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Impact of the Urban Growth Boundary on Metropolitan Housing Markets

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Impact of the Urban Growth Boundary on Metropolitan Housing Markets

Introduction

As required by state law, Metro has conducted an "Urban Growth Report" and a "Housing Needs Analysis" to determine whether the current Urban Growth Boundary (UGB) surrounding the Portland metropolitan area is sufficient to handle the increase in population and number of households expected over the next 20 years. Mr. Don Morissette commissioned Portland State University's Center for Urban Studies to assess whether the techniques used in these two studies were appropriate and to assess the impact of the UGB on housing markets in the Portland metropolitan area generally. The focus will be on the impact of the UGB and other land use regulations on the availability of land for development, the achievable density, as well as land and housing prices. As such, much of this report is a review of analysis and techniques used by Metro rather than primary data collection. However, some review of public data on housing construction, zoning, and prices was done as part of this study.

This study does not purport to offer a definitive alternative to the Metro analysis. Rather, it offers an analysis of some of the key assumptions in the Metro models and shows that several of the these assumptions are open to serious question. Further, it shows that under reasonable alternative assumptions the amount of land required to accommodate expected growth is substantially greater than allowed for under their analysis.

Any planning model makes implicit assumptions about market prices and peoples' reactions to them. In the real world, housing demand and supply are affected by many unpredictable factors, and the interaction of demand and supply ultimately determine the distribution of prices and quantities of housing. Because of this uncertainty, it does not make sense to talk about a twenty year supply of land for development since the actual amount needed to accommodate development will depend on many considerations, including the price of land. Decisions about how much land will be included in the growth boundary will affect land price and the development patterns that will occur. Some attempts to include market responses are included in Metro's modeling efforts, but failure to more consistently incorporate expected responses to market prices raises questions about some of the assumptions used in their modeling.

While Metro's two reports are presented as models of possible development patterns, most attention has been focused on the analysis labeled as the 2040 Growth Concept. The Urban Growth Report purports to show that development expected over the next 20 years can be accommodated within the existing urban growth boundary by changing zoning laws. One conclusion of the Urban Growth Report is that the current UGB can accommodate all but 4,445 households, which could be accommodated by a 1,000 acre expansion of the UGB. While we recognize that this 1,000 acre amount is not an explicit recommendation of Metro or the authors of the Report, we realize that the finding is the focus of current discussion. We primarily focus on this analysis.

The report is organized into the following sections:

(1) Findings and Implications presents our major conclusions and the implications of our analysis.

(2) Recent Trends in Housing and Land Prices reports on tax assessor and realtor data and compares that to the housing price scenarios described in the Housing Needs Analysis.

(3) Buildable Lands and Capacity Analysis: Reassessment discusses the techniques used in Metro's study of the housing capacity of the existing Urban Growth Boundary and the amount of land needed for expansion.

(4) Analysis of Subdivision Platting and Land Requirements in Multnomah and Clackamas Counties looks at subdivision plats in two counties in the metropolitan area to assess recent trends in lot size and open space and street access requirements. This report is a statistical analysis of a sample of subdivision plat maps in Multnomah and Clackamas Counties.

(5) Analysis of Subdivision Activity and Zoning in Washington and Clark Counties looks at recent subdivision activity in two metropolitan area counties to assess both trends in lot size and the degree to which subdivision densities are affected by zoning. This subdivision analysis uses a different methodology as that described above. Geographic Information Systems are used to explain development patterns in Washington and Clark Counties.

(6) Market Based UGB Expansion Process discusses alternative methods for deciding where the Urban Growth Boundary expansions should take place.

Following the body of the report, two **Appendices** explain the sensitivity analysis used in the Buildable Lands and Capacity Analysis: Reassessment.

Findings and Implications

Implementation of the Metro 2040 Growth Concept is based on population and housing projections for the year 2015. This ambitious plan calls for containing urban growth with compact development, which would reverse 50 years of strong urban decentralization trends. This long-term trend has been fueled by rising incomes that have allowed consumers to exercise preferences for lower housing densities and use of private transportation. Plans based on increased densities and use of public transportation will not be readily accepted without sensitivity to the issues of urban design and affordable housing. The 2040 plan is predicated on making denser housing more attractive and affordable than the conventional large-lot, single-family housing that dominates the current market place.

Central to the current debate concerning the expansion of the Urban Growth Boundary (UGB) are the implications of constraining the land market. If the market for developable land is overly constrained there will be a price effect that will increase the price of land and consequently the price of housing. While some of this effect will be ameliorated by an increase in density, some will not. The increase in price for single-family housing projected in the 2040 Growth Concept will deflect some of the demand to locations outside the UGB, such as Clark County, Sandy, Canby, Newberg, Vernonia, Scappoose, and Salem, and thereby increase long-distance commuting. A tight growth boundary will also shift some demand to existing single-family housing within the metropolitan area and drive up prices. This gentrification process will make housing less affordable to current lower and middle-income residents of the Portland area.

There are two ways to look at the Urban Growth Boundary. The UGB is intended to help manage growth, or the UGB is intended to limit growth. If the UGB is intended to help manage growth, then adequate land to accommodate this growth must be available. The requirement for a twenty-year supply of land appears to support the notion that the UGB is a growth management tool, not a growth-limitation tool. However, the consequence of an overly restrictive UGB will be to limit growth within the urban area and to redirect that growth to other parts of Oregon and Washington. The urban growth boundary is a tool that can be used to rationalize development and to increase density. However, negative consequences are associated with a tight boundary as well. In particular, higher housing prices within the urban area will generate pressure for people to locate in other areas, and the reduced housing affordability will create hardship for some families.

To accomplish an increase in density as called for in the Metro 2040 Growth Concept, real housing prices are expected to increase substantially. Yet we know from experience in other areas that people will commute long distances to achieve lower housing prices. Hence, one consequence of such limitations will be for people to choose lower-cost housing at distant locations and then commute into the Metro service area. Further, the largest restriction will be on large lot development. Hence, it is likely that many people desiring such large lots will be among the population pushed into other areas. In other words, a limitation on expansion of the boundary may induce higher-income families to locate outside the boundary while pricing out many lower-income families. We cannot precisely quantify this effect, but the procedures in the Metro reports appear to ignore the possibility of diverting growth and appear to make unrealistic assumptions regarding the availability of affordable housing under the 2040 Growth Concept.

In slow-growing urban areas, such as St. Louis or Milwaukee, decentralization results in growing suburbs while depopulating the central city. In rapidly growing urban areas, such as Dallas and Phoenix, the bulk of the growth occurs in suburban locations without densification of the central city, and with an ample land supply holding housing prices down. Some urban areas, such as Sacramento, San Diego, and San Francisco, have experienced sprawl and land price effects on housing affordability, not due to a growth containment policy, but to exclusionary zoning practices that make increasing density difficult. Portland is likely to experience both densification and a land price effect on housing affordability, and a new form of sprawling in nearby urban areas. Recognizing that planning for compact growth will have some sprawling impacts is not to imply that the growth management aspects of the UGB are not feasible, just that they are limited by the public's willingness to accept them.

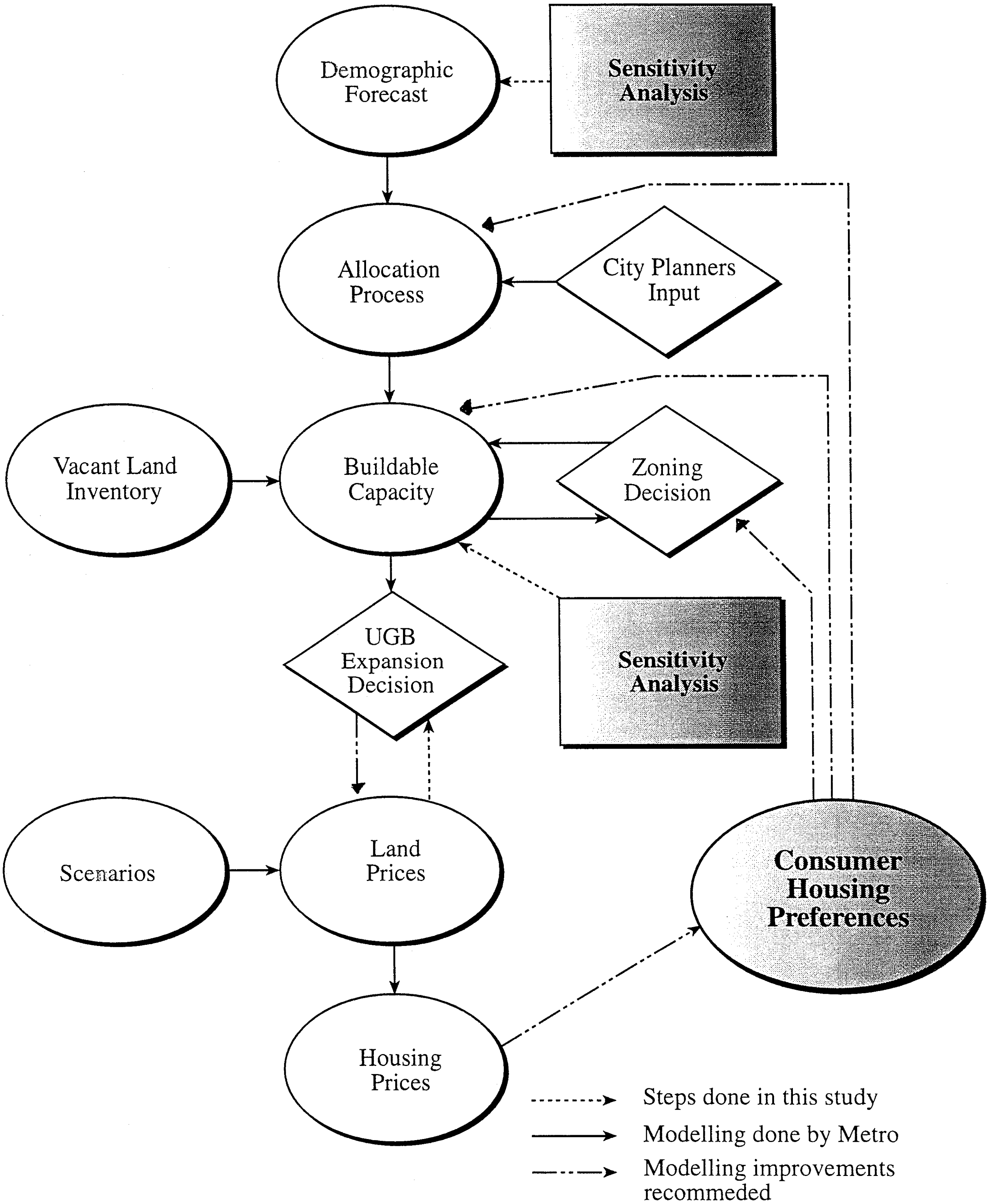
Although Metro's analyses have been extensive and detailed, proposed policies of the 2040 Growth Concept are not fully assessed in the Urban Growth Reports. There are a number of troublesome issues:

Impact of Higher Housing Prices.

The pieces of the Growth Report are not as tightly integrated as needed. For instance, the "Buildable Lands Capacity Analysis" indicates how population and employment can be accommodated within the Urban Growth Boundary, but the analysis is only an accounting process that compares the available space to the required space, without allowance for price effects, consumer preferences for housing type and location, and public acceptance of higher densities in their neighborhoods.

Similarly, growth allocation procedures are driven by assumed densities that rely upon rezoning and redevelopment that seem unlikely to ever occur. Finally, the housing demand model accepts the growth allocation model results and does not modify them to reflect the price effects upon the locational distribution of the population. Specifically, the housing demand model does not account for an increase in households choosing to locate outside the Portland Metro UGB due to price effects.

ANALYSIS OF LAND & HOUSING MARKETS



To illustrate this, we present a chart showing the analytical process that produced the Urban Growth Report and the Housing Needs Analysis. The Growth Report had three parts: a demographic forecast, a regional allocation, and a buildable lands capacity analysis. The demographic forecast is driven by long run economic and social forces, some of which are well identified and others are known only within ranges or probabilities. In the regional allocation, Metro has identified the localities in which the expected increase in households and employment will occur, relying in part on the contribution of local planners. Based upon a inventory of vacant land and information about past development practice, a capacity for development of subareas was established.

Metro proposed higher density development through rezoning, infill development and redevelopment of currently developed parcels, which expanded the potential capacity of existing land supply and led to a modest housing deficit which could be accommodated by a modest expansion in the UGB.

At the same time, Metro developed models of urban housing markets which took assumed land price impacts of different UGB expansion scenarios and identified their impact on housing prices, housing tenure decisions, and housing subsidy requirements.

