 dwelling units per net acre. The two methods begin to suggest a range of 12 to 15 units per acre for average multifamily densities, though the studies did not separate medium and high density residential.

CHAPTER 5: EMPLOYMENT LAND USE EFFICIENCY

This chapter presents an analysis of land use efficiency on employment lands. The analysis generally reports employment densities in employees per acre (EPA).

Findings

This chapter presents analysis of employment densities for Tier 1 and Tier 2 cities. Using Tier 1 cities, the research team was able to analyze changes in employment density over time for all land within city limits. Using Tier 2 data, we were able to analyze employment density for land that had employment in 2012.[14]

Note that all of the analysis in this section is based on data from the Quarterly Census of Employment and Wages (QCEW) and only includes employees "covered" by unemployment insurance. Total employment is typically about 25% higher than covered employment, and typically undercounts agricultural employment, real estate, and services, which are less likely to be considered "covered" and include a higher proportion of self-proprietors. It is not possible to estimate where uncovered employment is located but many of the underreported fields occur in areas outside UGBs or in home occupations. In the counties in our study, the share of total employment included in QCEW data ranges from 57% in Curry County to 84% in Marion County.

The research team decided to not make adjustments to covered employment data to reflect total employment. Our rationale is that (1) we observe wide variations in the ratio of covered to total employment by county, and (2) these ratios include employment outside city limits. It is reasonable to assume that in rural agricultural counties a higher proportion of non-covered employment exists outside city limits. Without a more accurate method of allocating non-covered employment, we chose to not make covered to total employment adjustments.

Employment Trends

Table 5-1 shows a summary of covered employment by city size in 2005 and 2012. The data show that more than 90% of covered employment is in cities of 5,000 population and larger. More than 50% of covered employment is in the seven cities over 50,000 population. The results show that employment grew only 1% during this period. Growth was uneven by size class, with cities less than 1,000 population experiencing the highest growth rate (32%) and cities over 50,000 losing employment. In 2012, there were 651,491 covered employees in the 216 cities outside the Metro UGB.

[14] We did not have historic taxlot data, so dynamic analysis (e.g., analysis over time) of employment densities at the tax lot level was not possible.

Table 5-1. Covered employment for all non-Metro cities, 2005 and 2012 (n=216)

City Size	Number of Cities	2005 Employment	2005 Percent of Emp	2012 Employment	2012 Percent of Emp	Change, 2005-12 Number	Change, 2005-12 Percent	Change, 2005-12 AAGR
<1,000	81	6,952	1%	9,178	1%	2,226	32%	4.0%
1,000-4,999	79	52,379	8%	53,269	8%	890	2%	0.2%
5,000-9,999	28	76,949	12%	78,566	12%	1,617	2%	0.3%
10,000-24,999	17	125,433	19%	128,840	20%	3,407	3%	0.4%
25,000-49,999	4	44,187	7%	46,297	7%	2,110	5%	0.7%
50,000 or more	7	338,690	53%	335,341	51%	(3,349)	-1%	-0.1%
All Classes	**216**	**644,590**	**100%**	**651,491**	**100%**	**6,901**	**1%**	**0.2%**

Source: Quarterly Census of Employment and Wages, Oregon Explorer, analysis by University of Oregon

Table 5-2 shows basic employment statistics for the 130 Tier 1 cities in 2012. Table 5-2 shows that the 130 Tier 1 cities had 627,441 covered employees, or 96% of all employment within city limits of all 216 cities outside Metro. The results also show considerable variation in the amount of employment exists in cities of all sizes (see maximum, minimum and standard deviation values).

Table 5-2. Covered employment statistics for Tier 1 cities by city size, 2012 (n=130)

City Size	Number of Cities	Total Employment	Average by City	Maximum	Minimum	St. Dev.
<1,000	26	3,220	124	401	4	114
1,000-4,999	48	35,177	733	3,713	98	656
5,000-9,999	28	78,566	2,806	6,214	676	1,468
10,000-24,999	17	128,840	7,579	16,586	3,262	3,254
25,000-49,999	4	46,297	11,574	17,068	5,614	4,896
50,000 or more	7	335,341	47,906	96,570	20,577	29,467
All Classes	**130**	**627,441**	**4,826**	**96,570**	**4**	**12,552**

Source: Quarterly Census of Employment and Wages, Oregon Explorer, analysis by University of Oregon

Table 5-3 shows population, covered employment, and population/employment ratio by city size for 2005 and 2012. Overall, the population/employment ratio trends towards 2:1.The results show that the population/employment ratio generally decreases as population increases. The results suggest that most small cities are “bedroom” communities, with population/employment ratios in the 5:1 range. Cities over 50,000 are employment centers, with population/employment ratios below 2:1. Between 2005 and 2012, population/employment ratios increased for all cities with the exception of cities under 1,000 population. This is consistent with job loss that occurred during the Great Recession.

Table 5-3. Population, covered employment, and population/employment ratio by city size, Tier 1 Cities, 2005 and 2012 (n=130)

City Size	Number of Cities	2005 Population	2005 Employment	2005 Pop/Emp Ratio	2012 Population	2012 Employment	2012 Pop/Emp Ratio
<1,000	26	13,914	2,444	5.7	14,805	3,220	4.6
1,000-4,999	48	102,190	34,691	2.9	114,025	35,177	3.2
5,000-9,999	28	201,795	76,949	2.6	218,885	78,566	2.8
10,000-24,999	17	268,645	125,433	2.1	285,375	128,840	2.2
25,000-49,999	4	110,850	44,187	2.5	130,255	46,297	2.8
50,000 or more	7	588,975	338,690	1.7	633,395	335,341	1.9
All Classes	**130**	**1,286,369**	**622,394**	**2.1**	**1,396,740**	**627,441**	**2.2**

Source: Quarterly Census of Employment and Wages, Oregon Explorer, analysis by University of Oregon

Employment by Land Use Classification

This section presents analysis of employment by property classifications. Table 5-4 shows that the majority of covered employment in all of the study cities is in lands with commercial property classifications (59% for all 127 Tier 2 cities). Exempt land accounted for 18% of employment, and industrial land 14%. Seven percent of employment was on land with residential property classifications (note this is not the same as plan designations or zoning), and 2% on other (farm, forest, tract).

Table 5-4. Covered employment by generalized property classification by city size, Tier 2 Cities, 2012 (n=127)

City Size	Number of Cities	Generalized Property Classification: Services	Industrial	Residential	Exempt	Other	Total
Total Employment							
<1,000	25	1,072	194	156	625	91	2,138
1,000-4,999	46	14,540	4,463	2,042	5,176	1,874	28,095
5,000-9,999	28	33,723	6,463	7,121	12,048	1,536	60,891
10,000-24,999	17	47,487	10,623	5,347	19,618	1,099	84,174
25,000-49,999	4	20,160	5,461	2,816	8,698	867	38,002
50,000 or more	7	143,596	35,410	13,005	31,612	2,419	226,042
All Classes	**127**	**260,578**	**62,614**	**30,487**	**77,777**	**7,886**	**439,342**
Percent of Employment							
<1,000	20%	50%	9%	7%	29%	4%	100%
1,000-4,999	36%	52%	16%	7%	18%	7%	100%
5,000-9,999	22%	55%	11%	12%	20%	3%	100%
10,000-24,999	13%	56%	13%	6%	23%	1%	100%
25,000-49,999	3%	53%	14%	7%	23%	2%	100%
50,000 or more	6%	64%	16%	6%	14%	1%	100%
All Classes	**100%**	**59%**	**14%**	**7%**	**18%**	**2%**	**100%**

Source: Quarterly Census of Employment and Wages, Oregon Explorer, analysis by University of Oregon
Note: only includes employment that was associated with a taxlot.

A key issue related to developing a simplified employment land need methodology is the relationship between employment by industry and land use (as indicated by

property classifications). This analysis allowed the research team to better understand the mix of industries that occurs by within cities as well as land use types. The research team used North American Industrial Classification System (NAICS) codes to conduct the analysis. To simplify the analysis, we created four meta-groupings of industries:

- Industrial: 11, 21, 22, 23, 31-33, 42, 48
- Retail: 44-45
- Services: 51, 52, 53, 54, 55, 56, 61, 62, 71, 72, 81
- Government: 92 and Public Ownership

To conduct this analysis, the research team used a different analysis than for the previous analyses in this section. To retain the industry codes, the research team joined tax lot data to the employment records (the other Tier 2 analysis joined employment data to tax lots).

Table 5-5 shows covered employment for all 216 cities outside of Metro by property classification and generalized employment sector. The results show a high degree of mixing of employment by land use (all of the generalized sectors except government had some employment in every property classification) as well as a high degree of employment sectors within individual land use categories. For example, 9% of industrial employment as measured by NAICS codes was on land classified as commercial; 18% of commercial employment was on land classified as industrial.

Table 5-5. Covered employment by generalized employment sector and property classification, Tier 2 cities, 2012 (n=127)

	Generalized Employment Sector					
Property Classification	**Services**	**Government**	**Industrial**	**Retail**	**Total Employment**	**Percent by Prop Class**
Covered Employment						
Commercial	214,158	14,380	29,900	79,545	337,983	62%
Exempt	63,701	13,414	5,605	615	83,335	15%
Farm	287	47	1,195	40	1,569	0%
Forest	79		25	1	105	0%
Industrial	13,120	776	57,837	3,098	74,831	14%
Misc	3,158	123	4,283	276	7,840	1%
Multi-Family	8,675	12	861	230	9,778	2%
Recreation	182		5	21	208	0%
Residential	17,839	636	9,628	1,587	29,690	5%
Tract	2,123		896	67	3,086	1%
Total	**323,322**	**29,388**	**110,235**	**85,480**	**548,425**	**100%**
Percent of Covered Employment by Employment Sector						
Commercial	63%	4%	9%	24%	100%	
Exempt	76%	16%	7%	1%	100%	
Farm	18%	3%	76%	3%	100%	
Forest	75%		24%	1%	100%	
Industrial	18%	1%	77%	4%	100%	
Misc	40%	2%	55%	4%	100%	
Multi-Family	89%		9%	2%	100%	
Recreation	88%		2%	10%	100%	
Residential	60%	2%	32%	5%	100%	
Tract	69%		29%	2%	100%	
Total	**59%**	**5%**	**20%**	**16%**	**100%**	

Source: Quarterly Census of Employment and Wages, Oregon Explorer, analysis by University of Oregon
Note: only includes employment that was associated with a taxlot

Tables 5-5 and 5-6 show covered employment by generalized employment sector and city size. The results show some interesting patterns. First, commercial employment both in real terms and as a percent of total employment increases as city size increases. Retail follows a similar pattern, with the exception of cities over 50,000. This suggests that as cities grow they provide a broader spectrum of commercial services. Industrial employment decreases as a percentage of total employment as city size increases. Government accounts for a pretty consistent percentage of employment for all cities—between 6% and 10%.

Table 5-6. Covered employment by generalized employment sector by city size, Tier 2 cities, 2012 (n=127)

	Generalized Employment Sector				
Population Class	**Services**	**Retail**	**Industrial**	**Government**	**Total Employment**
Total Employment					
<1,000	4,799	773	2,996	967	9,535
1,000-4,999	27,759	7,145	19,585	4,370	58,859
5,000-9,999	46,603	13,552	17,286	4,847	82,288
10,000-24,999	78,940	22,111	27,374	9,491	137,916
25,000-49,999	26,514	8,147	8,953	3,047	46,661
50,000 or more	217,240	45,603	60,049	27,679	350,571
All Classes	**401,855**	**97,331**	**136,243**	**50,401**	**685,830**
Percent of Employment					
<1,000	50%	8%	31%	10%	100%
1,000-4,999	47%	12%	33%	7%	100%
5,000-9,999	57%	16%	21%	6%	100%
10,000-24,999	57%	16%	20%	7%	100%
25,000-49,999	57%	17%	19%	7%	100%
50,000 or more	62%	13%	17%	8%	100%
All Classes	**59%**	**14%**	**20%**	**7%**	**100%**

Source: Quarterly Census of Employment and Wages, Oregon Explorer, analysis by University of Oregon
Note: only includes employment that was associated with a taxlot.

The research team also analyzed employment by region. The results show a high degree of consistency in the mix of employment by region (Table 5-7).

Table 5-7. Covered employment by generalized employment sector by region, Tier 2 cities, 2012 (n=127)

	Generalized Employment Sector				
Region	Services	Retail	Industrial	Government	Total Employment
Total Employment					
Central Oregon	45,144	12,198	14,783	4,107	76,232
North Coastal Oregon	20,593	5,774	5,365	2,701	34,433
Northeast Oregon	20,575	5,690	11,083	4,192	41,540
South Coastal Oregon	16,582	4,502	4,357	1,685	27,126
Southeast Oregon	16,652	4,925	6,342	2,797	30,716
Southern Oregon	63,423	16,801	17,181	6,213	103,618
Willamette Valley	218,886	47,441	77,132	28,706	372,165
Total	**401,855**	**97,331**	**136,243**	**50,401**	**685,830**
Percent of Covered Employment by Sector					
Central Oregon	59%	16%	19%	5%	100%
North Coastal Oregon	60%	17%	16%	8%	100%
Northeast Oregon	50%	14%	27%	10%	100%
South Coastal Oregon	61%	17%	16%	6%	100%
Southeast Oregon	54%	16%	21%	9%	100%
Southern Oregon	61%	16%	17%	6%	100%
Willamette Valley	59%	13%	21%	8%	100%
Total	**59%**	**14%**	**20%**	**7%**	**100%**

Source: Quarterly Census of Employment and Wages, Oregon Explorer, analysis by University of Oregon
Note: only includes employment that was associated with a taxlot.

Density of Lands Used for Employment

Table 5-8 shows acres in city limits (excluding prohibitively constrained acres), covered employment, and covered employment per acre by city size in 2005 and 2012. This analysis allows analysis of relative employment densities over time, but is limited in that it includes all land in city limits, not just land in employment uses.

The results show that employment density increases by city size, with employment density in cities over 50,000 persons being nine times the density in cities under 1,000 in 2012. The results also show that overall employment density decreased between 2005 and 2012. This is consistent with the employment data presented in Table 5-3.

Table 5-8. Covered employment density for all acres in city limits by city size, all cities outside the Portland Metro UGB, 2005 and 2012 (n=216)

		2005			2012			Change 2005-12		
City Size	Number of Cities	Acres in City Limit *	Covered Emp	Emp/Ac	Acres in City Limit *	Covered Emp	Emp/Ac	Acres in City Limit *	Employment	Emp/Ac
<1,000	81	29,401	6,952	0.24	30,086	9,178	0.31	685	2,226	0.069
1,000-4,999	79	69,059	52,379	0.76	72,407	53,269	0.74	3,348	890	(0.023)
5,000-9,999	28	67,119	76,949	1.15	73,108	78,566	1.07	5,989	1,617	(0.072)
10,000-24,999	17	73,488	125,433	1.71	78,425	128,840	1.64	4,937	3,407	(0.064)
25,000-49,999	4	26,442	44,187	1.67	28,031	46,297	1.65	1,589	2,110	(0.019)
50,000 or more	7	117,882	338,690	2.87	121,453	335,341	2.76	3,571	(3,349)	(0.112)
All Classes	**216**	**383,391**	**644,590**	**1.68**	**403,510**	**651,491**	**1.61**	**20,118**	**6,901**	**(0.067)**

Source: Quarterly Census of Employment and Wages, Oregon Explorer, analysis by University of Oregon
Note: Acres in city limit excludes acres that are "prohibitively constrained." Prohibitively constrained acres are acres in water (lakes, rivers, etc.) or FEMA floodways. The methodology uses property classifications and improvement values to identify improvements. As such, the analysis does not make any judgments about the development status of land (e.g., whether any of the land would be classified as "partially vacant" as some land inventories do. We note that OAR 660-009-0005 does not include any provisions for assessment of partially vacant land.

A more useful measure of employment density is based on employees per developed acre of employment land. The research team used Tier 2 data for 127 cities to conduct this analysis. It is based on covered employment as reported by the Quarterly Census of Employment and Wages (QCEW) and taxlot data. The acreages are acres in taxlots with employment, excluding prohibitive constraints.

Table 5-9 shows covered employment density for developed commercial and industrial land by city size in 2012. The results show an average density of 17.2 employees per net acre for commercial employment, and 8.7 employees per net acre for industrial employment. These results are in the range of those reported in the Goal 9 workbook.[15]

Unlike residential densities, the results do not show any discernable pattern by city size. In fact, the results show that cities under 1,000 population had densities that are similar to larger cities.

[15] The Goal 9 workbook suggests the following density assumptions: commercial – 12 to 20; light industrial – 10 to 15; heavy industrial – 7 to 12

Table 5-9. Covered employment density for developed commercial and industrial land by city size, Tier 2 cities, 2012 (n=127)

		Commercial			Industrial		
City Size	Number of Cities	Developed Acres *	Employment	Emp/Dev Ac	Developed Acres *	Employment	Emp/Dev Ac
<1,000	25	67	1,072	16.1	20	194	9.7
1,000-4,999	46	1,314	14,578	11.1	1,027	4,471	4.4
5,000-9,999	28	2,547	33,730	13.2	1,071	6,480	6.0
10,000-24,999	17	2,789	47,607	17.1	1,241	10,623	8.6
25,000-49,999	4	1,352	20,160	14.9	438	5,461	12.5
50,000 or more	7	7,116	143,596	20.2	3,364	35,410	10.5
All Classes	**127**	**15,184**	**260,743**	**17.2**	**7,161**	**62,639**	**8.7**

Source: Quarterly Census of Employment and Wages, Oregon Explorer, analysis by University of Oregon
Note: Developed acres excludes acres that are "prohibitively constrained." Prohibitively constrained acres are acres in water (lakes, rivers, etc.) or FEMA floodways. We use developed to indicate taxlots with improvements.