Missing from this analysis is a proper role for consumers' housing preferences, which given the higher housing prices, will affect the places they choose to live (the "allocation process") and the size of lot for their home (the "buildable capacity"). And while citizens may often express in public forums their willingness to accept higher density, this willingness does not always extend to their personal decisions, as revealed in actual houses being built and purchased. Consumers also play a role in determining the zoning and redevelopment decisions which Metro has envisioned. As we discuss below, we consider several of these proposals to be economically and politically infeasible. To handle some of the weaknesses of this analysis, we have performed sensitivity analyses that vary both the demographic assumptions and the buildable lands capacity assumptions, although this cannot fully compensate for the effects of the lack of consumer preference feedbacks.

We would also like to have seen a more explicit model of how UGB expansion decisions affect land prices. So far, the land and housing price impacts mostly falls out of assumptions used to describe the four Scenarios. In the 2040 Growth Concept Scenario, land prices rise by 20% in real dollars for the first 5 years, rise by 25% in the next 5 years, and stop rising completely for the next 10 years. Work done by Hobson-Johnson

Associates for the 2040 Means Business Committee suggests that those land price assumptions could be considerably under-estimated. Finally, we propose that land prices should be used as signals to Metro for deciding where the Urban Growth Boundary should be expanded. Thus, just as housing and land prices send signals to housing consumers to adjust their location patterns and housing consumption, land prices should send signals to local planners about the preferences of those consumers.

Inconsistent Scenarios.

The housing demand model in Metro's Housing Needs Analysis foretells a rather dramatic impending land price effect for the scenario labeled the "2040 Growth Concept" where the UGB is expanded by 4,000 to 9,000 acres. However, the conclusion of Metro's Urban Growth Report is that the UGB would need to be expanded by only 1,000 acres to accommodate the anticipated housing deficit. Hence the "2040 Growth Concept" understates the housing cost impact of adopting the expansion described in the Urban Growth Report. Instead, the alternative "Compact City" scenario in the Housing Needs Analysis, where the urban growth boundary is not expanded at all and housing price growth is much greater, may be more appropriate.

Moreover, data presented in the next sections suggests that land price and housing price inflation in the recent past has been greater than either of these two scenarios project for the next five years. Land price data for Washington County suggests that lot prices have risen 79% in real terms over the last 5 years, while the Compact City Scenario and the 2040 Plan Scenario project increases of 20% and 50% respectively. Because the Compact City Scenario bears a closer resemblance, this report will describe the housing cost impacts and housing affordability impacts based on this scenario.

Declining Housing Lot Size.

Examination of current experience in subdivision platting shows that lot sizes are larger than under the proposed densities of the 2040 Framework Plan designated zoning described in the Urban Growth Report. Although lot sizes are decreasing somewhat in response to the land price effect, most of the increase in lot prices is being passed forward in the form of higher housing prices, not smaller lots.

Metro has discussed the possibility of regulating maximum or maximum-average lot sizes for new development. However, should large lot development be outlawed or severely restricted, the demand for large lot development will likely divert to areas outside the UGB. And to the degree that lot sizes are reduced, this policy effect represents a decline in the amenities of housing for those who cannot choose exurban resettlement or long distance commuting.

Further, the analysis indicates that merely zoning for higher density does not have much of an impact on actual lot size, and that this "underbuild factor" is likely to grow with reductions in minimum lot sizes. Hence, expectations of higher density due to zoning changes alone appear to be overstated.

The anticipated reductions in lot size serve to partially offset the increase in price of housing. Yet it must be recognized that this implies lowered marketability for the housing. In general, the combination of higher housing prices and smaller lot sizes are expected to make alternatives look more attractive to many people. The diversion of people to these alternatives appears to be a significant possibility, but it does not appear to have been analyzed as one of the implications of higher density. There appear to be two ways in which the density could be achieved, very high land prices or minimum density zoning requirements. Either of these possibilities will reduce the willingness of people to purchase such housing and could lead to substantial commuting from distant locations or diversion of growth from the metropolitan area.

Threshold Price of New Construction.

The model does not recognize that higher land prices will raise the price threshold of what the market will provide. Metro's housing demand model provides estimates of the number of subsidized units that are likely to be required. However, this model relies on some questionable assumptions. For example, it appears that there is an assumption that the private market will provide single-family units as demanded, starting at prices of $100,000.

This appears to be questionable at best in the current market, and it becomes increasingly unlikely as the forecast land-price increases occur. The only feasible option for such housing appears to be as condominiums, but this represents a substantial change in the type of housing purchased by homeowners. Even if such units would be built by private developers, there is a question of whether consumers would purchase them or search for more desirable housing outside of the UGB. Further, housing built for

Redevelopment Rate and Land Prices

Estimating the supply of land available for redevelopment is also a function of land prices. Similarly, the assumed rate of redevelopment in the land supply analysis is higher than can be expected given the expected land price increase of the 2040 Plan scenario in the "Housing Needs Analysis". Our analysis of land price increases already underway suggests that we may be following the land price inflation path modeled in the Compact City scenario. Either the rate of redevelopment should be scaled back or the estimate of land price increase should be larger. And the rate of redevelopment should be reduced in the early years to allow time for a ramp-up to the higher rate. In any event, Metro has not done an analysis of past trends of redevelopment by which to compare future trends, as they have done with infill development.

Finally, the specific way in which Metro has modeled the redevelopment process, assuming the demolition of parcels with relatively low structure value, is likely to have adverse consequences on the availability of affordable housing. This assumption suggests that housing depreciation rates and housing unit longevity should be adjusted the Housing Needs Analysis, with a disproportionate number of low-cost units presumably being demolished.

Mixed Use Development and Land Prices

The land supply analysis assumes a much higher rate of mixed use development than current experience warrants. Mixed use, like infill and redevelopment, will be driven by higher land prices, higher than that expected in the housing demand model. In addition, the lack of experience with mixed use development provides very little confidence in the ability of land in mixed use zoning to meet residential and employment density targets. The residential densities assumed for mixed use land are higher than the densities in any current category of residential land, except multi-family, even before employment capacity is added. Either land prices must continuously increase to stimulate development and redevelopment at these densities, or density targets may not be met.

Need for Monitoring of Land Supply.

Improved monitoring of land supply changes and land use change are needed. Among the variables that we would recommend that Metro monitor are quality-adjusted housing prices, quality-adjusted land prices, relatively low prices tends to be only a small fraction of the actual construction at any time, yet the demand for housing in this price range is likely to be quite high. Much better analysis of the likely development and marketability of such units is needed before this type of assumption becomes a key part of the analysis. Failure to provide such units would put additional price pressure on the existing housing stock but the lower amenity value of small, high-density units would make marketability questionable.

There are similar questions relating to the assumption of rental housing being provided without subsidy for $500 per month rents, both now and with the increases in land prices. Improvements in the modeling process are needed to make them more consistent. This criticism should not detract from the significant and pioneering modeling that has been accomplished. The modeling effort needs to continue as it will take time to better integrate the models of land supply, demand, and allocation.

If the private market does not provide the number of units forecast then the number of people paying large percentages of their income for housing will increase. The high demand for housing would likely lead to gentrification of more of the existing stock, creating additional affordability problems for lower-income households. For this reason, the estimate contained in the Housing Needs Analysis that the number of housing units that will be unaffordable to the household occupying that unit (or will require public assistance) is likely to be understated.

Political Feasibility.

The growth allocation model assigns population and employment to already developed zones at a rate higher than will likely be politically achievable. For example, the process included a forum in which planners from most jurisdictions, not just Portland, were vying for an allocation of growth for their jurisdiction. Local residents are unlikely to have the same preferences for high density. This unusual competition among planners for growth tends to over-estimate the amount of densification and redevelopment that will occur.

Indeed, the levels of increased density proposed in the "Buildable Lands Analysis" are quite staggering. For land considered vacant in Metro's report, the number of housing units permitted to be built will rise from 121,000 to 194,000, an increase of 60%. Further, some densities would have to be increased by an even larger amount to accomplish 194,000 units as a target. Now for various environmental, transitional, and market-driven factors, this rezoned land is not actually expected to accommodate all 194,000 housing units in Metro's 2040 Plan.

However, for Metro to meet its housing target in the Plan, all vacant land inside the UGB will need to be upzoned by 60%, since local government refusal to rezone is not accounted for. Moreover, in every instance where zoning is changed, local property owners will likely assume that the re-zoned property will be developed to maximum density allowed. Calming them with discussion of the Zell factor or an underbuild rate will not suffice. This target seems politically infeasible.

Allowance for Error.

The analysis of the land supply model focuses on its sensitivity to the varying assumptions for population growth, land conversion, absorption, and density rates. This analysis shows the estimates of required land supply are highly sensitive to small changes in these rates, which indicates that we ought not to be overly confident or precise about the land supply estimates. This, in addition to factoring in the land price effect noted above, suggests a considerable margin for error should be added for density, home ownership, infill, and redevelopment rates. The assumed rates are much greater than being experienced currently.

Constant Infill Rates

Estimating the amount of land available for infill is more than counting under-developed lots. Most of these lots were passed over for reasons of terrain difficulties or lack of market demand. Increasing land prices makes these lots feasible for development. The rate of infill development is difficult to estimate for two reasons. The supply of infill sites will be used up, unless land prices rise sufficiently rapid to increase the number of sites feasible for infill. Unfortunately, there is not good data on the rate of infill over time, nor its response to housing prices.

However, the land supply analysis expects the rate of infill to remain constant. This expectation would be consistent with increasing land prices, as higher land prices will be required to stimulate development on the increasingly less desirable infill parcels that remain. In Metro's" Housing Needs Analysis", the land prices under the 2040 Concept scenario are expected to level off. Constant land prices would not be expected to support a constant rate of infill.

rates of infill development, and rates of redevelopment. Current estimates, rates, and models are too imprecise to meet expectations.

The 17-step process used in the land supply analysis was designed to determine whether and how much of the growth expected by 2015 can be accommodated on vacant land, infill sites, and by redeveloped sites. However, it may not be the most appropriate method to use every five years to assess how much the UGB should be expanded. A more direct measurement of land consumption is preferable.

A more direct approach to complying with the state statute requiring maintaining a 20-year supply would be to estimate the rate of vacant land conversion per 1000 new residents. This estimate should be updated every five years to account for changing densities, development patterns, infill rates, and redevelopment. This would provide a direct measure of the amount of new land that should be added to the UGB.

Conclusion.

Our conclusion is that the "Urban Growth Report" promises a future of compact urban form that is not achievable, and that adopting the 1,000 acre boundary expansion will result in significant increases in housing prices and declines in housing amenities. The growth containment objective is not achievable given a combination of consumers' demand for larger lot development than the Growth Report allows for, and residents of existing neighborhoods unwillingness to accept higher densities. And as noted in the section, "Buildable Lands Capacity Analysis: Reassessment", Metro has relied upon overly optimistic assumptions at a number of points in their analysis.

While we cannot predict the amount of land needed, we can show that most adjustments to the assumptions in the 2040 Growth Concept analysis lead to substantially larger amounts of land required. For example, using our "Moderate Adjusted Capacity and Moderate Growth Scenario," we project that the current UGB would leave a deficit of between 35,000 and 57,000 housing units, much larger than Metro's projected 4,445 housing units deficit. While this range of housing deficit is simply another "model" and not a forecast, the range more closely corresponds with what we consider a median rather an extreme assumption.

A further recommendation is to make adjustments from the methods that Metro has used to translate its projected housing deficit into a recommended acreage expansion for the Urban Growth Boundary. Metro assumes that the growth boundary expansion area will accommodate housing units on lot sizes of 6,200 square feet (40%), 4,000 square feet (10%), and 18 units to the acre multi-family development. Thus, Metro is assuming that residential development on the urban fringe of the metropolitan area will develop at densities as great as inner-city Portland neighborhoods. This result seems implausible.

As noted in our section, "Analysis of Subdivision Platting and Land Requirements," 62% of all lots in new single-family subdivisions in Multnomah County and 85% of lots in subdivisions in Clackamas County in the last 5 years are 7,000 square feet or larger. If a slightly lower density figure is used for this expansion area, eight housing units an acre rather than ten, the projected expansion required to accommodate the deficit described above would be between 8,750 acres and 14,250 acres. Since eight housing units an acre translates roughly into 5,000 square foot lots, this conversion of a housing deficit into an acreage expansion still represents a significant reduction in the size of lots that consumers have been currently purchasing.

If these assumptions are correct, such an expansion now would mitigate the projected land price and housing price impacts outlined in the Housing Needs Analysis and would allow for urban development more in line with housing consumers expressed preferences. An expansion of the supply of land would reduce land prices. Those reduced land prices would reduce lot prices and the price of new homes of all lot sizes. In any case, we believe that any housing shortage be evaluated using these lower densities for land to be added.

Implications.

The decision to establish and adjust Urban Growth Boundaries in Oregon should reflect the balancing of (at least) three statewide planning goals: creating a compact urban form, preserving farmland and environmentally sensitive areas, and maintaining affordable housing prices. The legislative target for maintaining the latter goal requires that a 20-year land supply be available. At the time of adoption, the UGB contained an adequate supply of land. Subsequently, Oregon experienced a long recession in which population grew much more slowly and, although individual developments were affected and growth was channeled along certain corridors, the UGB had an insignificant effect on overall land prices. In more recent years and for the foreseeable future, land prices and housing prices have risen and will continue to rise dramatically and the UGB constraint on land supply has played an important part.

This new economic environment means that growth planning analyses and decisions and the analysis behind have to be much more sophisticated than ever before. The two competing goals, housing affordability and compact urban form, need to be considered simultaneously. While Metro has developed elaborate and pioneering data collection systems and modeling frameworks, more recognition of the tradeoff between these two competing goals needs to be acknowledged.

The projected densities in Metro's Urban Growth Report might be achievable with lower land costs if minimum density, minimum-average density, or other restrictions are attached to land development, but such density restrictions are untested. Consumers and neighboring property owners may still not accept such high densities, and there are many questions about the time frame needed to adopt such restrictions and their ultimate effectiveness. Until some analysis is conducted on the possible timetable for adoption, the likely impact of exceptions to the regulations, and legal challenges, it appears very risky to simply assume that such a drastic change in land use regulations can be put in place and made effective in a short time.

If the density is expected to occur due to changes in minimum zoning requirements, Metro's current analysis appears to entail a fundamental contradiction. The density projected is achievable only with high land and housing prices, but high land and housing prices will induce more people to locate outside of the UGB and price more out of housing entirely. Thus, either the density will occur because of very high growth rates, with much of that growth diverted to rural or other urban areas, or the high prices will prevent the growth from occurring within the UGB. It does not seem possible, however, to both attain the density projected and keep growth from spilling over into lower housing-cost areas.

Metro's analysis may best be described as showing one set of outcomes that would accommodate expected future growth without expanding the UGB; however, the analysis fails to adequately address the market conditions that would make these outcomes occur and the responses of people to those market conditions. In particular, high land prices are necessary to induce high density for new construction, but such high land prices translate into high housing prices. These high housing prices in turn serve to limit the actual growth and, perhaps more importantly, to divert some of the population that would have settled within the UGB to locate outside of it. Further, these high housing prices are likely to require substantially more subsidization of housing cost for lower-income families than is acknowledged in the analysis.

Clearly, many urban areas have higher density than the Portland Metropolitan Area. Although it is <u>physically</u> possible to substantially increase the density of the region, areas with high density typically have very high prices for housing and have large numbers of people living at great distances from the city center to get low-density housing at lower prices.

High land prices are a necessary impetus to higher density. To some extent, land, labor, and materials are substitutable with each other in producing housing. When any input becomes expensive relative to the others, builders will try to conserve on the expensive input and use more of the less expensive inputs. When land is expensive, less is used; and housing is typically built denser. However, lot size itself is an amenity, and people will typically pay more for houses on slightly larger lots, all else being equal. Hence, both from the production and consumption sides, high land prices lead to higher density. Higher land prices directly raise housing cost by the higher cost of the input and indirectly raise housing cost by forcing substitution of labor and materials for land in producing housing. In other words, it is typically more expensive per square foot to build higher density buildings. To the extent that high land prices are offset by using little land, the final cost of the housing may not rise by as much, but the final unit is also not worth as much to the consumer.

One response to higher-priced housing is for people to search for lower-cost housing in distant locations and then commute. Hence, the high-density scenario is likely to imply that fewer people actually live within the UGB due to the higher housing cost. Some of the growth may simply be diverted to other metropolitan areas, but at least some of the growth will show up as people living in distant communities and commuting long distances. Surely, this outcome is not intended as the result of "growth management." Yet ample evidence from other areas indicates that people will indeed commute long distances to achieve low-cost, low-density housing. This likely outcome does not appear to have been taken into account in the analysis of the 2040 Growth Concept.

Another outcome of high land prices is to reduce the amount of housing available to lower-income families. Typically, lower cost housing is the older part of the housing stock; but in areas with high housing prices, higher-income families also compete for the existing stock. Further, new construction will only take place for relatively higher prices. Metro's housing analysis makes a questionable assumption that the private market will provide single-family dwellings as demanded from prices of $100,000 and up; however, the market is very unlikely to do this, especially as land prices increase. And Metro's reliance upon redevelopment to house one-third of the anticipated growth in households means that a good portion of the affordable housing supply will be demolished. The outcome will be that there will be fewer lower cost houses among the existing stock and few if any additions in the lower price range from new construction. Hence, many people will likely be forced into either condominiums or apartments and that larger than anticipated numbers will require some form of housing assistance. At the very lowest end of the income distribution, the higher housing prices will translate into increased rates of homelessness.

Recent Trends in Housing and Land Prices

Introduction

This portion of the report examines the recent trends in housing prices and land prices in the Metro region. The section relies upon published data on land price assessments in Washington County and realtor association information on housing prices, both in the metropolitan area and nationally.

Land Prices in Washington County

The Washington County Tax Assessor reviews sales prices and determines an average ratio of sales price to assessed value for each class of property. These ratios are used to adjust assessments and can be interpreted as an average percentage price increase for property within these property classes. With low transaction volumes, the average percentage increase might be unrepresentative of the class as a whole. However, errors due to the low number of observations do not create either an upward or downward bias and should be minimized over a number of years. Table 1 reports the annual percentage increases for property class 100, residential lot values.

Table 1
Residential Lot Prices
Washington County

Year	Annual Increase	Lot Price Index 1985=100	Lot Price Index 1990=100
1986	2%	102	89
1987	3	105	92
1988	4	109	95
1989	-1	108	94
1990	6	115	100
1991	17	134	117
1992	8	145	126
1993	20	174	152
1994	20	209	182
1995	15	240	209

Source: Annual rates of increase are reported in Department of Assessment and Taxation, Washington County, Ratio Studies, 1986-95

Table 1 presents the annual rate of increase in Washington County residential lot prices over the 10 year period 1985-1995, and also reports two indices of lot prices using 1985 and 1990 as a year of comparison. As the data indicates, land prices were fairly stable in the 1980's, with single digit annual rates of increase. However since 1990, land prices have grown at a rapid pace. Taking the County's assessment ratios as presented, lot prices have doubled in 5 years.

This rate of price increase could have many causes, one of which is the general rate of inflation in the economy. We have adjusted the price index by the Consumer Price Index and report inflation-adjusted price indices in the Table 2. This adjustment shows that about 20% of the increase in lot prices over the 1990-95 period was due to inflation. However, the conclusion remains that lot prices in Washington County grew by 79% in inflation-adjusted terms.

Table 2
Inflation-Adjusted Residential Lot Prices
Washington County

Year	Lot Price Index (1985=100)	CPI Index (1982-84 = 100)	Real Lot Price Index 1985=100	Real Price Index 1990=100
1985	100	107.6	100	106
1986	102	109.6	100	106
1987	105	113.6	99	105
1988	109	118.3	99	105
1989	108	124.0	94	99
1990	115	130.7	95	100
1991	134	136.2	106	112
1992	145	140.3	111	117
1993	174	144.5	130	137
1994	209	148.2	152	160
1995	240	152.5	169	179

In Metro's "Housing Needs Analysis," real land prices are expected to rise significantly. Land prices are modeled to rise by 20% in real terms over 1995-2000 in the 2040 Growth Scenario, and by 50% in real terms in the Compact City Scenario. Data on lot price inflation from 1990-1995 from Washington County suggests that land prices have already been rising at a faster rate than either of these two scenarios would project for the next five years.

Housing Prices in the Portland PMSA

Changes in the value of land will be reflected in housing prices. Table 3 shows data on the median value and the average value of existing single family homes in the Portland Primary Metropolitan Statistical Area and in metropolitan areas around the United States. The data comes from two federal publications, "U.S. Housing Market Conditions" and "The Statistical Abstract of the United States", and the "Real Estate Report for Metropolitan Portland, Oregon", published by the University of Portland. Ultimately, both sets of data came from the National Association of Realtors and the Oregon Multiple Listing Service.

The data indicates the well-known story that housing prices in the Portland metro area are rising more rapidly than in the rest of nation. The median price home in the Portland area has risen from being 19% below the average of US metro areas in 1985 to 6% greater by 1994. The average price home in the Portland area rose from being 22% cheaper the US average in 1985 to 7% greater by 1995. And as with land prices, most of the increase has occurred since 1990.

Table 3
Single-Family Housing Prices:
Portland PMSA and National
(in thousands of dollars)

Year	Median Price Existing Home Portland	Median Price Existing Home, US metro areas	Average Price Existing Home Portland	Average Price Existing Home, US metro areas
1985	61.5	75.5	70.6	90.8
1986	62.6	80.3	72.3	98.5
1987	64.2	85.6	73.3	106.3
1988	64.4	89.3	76.2	112.8
1989	70.1	93.1	85.0	118.1
1990	79.5	95.5	96.0	118.6
1991	88.5	100.3	111.3	128.4
1992	97.7	103.7	116.3	130.9
1993	106.0	106.8	123.4	133.5
1994	116.9	109.8	134.2	136.7
1995			149.4	139.0

After adjusting for inflation in Table 4, the average home price in Portland has risen by 33% in real terms over the last five years and the median price home has risen by 30% in real terms over the last four years.

Table 4
Inflation-Adjusted Single-Family Housing Prices: Portland PMSA
(in thousands of dollars)

Year	Average Real Price Existing Home (1990=100)	Median Real Price Existing Home (1990=100)
1985	89	94
1986	90	94
1987	88	93
1988	88	89
1989	93	93
1990	100	100
1991	111	107
1992	113	114
1993	116	121
1994	123	130
1995	133	

Again, this data suggests that real housing prices are rising quite rapidly. The comparable projections for the next five-year period (1995-2000) in Metro's Housing Needs Analysis under the Compact City Scenario are an 11% real price increase for constant lot size houses or a 6% real price increase given adjustments for a trend towards smaller lot sizes. Under the 2040 Growth Scenario, the real price increases are either 4% in constant lot size house or 3% in adjusted lot size houses. In essence, the Housing Needs Analysis projections are assuming that housing price inflation in the Portland area will slow substantially.

Admittedly, there are many causes of housing price inflation; the Urban Growth Boundary's impact on land prices is only one cause. Land is only one of many inputs in the construction of a home. Other factors that can explain some of the housing price growth over the last 5-6 years include employment growth, real wage growth, net migration to the region, declining interest rates, and declining property tax rates (relative to local government service levels). Yet the ability of housing supply to moderate these demand pressures is affected by the growth boundary and the supply of land. Moreover, there is no evidence in the Housing Needs Analysis that any of the other trends will reverse themselves in the future.

Conclusions.

This section of the report detailed recent trends in housing prices in the Portland area and compared them to assumptions contained in the Housing Needs Analysis. Using a relatively under-utilized data source, assessment adjustments for residential lots, we have found that lot values in Washington County have doubled since 1990, representing a 79% increase after adjusting for inflation. This rate of increase is substantially greater than either the Compact City Scenario or the 2040 Growth Concept Scenario projections for the next five years. Thus, despite the anticipated population growth, Metro is projecting a substantial decline in land price and housing price increases for the next five years to reach their conclusions about housing prices and housing affordability.

Data on average and median housing prices indicates that prices in the Portland metropolitan area have risen dramatically, whether compared to the nation as a whole or against the price of other goods. The last five years have seen housing prices rise by between approximately 33% in inflation-adjusted terms, which again, are substantially greater than either the Compact City or 2040 Growth Scenarios. While there are other causes of housing price inflation and land price inflation, no information is presented in the Housing Needs Analysis suggesting that these other factors have diminished.

Buildable Lands and Capacity Analysis: Reassessment

Introduction

This portion of the report examines the method and theory behind Metro's "Buildable Lands and Capacity Analysis" (BLCA), part three of the Urban Growth Report. This reassessment emphasizes the uncertainty surrounding any estimate of housing capacity. This section begins with a discussion of what is meant by "capacity". The second part critiques the "seventeen steps process" used by Metro to estimate capacity. Part three presents a sensitivity analysis, which illustrates the range of values for estimates when small changes are made to the different components used to determine the estimate. Part four presents alternative estimates of the UGB housing capacity based on the sensitivity analysis, and part five describes scenarios that combine different forecast assumptions and capacity estimates. These scenarios are intended to show the overall surplus or deficit in housing capacity that might develop under various conditions.

Part I: Definitions of Capacity

There are different definitions of capacity that might be used to determine the number of housing units that could be accommodated within the urban growth boundary (UGB). The capacity estimates will vary dramatically depending on which definition is used, so defining what is meant by capacity is a crucial first step in calculating a capacity number. This report considers two definitions of capacity: plan capacity and adjusted capacity

Plan capacity -- the maximum number of housing units that could theoretically be accommodated within the UGB, based on plan densities.