Table 5-10 shows statistics for employment density for commercial land by city size. The results show considerable variation by city size (as evidenced by the maximum, minimum and standard deviations). The results also clearly show that variation decreases as size increases (as measured by standard deviation).

Table 5-10. Covered employment statistics for developed commercial land by city size, Tier 2 cities, 2012 (n=101)

City Size	Number of Cities	Developed Acres *	Employment	Emp/Dev Ac	Max EPA	Min EPA	Std. Dev EPA
<1,000	13	67	1,072	16.1	81.9	9.6	18.8
1,000-4,999	41	1,314	14,578	11.1	104.8	2.2	17.7
5,000-9,999	22	2,547	33,730	13.2	37.9	4.7	8.9
10,000-24,999	15	2,789	47,607	17.1	27.9	10.0	5.1
25,000-49,999	3	1,352	20,160	14.9	17.1	12.9	2.2
50,000 or more	7	7,116	143,596	20.2	24.6	15.4	3.2
All Classes	**101**	**15,184**	**260,743**	**17.2**	**104.8**	**2.2**	**14.1**

Source: Quarterly Census of Employment and Wages, Oregon Explorer, analysis by University of Oregon
Note: Developed acres excludes acres that are "prohibitively constrained." Prohibitively constrained acres are acres in water (lakes, rivers, etc.) or FEMA floodways. We use developed to indicate taxlots with improvements.
Note: 101 of 127 Tier 2 cities had land with a commercial property classification (2XX)

Table 5-11 shows statistics for employment density for industrial land by city size. The results show considerable variation by city size (as evidenced by the maximum, minimum and standard deviations). The results also clearly show that variation decreases as size increases (as measured by standard deviation).

Table 5-11. Covered employment statistics for developed industrial land by city size, Tier 2 cities, 2012 (n=77)

City Size	Number of Cities	Developed Acres *	Employment	Emp/Dev Ac	Max EPA	Min EPA	Std. Dev EPA
<1,000	5	20	194	9.7	60.7	0.7	25.8
1,000-4,999	28	1,027	4,471	4.4	89.8	0.4	17.7
5,000-9,999	20	1,071	6,480	6.0	33.5	1.6	7.4
10,000-24,999	14	1,241	10,623	8.6	28.1	2.1	6.8
25,000-49,999	3	438	5,461	12.5	23.2	9.3	7.0
50,000 or more	7	3,364	35,410	10.5	18.2	6.7	3.6
All Classes	**77**	**7,161**	**62,639**	**8.7**	**89.8**	**0.4**	**13.2**

Source: Quarterly Census of Employment and Wages, Oregon Explorer, analysis by University of Oregon
Note: Developed acres excludes acres that are "prohibitively constrained." Prohibitively constrained acres are acres in water (lakes, rivers, etc.) or FEMA floodways. We use developed to indicate taxlots with improvements.
Note: 77 or 127 Tier 2 cities had an industrial property classification (3XX)

Table 5-12 shows covered employment density for developed commercial and industrial land by region in 2012. The results show that commercial densities are more consistent across regions than industrial densities. Central Oregon shows the highest commercial density (20.3 employees per net developed acre), while the South Coastal region shows the lowest (12.1 employees per net developed acre). The South Coastal region showed the highest industrial density (18.9 employees per net developed acre), while the Southeast region showed the lowest (4.5 employees per net developed acre).

Table 5-12. Covered employment density for developed commercial and industrial land by region, Tier 2 cities, 2012 (n=127)

		Commercial			Industrial		
City Size	Number of Cities	Developed Acres *	Employment	Emp/Dev Ac	Developed Acres *	Employment	Emp/Dev Ac
Central Oregon	12	1,597	32,484	20.3	1,299	11,440	8.8
North Coastal Oregon	14	794	15,574	19.6	159	1,338	8.4
Northeast Oregon	12	312	4,290	13.7	74	451	6.1
South Coastal Oregon	6	887	10,702	12.1	58	1,086	18.9
Southeast Oregon	6	486	7,934	16.3	450	2,026	4.5
Southern Oregon	17	2,953	46,914	15.9	386	4,644	12.0
Willamette Valley	60	8,155	142,845	17.5	4,736	41,654	8.8
Total	**127**	**15,184**	**260,743**	**17.2**	**7,161**	**62,639**	**8.7**

Source: Quarterly Census of Employment and Wages, Oregon Explorer, analysis by University of Oregon
Note: Developed acres excludes acres that are "prohibitively constrained." Prohibitively constrained acres are acres in water (lakes, rivers, etc.) or FEMA floodways. We use developed to indicate taxlots with improvements.

CHAPTER 6: FINDINGS AND IMPLICATIONS

This chapter summarizes the key findings of our research and discusses some of the implications for development of a simplified land need methodology. It begins with a discussion regarding the scope of the research and how the UO research team worked to ensure that the work is as comprehensive and accurate as possible. It then discusses the key findings of the research in the context of the HB 2254 requirements. It concludes with a discussion of the implications of our research and how the results might be applied to development of a simplified land need methodology.

Scope of the Research

It is helpful to put the scope of this project in context of previous research efforts in Oregon and of how other states have addressed the issue of monitoring and evaluation of land use and growth management policies.

In Oregon, the most comprehensive evaluation of land use efficiency was completed in 1991. The **Urban Growth Management Study**, conducted by ECONorthwest, used a case study approach, in part due to the limitations of data at that time. The case studies included Portland Metro, Bend, Brookings, and Medford. The conclusions were that significant residential development was occurring outside some of the case study UGBs. The study found that 70% of new residential development was occurring in areas the study defined as "contiguous to the urban core." More important to our study, residential densities were less than those allowed by comprehensive plans. Between 1985 and 1989, single-family development in the "Urban Area" (the incorporated area within the UGB) averaged 3.6 dwelling units per net acre in Medford, 2.5 dwelling units per net acre in Bend, and 3.6 dwelling units per net acre in Medford. While a small sample, the case study results compared to the results of this study suggest Oregon cities have increased residential densities since the late 1980s.

In 2007, DLCD sponsored a project called the "Big Look," which was intended as a comprehensive review of the statewide land use program. While considerable effort was put into the work, it did not include any empirical analysis of land use efficiency. It did include a literature review that was coordinated by the Institute for Natural Resources (INR) at Oregon State University. The INR published "**The Oregon Land Use Program: An Assessment of Selected Goals**" in 2008. The study concluded:

> "Studies of urban form vary greatly in their methodology; they utilize different measures (e.g., density, street connectivity) and different techniques (e.g., cross-sectional and longitudinal data comparisons, econometric modeling; GIS-based analyses.) Judging just on the criterion of population density (as an indicator of more compact urban form), most studies find positive impacts (that is, increasing or more slowly decreasing population densities) either for the UGBs under study or for the type of growth management

> implemented by the State of Oregon. The GIS-based studies find some physical evidence for compact urban form (greater connectivity, pedestrian-accessible commercial development)— these studies, however, have been only conducted for the Portland region (Washington County) and cannot be used as evidence for the other UGBs of the state as local level implementation has been shown (at least in 1991) to play a critical role in physical outcomes. The literature does raise continued concern about the performance of the Bend UGB in achieving higher densities and compact urban form."

Outside of Oregon, **Washington's Buildable Lands Program** is a review and evaluation program that requires certain counties and their cities to evaluate whether they have an adequate amount of residential, commercial, and industrial land to meet the forecasted growth. The Buildable Lands Program requires counties and cities to collect data to evaluate the amount and density of development occurring within their jurisdictions. The purpose of the analysis is to determine if jurisdictions are achieving targeted urban densities within urban growth areas consistent with county policies and density targets.[16]

Relying on statewide parcel data (Maryland PropertyView), the **Maryland Department of Planning** publishes annual data on the parcels and acres of residential development inside and outside Priority Funding Areas.[17]

In 2009, the Lincoln Institute of Land Policy published a book called ***Smart Growth Policies: An Evaluation of Programs and Outcomes***. In this study, scholars from across the country examined four states with growth management programs and four states without growth management programs, focusing on several key evaluation areas including population and employment growth patterns, natural resources and environmental quality, transportation, affordable housing, and fiscal dimensions. The section on population and employment growth patterns parallels our work in this report. Relying on nationally available consistent data for 1990-2000, authors considered the change in population and employment density, land consumption, and concentration. The data on population and employment growth patterns convey evidence of declining land consumption in Oregon. The authors conclude, "Data on development patterns in Oregon may indicate more smart growth success there than in any other state. While not among the fastest-growing states, Oregon posted a decade-long decline in developed land per capita. In addition, it was the only state where population and employment became more concentrated during the 1990s and where employment deconcentrated the least." (Ingram et. al, 2009, p. 43.) While these data provided a consistent method for measuring differences across the states, the study was limited to relying on population from Census data at the block group level. In this study, we use tax lot

[16] See http://www.commerce.wa.gov/Services/localgovernment/GrowthManagement/Growth-Management-Planning-Topics/Pages/Buildable-Lands.aspx.

[17] See: http://www.mdp.state.md.us/msdc/PFA/Resid_Growth/PFA_resid_growth_idx.shtml .

data from County Assessor offices to examine the development of parcels, offering a more refined measure of density.

In short, this research represents the most detailed analysis of land use efficiency in the history of the Oregon land use program. The analysis is based on extensive analysis of about 750,000 tax lots in about 130 Oregon cities outside the Portland Metro UGB.

Quality Control

The UO research team took painstaking effort to ensure the accuracy of the data and analysis presented in this report. The quality review process extended through all phases of the research. Quality review began during the data collection process; the team spent considerable time reviewing the data sets and evaluating their potential for use in the research. We concluded that several data sets (including the statewide zoning layer) were not suitable for use in the study. We also eliminated cities that were under population 5,000 and grew less than 1% annually to reduce the effects of development on legacy lands (e.g., lots that were previously platted).

After conducting the analysis, we reviewed several cities that were outliers in terms of land use efficiency and other measures.

- **Residential Density**. A few cities were outliers on single-family residential density. For example, the results show that Seaside had an average single-family and plex density of over 15 dwelling units per net acre. Upon further review, the research team discovered that some types of condominiums had single-family property classifications. Thus, our analysis is correct in the sense that it accurately represents how the Clatsop County Assessor classified those lands, but if these condominiums are in multi-family buildings they would be classified for planning purposes in Oregon as multi-family. On the low side, Lyons had a single-family/plex density of around two units per net acre. Upon review, the research team confirmed that finding; the City has allowed very low-density subdivisions in the recent past.

- **Constraints**. The research team's analysis of residential densities on constrained lands produced an unexpected result: densities on fully constrained tax lots (e.g., lots that are 100% within a constrained area) had higher overall densities than those on partially-constrained or unconstrained land. Upon review, the research team discovered that the higher densities are a result of legacy development that occurred primarily in floodplains in the early 20th century. Development on partially constrained lands appears to result in lower densities (see Appendix C). We note that a relatively small percentage (~2%) of recent development has occurred on constrained lands.

- **Exempt land**. The research team's analysis of exempt lands identified several cities that had high percentages of exempt lands. Upon review, the results are correct and reflect how those lands are classified. Cities with airports, ports, beaches or other large publicly held lands have more land in exempt classifications.

The research team's quality assurance efforts identified some anomalies in the data, but verified that the analysis of the data is correct. Those efforts suggest that some variations exist in how county assessors are classifying land. More important, we confirmed that the outliers represent such a small portion of the overall development analyzed that they do not have a significant influence on the results.

In summary, the analysis presented in this report represents the most comprehensive and accurate analysis possible in the context of the objectives outlined in HB 2254.

Key Findings

This section presents the key findings of our research on land use efficiency. Section 4(3)(b) of the bill requires that the determination of supply and development capacity within UGBs:

> *Be based on an empirical evaluation of the relation between population and employment growth and the rate and trends of land utilization in the recent past in the applicable major region of the state.*

In Chapter 2 we described the framework the UO research team used to measure land use efficiency and trends in land use efficiency. The simplest way to measure land use efficiency is in persons or employees per unit area (typically square miles or acres). Following are conclusions about population and employment densities by type:

- **Smaller cities have a proportionally larger share of land in their city limits**. In 2012, 160 of the 216 (75%) cities had a population of less than 5,000 residents. Those cities accounted for 15% of the population and 25% of the total acres within city limits in UGBs. Conversely, 11 cities had a population over 25,000 people 34% of acreage within UGBs. Cities with populations between 5,000 and 25,000 contain 40% of the acreage in UGBs.

- **Smaller cities have lower population and employment densities**. Table 6-1 shows that population density increases as city size increases.

Table 6-1. Population Density by City Size, All Cities Outside the Portland Metro UGB, 2012

	2012 Population		2012 City Limit		
City Size	Number	Percent	Sq Mi	Percent	Persons Per Acre
<1,000	33,772	2%	49.73	7%	679
1,000-4,999	181,620	12%	123.32	18%	1,473
5,000-9,999	218,885	15%	130.76	19%	1,674
10,000-24,999	285,375	19%	132.43	20%	2,155
25,000-49,999	130,255	9%	44.85	7%	2,904
50,000 or more	633,395	43%	197.80	29%	3,202
Total	**1,483,302**	**100%**	**678.89**	**100%**	**2,185**

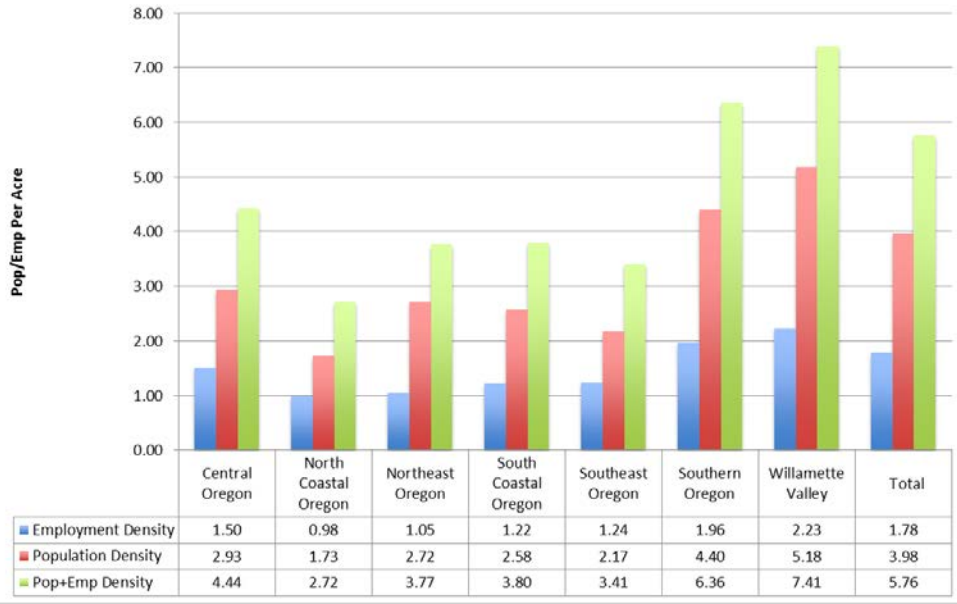
- **Between 2005 and 2012, population increased faster than employment**. Based on covered employment data, the 216 cities outside of the Portland Metro UGB added about 5,900 jobs between 2005 and 2012. Employment grew at a rate much slower than population. Between 2005 and 2012, employment for the 216 cities outside the Portland Metro UGB increased 1.1%; population increased 7.9%. This difference is certainly influenced by the Great Recession, where employment dropped while population remained about the same.

- **Population densities within city limits increased over the 2005 through 2012 period**. For the 130 cities outside the Portland Metro UBG included in the study, population density within city limits (inside UGBs) increased by 12%. Population density for all land in city limits increased from 3.86 persons per acre (2,474 persons per square mile) to 4.32 persons per acre (2,763 persons per square mile).

- **Employment densities within city limits increased over the 2005 through 2012 period.** For the 130 cities outside the Portland Metro UBG included in the study, employment density within city limits increased by 4%. Employment density for all land within city limits increased from 1.86 employees per acre (1,188 employees per square mile) to 1.94 employees per acre (1,240 employees per square mile).

- **Regional differences exist**. Figure 6-1 shows that cities in rural regions generally have lower population and employment densities (as measured in persons or employees per acre). Cities in the Willamette Valley and Southern Oregon region had higher average population and employment densities than other regions. Those regional differences, however, do not control for size or other variables that might explain density.