Comment: This capacity number assumes all developable land (i.e. net buildable vacant land from step 5) is built out at *2040 Plan* expected yield densities (except where limited by physical characteristics such as identified in the Zell report).[1] Plan capacity would also include the total stock of potential infill lots and the total stock of redevelopable land (as identified in steps 14 and 15). Plan capacity is a theoretical number because it assumes total build-out: there would be no remaining vacant buildable land, potential infill lots,

[1] The steps referred to in this estimate are the steps listed in the "Buildable Lands Capacity Analysis".

or economically redevelopable parcels. (Redevelopment is qualified by the term economically because *all* developed land is *potentially* redevelopable, but only the relatively low-value parcels are expected to be redeveloped.)

Adjusted capacity -- the number of housing units expected to be provided given certain political, social, and economic constraints.

Comment: An estimate of adjusted capacity considers factors that might prevent the actual housing capacity from reaching what is theoretically possible. For example, due to political or economic constraints, some jurisdictions may not be able to meet the densities assumed in the 2040 Growth Concept. Similarly, for political or social reasons, some of the vacant land currently under farm use assessment may not be developed within the next twenty years. Capacity constraints can also be expressed in terms of an expected *rate* of development. To say land is expected to be developed at a particular rate is another way of saying that various factors will prevent all of the land from being developed at once.

An example of the difference between a plan capacity estimate and an adjusted capacity estimate is provided by a comparison of steps 14 and 15 in the BLCA. Step 14 identifies the total stock of redevelopable parcels and the total capacity of those parcels, and uses this number as an estimate of redevelopment capacity. Thus the estimate of redevelopment capacity in step 14 is an estimate of plan capacity because it assumes that all potential redevelopment will actually occur. Step 15, on the other hand, identifies both the total stock of lots on which infill could occur and the rate at which those lots might develop. The estimate of infill capacity in step 15 is an estimate of adjusted capacity because it is based on the expected rate of infill rather than on the total potential supply. Thus, Step 15 identifies a total stock of potential infill as high as 90,000 housing units, but includes only 24,570 units in the final capacity estimate.

The fourth part of this section identifies both an plan capacity estimate and several adjusted capacity estimates. The adjusted capacity estimates demonstrate a range of potential capacities based on different assumptions of how development might actually occur. No assumption is made about how capacity should be defined for the purposes of identifying a 20-year land supply, but more attention is paid to estimating adjusted capacity in order to illustrate the uncertainty surrounding capacity estimates.

Part II: Critique of Metro's Capacity Analysis

Metro based its "Buildable Lands and Capacity Analysis" on a seventeen-step process. This part examines each of the steps, identifies questions raised by the analysis, and suggests changes that might be made to Metro's approach.

Steps one through eight represent the past practice used by Metro to analyze capacity. The capacity estimated in step eight might be considered a minimum expected capacity under current zoning and trends. The Net Buildable Vacant Land identified in step 5 represents a starting place for later estimates of capacity.

The only obvious adjustment that might be made to this initial capacity estimate is to account for the physical barriers to development outlined in step 12, as taken from the Zell Report.[2] Although this has not been past practice, it would provide a more consistent and defensible estimate of vacant land capacity under current zoning.

Steps 9-17 detail the capacity estimate based on Metro's 2040 Growth Concept. The methods used to derive this capacity estimate differ from those that have been used in previous efforts and are the focus of this critique.

Steps 9-10: Underbuild

In step 9, Metro assigns the vacant land identified in step 5 to new zoning categories based on the 2040 Concept and calculates a new capacity. Step 10 then reduces the densities used in step 9 by fifteen percent to account for **underbuild**, which is the tendency to build housing at a density lower than the maximum allowed. The approach to underbuild adopted by Metro in step 10, however, <u>is not consistent with the historic approach to underbuild as detailed in step 7</u>.

In step 9, Metro refers to the "rezoning" matrix that has been used in the Metro 2040 Growth Concept and is shown in Appendix C of the <u>Urban Growth Report</u>. Table 9 then shows the net vacant land identified in step 5 as it has been reassigned to 2040 Growth Concept design categories according to the rezoning matrix. Also listed in Table 9 are the densities used to generate a new estimate of vacant land capacity. The densities used in this step, however, are not the simple densities shown in the rezoning matrix. Rather, the densities from the rezoning matrix have been increased by 17.65%. The capacity number calculated in step 9 is thus based on densities that exceed the 2040 Growth Concept assumptions by exactly that amount.

In step 10, these inflated density numbers are then deflated by an underbuild factor of 15%. This brings the density assumption back down to those used in the 2040 Growth Concept. The capacity estimate in step 10 thus represents the maximum expected vacant land capacity under 2040 densities. The capacity

[2] Zell and Associates, <u>Buildable Land Inventory Review</u>, Summer, 1995.

calculated in step 9 is not consistent with the densities assumed for the 2040 rezoning. Metro takes this approach so that the concept of underbuild can be incorporated into the analysis without having to change the densities assumed in the 2040 Growth Concept. As stated in the report, "...the yield under the Growth Concept is held constant or considered an 'effective yield'," but this approach assumes that underbuild can be effectively eliminated by rezoning at higher densities than those in the rezoning matrix.

Metro's approach operates on the assumption that the 2040 Growth Concept densities will be reached, hence the concept of "effective yield". However, it is possible that those 2040 densities will not be reached. In step 7, Metro states that underbuild, "occurs primarily because of either a lack of market support for the density or local government response to neighborhood concerns." Market forces and political factors cannot be expected to disappear. For this reason, this report defines underbuild as development at less than the targeted density. The underbuild described in part three, below, applies a discount to the effective yield densities to illustrate the possibility that these densities will not be reached.

Unlike the impression given above, the concept of underbuild is not a hypothetical construct. Metro's "Regional Underbuild Study" examined underbuild factors across jurisdictions in the UGB. This study found underbuild varying across the region, from an overbuild in Happy Valley of +27% to an underbuild in unincorporated Washington County of -62%. The underbuild factor also increases with the zoned density. The factor ranged from 4% overbuild on small parcels zoned SFR1 to -38% underbuild on large parcels zoned SFR3. As zoned densities are increased under the 2040 Growth Concept, <u>underbuild will likely be greater</u>. There are incentives built in to the 2040 process that are intended to counteract the market forces that lead to underbuild, but the incentives are unproven. These incentives also cannot address the "local government response to neighborhood concern" that Metro identifies as a contributing factor to underbuild. Even the best efforts of jurisdictions may not be able to eliminate the underbuild phenomenon.

Steps 11 and 12 of the BLCA are accepted as presented. The housing units assigned to platted lots and the reductions for physical barriers are incorporated into the capacity scenarios described in part four.

Step 13: Ramp-up density

The concept of **ramp-up** refers to the reduction in housing production not achieved as lower density development is built during the transition process from lower to higher density development over the period 1994-2001. The calculation in Step 13 assumes a linear increase in density, starting from the allowed comprehensive plan densities in 1994 and reaching the 2040 effective yield densities in 2001. Metro's methodology could be questioned on several points: the increase may not be linear, it may take more time for the transition to occur, and the effective yield densities may never be reached. However, changing assumptions about the linearity or the time frame of transition would have little impact on the overall capacity analysis, and the possibility that density targets will never be reached is incorporated in the analysis of underbuild. Therefore, the methodology used by Metro was also used in the capacity estimates below.

There is, however, a problem with the method used by Metro to calculate housing production lost during ramp-up. The appropriate ramp-up factor should compare land *under its current zoning* to the same acreage under 2040 zoning.

To give an example, the ramp up factor on the 1,925 acres[3] designated PUD in the 2040 Growth Concept should be based on the difference between current actual densities allowed and densities assumed under 2040 zoning. Only 105 acres in the UGB are currently zoned for PUDs, so the other 1,820 acres fall under some other zoning. Thus if the current zoning on this land is, hypothetically, a mixture of SFR2 and SFR3, the average maximum density is approximately 5 units per acre under current zoning rather than the 10 units per acre used in Metro's ramp-up calculation. Making this substitution in the ramp-up calculation results in a decrease of 1,600 units of capacity on land zoned PUD.

Some land, however, will move from categories with higher residential densities than they are assigned under the 2040 zoning. The overall effect of this problem may turn out to be minor, but only an accounting of current and future zoning for vacant land would allow a realistic estimate of the ramp-up effects. Applying a nominal discount to densities based on their zoning under the 2040 Growth Concept will in many cases overstate the density that would be achieved under current plans. The extent of this overstatement will not be estimated here, primarily because a comparison of current to future zoning by acreage is not available. This is, however, a methodological problem that should be addressed in the capacity analysis.

Step 14: Redevelopment

Metro defines redevelopment as the additional housing and employment capacity from new construction on parcels already considered developed. Metro's estimate of redevelopment capacity is based on an estimate of the available stock of redevelopable land. The criteria used to identify redevelopable parcels were developed as part of the 2040 planning process. These criteria were intended to estimate potential redevelopment through

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[3] See Appendix, Acreage Adjustments for breakdown of acreage after application of Zell factors. The breakdown is based on a spreadsheet provided by Stuart Todd, March 1996.

2040, but Metro considers the criteria conservative and expects the identified parcels to redevelop sooner rather than later.[4]

There are two points that raise questions concerning this estimate of redevelopment capacity. The first is the possibility that Metro's methodology overestimates redevelopment potential through 2015 because it utilizes criteria developed for the 2040 planning process. The second, and possibly more important, point is that this capacity estimate assumes the entire stock of redevelopable parcels will be redeveloped. Alternatives to that assumption are analyzed below.

It is important to note that the extent of redevelopment in the future will depend directly on increases in land value. While assumptions regarding land price are not included in the BLCA, the reliance upon redevelopment assumed in the 2040 Growth Concept implies a substantial increase in price. Redevelopment presumes that an existing land use will be "retired", implying both a demolition cost and the opportunity cost of no longer using that parcel for the previous land use. For example, redeveloping a site occupied by two single family homes into an apartment building will not just be the land cost and the construction cost, but the cost of buying out the existing two homeowners and the cost of demolishing their properties.

The feedbacks between land price and redevelopment are difficult to model, but an increasing price for land will be expected to limit development at some point. The increasing price would also tend to push development out of the UGB. One possibility is that these feedbacks would prevent land prices from rising high enough to stimulate the anticipated redevelopment.

Step 15: Infill

The definition of **infill** is the development of new housing and employment capacity on vacant land smaller than one half acre. The primary difference between Metro's estimates of redevelopment and infill capacities is that the infill estimate is based on an expected rate rather than a total stock. Metro analyzed single family building permits from September 1994 to September 1995 to estimate a current rate of infill. This rate is then applied to the full time period to calculate an expected infill capacity. The potential stock of developed land suitable for infill was also estimated, and was found to exceed the estimate of infill capacity by a factor of two to three.

To be consistent, the same methodology could be used to calculate both infill and redevelopment capacity. The capacity estimates detailed below include an estimate based on stocks and several estimates based on rates.

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[4] Communication from Stuart Todd, March 1996.

Step 16: Farm Use Assessment Acres

A similar argument regarding stock and rate can be applied to the estimate of capacity on land currently under farm use assessment. Metro's capacity estimate assumes that all of this land will be developed between now and 2015. However, it is reasonable to expect that a portion of this land will remain vacant to 2015 and beyond. The rate of conversion of this land from farm use to urban use is currently being studied by Metro.[5] The following capacity estimates consider the possibility that some land under farm use assessment will remain undeveloped in 2015.

Part III: Sensitivity Analysis

This section estimates ranges into which actual capacity and growth figures might fall given the uncertainty surrounding the capacity estimates and the growth forecast. Since no estimate or forecast is ever one hundred percent accurate, it is useful to determine how a small change in one part of the analysis affects the overall estimate of capacity and the expected housing surplus or deficit for 2015.

The sensitivity analysis is broken into two sections. The first examines the 2015 Growth Forecast and the range in which growth might be expected to fall. The second looks at the BLCA and the effect of changing the assumptions used in several of the Steps.

2015 Growth Forecast

The 2015 Growth Forecast developed three scenarios, a Moderate/Trend Scenario, a High Growth Scenario, and a Low Growth Scenario.[6] The 2015 housing capacity deficit of 4445 units projected in the BLCA is based on the Moderate/Trend (or "Medium") scenario. This sensitivity analysis looks at the difference between the high, moderate, and low scenarios, and also examines a range of plus and minus five percent around the moderate forecast (see Table 1). In addition, the assumed UGB share of regional growth and the vacancy rate were also varied (see Appendix for full results of the sensitivity analysis).

It is notable that the moderate forecast is based on a growth rate closer to the low forecast than to the high forecast; hence, it is not a "medium" forecast. If actual growth falls closer to the median of this range it would result in a significantly higher deficit in housing capacity. The forecast, however, has

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[5] BLCA, p. 24.
[6] "The 2015 Regional Forecast", Urban Growth Report, p. 6.

withstood a great deal of scrutiny and this report accepts that the moderate scenario is considered most probable. Perhaps more relevant to planning purposes is the degree of error expected in the estimates, as well as the possibility that growth will diverge from the most probable path. Every such estimate has an explicit confidence level and interval associated with it. A range of plus and minus five percent was calculated around the moderate forecast in order to simulate such a confidence interval. In addition, plans must account for uncertainty. The high and low forecasts were made presumably so that the region could prepare for divergence from the most probable scenario. Rather than picking one number from the forecast, as is done for the BLCA, it would be useful to model outcomes based on the range of forecasts, and then consider how the region might prepare for such outcomes.

Table 1:
Sensitivity of the Housing Unit Demand to Variations in the 2015 Regional Forecast of Households

FORECAST	High	Mod. +5%	Moderate	Mod. -5%	Low
Regional HH[1] Total	1,105,600	932,632	917,000	901,368	855,900
Urban HU[2] Increase: Forecast Range	359,129	235,202	224,000	212,801	180,225
HU Surplus/ (Deficit)	(135,128)	(11,200)	0	11,200	43,777
Urban HU Increase: Range with sensitivity analysis	375,778	246,105	224,000	202,888	171,829
HU Surplus/ (Deficit)	(151,777)	(22,104)	0	21,113	52,172

[1] HH = Households
[2] HU = Housing Units. Conversion: HU = HH / (1 - vacancy rate).

Buildable Lands and Capacity Analysis: Vacant Land

The next two sections test the BLCA assumptions regarding the capacity of vacant lands and additional capacity of developed lands.

The first assumption tested is the underbuild factor as described in steps 9 and 10. Rather than assuming that the effective yield densities identified by Metro will be reached, this section examines the implications of a failure to meet those density targets. The underbuild was tested at a rate of 15% and then tested at low and high rates of 12% and 18%. These underbuilt densities were then adjusted for ramp-up according to Metro's methodology (see table 2). This defines a range that might be expected if the market and political conditions will not support target densities.

Table 2:
Sensitivity of the Housing Unit Capacity to Variations in Underbuild

Underbuild factor	Vacant Land Capacity after Ramp-Up[1]	Total UGB Capacity (housing units)	Deficit/ Surplus Capacity
Metro baseline	129,895	219,555	(4,445)
12%	115,575	205,235	(18,765)
15%	111,916	201,576	(22,424)
18%	108,258	197,918	(26,082)
Varied	114,949	204,609	(19,391)

[1] Does not include units on platted lots

The underbuild factor is also examined on a differential basis. In this analysis, some densities are discounted by 25% while others are not discounted at all. The categories chosen to discount are the single family categories, on the assumption that the market may not support lot sizes as small as anticipated, and mixed-use categories, on the grounds that there is little experience with such zones and their ability to absorb the expected residential densities. The results of this analysis are also presented in table 2 as varied underbuild.

The second assumption tested under the category of vacant lands is the development of land under farm use assessment (FUA). Metro's analysis assumes that all developable FUA land will be developed by 2015. The anticipated breakdown of development on this land is presented in step 16.[7]

[7] The figures presented in the draft report will be discounted by approximately 25% to account for a conversion from gross to net land that was left out of the draft (Communication from Stuart Todd, March 1996).

This sensitivity analysis assumes that some FUA land will remain undeveloped in 2015. The analysis considers reductions to capacity that would result if 80% or 60% of the FUA land were actually developed, rather than the 100% assumed in the BLCA (see table 3).

Table 3:
Sensitivity of the Housing Unit Capacity to Variations in Farm Use Assessment Land Availability

% FUA Developed	FUA Capacity (housing units)	UGB Capacity (housing units)	HU Surplus/ (Deficit)
Metro (100%)	35,914	219,555	(4,445)
80%	28,731	212,372	(11,628)
60%	21,548	205,189	(18,811)

Buildable Lands and Capacity Analysis: Developed Land

Estimates of capacity on developed lands include redevelopment (step 14) and infill (step 15). The estimates of redevelopment and infill capacity were derived using different approaches, so in addition to sensitivity analysis, this section develops estimates that are more consistent with each other.

The redevelopment capacity estimated in step 14 assumes that all of the land identified as redevelopable will be developed, whereas the infill estimate in step 15 assumes that only a portion of the potential infill capacity identified will actually be developed, as determined by the infill rate. Table 4 below lists plan and adjusted capacity estimates for developed lands. The plan estimate includes all of the identified redevelopment capacity and all of the infill capacity reasonably expected.[8]

The adjusted estimate applies the expected rate of infill (16.8%) to both infill and redevelopment. In the case of infill, Metro 's 16.8% infill rate is multiplied against the 65% of housing demand expected to be fulfilled by single family home construction on developed land. In the case of redevelopment, the 16.8% redevelopment rate has been applied here to the total expected housing demand on developed land. Unfortunately, Metro has not conducted any studies of how much current housing development has

[8] Step 15 limits potential infill by capping the number of partitions per lot and excluding lots valued above $300,000.

been redevelopment to test this. Nevertheless, it seems unlikely that all redevelopable parcels will be redeveloped over the 20-year time period.

Table 4:
Sensitivity of the Housing Unit Capacity to Estimates of Infill and Redevelopment Capacity

	Redevelopment	Infill	Capacity on Developed Land	Vacant Land Capacity	UGB Capacity	Surplus/ (Deficit)
Plan	54,207	47,754	101,961	140,776	242,737	18,737
Adjusted	37,623	24,570	62,202	140,776	202,978	(21,022)

A sensitivity analysis of redevelopment and infill is presented in table 5. Redevelopment is tested at a rate of 15% and 20%.[9] Infill is tested at +/- 20% of the rate used in step 15.

Table 5:
Sensitivity of Housing Unit Capacity to Variations in Rate of Redevelopment and Infill

	Developed Land Capacity (housing units)	UGB Capacity (housing units)	Surplus/ (Deficit)
Redevelopment Rate:			
20.0%	69,370	210,146	(13,854)
16.8%	62,202	202,978	(21,022)
15.0%	58,170	198,946	(25,054)
Infill Rate:			
20.2%	83,691	224,467	467
16.8%	78,777	219,555	(4,445)
13.4%	73,863	214,639	(9,361)

As a final note on the sensitivity analysis, it should be mentioned that most

[9] The implied rate of redevelopment in step 14 is just under 25% (54,207 / 219,566 = .247).

of these tests result in reductions to the estimated capacity, rather than in a range of possible reductions and increases. This happens because most of the assumptions tested were already at an implied maximum. For example, there is no reason to assume that the average densities in 2015 will exceed those targeted by the 2040 Growth Concept. Another way of describing this approach is to note that most of the estimates in the BLCA are estimates of plan capacity. Given the definition of plan capacity as, "the maximum number of housing units that could theoretically be accommodated under the plan," it makes no sense to exceed the maximum. The one exception to this was the estimate of infill in step 15. There, a plan capacity was estimated, and an infill rate both higher and lower than that used in the BLCA was tested.

Part IV: Housing Unit Capacity Estimates for the UGB

This section develops capacity estimates based on different combinations of the values from the sensitivity analysis. The next section then combines these capacity estimates with figures from the 2015 Regional Forecast sensitivity analysis to illustrate the capacity surpluses or deficits that would develop under these different scenarios.

These capacity estimates should not be viewed as forecasts of what is likely to occur. They are intended to illustrate the impact of combining estimates from the sensitivity analysis in a consistent fashion. It should be noted that the adjusted capacity estimates assume there will still be some vacant land and opportunities for infill and redevelopment in 2015. However, all of the remaining vacant land will be under farm use assessment, and the most attractive opportunities for redevelopment and, especially, infill, will have been taken.

- **Plan Capacity Estimate:** The only difference between the capacity estimated in the BLCA and this estimate is the addition of 23,293 units of infill. Total capacity is then 242,848 housing units. Comparing this to the estimate of 224,000 additional housing units needed in the UGB leaves a surplus capacity of 18,750 housing units.

- **High Estimate of Adjusted Capacity:** This estimate comes closer to meeting Metro's targets and assumptions. It assumes 12% underbuild, a 20% redevelopment rate, a 20% higher rate of infill than the Metro's baseline estimate, and 80% development of farm use assessment acres. The high adjusted capacity estimate is 193,570 housing units, leaving a deficit of 30,430 units.

- **Moderate Estimate of Adjusted Capacity:** This moderate estimate incorporates some of the estimates from the various steps in the BLCA, and adjusts others to meet the definition of adjusted capacity. This estimate is intended to be as consistent with Metro's assumptions and methodology as possible while meeting the definition of adjusted capacity. This estimate assumes a 15% underbuild, a redevelopment and infill rate of 16.8%, and 80% development of farm use assessment acres. Total moderate capacity is 177,830 housing units, leaving a deficit of 46,170 units.

- **Low Estimate of Adjusted Capacity:** This estimate assumes that Metro's projections fall short by a wide margin. It assumes an 18% underbuild, 15% redevelopment rate, a 20% lower rate of infill than the moderate estimate, and 60% development of farm use assessment acres. The low adjusted capacity estimate is 158,043 housing units. This estimate leaves a deficit of 65,957 units.

Part V: Combining Capacity Estimates and the 2015 Forecast

These scenarios, as with the capacity estimates, illustrate the impact of combining results from the sensitivity analyses in a consistent manner. They demonstrate expected correlations between growth rates, densities, vacancy rates, and percentage of regional households in the UGB.

These scenarios are based on a comparison of the capacity estimates listed above to the sensitivity analysis of the 2015 regional forecast. The full range of forecast results under the sensitivity analysis are given in appendix A.

Scenario 1: Plan Capacity and High Growth.

The likelihood of plan capacity being reached, at least by 2015, seems highly remote. So, too, does the likelihood of reaching the highest growth forecast. However, if the Metro UGB comes close to reaching plan capacity it will be due at least in part to extraordinary growth pressures. A high rate of growth combined with a lower expected vacancy rate and a lower percentage of households locating in the UGB gives an estimate of demand for an additional 340,000 to 358,000 housing units, as shown in appendix A. Subtracting the plan capacity estimate of approximately 243,000, as derived in the previous section, leaves a deficit of between 97,000 and 115,000 housing units.

Scenario 2: High Adjusted Capacity and Moderate to High Growth

To reach the higher capacity estimates will likely require relatively high growth. This would be consistent with the higher moderate growth figure of about 235,000 units, or perhaps with the lower of the high-growth estimates, 340,000 units (see appendix A). Comparing these growth figures to the high estimate of adjusted capacity from part four of 193,570 leaves a deficit of between 41,000 and 146,000 units.

Scenario 3: Moderate Adjusted Capacity and Moderate Growth

If growth follows the moderate forecast predicted by Metro, this level of growth could be consistent with the moderate estimate of adjusted capacity of approximately 178,000 housing units. The need for new housing units might fall in the range between 213,000 and 235,000, depending on the percentage of households choosing to locate within the UGB. This would leave a deficit of between 35,000 and 57,000 units.

Scenario 4: Low Adjusted Capacity and Moderate to Low Growth

If densities remain low and relatively little of farm use, infill, and redevelopment capacities are realized, this would consistent with a lower rate of growth. If growth is slow, the vacancy rates and the percentage of households locating within the UGB are likely to be high. The corresponding low and moderate-low growth range falls between 180,000 and 224,000 units. Comparing this to the low estimate of adjusted capacity of 158,000 units, as developed above, equates to a deficit of 22,000 to 66,000 units.

Estimated Need for UGB Expansion

While we hesitate to label any of these scenarios as "most likely", the moderate scenario represents what we believe is a conservative projection of adjusted UGB capacity and future growth. Under this scenario, the housing unit deficit is projected to be between 35,000 and 57,000 units. This translates into a UGB expansion of 7,000 to 11,000 acres using Metro's assumptions regarding the density of development on lands added to the UGB[10]. If development were to occur at less than that density, it would require a greater expansion of the UGB.

The mix of housing assumed by Metro in calculating the capacity of new lands added to UGB may be overly dense. In particular, the assumption that 40% of the land will be developed at multifamily densities of 18 units per acre appears questionable, although this skepticism is based on our collective wisdom and experience rather than hard data. The typical pattern of development in outlying suburban areas is more predominantly single family, and what multifamily is developed tends to be at lower densities.

Metro also assumes single-family lot sizes somewhat smaller than those

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[10] Metro assumes a 50% reduction from gross to net acres on new land, and an average density of 10 units per acre based on 50% 6,200 square foot lots, 10% 4,000 square foot lots, and 40% 18 units per acre (BLCA, p. 26).

implied by the 2040 densities for SFR2 and SFR3 categories (6,200 square feet rather than 7,000 and 4,000 square feet rather than 5,200, respectively). This seems a strong assumption given the results later in this report that 62% of lots in new subdivision development in Multnomah County and 85% of lots in Clackamas County are greater than 7,000 square feet. Moreover, it seems unlikely that the fringe of the metropolitan area would develop at the same densities as inner-city Portland neighborhoods. If a somewhat lower density pattern of development is assumed, at an average density of eight rather than ten units per net acre, the projected expansion would be between 8750 and 14,250 acres.