Figure 6-1. Population and Employment Density for Tier 1 Cities By Region, 2012 (n=130)



	Central Oregon	North Coastal Oregon	Northeast Oregon	South Coastal Oregon	Southeast Oregon	Southern Oregon	Willamette Valley	Total
Employment Density	1.50	0.98	1.05	1.22	1.24	1.96	2.23	1.78
Population Density	2.93	1.73	2.72	2.58	2.17	4.40	5.18	3.98
Pop+Emp Density	4.44	2.72	3.77	3.80	3.41	6.36	7.41	5.76

- **Larger cities account for the majority of population growth.** Between 2005 and 2012, nearly 60% of the population growth in the 216 cities outside the Portland Metro UGB occurred in cities over 25,000 (11 cities) and 75% occurred in cities over 10,000 (28 cities). Seventy-one percent of the 2012 population in cities that are not in the Portland Metro UGB was in cities over 10,000. In this sense, those cities are growing faster on a per unit basis (more new residents per 1,000 existing residents).

- **Population and employment per developed acre vary by city size.** Table 6-2 shows population and employment per improved acre by city size in 2012. The data show that population per improved residential acre generally increases as city size increases. Employment densities show more variation by city size and do not reveal any clear pattern. Analysis by region did not identify any clear patterns in population and employment per improved acre.

Table 6-2. Population and Employment Per Improved Acre by City Size, 2012

City Size	Pop/Ac	Emp/ Comm Ac	Emp/ Ind Ac
<1,000	5.9	16.1	9.7
1,000-4,999	8.3	11.1	4.4
5,000-9,999	11.4	13.2	6.0
10,000-24,999	13.4	17.1	8.6
25,000-49,999	13.0	14.9	12.5
50,000 or more	15.7	20.2	10.5
All Classes	**12.8**	**17.2**	**8.7**

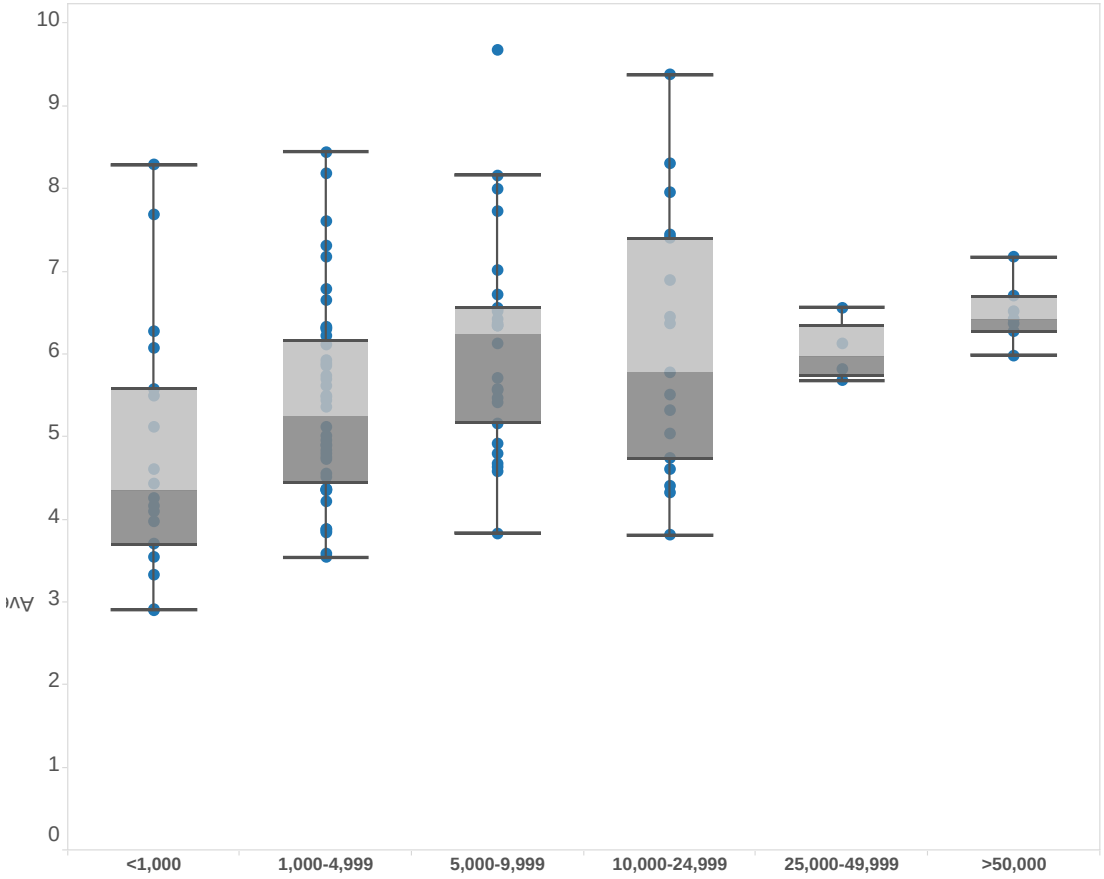
Note: Population density represents 159 cities; commercial employment 101; industrial employment 77

Residential Land Use Efficiency

The analysis of residential densities generally shows that single-family and plex densities have increased over time—for all city sizes and all regions. It also shows that considerable variation exists in single-family and plex densities among cities. Due to data limitations, the research team was not able to analyze trends in multifamily density.

Figure 6-2 shows box-and-whisker plots for single-family and plex density by city size for the 120 Tier 3 cities. Each point represents a city; high and low outliers, including Seaside and Lyons, were excluded. The observations (cities) are divided into quartiles, where each bar represents a quartile and the line between the light and dark gray represents the median value. The narrow bands around values for cities between 25,000-49,999 and cities over 50,000 in population reiterates that larger cities convey less variation than smaller cities. However, these graphics show that densities across the state exist in a narrow band – most cities range from 5 to 7 parcels per unprohibitive acre.

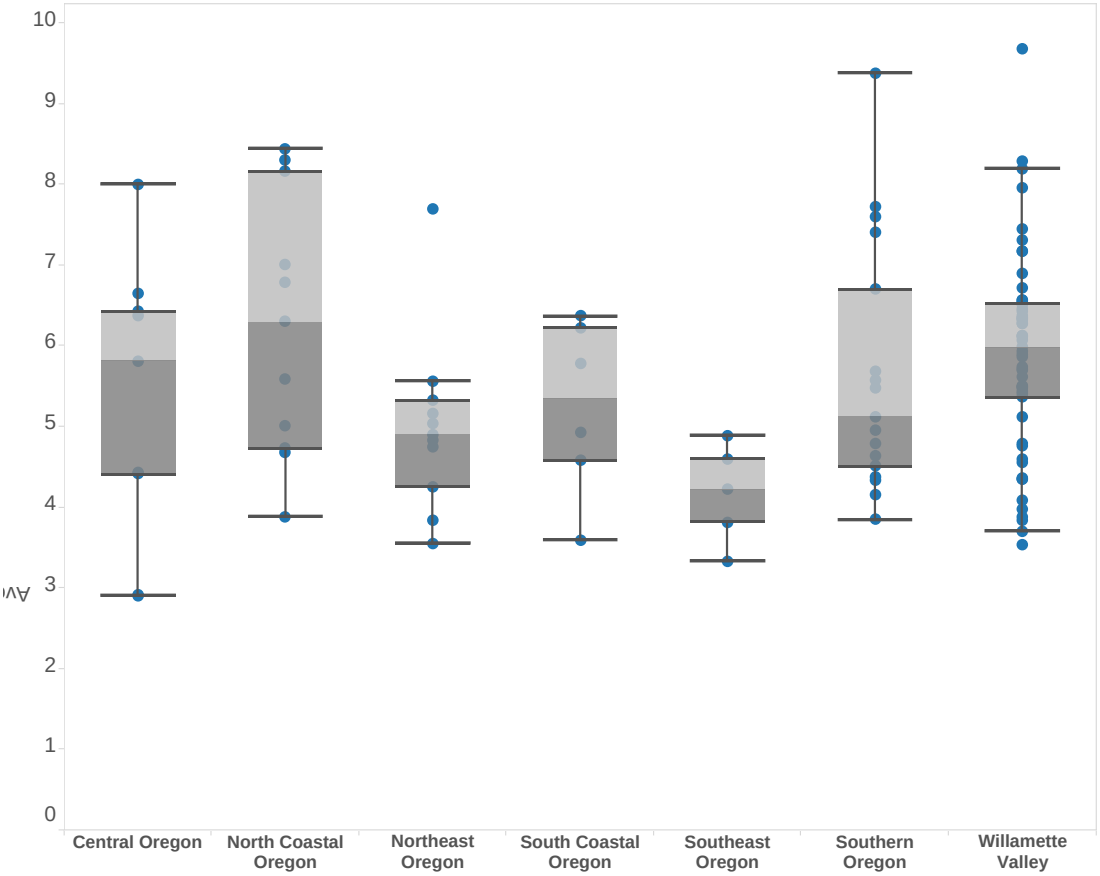
Figure 6-2. Box and Whisker Plot of Single Family & Plex Density by City Size, 2003-2007, Tier 3 cities (n=118)



Excludes Outliers: Lyons, Seaside.

Figure 6-3 shows a box-and-whisker plot by region. The graphic illustrates great variation by region, particularly in the Willamette Valley and Southern Oregon. Northeast and Southeast Oregon show less variation overall, as cities have a narrow range of values.

Figure 6-3. Box and Whisker Plot of Single Family & Plex Density by Region, 2003-2007 (n=118)



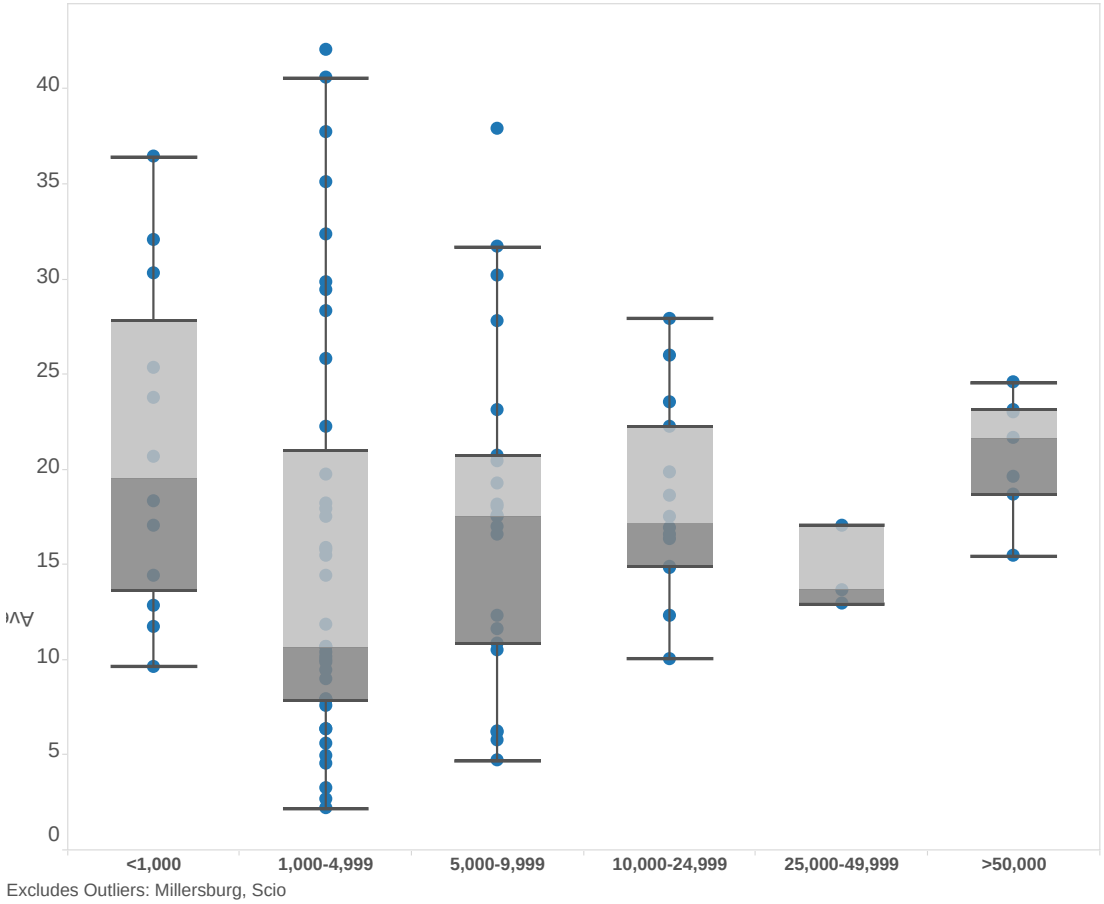
Excludes Outliers: Lyons, Seaside

Employment Land Use Efficiency

Chapter 5 provided a detailed analysis of employment densities. Drawing trend conclusions from the employment data are limited by (1) the data, and (2) the impact of the Great Recession on employment in Oregon. The employment data presented in this report only represent so-called "covered" employment—employment that is covered by unemployment insurance. Covered employment represents about 75% of total employment in Oregon. Thus, the employment densities in this report are systematically low.

Figure 6-4 shows box-and-whisker plots for **commercial** employment density by city size for 128 Tier 2 cities. The narrow bands around values for cities between 25,000-49,999 and cities over 50,000 in population underscores that larger cities have less variation than smaller cities. The graphic shows that commercial densities across the state have considerable variation. Looking at averages by city size, most cities range from 11 to 21 employees per net acre. Commercial employment densities averaged 17.1 employees per net acre for all 128 cities and ranged from a low of 11.1 employees per net acre for cities with populations between 1,000 and 4,999, to a high of 20.9 for cities with populations over 50,000.

Figure 6-4. Box and Whisker Plot of Commercial Employment Density by City Size, 2003-2007 (n=128)



Excludes Outliers: Millersburg, Scio

Figure 6-5 shows box-and-whisker plots for **industrial** employment density by city size for 128 Tier 2 cities. The shaded bands around values for cities between 25,000-49,999 and cities over 50,000 in population shows that the smallest and largest cities have less variation than other cities. The graphic shows that industrial densities across the state show considerable variation. Averages by population class show that industrial densities generally range from 4.4 to 12.5 employees per net acre. Industrial employment densities averaged 8.7 employees per net acre for all 128 cities and ranged from a low of 4.4 employees per net acre for cities with populations less than 1,000, to a high of 12.5 for cities with populations between 25,000 and 49,999.

Figure 6-5. Box and Whisker Plot of <u>Industrial</u> Employment Density by City Size, 2003-2007 (n=128)

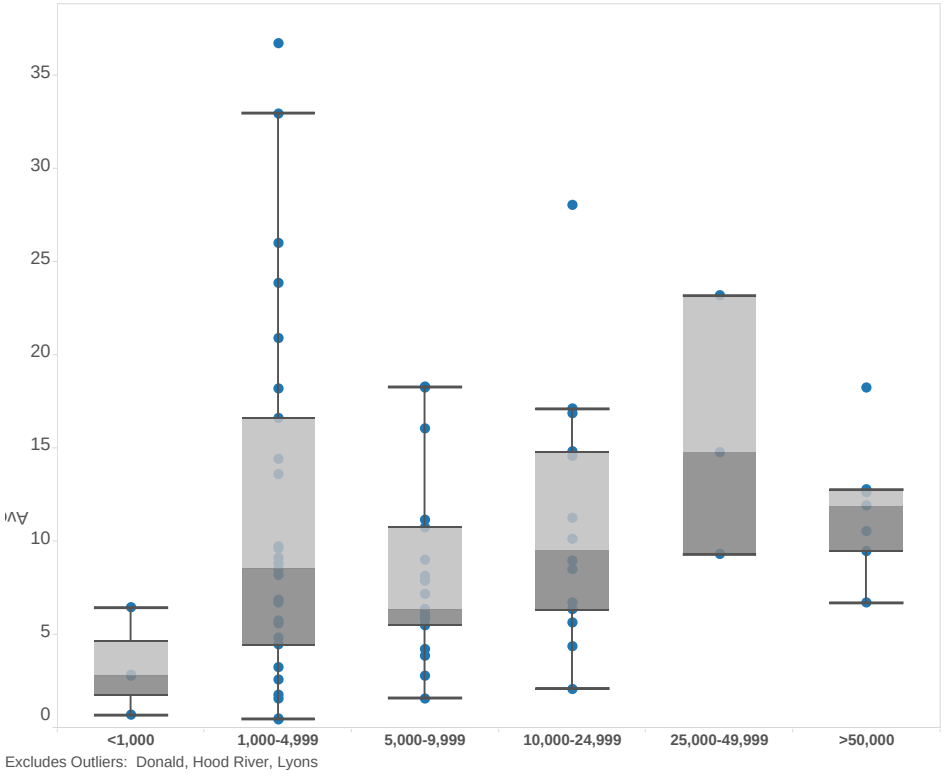


Figure 6-6 shows a box-and-whisker plot of **commercial** employment density by region. The graphic illustrates great variation by region, particularly in the Willamette Valley and North Coast regions.