Conclusion

Determining which, if any, of these scenarios might closely correspond to actual patterns of development is, perhaps, impossible. The most notable result is that all of the scenarios and all of the capacity estimates (except plan capacity), including Metro's, project a deficit in the number of housing units supplied compared to the number needed. This is true for the sensitivity analysis as well: failure of actual development to conform to any one of Metro's assumptions simply increases the expected deficit (with the exception of infill, where a higher than expected rate would push the capacity estimate just over the projected need). Almost any interpretation of these numbers suggests there will be a significant capacity deficit by 2015.

As with any forecast or estimate, there is considerable room for error in both the Regional Forecast and the Buildable Lands and Capacity Analysis. Rather than try to pin down one specific estimate considered most likely, this report emphasizes the uncertainty involved and the role of judgments and assumptions in generating estimates. This uncertainty should be incorporated into the planning process for the UGB just as it is in other planning processes. Developing a range of options that can be called upon when actual development diverges from projections would give Metro the flexibility to respond to changing conditions. It would also free planners from the impossible task of developing the one perfect estimate or forecast of the future. Metro needs to continue its emphasis on gathering the best possible information on which to base decisions, but Metro should also acknowledge that nothing can eliminate uncertainty from the planning process.

Analysis of Subdivision Platting and Land Requirements in Multnomah and Clackamas Counties

Introduction

An analysis of all approved subdivision plat maps approved since 1991 for Clackamas County and Multnomah County were performed. For selected jurisdictions, several indicators of land consumption and land constraints were calculated. This section of the report begins with a description of the data and sample methodology, a description of the indicators used, and an analysis of the overall trends.

Data and Sampling Methodology

The data was obtained from title company records of plat maps for all subdivisions approved since 1991 that were located inside the Urban Growth Boundary (UGB) in each of the two counties. Each subdivision's location relative to the UGB was determined by consulting local maps. Multifamily and nonresidential subdivisions were excluded, but single-family townhouses were included.

Every other subdivision in Clackamas County was sampled, implying a sample rate of 50%. For Multnomah County, every third major subdivision and every fifth minor subdivision was sampled, where a major subdivion was defined as comprising four or more residential lots. Subdivisions in Clackamas County were oversampled to ensure that sufficient observations were made to separately identify the larger number of jurisdictions in that county. Subdivisions were arranged in the files in chronological order prior to sampling, so the sample chosen should be unbiased.

The sample of major subdivisions accounted for 2,334 lots, as compared to 287 lots for the sample of minor subdivisions. Since major subdivisions dominate construction, the bias introduced by selecting a smaller proportion of the minor subdivisions is slight. The minor subdivisions have a larger average lot size than the major subdivisions, 10,481 sq. ft. versus 8,527 sq. ft., presumably reflecting the ease of maximizing the number of lots with a larger parcel. If the selected subdivisions are typical in terms of the average number of lots which they contain, the population of newly-subdivided lots in Multnomah County for 1991-95 should consist of about 7,000 large subdivision lots and about 1,400 small subdivision lots. Proportional sampling would have yielded an average lot size of 8,859, or about 120 square feet more than the figure of 8,740 reported below.

Indicators

For each subdivision, the total area (gross area) was separated into three categories.

Dedicated open space

Street area
Gross lot area

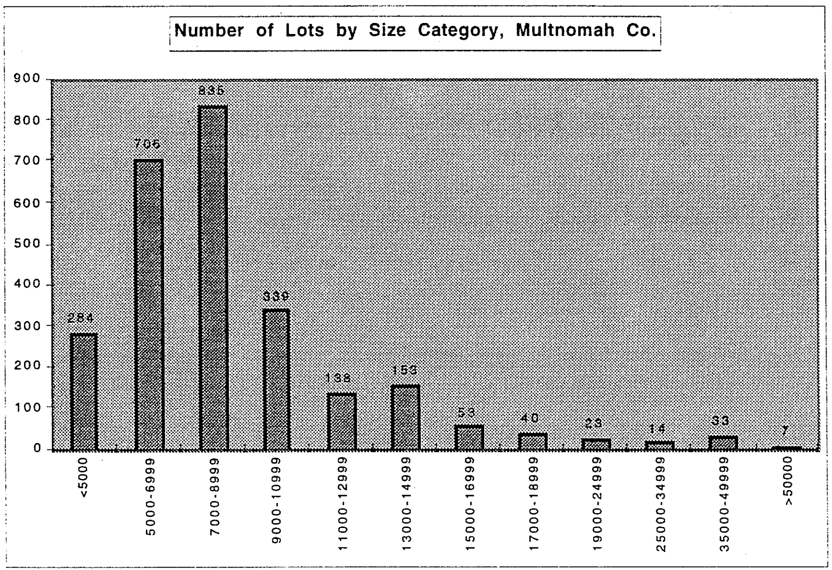
Dedicated open space includes any lot or tract which is not a portion of a buildable lot and which is left open for any reason. The following additional information was also recorded:

Number of lots.
Average lot size
Percent of lot area in easement (slope, environmental, access, utility)
Net lot area, which removed lot area placed in easements
Number of lots with slope or environmental easements
County and city jurisdiction.
Year approved, where the later date was used if two jurisdictions were involved

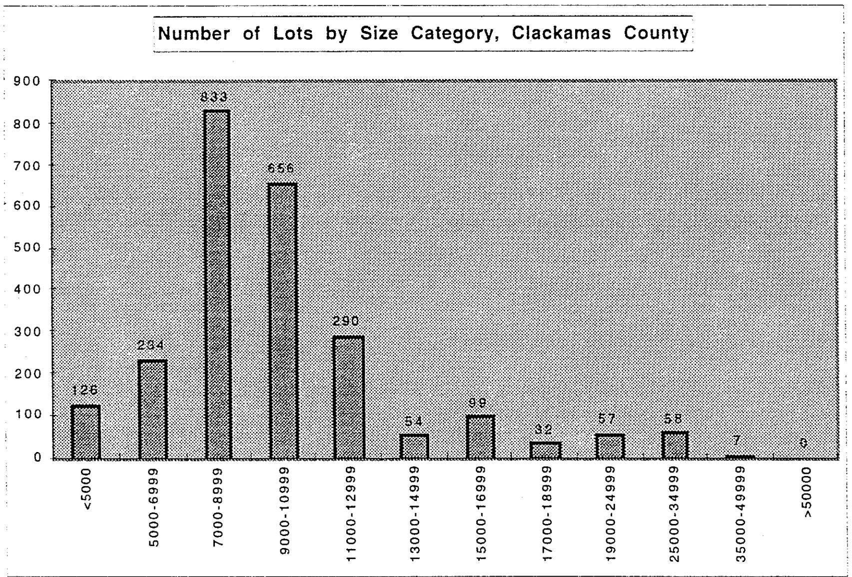
For small partition plats, average lot size was calculated directly from the listed parcel sizes. For large subdivisions, lot sizes were rounded to the nearest 1000 sq. ft. to save time. Utility easements adjacent to the right of way were not counted. Since exact sizes of easements in sq. feet are not reported on the plat maps, the percentages of area in different categories of easements are eyeball estimates. All three percentages (slope, access, and total easement) were recorded.

Analysis of Average Lot Size

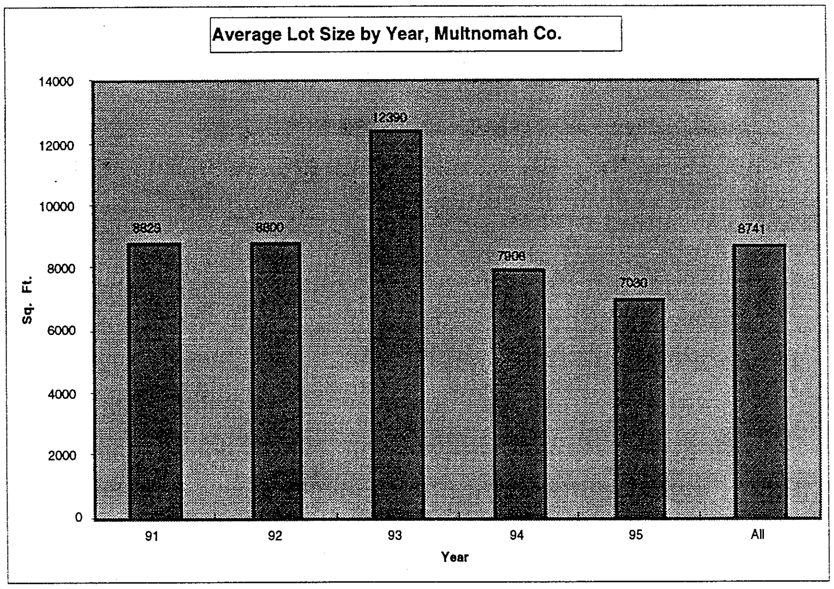
The graphs below illustrate the distribution of lots by size category for the whole 1991-95 period. The average lot size for newly platted subdivisions in Multnomah County is 8,741 square feet. The distribution can be seen as three roughly equal groups: lots less than 7,000 square feet (37.8%), lots between 7,000 and 9,000 square feet (31.8%), and lots over 9,000 square feet (30.8%).



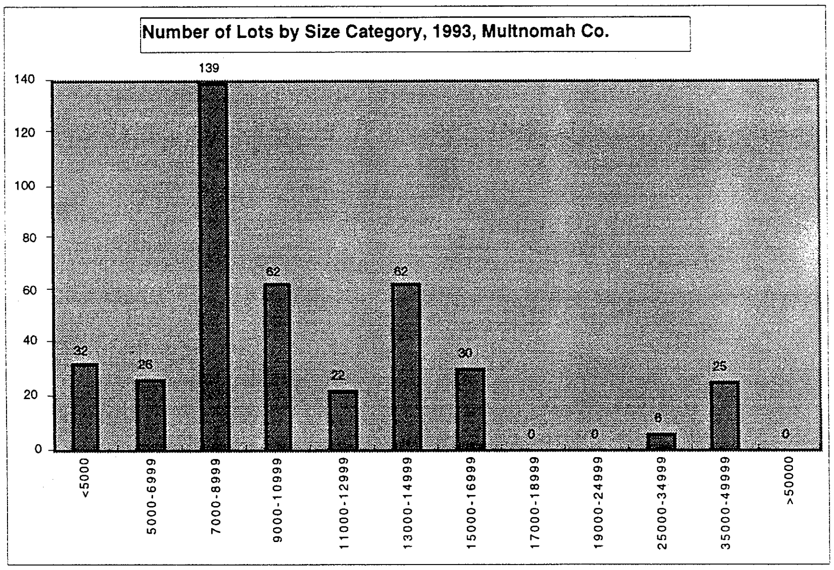
For Clackamas County, the average lot size for newly platted subdivisions is about 20% greater than for Multnomah County, 10,370 versus 8,741 square feet. As might be expected for a suburban county 51.2% of the lots in Clackamas County over 9,000 square feet, as compared to 30.8% in Multnomah County.



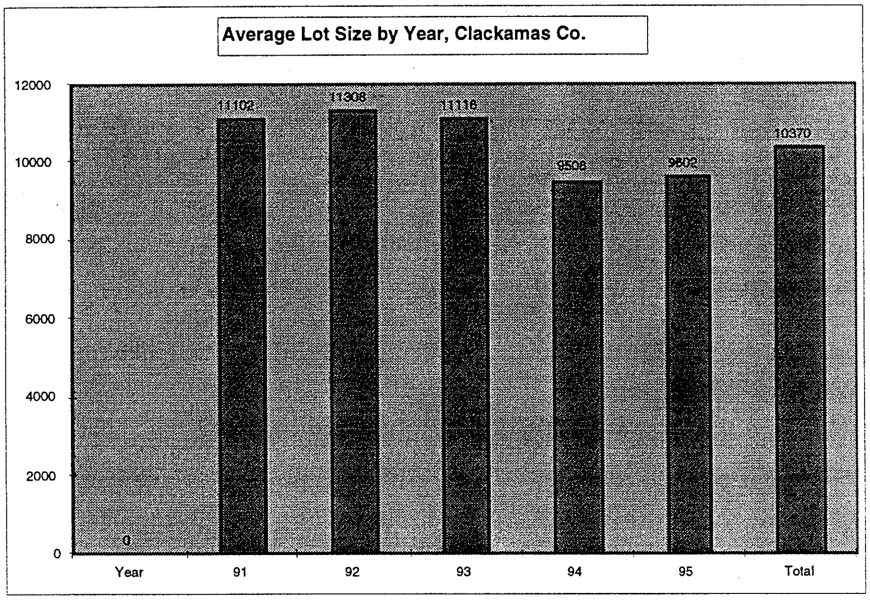
For each county, average lot sizes by year and by jurisdiction were calculated. Over the entire time period, average lot sizes appear to have declined somewhat in Multnomah County, from 8,823 square feet in 1991 to 7,030 square feet in 1995, a decline of about 20%.