Figure 6-6. Box and Whisker Plot of Commercial Employment Density by Region, 2003-2007 (n=128)

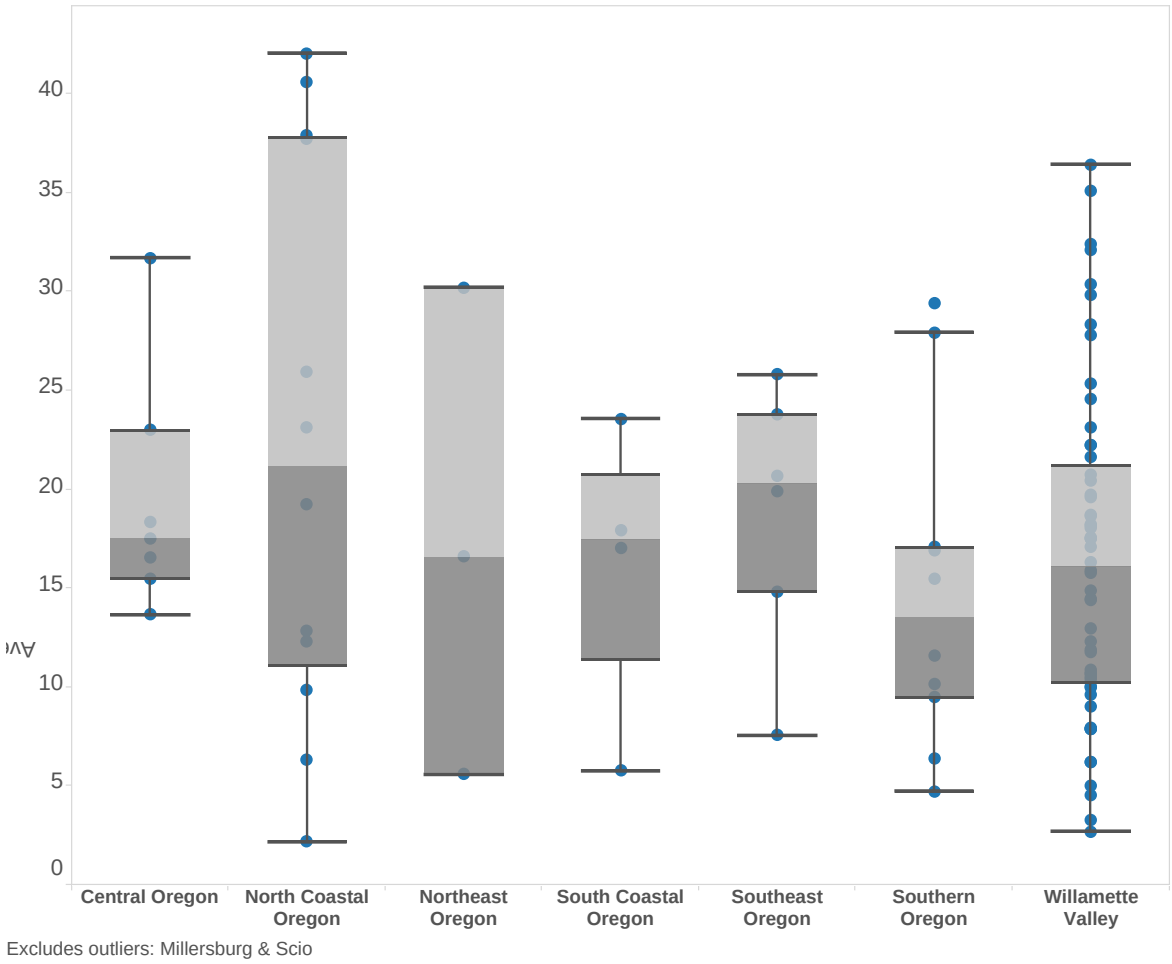
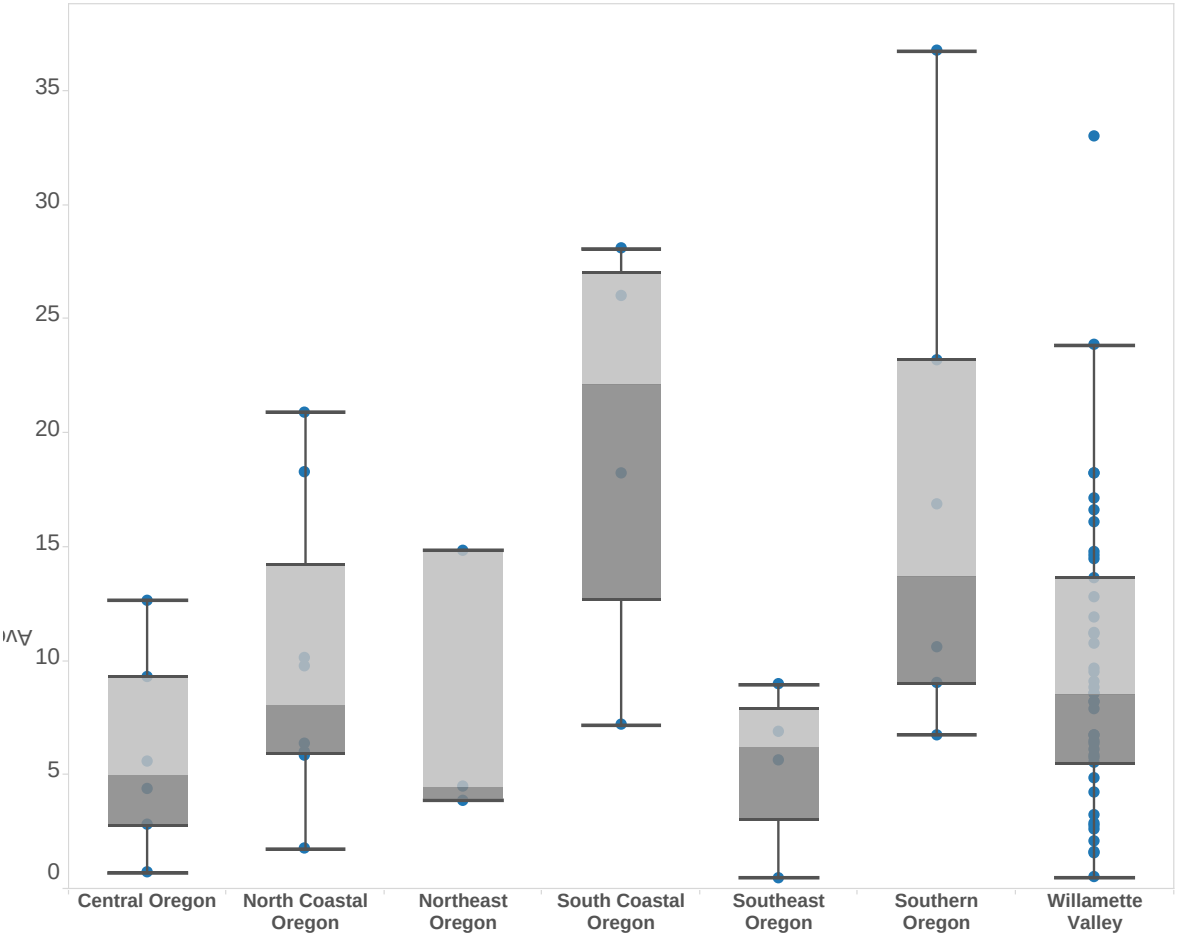


Figure 6-7 shows a box-and-whisker plot of **industrial** employment by region. The graphic illustrates great variation by region, particularly in the Willamette Valley and Southern Oregon regions.

Figure 6-7. Box and Whisker Plot of Industrial Employment Density by Region, 2003-2007



Excludes Outliers: Donald, Hood River, Lyons

Statistical Relationships

Of interest to the H.B. 2254 Rulemaking Advisory Committee was whether simple statistical relationships existed that could explain the influence of city size or region on land use efficiency. To better understand whether those relationships exist, the UO Team developed several simple linear regression models. The results were conclusive: housing and employment density is a function of more than just population or region. The implication is that developing a deterministic statistical model that meets the objectives of this study (e.g., a simple method of determining land need) is not possible. We note that development of a deterministic statistical model was never an objective of this research and is not mentioned in the legislation.

The key issue is the amount of variability that exists among cities. Based on the simple statistical models, that variability is a function of more than population and region. While the UO Team did not find simple statistical models that fit, the data still show patterns that are relevant and useful for the purposes of the research and legislation.

Implications

The results of the research have utility for the rulemaking process, but do not obviate the need for difficult policy choices. The results show that cities are becoming more efficient over time. The policy choice about whether cities should become more efficient in the future is embedded in the legislation; the approach the rule takes will need to incorporate this requirement.

Following is a summary of implications developed by the UO research team:

- **Smaller cities, on average, are less dense than larger cities.** This suggests that methodologies that incorporate city size may be appropriate. Moreover, population appears to be a strong determinant of the amount of variability in land use efficiency. The data clearly show that smaller cities have more variability in both housing and employment density than larger cities. This variability makes it difficult to develop simple linear functions that would serve as predictors of future densities.

  OAR 660-024a provides density and housing mix "safe harbor" thresholds that vary by city size. OAR 660-007 has a similar system for cities in the Portland Metro UGB. The rule provides sample calculations for calculating the needed density and mix of housing. The methodology provides an example of one possible approach to simplify land need estimates. While we do not have empirical data on the number of cities that have used this methodology, our general sense is that most cities have opted for the standard path. It is worth considering why jurisdictions have selected the standard pathway over the OAR 660-024-0040(8)(a) methodology.

- **The density analysis provides baseline data that can inform density thresholds.** No previous studies in Oregon have included such a broad and comprehensive review of land use efficiency. Accompanying this report is a set of tables that provides data for each city included in the study. That data provides a point-in-time snapshot of the efficiency of residential and employment development for each city. This baseline data provides a foundation that can be used to establish density thresholds. The two obvious variations for setting thresholds are by city size (similar to OAR 660-024a) and by region.

- **Larger cities account for the majority of population growth**. Between 2005 and 2012, 75% of population growth occurred in cities over 10,000. Because these cities are growing, they are the most likely to use a simplified UGB methodology. If the intent of UGB streamlining is to develop simpler methods to estimate land need, methodologies that consider city size and growth rates have merit.

- **Regional differences exist, and could be incorporated into a simplified methodology**. The results show that cities in Northeast and Southeast

Oregon have consistently lower residential and employment densities than other regions. A simplified methodology could recognize these differences and establish density thresholds based on location.

- **Limits to efficiency increases should be recognized and incorporated into the methodology**. Focusing on one element of the analysis—single-family and plex efficiency—the data clearly show that on average cities are generally becoming more efficient. Upper bounds to single-family efficiency exist and are a simple function of lot and dwelling sizes. As a general rule of thumb, single-family densities of 8 to 10 units per net acre represent a reasonable upper bound. This equates to average lot sizes of 4,300 to 3,630 square feet. While smaller lot sizes are possible, achieving average single-family densities in this range implies a much different urban form. In short, the rule should recognize these limits to density and not assume a straight linear function for all time.

- **Limited data on multifamily densities creates complications for estimating multifamily land need**. Few counties had dwelling unit counts associated with tax lots, and those that did we found unreliable. Simplified methods for determining multifamily land need are still possible and should be considered in the context of overall housing density and mix. A combination of census data and multifamily density assumptions is one possibility:

    - Use the Census data analysis by city size as a baseline for housing mix.

    - Consider establishing a "standard" multifamily density that gets scaled by city size. In studies the UO research team reviewed as part of this research, most cities are achieving densities of 15+ dwelling units per net acre.

    - Consider incentives for small cities to create exclusive multifamily zones. Many small cities allow single-family detached dwellings as an outright use in multifamily zones. While this provides flexibility in the market, having dedicated multifamily zones provides greater certainty that cities will meet identified needs for multifamily housing.

- **Employment shows dispersion patterns similar to housing by city size**. The average employment figures track pretty closely with employment densities DLCD recommends in the Goal 9 workbook. These average densities could be used as thresholds or nominal assumptions. Because industrial densities are so much different that other employment types, we recommend disaggregating by industrial and other employment consistent with the guidance in OAR 660-009.

- **Methodologies for roads and public lands should apply to all lands within city limits, not only residential lands**. Current state policy (OAR

660-024) allows cities to use a safe harbor assumption of 25% for roads, schools and parks. The research suggests that these uses do not always occur in residential areas and that a factor applied to all land might provide a more consistent and accurate approach. Due to limitations with zoning data, the UO research team was unable to analyze the amount of exempt land by zone.

- **Simplified methods that use a population or employment factor per improved acre are possible**. Tables 6-2 and 6-3 show average population and employment per improved acre by city size and region.

Table 6-2. Average population and employment per improved acre, by city size, 2012

City Size	Pop/Ac	Emp/ Comm Ac	Emp/ Ind Ac
<1,000	5.9	16.1	9.7
1,000-4,999	8.3	11.1	4.4
5,000-9,999	11.4	13.2	6.0
10,000-24,999	13.4	17.1	8.6
25,000-49,999	13.0	14.9	12.5
50,000 or more	15.7	20.2	10.5
All Classes	**12.8**	**17.2**	**8.7**

Note: Population density represents 159 cities; commercial employment 101; industrial employment 77

Table 6-3. Average population and employment per improved acre, by region, 2012

Region	Pop/Ac	Emp/Comm Ac	Emp/Ind Ac
Central Oregon	10.7	20.3	8.8
North Coastal Oregon	10.6	19.6	8.4
Northeast Oregon	10.3	13.7	6.1
South Coastal Oregon	8.9	12.1	18.9
Southeast Oregon	14.0	16.3	4.5
Southern Oregon	10.4	15.9	12.0
Willamette Valley	15.8	17.5	8.8
Total	**12.8**	**17.2**	**8.7**

Note: Population density represents 159 cities; commercial employment 101; industrial employment 77

A simplified method using population and employment per acre factors would have four steps. It would require a population forecast and an employment forecast that disaggregates employment by commercial and industrial land use. Following is an example using the factors from Tables 6-2 and 6-3:

1. City X has a population forecast that adds 10,000 persons for the 20 year period. Total residential land need is 781 acres (10,000 divided by 12.8 persons per acre)).

2. City X has an employment forecast of 5,000. Disaggregated, 3,500 employees need commercial land and 1,500 need industrial land.
    a. Commercial land need is 204 acres (3,500 divided by 17.2 employees per acre)
    b. Industrial land need is 171 acres (1,500 divided by 8.7)
3. Total land need for population and employment is 1,156 acres (781 + 204 + 171)
4. Land need for roads, schools, parks, and all other government uses is 472 acres (1,156 acres divided by 1 minus 29% from Table 3-12) equals 472 acres (1,628 minus 1,156)
5. Total land need is 1,628 acres. This equates to 9.21 persons+employees per acre (10,000 persons plus 5,000 employees equals 15,000; 15,000 divided by 1,628 equals 9.21).

In summary, the analysis presented in this report represents the most comprehensive and accurate analysis possible in the context of the objectives outlined in HB 2254. We recognize considerable variation exists among cities; that variability underscores the normative decisions that accompany this effort to simplify the need determination. To the extent the data allow, it provides the foundation to address the requirement that the method.

APPENDIX A: ORS 197A

Chapter 197A —

Comprehensive Land Use Planning II

2013 EDITION

COMPREHENSIVE LAND USE PLANNING II

MISCELLANEOUS MATTERS

Note: Definitions in 197.015 apply to ORS chapter 197A.

197A.300 Definitions for ORS 197A.300 to 197A.325. As used in ORS 197A.300 to 197A.325:

(1) "Buildable lands" means land in urban or urbanizable areas that are suitable for urban uses.

(2) "Serviceable" means, with respect to land, that:

(a) Adequate sewer, water and transportation capacity for planned urban development is available or can be either provided or made subject to committed financing; or

(b) Committed financing can be in place to provide adequate sewer, water and transportation capacity for planned urban development. [2013 c.575 §1]

Note: 197A.300 becomes operative January 1, 2016. See section 13, chapter 575, Oregon Laws 2013, as amended by section 14, chapter 575, Oregon Laws 2013.

197A.302 Purposes; rules. The purpose of ORS 197A.300 to 197A.325 is to direct the Land Conservation and Development Commission to develop and adopt simplified methods

for a city that is outside Metro to evaluate or amend the urban growth boundary of the city. The commission should design the methods to:

(1) Become, as a result of reduced costs, complexity and time, the methods that are used by most cities with growing populations to manage the urban growth boundaries of the cities;

(2) Encourage, to the extent practicable given market conditions, the development of urban areas in which individuals desire to live and work and that are increasingly efficient in terms of land uses and in terms of public facilities and services;

(3) Encourage the conservation of important farm and forest lands, particularly lands that are needed to sustain agricultural and forest products industries;

(4) Encourage cities to increase the development capacity within the urban growth boundaries of the cities;

(5) Encourage the provision of an adequate supply of serviceable land that is planned for needed urban residential and industrial development; and

(6) Assist residents in understanding the major local government decisions that are likely to determine the form of a city's growth. [2013 c.575 §2]

Note: 197A.302 becomes operative January 1, 2016. See section 13, chapter 575, Oregon Laws 2013, as amended by section 14, chapter 575, Oregon Laws 2013.

197A.305 Amendment of urban growth boundaries outside Metro; rules. (1) In addition to and not in lieu of the method prescribed in ORS 197.295 to 197.314 and the statewide land use planning goals, the Land Conservation and Development Commission shall adopt by rule methods by which a city that is outside Metro may evaluate or amend the urban growth boundary of the city.

(2) A city outside Metro may use the methods adopted pursuant to:

(a) ORS 197A.310 if the city has a population of less than 10,000.

(b) ORS 197A.312 if the city has a population of 10,000 or more.

(3) A city that elects to include land within the urban growth boundary of the city under a method established pursuant to ORS 197A.310 or 197A.312:

(a) May use the method again when:

(A) The population of the city has grown by at least 50 percent of the amount of growth forecast to occur in conjunction with the previous use of the method by the city; or

(B) At least one-half of the lands identified as buildable lands during the previous use of the method by the city have been developed.