The unusually high average lot size of 12,390 sq. ft. in 1993 is explained by one very large lot subdivision approved in that year. Park Ridge Estates, a development in Northwest Portland with 25 lots averaging more than 48,000 square feet each, together with a relative scarcity of small lots in that year, explains this anomaly. Removing this one development, for example, lowers the 1993 average lot size to 10,041 square feet. The graph below shows distribution of lots in 1993 among the various size ranges



Similarly for Clackamas County, average lot sizes were between 11,000 and 11,500 square feet in 1991-93 and appear to have fallen by about 15% in 1994-95. Thus, there seems to be either some response by developers and consumers to higher land prices or to planning regulations promoting smaller lot sizes.



Because plat maps do not list zoning and matching each subdivision with a location on municipal zoning maps would have been a very time-consuming and imprecise process, an underbuild study for Clackamas and Multnomah counties was not undertaken. Thus, we cannot separately identify the role of market demand and zoning constraints in this section of the study.

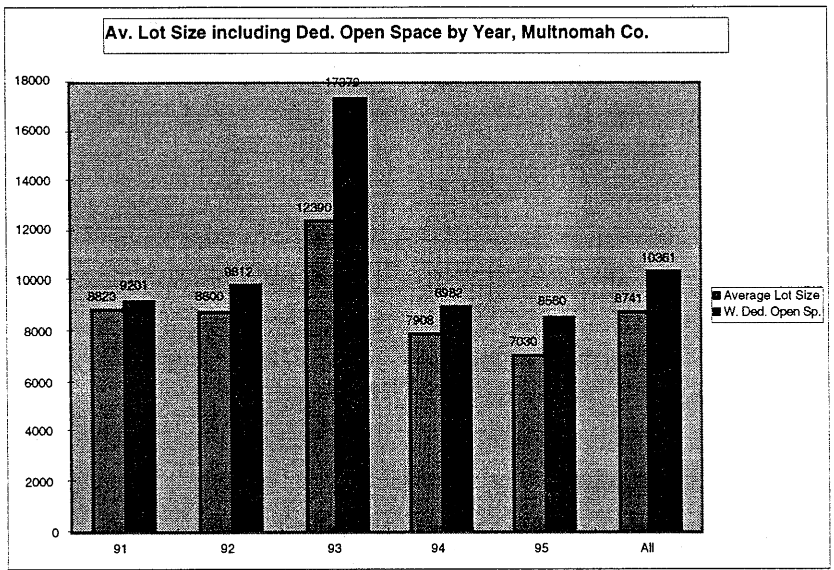
Analysis of Dedicated Open Space

To give a better indication of the land requirements for new housing development, an adjusted average lot size that included dedicated open space was calculated for each year and jurisdiction. While much dedicated open space is accounted for as wetlands, floodplain, or otherwise environmentally sensitive land, much of the open space does not appear to have any environmental constraints, but has simply been left open and deeded to the city or to the homeowners association for aesthetic purposes. Not all of the dedicated open space represents buildable land, but including common open space as if it were part of the lots gives a better indication of the land requirements per housing unit. And as the analysis of lot size, we cannot be sure whether the open space dedication represents a preference by housing consumers for park space or buffers between houses or regulatory requirements by local government.

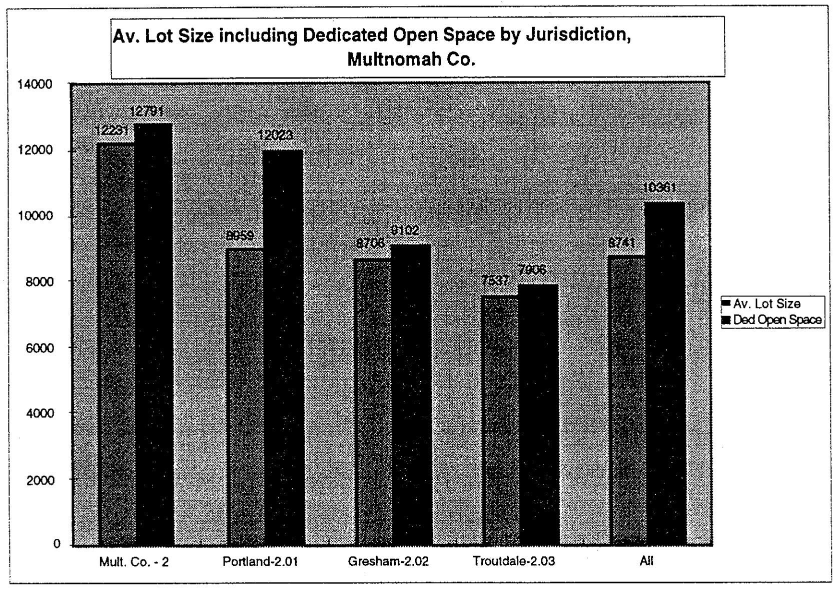
Not included in this analysis were slope, environmental, access or utility easements. Unlike dedicated open spaces, slope and environmental easements accounted for an insignificant amount of land: between 1 and 1.5% of gross area. All four types of easements together came to about 6% of gross area.

By comparison, dedicated open space added about 18.5% and 15.2% to the average lot size in Multnomah and Clackamas County, respectively. In area, adding open space raised the average lot size by 1,620 square feet in Multnomah County and by 1,575 square feet in Clackamas County.

The trends in average lot size and adjusted average lot size for Multnomah County are shown below. The amount of dedicated open space seems to have grown somewhat over the time period and reduced much of the apparent trend toward declining average lot size. The difference between the adjusted average lot size in 1991 and 1995 is only 7%, whereas not taking the dedicated open space into account suggests a decline of 20%.

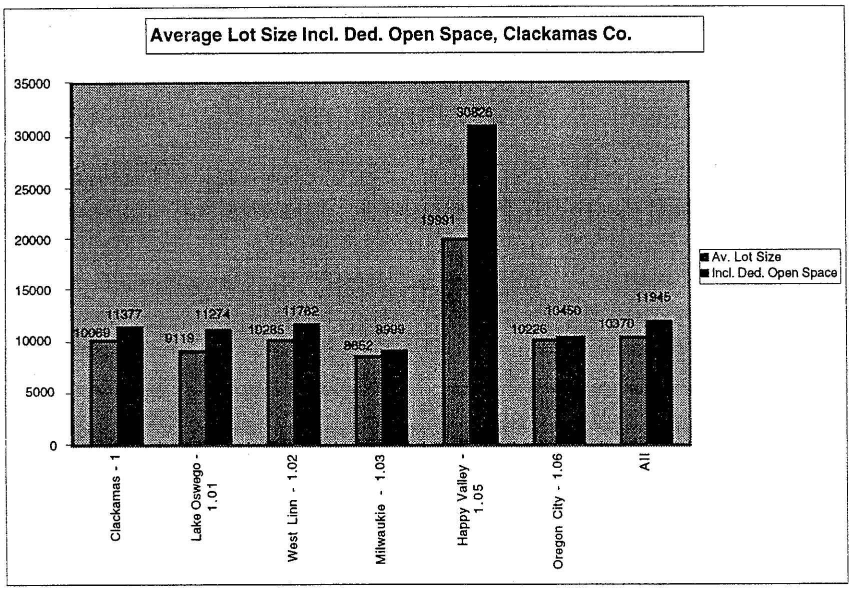


There is a great deal of variarion in the amount of dedicated open space by jurisdiction. Subdivisions in some jurisdictions have very little, whereas those in others have a great deal. Gresham, for example, has nearly the same average lot size as Portland, but much less open space. Troutdale has the smallest lot sizes both before and after including dedicated open space. Subdivisions in Portland, on the other hand, have so much dedicated open space that its average adjusted lot size approaches that of unincorporated Multnomah County.



As in Multnomah, lot sizes vary by jurisdiction, but the amount of dedicated open space varies even more. Happy Valley has both large lot sizes and a lot of open space, while Lake Oswego's relatively small lot sizes appear much larger when open space is included. On the other hand, Oregon City and Milwaukie have fairly small lots and almost no dedicated open space.

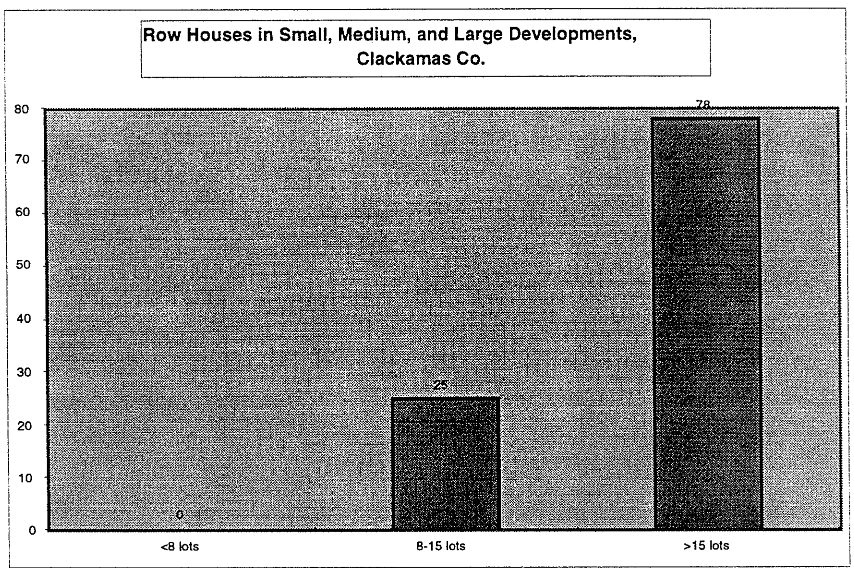
In general, there seems to be a strong correlation between community wealth, presence of slopes, average lot size and dedicated open space. Most of the large lot development and dedicated open space in the city of Portland is the result of a number of higher income West Hills developments. The presence of slopes and hills adds a view amenity. Dedicated open space may either be a local land use requirement or a consumer preference. Its purpose may be to preserve view amenties and privacy or to preserve the integrity of steep hillsides. Larger townhouse developments typically have some dedicated open space, while small-lot single-family home developments typically do not. With the exception of Lake Oswego, the largest dedicated open spaces are found where the lots are already big.



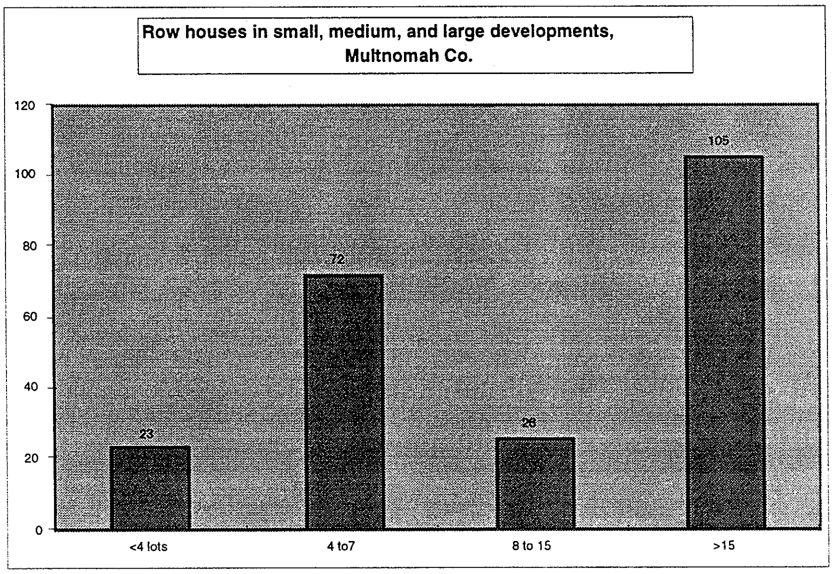
Analysis of Small Lot Development (Row Houses)

To illustrate the row house phenomenon, any development with an average lot size of less than 4000 square feet was assumed to be a row house development. Row house developments were categorized into the number of lots or units per subdivision, with 0 to 7 units being a small development, 8-15 medium size, and 16 or greater a large row house development.