(b) Shall evaluate whether the city needs to include within the urban growth boundary additional land for residential or employment uses before the population of the city has grown by 100 percent of the population growth forecast to occur in conjunction with the previous use of the method by the city.

(4) A city that elects to use a method established pursuant to ORS 197A.310 or 197A.312 shall notify the Department of Land Conservation and Development of the election in the manner required by ORS 197.610 for notice of a post-acknowledgment plan amendment. The city may revoke the election until the city makes a final decision whether to amend the urban growth boundary of the city. A city that has initiated, but not completed, an amendment of its urban growth boundary before January 1, 2014, may withdraw the proposed amendment and use a method established pursuant to ORS 197A.310 or 197A.312 by filing notice of the election with the department in the manner required by ORS 197.610 and 197.615 for notice of a post-acknowledgment plan amendment.

(5) Beginning on or before January 1, 2023, the commission shall:

(a) Evaluate, every five years, the impact of the implementation of ORS 197A.310 (2) and 197A.312 (2) on the population per square mile, livability in the area, the provision and cost of urban facilities and services, the rate of conversion of agriculture and forest lands and other considerations;

(b) Consider changes to the statewide land use planning goals or rules to address adverse outcomes; and

(c) Make recommendations to the Legislative Assembly, as necessary, for statutory changes. [2013 c.575 §3]

Note: 197A.305 becomes operative January 1, 2016. See section 13, chapter 575, Oregon Laws 2013, as amended by section 14, chapter 575, Oregon Laws 2013.

197A.310 Cities with population of less than 10,000; rules. (1) In addition to and not in lieu of the method prescribed in ORS 197.295 to 197.314 and the statewide land use planning goals, the Land Conservation and Development Commission shall adopt a method by which a city outside Metro that has a population of less than 10,000 may evaluate or amend its urban growth boundary.

(2) The commission shall design the method so that:

(a) A city using the method:

(A) Will have within its boundaries sufficient buildable lands and other development capacity, including land and capacity for needed housing and employment opportunities, to meet the growth in population and employment forecast to occur over a 14-year period.

(B) Will not become less efficient in its use of land as a result of a change to the urban growth boundary.

(b) The urban population per square mile will continue, subject to market conditions, to increase over time on a statewide basis and in major regions of the state, including that portion of the Willamette Valley outside of Metro.

(c) The rate of conversion of agricultural and forest lands to urban uses does not increase over time in any major region of the state.

(3) Under the method adopted by the commission:

(a) A city's determination of the amount of buildable lands needed for housing, employment and other urban uses must be based on the population and employment growth forecast to occur over a 14-year period.

(b) A city's determination of the supply and development capacity of lands within its urban growth boundary must be based on:

(A) A simple inventory of vacant and partially vacant buildable lands within the urban growth boundary;

(B) The comprehensive plan designation and the zoning of the portion of the buildable lands that is urban; and

(C) Simple factors established by the commission for forecasting:

(i) The development and redevelopment capacity of urbanizable lands within the urban growth boundary; and

(ii) The redevelopment capacity of developed urban lands within the urban growth boundary.

(c) A city's determination of the supply and development capacity of lands the city proposes to include within the urban growth boundary must be based on:

(A) A simple inventory of vacant and partially vacant lands; and

(B) Simple factors established by the commission for forecasting the development and redevelopment capacity of the lands.

(d) A city shall demonstrate that lands included within the urban growth boundary:

(A) Include sufficient serviceable land for at least a seven-year period.

(B) Can all be serviceable over a 14-year period.

(e) Lands included within the urban growth boundary:

(A) Must be planned and zoned for categories of land uses in amounts that are roughly proportional to the land need determined for each category of use;

(B) Must be planned and zoned for an intensity of use that is generally consistent with the estimates that were used to determine the amount of land needed;

(C) Must be planned and zoned to meet the requirements for needed housing, and those requirements must be specified by rule of the commission in a manner that is as objective as practicable; and

(D) May be either:

(i) Planned and zoned, or otherwise conditioned, to avoid significantly affecting a state highway, a state highway interchange or a freight route designated in the Oregon Highway Plan; or

(ii) Allowed to significantly affect a state highway, a state highway interchange or a freight route designated in the Oregon Highway Plan subject to mitigation, consistent with rules of the commission, if the lands are planned and zoned for compact urban development or industrial uses.

(4) For purposes of subsection (3)(a) of this section, population growth must be forecast as provided in ORS 195.033. Employment growth must be forecast based on the population growth forecast for the city or the employment growth forecast issued by the Employment Department for the county or region. The commission shall establish factors, by rule, for converting the forecasted population and employment growth into forecasts of land need for housing, employment and other categories of uses. The factors must:

(a) Be based on an empirical evaluation of the relation between population and employment growth and the rate and trends of land utilization in the recent past in the applicable major region of the state;

(b) Reflect consideration by the commission of any significant changes occurring or expected to occur in the markets for urban land uses in that major region of the state;

(c) Be designed to encourage an increase in the land use efficiency of a city, subject to market conditions; and

(d) Provide a range of policy choices for a city about the form of its future growth.

(5) For purposes of subsection (3)(b) of this section, the commission shall establish factors for supply and development capacity that are:

(a) Based on an empirical evaluation of the population and employment growth that has occurred on similarly situated lands through development and redevelopment;

(b) Based on consideration by the commission of any significant changes occurring or expected to occur in the markets for urban land uses in that major region of the state;

(c) Designed to encourage an increase in the land use efficiency of the city, subject to market conditions; and

(d) Designed to provide a range of policy choices for a city about the form of its future growth.

(6) For purposes of subsection (3)(c) of this section, the commission shall establish factors that are:

(a) Based on an empirical evaluation of the population and employment growth that has occurred on similarly situated lands through development and redevelopment;

(b) Based on consideration by the commission of any significant changes occurring or expected to occur in the markets for urban land uses in each major region of the state;

(c) Designed to encourage an increase in the land use efficiency of the city, subject to market conditions; and

(d) Designed to provide a range of policy choices for a city about the form of its future growth.

(7) For lands that are included within an urban growth boundary pursuant to this section and not made serviceable within 20 years after the date of their inclusion, the commission may provide by rule that:

(a) The lands must be removed from within the urban growth boundary the next time the city evaluates the urban growth boundary; or

(b) The planned development capacity of the lands must be reduced if there are significant increases in the cost of making the lands serviceable.

(8) When lands included within the urban growth boundary pursuant to this section are planned and zoned for industrial or residential uses, the lands must remain planned and zoned for the use unless a rule of the commission allows a change in planning and zoning based on a significant change in circumstance. [2013 c.575 §4; 2013 c.575 §9]

Note: 197A.310 becomes operative January 1, 2016. See section 13, chapter 575, Oregon Laws 2013, as amended by section 14, chapter 575, Oregon Laws 2013.

197A.312 Cities with population of 10,000 or more; rules. (1) In addition to and not in lieu of the method prescribed in ORS 197.295 to 197.314 and the statewide land use planning goals, the Land Conservation and Development Commission shall adopt a method by which a city outside Metro that has a population of 10,000 or more may evaluate or amend its urban growth boundary.

(2) The commission shall design the method so that:

(a) A city using the method:

(A) Will have within its boundaries sufficient buildable lands and other development capacity, including land and capacity for needed housing and employment opportunities, to meet the growth in population and employment forecast to occur over a 14-year period.

(B) Will not become less efficient in its use of land as a result of a change to the urban growth boundary.

(b) The urban population per square mile will continue to increase over time on a statewide basis and in major regions of the state, including that portion of the Willamette Valley outside of Metro.

(c) The rate of conversion of agricultural and forest lands to urban uses does not increase over time in any major region of the state.

(3) Under the method adopted by the commission:

(a) A city's determination of the amount of buildable lands needed for housing, employment and other urban uses must be based on the population and employment growth forecast to occur over a 14-year period.

(b) A city's determination of the supply and development capacity of lands within its urban growth boundary must be based on:

(A) An inventory of vacant and partially vacant buildable lands within the urban growth boundary;

(B) The comprehensive plan designation and the zoning of the portion of the buildable lands that is urban; and

(C) Factors established by the commission for forecasting:

(i) The development and redevelopment capacity of urbanizable lands within the urban growth boundary; and

(ii) The redevelopment capacity of developed urban lands within the urban growth boundary.

(c) A city shall consider a range or combination of measures identified by rule of the commission to accommodate future need for land within the urban growth boundary and implement at least one measure or satisfy an alternate performance standard established by the commission. The commission shall design the alternate performance standard so that the standard is satisfied when the city:

(A) Has a development code that contains specified provisions designed to encourage the development of needed housing; and

(B) Demonstrates that, during the preceding planning period, the city:

(i) If located in the Willamette Valley, exceeded the median rate of redevelopment and infill for cities with a population of 10,000 or more in the Willamette Valley that are outside of the boundaries of Metro by an amount set by commission rule; and

(ii) If located outside of the Willamette Valley, exceeded the median rate of redevelopment and infill for cities with a population of 10,000 or more that are outside the Willamette Valley by an amount set by commission rule.

(d) A city shall demonstrate that lands included within the urban growth boundary:

(A) Include sufficient serviceable land for at least a seven-year period.

(B) Can all be serviceable over a 14-year period.

(e) Lands included within the urban growth boundary:

(A) Must be planned and zoned for categories of land uses in amounts that are roughly proportional to the land need determined for each category of use;

(B) Must be planned and zoned for an intensity of use that is generally consistent with the estimates that were used to determine the amount of land needed;

(C) Must be planned and zoned to meet the requirements for needed housing, and those requirements must be specified by rule of the commission in a manner that is as objective as practicable; and

(D) May be either:

(i) Planned and zoned, or otherwise conditioned, to avoid significantly affecting a state highway, a state highway interchange or a freight route designated in the Oregon Highway Plan; or

(ii) Allowed to significantly affect a state highway, a state highway interchange or a freight route designated in the Oregon Highway Plan subject to mitigation, consistent with rules of the commission, if the lands are planned and zoned for compact urban development or industrial uses.

(4) For purposes of subsection (3)(a) of this section, population growth must be forecast as provided in ORS 195.033. Employment growth must be forecast based on the population growth forecast for the city or the employment growth forecast issued by the Employment Department for the county or region. The commission shall establish factors, by rule, for converting the forecasted population and employment growth into forecasts of land need for housing, employment and other categories of uses. The factors must:

(a) Be based on an empirical evaluation of the relation between population and employment growth and the rate and trends of land utilization in the recent past in the applicable major region of the state;

(b) Reflect consideration by the commission of any significant changes occurring or expected to occur in the markets for urban land uses in that major region of the state;

(c) Be designed to encourage an increase in the land use efficiency of a city, subject to market conditions; and

(d) Provide a range of policy choices for a city about the form of its future growth.

(5) For purposes of subsection (3)(b) of this section, the commission shall establish factors for supply and development capacity that are:

(a) Based on an empirical evaluation of the population and employment growth that has occurred on similarly situated lands through development and redevelopment;

(b) Based on consideration by the commission of any significant changes occurring or expected to occur in the markets for urban land uses in that major region of the state;

(c) Designed to encourage an increase in the land use efficiency of the city, subject to market conditions; and

(d) Designed to provide a range of policy choices for a city about the form of its future growth.

(6) For purposes of subsection (3)(c) of this section, the commission shall establish factors that are:

(a) Based on an empirical evaluation of the population and employment growth that has occurred on similarly situated lands through development and redevelopment;

(b) Based on consideration by the commission of any significant changes occurring or expected to occur in the markets for urban land uses in each major region of the state;

(c) Designed to encourage an increase in the land use efficiency of the city, subject to market conditions; and

(d) Designed to provide a range of policy choices for a city about the form of its future growth.

(7) For lands that are included within an urban growth boundary pursuant to this section and not made serviceable within 20 years after the date of their inclusion, the commission may provide by rule that:

(a) The lands must be removed from within the urban growth boundary the next time the city evaluates the urban growth boundary; or

(b) The planned development capacity of the lands must be reduced if there are significant increases in the cost of making the lands serviceable.

(8) When lands included within the urban growth boundary pursuant to this section are planned and zoned for industrial or residential uses, the lands must remain planned and zoned for the use unless a rule of the commission allows a change in planning and zoning based on a significant change in circumstance. [2013 c.575 §5; 2013 c.575 §10]

Note: 197A.312 becomes operative January 1, 2016. See section 13, chapter 575, Oregon Laws 2013, as amended by section 14, chapter 575, Oregon Laws 2013.

197A.315 Expansion study areas; notice; urban services agreements. (1) As used in this section, "district" means:

(a) A domestic water supply district organized under ORS chapter 264.

(b) A parks and recreation district organized under ORS chapter 266.

(c) A sanitary district organized under ORS 450.005 to 450.245.

(d) A rural fire protection district organized under ORS chapter 478.

(2) When a city evaluates or amends the urban growth boundary of the city under ORS 197A.312, the city shall notify:

(a) Each district that has territory within the study area established under ORS 197A.320.

(b) Each county that has land use jurisdiction over any portion of the study area.

(3) The notification must:

(a) Include a map showing the study area; and

(b) State that, in order to execute or amend an urban services agreement concerning the study area, the district shall respond to the notice within 60 days of the date the notice is mailed if the district enters into or amends an urban services agreement concerning the study area.

(4) An urban services agreement executed under this section must satisfy the requirements of ORS 195.065 (1)(a) to (f). When a city and a district execute an urban services agreement pursuant to this section, the city and the district are not required to participate in the negotiation of an urban service agreement under ORS 195.065 to 195.085.

(5) Before executing the urban service agreement, the city and the district shall consult with community planning organizations that are recognized by the governing body of the city and whose boundaries include territory in the study area that may be affected by the urban service agreement.

(6) If the special district chooses not to negotiate an urban service agreement or does not respond to the notice within 60 days, the city may withdraw from the service territory of the district any portion of the study area that is included within the urban growth boundary of the city and annexed to the city.

(7) If the district responds in writing to the notice within 60 days and requests to execute an urban service agreement for the study area with the city, the city and the district shall meet to develop the agreement within 60 days after the district responds.

(8) If the city and district are unable to develop the agreement within 180 days after the date of the first meeting, the city or the district may require mediation. If mediation is required, the city and the district shall each designate an individual to work with the city and the district to develop an agreement. The city and the district are each responsible for the costs of the mediator it selects.

(9) If the city and the district are unable to develop the agreement after an additional 180 days, the city or the district may require arbitration. The mediators selected under subsection (8) of this section shall jointly select a third individual, and the three individuals shall constitute an arbitration panel to develop the urban services agreement. If the mediators are unable to agree on the third individual, the Director of the Department of Land Conservation and Development shall select an individual from a list of qualified arbitrators provided by the Land Conservation and Development Commission. The city and the district shall bear the cost of the third individual equally. The arbitration panel:

(a) Shall consider the provisions of ORS 222.460, 222.465, 222.510 to 222.570, 222.575 and 222.580; and

(b) May not:

(A) Require the city or the district to pay the other party as part of the urban services agreement unless:

(i) The urban services agreement requires a transfer of physical assets, in which case the agreement may require the payment of fair market value for the assets; or

(ii) A party has offered a payment as part of prior negotiations and the arbitrators incorporate all or a portion of the negotiated payment in the agreement;

(B) Prevent a city from including land within the urban growth boundary of the city; or

(C) Prohibit a city from annexing territory that is within the urban growth boundary of the city.

(10) A city may not withdraw territory from the service territory of a district:

(a) Unless the district does not respond to the notice required by subsection (2) of this section; or

(b) Until the city and the district develop an urban services agreement under this section.

(11) Decisions related to the execution of an urban service agreement under this section are not land use decisions subject to the jurisdiction of the Land Use Board of Appeals. [2013 c.575 §6]

Note: 197A.315 becomes operative January 1, 2016. See section 13, chapter 575, Oregon Laws 2013, as amended by section 14, chapter 575, Oregon Laws 2013.

197A.320 Priority of land to be included within urban growth boundaries outside Metro; rules. (1) Notwithstanding the priority in ORS 197.298 for inclusion of land within an urban growth boundary, a city outside of Metro shall comply with this section when determining which lands to include within the urban growth boundary of the city pursuant to ORS 197.295 to 197.314, 197A.310 or 197A.312.

(2) The Land Conservation and Development Commission shall provide, by rule, that:

(a) When evaluating lands for inclusion within the urban growth boundary, the city shall establish a study area that includes all land that is contiguous to the urban growth boundary and within a distance specified by commission.

(b) The city shall evaluate all land in the study area for inclusion in the urban growth boundary as provided in subsection (4) of this section, except for land excluded from the study area because:

(A) It is impracticable, as provided in subsection (3) of this section, to provide necessary public facilities or services to the land.

(B) The land is subject to significant development hazards, including a risk of land slides, a risk of flooding because the land is within the 100-year floodplain or is subject to inundation during storm surges or tsunamis, and other risks determined by the commission.

(C) The long-term preservation of significant scenic, natural, cultural or recreational resources requires limiting or prohibiting urban development of the land that contains the resources.

(D) The land is owned by the federal government and managed primarily for rural uses.

(c) When evaluating the priority of land for inclusion under paragraph (b) of this subsection:

(A) The city shall evaluate the land within the study area that is designated as an urban reserve under ORS 195.145 in an acknowledged comprehensive plan, land that is subject to an acknowledged exception under ORS 197.732 or land that is nonresource land and select as much of the land as necessary to satisfy the need for land using criteria established by the commission and criteria in an acknowledged comprehensive plan and land use regulations.

(B) If the amount of land appropriate for selection under subparagraph (A) of this paragraph is not sufficient to satisfy the need for land, the city shall evaluate the land within the study area that is designated as marginal land under ORS 197.247 (1991 Edition) in the acknowledged comprehensive plan and select as much of the land as necessary to satisfy the need for land using criteria established by the commission and criteria in an acknowledged comprehensive plan and land use regulations.

(C) If the amount of land appropriate for selection under subparagraphs (A) and (B) of this paragraph is not sufficient to satisfy the amount of land needed, the city shall evaluate

land within the study area that is designated for agriculture or forest uses in the acknowledged comprehensive plan that is not predominantly high-value farmland, as defined in ORS 195.300, or does not consist predominantly of prime or unique soils, as determined by the United States Department of Agriculture Natural Resources Conservation Service, and select as much of that land as necessary to satisfy the need for land:

(i) Using criteria established by the commission and criteria in an acknowledged comprehensive plan and land use regulations; and

(ii) Using the predominant capability classification system or the predominant cubic site class, as appropriate for the acknowledged comprehensive plan designation, to select lower capability or cubic site class lands first.

(D) If the amount of land appropriate for selection under subparagraphs (A) to (C) of this paragraph is not sufficient to satisfy the need for land, the city shall evaluate land within the study area that is designated as agricultural land in an acknowledged comprehensive plan and is predominantly high value farmland and select as much of that land as necessary to satisfy the need for land. A local government may not select land that is predominantly made up of prime or unique farm soils, as defined by the United States Department of Agriculture Natural Resources Conservation Service, unless there is an insufficient amount of other land to satisfy its land need.

(3) For purposes of subsection (2)(b)(A) of this section, the commission shall determine impracticability by rule, considering the likely amount of development that could occur on the lands within the planning period, the likely cost of facilities and services, physical, topographical or other impediments to service provision and whether urban development has occurred on similarly situated lands such that it is likely that the lands will be developed at an urban level during the planning period. When impracticability is primarily a result of existing development patterns, the rules of the commission shall require that the lands be included within the study area, but may allow the development capacity forecast for the lands to be specified at a lower level over the planning period. The rules of the commission must be based on an evaluation of how similarly situated lands have, or have not, developed over time.

(4) For purposes of subsection (2)(b)(C) of this section, the commission by rule shall determine the circumstances in which and the resources to which this exclusion will apply.

(5) Notwithstanding subsection (2)(c)(D) of this section, the rules must allow land that would otherwise be excluded from an urban growth boundary to be included if:

(a) The land contains a small amount of resource land that is not important to the commercial agricultural enterprise in the area and the land must be included to connect a nearby and significantly larger area of land of higher priority for inclusion within the urban growth boundary; or

(b) The land contains a small amount of resource land that is not predominantly high-value farmland or predominantly made up of prime or unique farm soils and the land is completely surrounded by land of higher priority for inclusion into the urban growth boundary.

(6) When the primary purpose for expansion of the urban growth boundary is to accommodate a particular industry use that requires specific site characteristics, or to accommodate a public facility that requires specific site characteristics and the site characteristics may be found in only a small number of locations, the city may limit the study area to land that has, or could be improved to provide, the required site characteristics. Lands included within an urban growth boundary for a particular industrial use, or a particular public facility, must remain planned and zoned for the intended use:

(a) Except as allowed by rule of the commission that is based on a significant change in circumstance or the passage of time; or

(b) Unless the city removes the land from within the urban growth boundary.

(7) Notwithstanding any other provision of this section, the commission may adopt rules that specify circumstances under which a city may exchange land within the urban growth boundary of the city for land that is outside of the urban growth boundary and that is designed to avoid adverse effects of an exchange on agricultural or forest operations in the surrounding area. [2013 c.575 §7]

Note: 197A.320 becomes operative January 1, 2016. See section 13, chapter 575, Oregon Laws 2013, as amended by section 14, chapter 575, Oregon Laws 2013.

197A.325 Review of final decision of city; rules. (1) Notwithstanding ORS 197.626, when a city evaluates or amends the urban growth boundary of the city pursuant to ORS 197A.310 or 197A.312, the Land Use Board of Appeals has jurisdiction for review of a final decision of the city.

(2) The board shall review the final decision of the city under ORS 197A.300 to 197A.325 as provided in ORS 197.805 to 197.855, except that:

(a) In circumstances in which the Land Conservation and Development Commission has specified by rule a number or a range of numbers that the city may use:

(A) The city is not required to adopt findings to support the use of the number or a number within the range of numbers; and

(B) The board's review of the number may determine only that the city has used a number that is allowed by the rule.

(b) The board shall affirm an interpretation by a local government of its comprehensive plan or land use regulations unless that interpretation is clearly erroneous.

(3) Notwithstanding ORS 197.628 and 197.629, when a city evaluates or amends the urban growth boundary of the city pursuant to ORS 197A.310 or 197A.312, the city is not required to commence or complete periodic review. The commission shall, by rule, specify alternate means to ensure that the comprehensive plan and land use regulations of the city comply with the statewide land use planning goals and are updated over time to reflect changing conditions and needs. [2013 c.575 §8]

Note: 197A.325 becomes operative January 1, 2016. See section 13, chapter 575, Oregon Laws 2013, as amended by section 14, chapter 575, Oregon Laws 2013.

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APPENDIX B: LIST OF CITIES BY TIER

Table B-1: List of Cities by Tier

Tier 1 excludes counties where cities are small & not growing; Tier 2 excludes counties where cities are small & not growing and counties omitted from ORMAP; Tier 3 excludes counties where cities are small & not growing & counties for which we lack quality or accessible data; cities lacking single family residential parcels are also excluded. Note: 1=Yes

City	Split by County	County	Region	Population Class	2012 Population <5,000 and Avg. Annual Growth <1%, 1993-2012	Tier 1	Tier 2	Tier 3
Baker City		Baker County	Northeast Oregon	3	0	1	1	1
Greenhorn		Baker County	Northeast Oregon	1	1	0	0	0
Haines		Baker County	Northeast Oregon	1	1	0	0	0
Halfway		Baker County	Northeast Oregon	1	1	0	0	0
Huntington		Baker County	Northeast Oregon	1	1	0	0	0
Richland		Baker County	Northeast Oregon	1	1	0	0	0
Sumpter		Baker County	Northeast Oregon	1	0	1	1	1
Unity		Baker County	Northeast Oregon	1	1	0	0	0
Adair Village		Benton County	Willamette Valley	1	0	1	1	1
Corvallis		Benton County	Willamette Valley	6	0	1	1	1
Monroe		Benton County	Willamette Valley	1	0	1	1	1
Philomath		Benton County	Willamette Valley	2	0	1	1	1
Albany	1	Benton & Linn County	Willamette Valley	6	0	1	1	1
Barlow		Clackamas County	Willamette Valley	1	1	0	0	0
Canby		Clackamas County	Willamette Valley	4	0	1	1	1
Estacada		Clackamas County	Willamette Valley	2	0	1	1	1
Molalla		Clackamas County	Willamette Valley	3	0	1	1	1
Sandy		Clackamas County	Willamette Valley	3	0	1	1	1

City	Split by County	County	Region	Population Class	2012 Population <5,000 and Avg. Annual Growth <1%, 1993-2012	Tier 1	Tier 2	Tier 3
Astoria		Clatsop County	North Coastal Oregon	3	0	1	1	1
Cannon Beach		Clatsop County	North Coastal Oregon	2	0	1	1	1
Gearhart		Clatsop County	North Coastal Oregon	2	0	1	1	1
Seaside		Clatsop County	North Coastal Oregon	3	0	1	1	1
Warrenton		Clatsop County	North Coastal Oregon	3	0	1	1	1
Clatskanie		Columbia County	Willamette Valley	2	1	0	0	0
Columbia City		Columbia County	Willamette Valley	2	0	1	1	1
Prescott		Columbia County	Willamette Valley	1	1	0	0	0
Rainier		Columbia County	Willamette Valley	2	1	0	0	0
Scappoose		Columbia County	Willamette Valley	3	0	1	1	1
St Helens		Columbia County	Willamette Valley	4	0	1	1	1
Vernonia		Columbia County	Willamette Valley	2	1	0	0	0
Bandon		Coos County	South Coastal Oregon	2	0	1	1	1
Coos Bay		Coos County	South Coastal Oregon	4	0	1	1	1
Coquille		Coos County	South Coastal Oregon	2	1	0	0	0
Lakeside		Coos County	South Coastal Oregon	2	1	0	0	0
Myrtle Point		Coos County	South Coastal Oregon	2	1	0	0	0
North Bend		Coos County	South Coastal Oregon	3	0	1	1	1
Powers		Coos County	South Coastal Oregon	1	1	0	0	0
Prineville		Crook County	Central Oregon	3	0	1	1	1
Brookings		Curry County	South Coastal Oregon	3	0	1	1	1
Gold Beach		Curry County	South Coastal Oregon	2	0	1	1	1

City	Split by County	County	Region	Population Class	2012 Population <5,000 and Avg. Annual Growth <1%, 1993-2012	Tier 1	Tier 2	Tier 3
Port Orford		Curry County	South Coastal Oregon	2	1	0	0	0
Bend		Deschutes County	Central Oregon	6	0	1	1	1
Redmond		Deschutes County	Central Oregon	5	0	1	1	1
Sisters		Deschutes County	Central Oregon	2	0	1	1	1
Canyonville		Douglas County	Southern Oregon	2	0	1	1	1
Drain		Douglas County	Southern Oregon	2	1	0	0	0
Elkton		Douglas County	Southern Oregon	1	0	1	1	1
Glendale		Douglas County	Southern Oregon	1	0	1	1	1
Myrtle Creek		Douglas County	Southern Oregon	2	1	0	0	0
Oakland		Douglas County	Southern Oregon	1	1	0	0	0
Reedsport		Douglas County	South Coastal Oregon	2	1	0	0	0
Riddle		Douglas County	Southern Oregon	2	1	0	0	0
Roseburg		Douglas County	Southern Oregon	4	0	1	1	1
Sutherlin		Douglas County	Southern Oregon	3	0	1	1	1
Winston		Douglas County	Southern Oregon	3	0	1	1	1
Yoncalla		Douglas County	Southern Oregon	2	0	1	1	1
Arlington		Gilliam County	Northeast Oregon	1	0	0	0	0
Condon		Gilliam County	Northeast Oregon	1	1	0	0	0
Lone Rock		Gilliam County	Northeast Oregon	1	0	0	0	0
Canyon City		Grant County	Northeast Oregon	1	1	0	0	0
Dayville		Grant County	Northeast Oregon	1	1	0	0	0
Granite		Grant County	Northeast Oregon	1	0	0	0	0

City	Split by County	County	Region	Population Class	2012 Population <5,000 and Avg. Annual Growth <1%, 1993-2012	Tier 1	Tier 2	Tier 3
John Day		Grant County	Northeast Oregon	2	1	0	0	0
Long Creek		Grant County	Northeast Oregon	1	1	0	0	0
Monument		Grant County	Northeast Oregon	1	1	0	0	0
Mt Vernon		Grant County	Northeast Oregon	1	1	0	0	0
Prairie City		Grant County	Northeast Oregon	1	1	0	0	0
Seneca		Grant County	Northeast Oregon	1	1	0	0	0
Burns		Harney County	Southeast Oregon	2	1	0	0	0
Hines		Harney County	Southeast Oregon	2	1	0	0	0
Cascade Locks		Hood River County	Central Oregon	2	1	0	0	0
Hood River		Hood River County	Central Oregon	3	0	1	1	1
Ashland		Jackson County	Southern Oregon	4	0	1	1	1
Butte Falls		Jackson County	Southern Oregon	1	1	0	0	0
Central Point		Jackson County	Southern Oregon	4	0	1	1	1
Eagle Point		Jackson County	Southern Oregon	3	0	1	1	1
Gold Hill		Jackson County	Southern Oregon	2	1	0	0	0
Jacksonville		Jackson County	Southern Oregon	2	0	1	1	1
Medford		Jackson County	Southern Oregon	6	0	1	1	1
Phoenix		Jackson County	Southern Oregon	2	0	1	1	1
Rogue River		Jackson County	Southern Oregon	2	1	0	0	0
Shady Cove		Jackson County	Southern Oregon	2	0	1	1	1
Talent		Jackson County	Southern Oregon	3	0	1	1	1
Culver		Jefferson County	Central Oregon	2	0	1	1	0

City	Split by County	County	Region	Population Class	2012 Population <5,000 and Avg. Annual Growth <1%, 1993-2012	Tier 1	Tier 2	Tier 3
Madras		Jefferson County	Central Oregon	3	0	1	1	0
Metolius		Jefferson County	Central Oregon	1	0	1	1	0
Cave Junction		Josephine County	Southern Oregon	2	0	1	1	1
Grants Pass		Josephine County	Southern Oregon	5	0	1	1	1
Bonanza		Klamath County	Southeast Oregon	1	0	1	1	1
Chiloquin		Klamath County	Southeast Oregon	1	1	0	0	0
Klamath Falls		Klamath County	Southeast Oregon	4	0	1	1	1
Malin		Klamath County	Southeast Oregon	1	1	0	0	0
Merrill		Klamath County	Southeast Oregon	1	1	0	0	0
Lakeview		Lake County	Southeast Oregon	2	1	0	0	0
Paisley		Lake County	Southeast Oregon	1	1	0	0	0
Coburg		Lane County	Willamette Valley	2	0	1	1	1
Cottage Grove		Lane County	Willamette Valley	3	0	1	1	1
Creswell		Lane County	Willamette Valley	2	0	1	1	1
Dunes City		Lane County	South Coastal Oregon	2	1	0	0	0
Eugene		Lane County	Willamette Valley	6	0	1	1	1
Florence		Lane County	South Coastal Oregon	3	0	1	1	1
Junction City		Lane County	Willamette Valley	3	0	1	1	1
Lowell		Lane County	Willamette Valley	2	0	1	1	1
Oakridge		Lane County	Willamette Valley	2	1	0	0	0
Springfield		Lane County	Willamette Valley	6	0	1	1	1
Veneta		Lane County	Willamette Valley	2	0	1	1	1

City	Split by County	County	Region	Population Class	2012 Population <5,000 and Avg. Annual Growth <1%, 1993-2012	Tier 1	Tier 2	Tier 3
Westfir		Lane County	Willamette Valley	1	1	0	0	0
Depoe Bay		Lincoln County	North Coastal Oregon	2	0	1	1	1
Lincoln City		Lincoln County	North Coastal Oregon	3	0	1	1	1
Newport		Lincoln County	North Coastal Oregon	4	0	1	1	1
Siletz		Lincoln County	North Coastal Oregon	2	1	0	0	0
Toledo		Lincoln County	North Coastal Oregon	2	1	0	0	0
Waldport		Lincoln County	North Coastal Oregon	2	0	1	1	1
Yachats		Lincoln County	North Coastal Oregon	1	0	1	1	1
Gates	1	Linn & Marion County	Willamette Valley	1	1	0	0	0
Brownsville		Linn County	Willamette Valley	2	0	1	1	1
Halsey		Linn County	Willamette Valley	1	0	1	1	1
Harrisburg		Linn County	Willamette Valley	2	0	1	1	1
Lebanon		Linn County	Willamette Valley	4	0	1	1	1
Lyons		Linn County	Willamette Valley	2	0	1	1	1
Millersburg		Linn County	Willamette Valley	2	0	1	1	1
Scio		Linn County	Willamette Valley	1	0	1	1	1
Sodaville		Linn County	Willamette Valley	1	0	1	1	1
Sweet Home		Linn County	Willamette Valley	3	0	1	1	1
Tangent		Linn County	Willamette Valley	2	0	1	1	1
Waterloo		Linn County	Willamette Valley	1	0	1	1	1
Idanha	1	Linn& Marion County	Willamette Valley	1	1	0	0	0

City	Split by County	County	Region	Population Class	2012 Population <5,000 and Avg. Annual Growth <1%, 1993-2012	Tier 1	Tier 2	Tier 3
Mill City	1	Linn& Marion County	Willamette Valley	2	1	0	0	0
Adrian		Malheur County	Southeast Oregon	1	0	1	1	1
Jordan Valley		Malheur County	Southeast Oregon	1	1	0	0	0
Nyssa		Malheur County	Southeast Oregon	2	0	1	1	1
Ontario		Malheur County	Southeast Oregon	4	0	1	1	1
Vale		Malheur County	Southeast Oregon	2	0	1	1	1
Aumsville		Marion County	Willamette Valley	2	0	1	1	1
Aurora		Marion County	Willamette Valley	1	0	1	1	1
Detroit		Marion County	Willamette Valley	1	1	0	0	0
Donald		Marion County	Willamette Valley	1	0	1	1	1
Gervais		Marion County	Willamette Valley	1	0	1	1	1
Hubbard		Marion County	Willamette Valley	2	0	1	1	1
Jefferson		Marion County	Willamette Valley	2	0	1	1	1
Keizer		Marion County	Willamette Valley	5	0	1	1	1
Mt Angel		Marion County	Willamette Valley	2	1	0	0	0
Scotts Mills		Marion County	Willamette Valley	1	0	1	1	1
Silverton		Marion County	Willamette Valley	3	0	1	1	1
St Paul		Marion County	Willamette Valley	1	0	1	1	1
Stayton		Marion County	Willamette Valley	3	0	1	1	1
Sublimity		Marion County	Willamette Valley	2	0	1	1	1
Turner		Marion County	Willamette Valley	2	0	1	1	1
Woodburn		Marion County	Willamette Valley	4	0	1	1	1

City	Split by County	County	Region	Population Class	2012 Population <5,000 and Avg. Annual Growth <1%, 1993-2012	Tier 1	Tier 2	Tier 3
Salem	1	Marion& Polk County	Willamette Valley	6	0	1	1	1
Boardman		Morrow County	Northeast Oregon	2	0	1	0	0
Heppner		Morrow County	Northeast Oregon	2	1	0	0	0
Ione		Morrow County	Northeast Oregon	1	0	1	0	0
Irrigon		Morrow County	Northeast Oregon	2	0	1	0	0
Lexington		Morrow County	Northeast Oregon	1	1	0	0	0
Willamina	1	Polk &Yamhill County	Willamette Valley	1	1	0	0	0
Dallas		Polk County	Willamette Valley	4	0	1	1	1
Falls City		Polk County	Willamette Valley	1	1	0	0	0
Independence		Polk County	Willamette Valley	3	0	1	1	1
Monmouth		Polk County	Willamette Valley	3	0	1	1	1
Grass Valley		Sherman County	Northeast Oregon	1	1	0	0	0
Moro		Sherman County	Northeast Oregon	1	1	0	0	0
Rufus		Sherman County	Northeast Oregon	1	1	0	0	0
Wasco		Sherman County	Northeast Oregon	1	1	0	0	0
Bay City		Tillamook County	North Coastal Oregon	2	0	1	1	1
Garibaldi		Tillamook County	North Coastal Oregon	1	1	0	0	0
Manzanita		Tillamook County	North Coastal Oregon	1	1	0	0	0
Nehalem		Tillamook County	North Coastal Oregon	1	1	0	0	0
Rockaway Beach		Tillamook County	North Coastal Oregon	2	0	1	1	0
Tillamook		Tillamook County	North Coastal Oregon	2	1	1	1	1
Wheeler		Tillamook County	North Coastal Oregon	1	0	1	1	0

City	Split by County	County	Region	Population Class	2012 Population <5,000 and Avg. Annual Growth <1%, 1993-2012	Tier 1	Tier 2	Tier 3
Adams		Umatilla County	Northeast Oregon	1	0	1	1	1
Athena		Umatilla County	Northeast Oregon	2	1	0	0	0
Echo		Umatilla County	Northeast Oregon	1	0	1	1	1
Helix		Umatilla County	Northeast Oregon	1	0	1	1	1
Hermiston		Umatilla County	Northeast Oregon	4	0	1	1	1
Milton-Freewater		Umatilla County	Northeast Oregon	3	0	1	1	1
Pendleton		Umatilla County	Northeast Oregon	4	0	1	1	1
Pilot Rock		Umatilla County	Northeast Oregon	2	1	0	0	0
Stanfield		Umatilla County	Northeast Oregon	2	0	1	1	1
Ukiah		Umatilla County	Northeast Oregon	1	1	0	0	0
Umatilla		Umatilla County	Northeast Oregon	3	0	1	1	1
Weston		Umatilla County	Northeast Oregon	1	1	0	0	0
Cove		Union County	Northeast Oregon	1	1	0	0	0
Elgin		Union County	Northeast Oregon	2	1	0	0	0
Imbler		Union County	Northeast Oregon	1	1	0	0	0
Island City		Union County	Northeast Oregon	2	0	1	1	1
La Grande		Union County	Northeast Oregon	4	0	1	1	1
North Powder		Union County	Northeast Oregon	1	1	0	0	0
Summerville		Union County	Northeast Oregon	1	1	0	0	0
Union		Union County	Northeast Oregon	2	1	0	0	0
Enterprise		Wallowa County	Northeast Oregon	2	1	0	0	0
Joseph		Wallowa County	Northeast Oregon	2	1	0	0	0

City	Split by County	County	Region	Population Class	2012 Population <5,000 and Avg. Annual Growth <1%, 1993-2012	Tier 1	Tier 2	Tier 3
Lostine		Wallowa County	Northeast Oregon	1	1	0	0	0
Wallowa		Wallowa County	Northeast Oregon	1	1	0	0	0
Antelope		Wasco County	Central Oregon	1	0	1	1	1
Dufur		Wasco County	Central Oregon	1	1	0	0	0
Maupin		Wasco County	Central Oregon	1	1	0	0	0
Mosier		Wasco County	Central Oregon	1	0	1	1	1
Shaniko		Wasco County	Central Oregon	1	0	1	1	1
The Dalles		Wasco County	Central Oregon	4	0	1	1	1
Banks		Washington County	Willamette Valley	2	0	1	1	1
Gaston		Washington County	Willamette Valley	1	1	0	0	0
North Plains		Washington County	Willamette Valley	2	0	1	1	1
Fossil		Wheeler County	Northeast Oregon	1	1	0	0	0
Mitchell		Wheeler County	Northeast Oregon	1	1	0	0	0
Spray		Wheeler County	Northeast Oregon	1	1	0	0	0
Amity		Yamhill County	Willamette Valley	2	0	1	1	1
Carlton		Yamhill County	Willamette Valley	2	0	1	1	1
Dayton		Yamhill County	Willamette Valley	2	0	1	1	1
Dundee		Yamhill County	Willamette Valley	2	0	1	1	1
Lafayette		Yamhill County	Willamette Valley	2	0	1	1	1
McMinnville		Yamhill County	Willamette Valley	5	0	1	1	1
Newberg		Yamhill County	Willamette Valley	4	0	1	1	1
Sheridan		Yamhill County	Willamette Valley	3	0	1	1	1

City	Split by County	County	Region	Population Class	2012 Population <5,000 and Avg. Annual Growth <1%, 1993-2012	Tier 1	Tier 2	Tier 3
Yamhill		Yamhill County	Willamette Valley	2	0	1	1	1
Totals (out of 216 cities)					84	130	127	122

APPENDIX C: EFFECT OF CONSTRAINTS ON RESIDENTIAL DENSITY

A question posed by the Rulemaking Advisory Committee was whether physical constraints have measureable effects on housing density. This appendix presents analysis of constraints for 120 cities where data were available to analyze constraints. For this analysis, the research team coded lands with single-family and plex dwellings into three categories:

1. Unconstrained – no constraints are present
2. Partially constrained – between 0.0001% and 99.9999% of the taxlot has a constraint
3. Fully constrained – the taxlot is 100% within a constrained area

To conduct the analysis the research team lumped all constraints together. It includes land in water or floodways (prohibitive constraints) and land in 100-year floodplains, slopes over 25%, or wetlands as documented in the National Wetlands Inventory.

Table C-1 shows average single-family and plex densities by city size for 120 study cities by constraint status. The results show a lot of variation by city size and constraint status (see percent of unconstrained density columns). Partially constrained densities are all less than unconstrained densities and show less variation than fully constrained taxlots. Densities in partially constrained taxlots averaged 82% of unconstrained densities.

Table C-1. Average improved single-family and plex density for taxlots <0.5 acres by city size and constraint status, Tier 3 cities, 2012

		Improved Single Family & Plex Single Family Parcels/Acres				Percent of Unconstrained Density		
City Size	Number of Cities	Fully Constrained	Partially Constrained	Unconstrained	All Parcels	Fully Constrained	Partially Constrained	All Parcels
<1,000	20	4.15	3.92	4.79	4.58	87%	82%	96%
1,000-4,999	45	6.30	4.21	5.22	5.10	121%	81%	98%
5,000-9,999	27	6.58	4.84	5.52	5.44	119%	88%	99%
10,000-24,999	17	4.73	4.32	5.64	5.45	84%	77%	97%
25,000-49,999	4	5.65	4.22	5.17	5.08	109%	82%	98%
50,000 or more	7	6.19	4.34	5.37	5.26	115%	81%	98%
Total	**120**	**5.98**	**4.41**	**5.41**	**5.29**	**111%**	**82%**	**98%**

Analysis by constraint status shows that the average density of improved taxlots per acre for fully constrained land is higher than that of unconstrained land (with the exception of cities in the Northeast and Southern Oregon). Partially constrained taxlots generally had lower taxlot per acre densities than unconstrained taxlots.

Tables C-2 shows average single-family and plex densities by city size for 120 study cities by region and constraint status. Similar to the analysis by city size, the

densities show a lot of variation by region and constraint status (see percent of unconstrained density columns). Partially constrained densities are all less than unconstrained densities and show less variation than fully constrained taxlots. Densities in partially constrained taxlots averaged 82% of unconstrained densities, while aggregate density averages 98% of unconstrained densities, meaning that constraints do not significantly impact average densities.

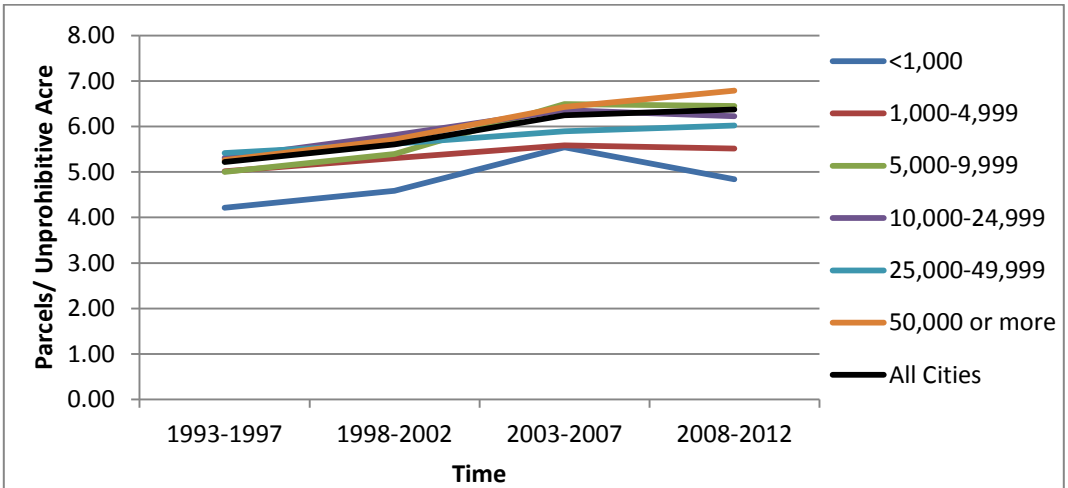
Table C-2. Lots, acres, and parcels/acre by constraint status for improved single-family and plex taxlots for taxlots <0.5 acres, by region constraint case study cities, 2012

		Improved Single Family & Plex Single Family Parcels/Acres				Percent of Unconstrained Density		
City Size	Number of Cities	Fully Constrained	Partially Constrained	Unconstrained	All Parcels	Fully Constrained	Partially Constrained	All Parcels
Central Oregon	9	6.59	4.08	5.19	5.08	127%	79%	98%
North Coastal Oregon	12	8.52	5.19	7.33	6.52	116%	71%	89%
Northeast Oregon	12	4.31	4.38	5.29	5.17	81%	83%	98%
South Coastal Oregon	6	6.00	4.08	5.45	5.21	110%	75%	96%
Southeast Oregon	6	6.26	4.56	5.34	5.27	117%	85%	99%
Southern Oregon	17	4.98	3.92	5.19	5.02	96%	76%	97%
Willamette Valley	58	5.89	4.42	5.42	5.32	109%	81%	98%
All Cities	**120**	**5.98**	**4.41**	**5.41**	**5.29**	**111%**	**82%**	**98%**

APPENDIX D: ADDITIONAL DATA ON CITY CHARACTERISTICS

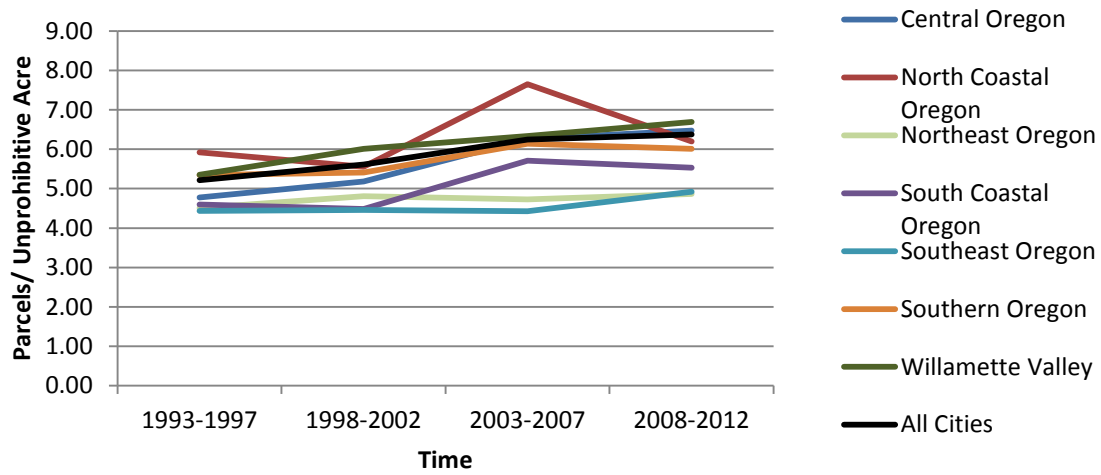
Part 1: Residential

Figure D-1. Improved Single Family and Plex Density by City Size, Tier 3 Cities, 1993-2012



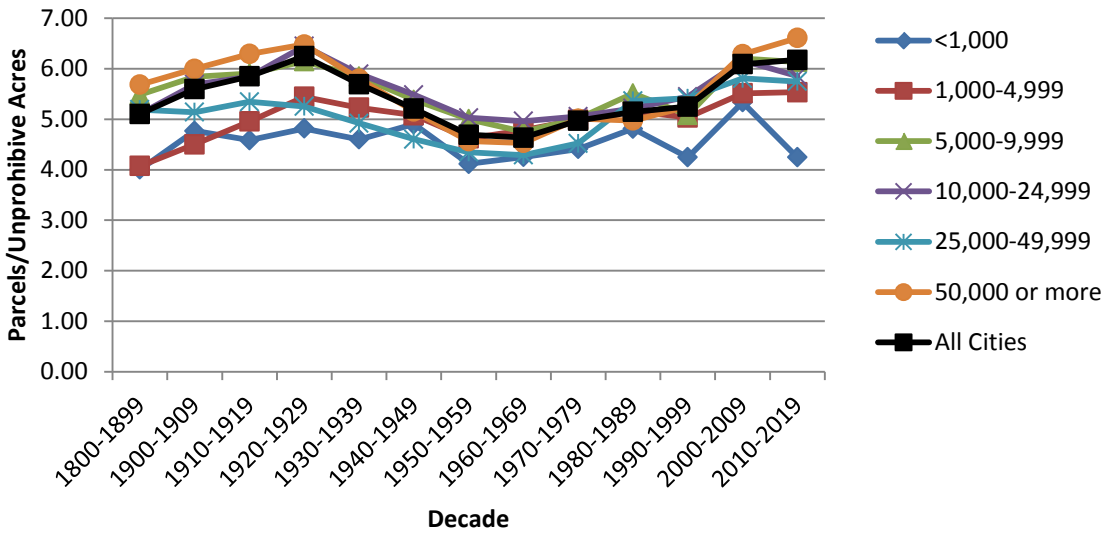
Description: Count of Parcels (Residential Class 100)/Unprohibitive Acres. Data is filterd on Yr Built, Improved and General Land Classification. The Yr Built Filter excludes Null and 0. Improved: property classification code improved AND assessed improved value >$10,000. The Generalized Land Classification filter keeps Residential, which includes structures with <5 units. Parcels >0.5 acres are excluded.

Figure D-2. Improved Single Family and Plex Average Density by Region, Tier 3 Cities, 1993-2012



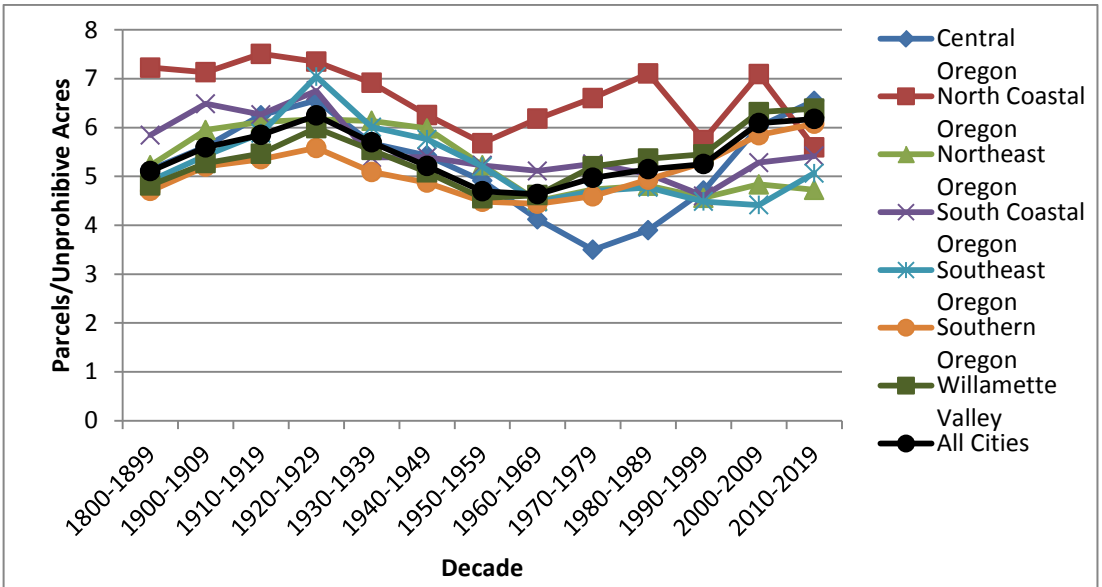
Description: Count of Parcels (Residential Class 100)/Unprohibitive Acres. Data is filterd on Yr Built, Improved and General Land Classification. The Yr Built Filter excludes Null and 0. Improved: property classification code improved AND assessed improved value >$10,000. The Generalized Land Classification filter keeps Residential, which includes structures with <5 units. Parcels >0.5 acres are excluded.

Figure D-3. Improved Single Family and Plex Average Density by City Size by Decade, Tier 3 Cities, 1800-2012



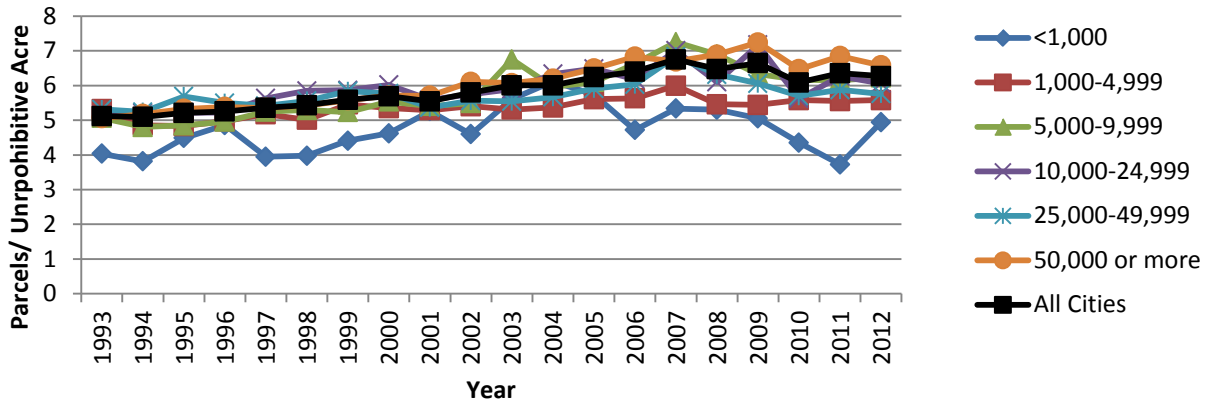
Description: Count of Parcels (Residential Class 100)/Unprohibitive Acres. Data is filtered on Yr Built, Improved and General Land Classification. The Yr Built Filter excludes Null and 0. Improved: property classification code improved AND assessed improved value >$10,000. The Generalized Land Classification filter keeps Residential, which includes structures with <5 units. Parcels >0.5 acres are excluded.

Figure D-4. Improved Single Family and Plex Average Density by Region by Decade, Tier 3 Cities, 1800-2012



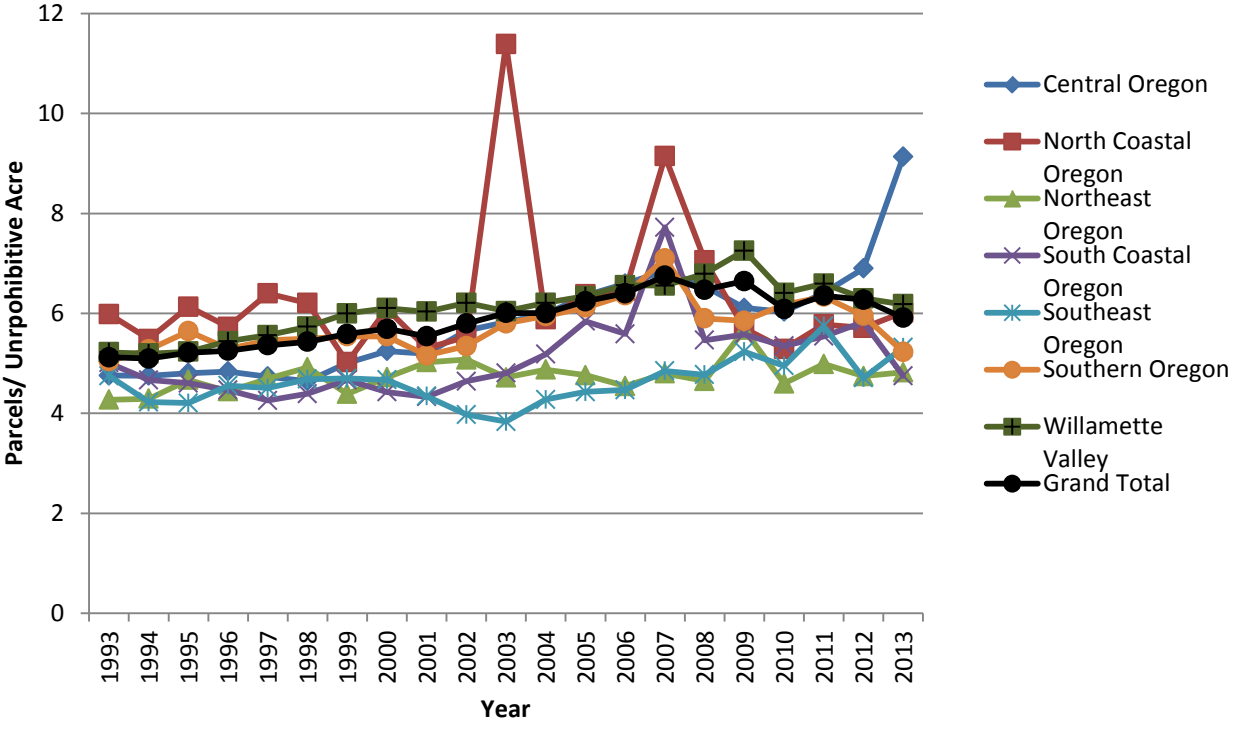
Description: Count of Parcels (Residential Class 100)/Unprohibitive Acres. Data is filtered on Yr Built, Improved and General Land Classification. The Yr Built Filter excludes Null and 0. Improved: property classification code improved AND assessed improved value >$10,000. The Generalized Land Classification filter keeps Residential, which includes structures with <5 units. Parcels >0.5 acres are excluded.

Figure D-5. Improved Single Family and Plex Average Density by City Size by Year, Tier 3 Cities, 1993-2012



Description: Count of Parcels (Residential Class 100)/Unprohibitive Acres. Data is filterd on Yr Built, Improved and General Land Classification. The Yr Built Filter excludes Null and 0. Improved: property classification code improved AND assessed improved value >$10,000. The Generalized Land Classification filter keeps Residential, which includes structures with <5 units. Parcels >0.5 acres are excluded.

Figure D-6. Improved Single Family and Plex Average Density by Region by Year, Tier 3 Cities, 1993-2012



Description: Count of Parcels (Residential Class 100)/Unprohibitive Acres. Data is filterd on Yr Built, Improved and General Land Classification. The Yr Built Filter excludes Null and 0. Improved: property classification code improved AND assessed improved value >$10,000. The Generalized Land Classification filter keeps Residential, which includes structures with <5 units. Parcels >0.5 acres areexcluded.

Part 2: Employment

Table D-1. Covered employment for all cities outside the Metro UGB by region, 2005 and 2012

Region	Number of Cities	2005 Employment	2005 Percent of Emp	2012 Employment	2012 Percent of Emp	Change, 2005-12 Number	Change, 2005-12 Percent	Change, 2005-12 AAGR
Central Oregon	15	72,721	11%	75,204	12%	2,483	3%	0.5%
North Coastal Oregon	19	31,476	5%	34,064	5%	2,588	8%	1.1%
Northeast Oregon	56	36,434	6%	39,336	6%	2,902	8%	1.1%
South Coastal Oregon	13	27,733	4%	25,170	4%	(2,563)	-9%	-1.4%
Southeast Oregon	14	26,221	4%	25,555	4%	(666)	-3%	-0.4%
Southern Oregon	24	103,239	16%	97,664	15%	(5,575)	-5%	-0.8%
Willamette Valley	75	346,766	54%	354,498	54%	7,732	2%	0.3%
Total	**216**	**644,590**	**100%**	**651,491**	**100%**	**6,901**	**1%**	**0.2%**

Table D-2. Population and employment by city size, all cities outside the Metro UGB 2005 and 2012

City Size	Number of Cities	2005 Population	2005 Employment	2005 Pop/Emp Ratio	2012 Population	2012 Employment	2012 Pop/Emp Ratio
<1,000	81	38,650	6,952	5.6	38,317	9,178	4.2
1,000-4,999	79	166,360	52,379	3.2	177,075	53,269	3.3
5,000-9,999	28	201,795	76,949	2.6	218,885	78,566	2.8
10,000-24,999	17	268,645	125,433	2.1	285,375	128,840	2.2
25,000-49,999	4	110,850	44,187	2.5	130,255	46,297	2.8
50,000 or more	7	588,975	338,690	1.7	633,395	335,341	1.9
All Classes	**216**	**1,375,275**	**644,590**	**2.1**	**1,483,302**	**651,491**	**2.3**

Table D-3. Population and employment by region, all cities outside the Metro UGB 2005 and 2012

Region	Number of Cities	2005 Population	2005 Employment	2005 Pop/Emp Ratio	2012 Population	2012 Employment	2012 Pop/Emp Ratio
Central Oregon	15	130,175	72,721	1.8	148,015	75,204	2.0
North Coastal Oregon	19	58,435	31,476	1.9	60,910	34,064	1.8
Northeast Oregon	56	101,876	36,434	2.8	104,362	39,336	2.7
South Coastal Oregon	13	60,515	27,733	2.2	61,355	25,170	2.4
Southeast Oregon	14	47,747	26,221	1.8	48,195	25,555	1.9
Southern Oregon	24	205,982	103,239	2.0	224,510	97,664	2.3
Willamette Valley	75	770,545	346,766	2.2	835,955	354,498	2.4
Total	**216**	**1,375,275**	**644,590**	**2.1**	**1,483,302**	**651,491**	**2.3**

Table D-4. Employment statistics by city size, all cities outside the Metro UGB, 2012

City Size	Number of Cities	Total Employment	Average by City	Maximum	Minimum	St. Dev.
<1,000	81	9,178	113	476	-	103
1,000-4,999	79	53,269	674	3,713	32	573
5,000-9,999	28	78,566	2,806	6,214	676	1,468
10,000-24,999	17	128,840	7,579	16,586	3,262	3,254
25,000-49,999	4	46,297	11,574	17,068	5,614	4,896
50,000 or more	7	335,341	47,906	96,570	20,577	29,467
All Classes	**216**	**651,491**	**3,016**	**96,570**	**-**	**9,978**

Table D-5. Employment statistics by region, all cities outside the Metro UGB, 2012

Region	Number of Cities	Total Employment	Average by City	Maximum	Minimum	St. Dev.
Central Oregon	15	75,204	5,014	40,115	10,265	75,204
North Coastal Oregon	19	34,064	1,793	7,390	2,219	34,064
Northeast Oregon	56	39,336	702	8,093	1,638	39,336
South Coastal Oregon	13	25,170	1,936	8,833	2,492	25,170
Southeast Oregon	14	25,555	1,825	12,360	3,621	25,555
Southern Oregon	24	97,664	4,069	41,697	9,341	97,664
Willamette Valley	75	354,498	4,727	96,570	15,055	354,498
Total	**216**	**651,491**	**3,016**	**96,570**	**9,978**	**651,491**

Part 3: Relationship Between City Size and Density

Figure D-8. Scatterplot of population and percent single-family detached housing, Tier 3 cities

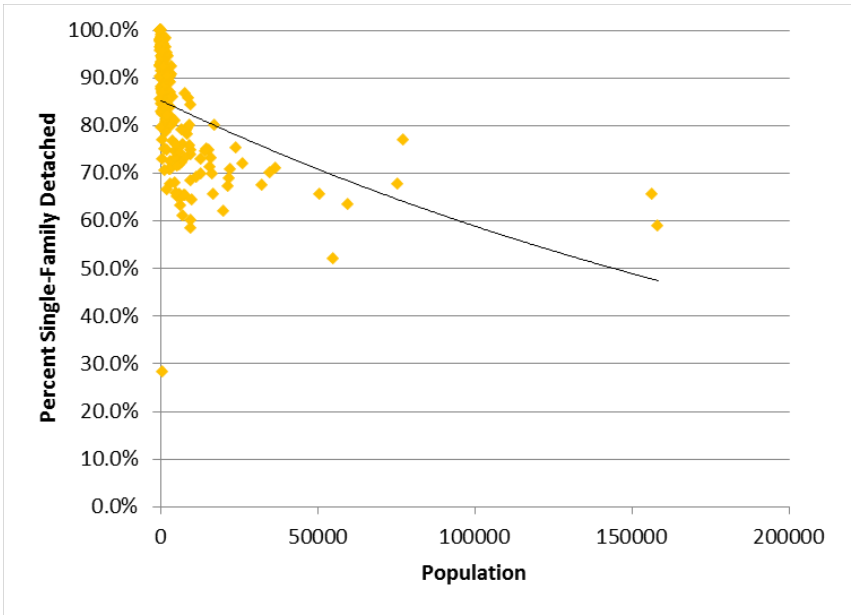


Figure D-9. Scatterplot: Population v. Average SF and Plex Density 2003-2007, Tier 3 cities

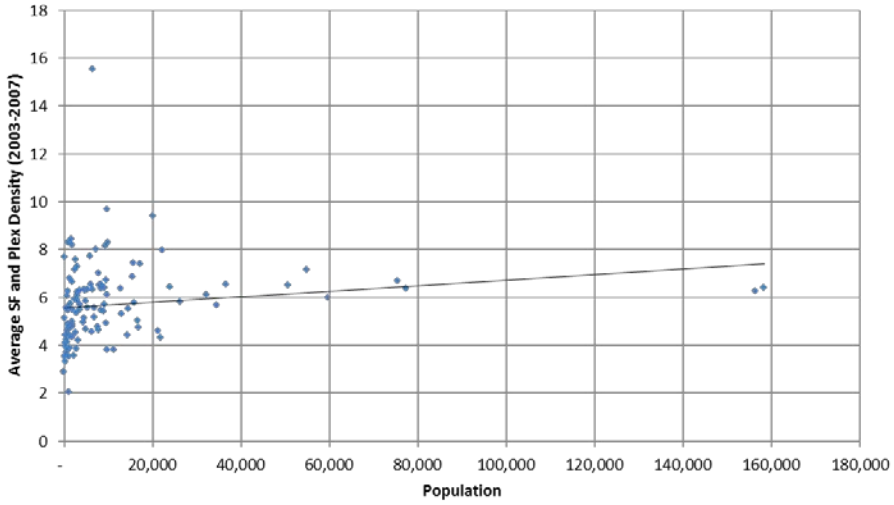


Figure D-10. Commercial density (EPA) by population, Tier 2 cities, 2012

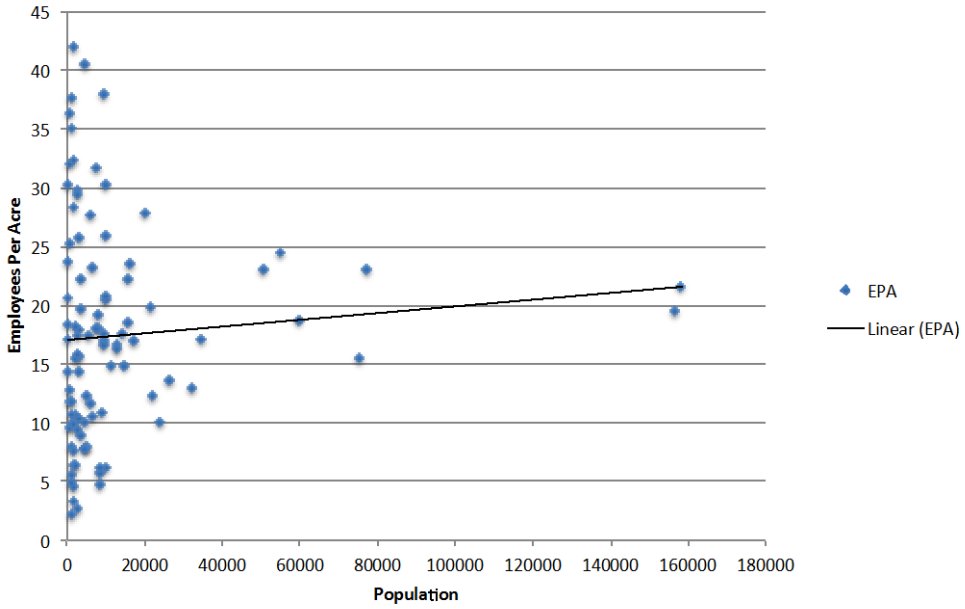


Figure D-11. Industrial density (EPA) by population, Tier 2 cities, 2012