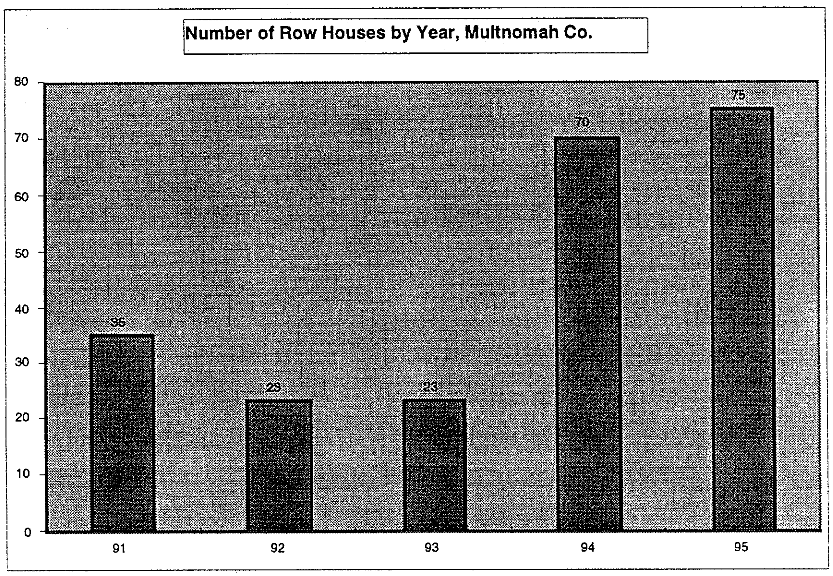
In Clackamas County all row houses were in medium or large developments. The smallest row house development in Clackamas was 10 lots.



Multnomah County had 42% of its row houses in developments of less than 8 lots. This proportion may be somewhat higher, given the sampling methods used in this study. Partition plats (which contain 3 or fewer lots) were more lightly sampled in Multnomah County than large subdivisions (which contain 4 lots or greater).



Construction of row houses is increasing over time. Clackamas has too little construction to be worth graphing, while Multnomah shows much greater construction over the last two years. The numbers reported below do not represent actual totals, only totals for the sample, so they understate the total row house construction. Finally, since lot size numbers reported earlier in this study include both row houses and single family homes, the decline reported for average lot size in 1994 and 1995 may actually reflect a shift in housing development from single family homes to row houses. Unfortunately, the plat map data for this section of the study does not give us a way of separately identifying row house development from small lot single family home development.



Summary: Gross Land Area Per Lot

Ultimately, this section is concerned with how much land is needed to create one unit of housing. The broadest measure of land requirements would be gross land area per lot, which would include both dedicated open space and street area, divided by the number of lots per subdivision.

The table below summarizes the land requirements for new developments in Clackamas County and Multnomah County between 1991-1995. Only about 72% of the land used for housing development is actually utilized as lots. Approximately 12% of the total land required is set aside as dedicated open space. An even larger amount, 16% is needed for street right of way.

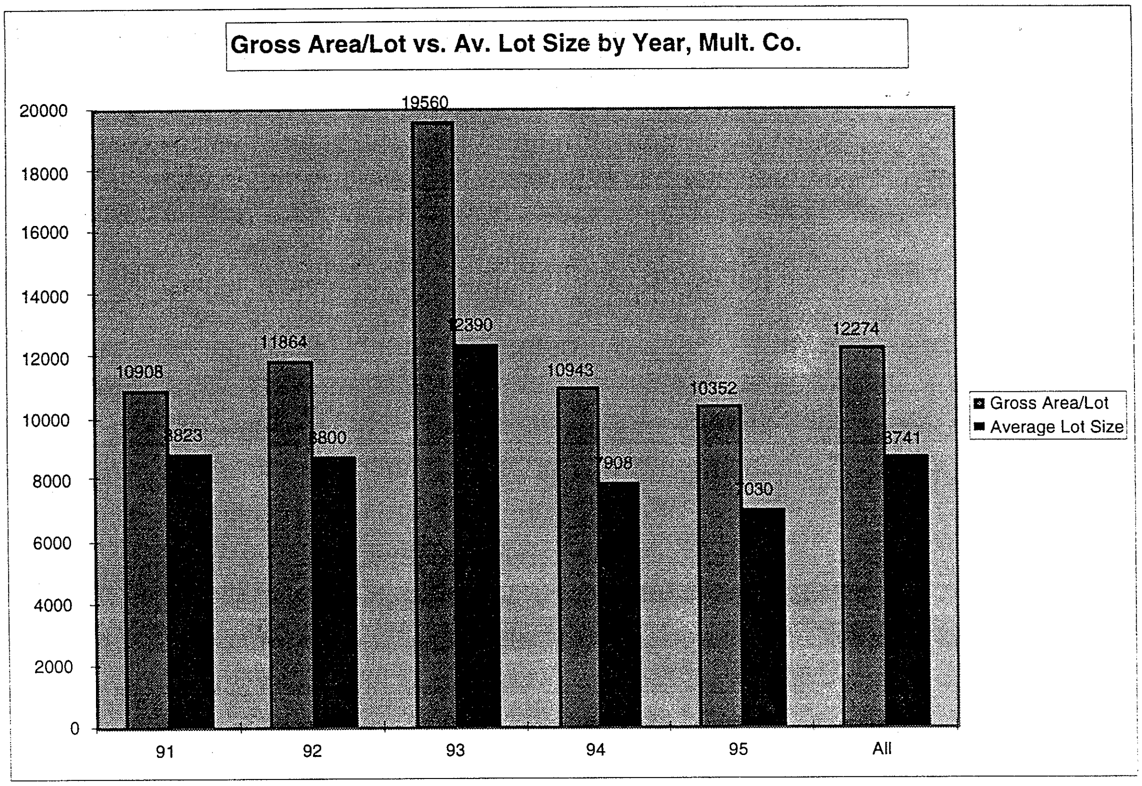
How do these figures compare to Metro's assumptions for open space and park area? The 16% estimate for street area compares favorably to Metro's numbers. Metro estimates that 22% of land for parecel's larger than one acre with a 10% reduction for land with streets adjoining parcels of less than one acre.

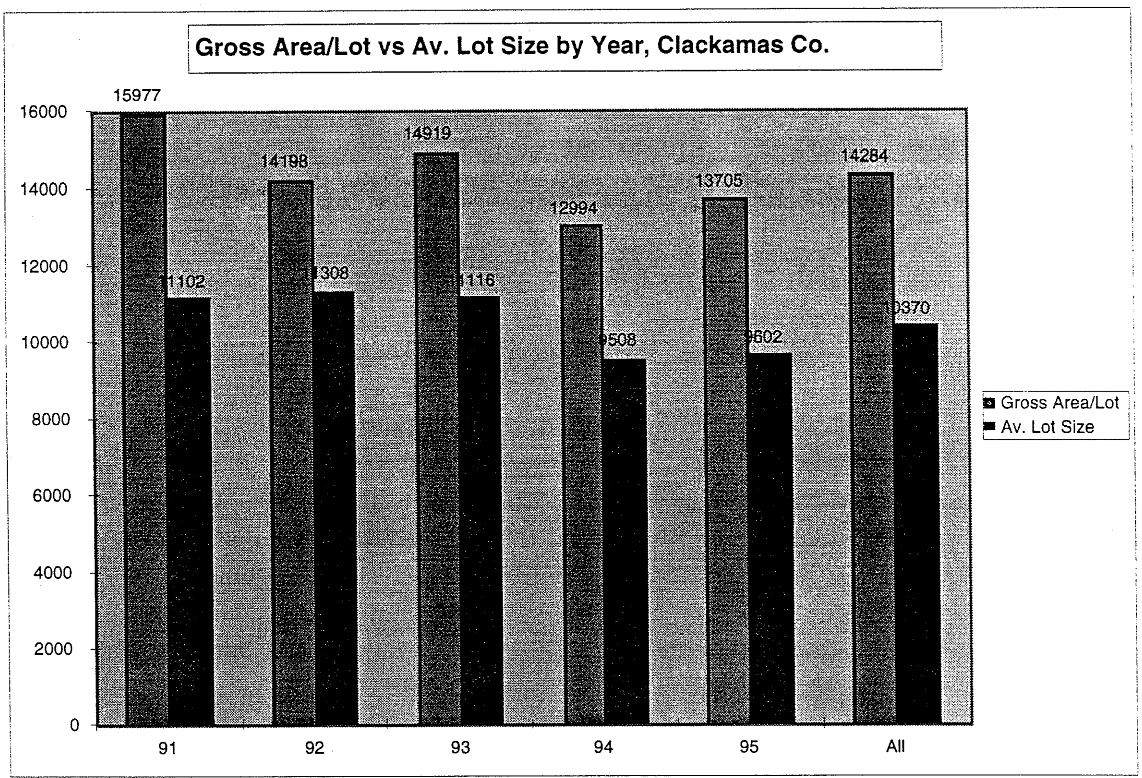
The 12% open space figure is best compared when added to the 6% estimate for slope, environmental, access and utility easements, making a total of 18%. The comparable figures in Metro's analysis are the 401 acres allocated for future parks in the vacant land supply and the "Zell Factor" reduction of 2,986 acres for slope, environmental, and the constraint of oddly-shaped lots. Those two totals amount to 17.3% of the total vacant land supply capacity for housing, 19,596 acres. The two sources are blended since dedicated open space might be municipally-owned or held by subdivisions as formal park land.

Average Land Utilized per Housing Unit, 1991-1995

	Multnomah County		Clackamas County	
	square feet	percent	square feet	percent
Housing Lot Area	8,741	71.2%	10,370	72.6%
Dedicated Open Space	1,620	13.2	1,575	11.0
Subtotal: Adjusted Housing Lot Size	10,361	84.4	11,945	83.6
Street Area	1,913	15.6	2,339	16.4
Gross Lot Size	12,274	100.0	14,284	100.0

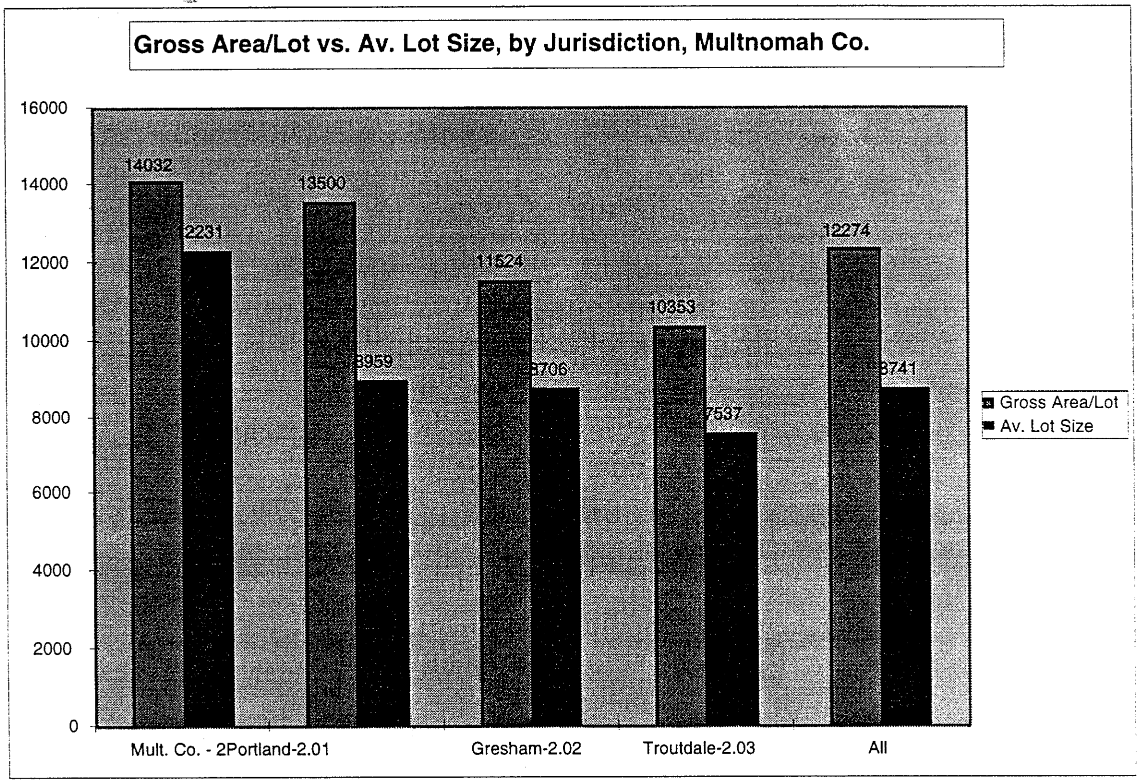
As shown below, gross land per lot has shown very little growth or reduction over the period surveyed. For Multnomah County, average gross area per lot has fluctuated between 10,000 and 12,000 square feet, with 1993 being an anomalous case. In Clackamas County, the gross amount of land per lot also shows fluctuations, although it is easier to detect a downward trend. 15,977 square feet were required in 1991, while 13,705 were needed in 1995, a reduction of 14%. The differences in these two trends may reflect a general trend toward smaller lot sizes for any given location in the metropolitan area, with a greater share of development in Multnomah County occuring in West Hills and East County areas where lot sizes tend to larger than in other parts of the county.



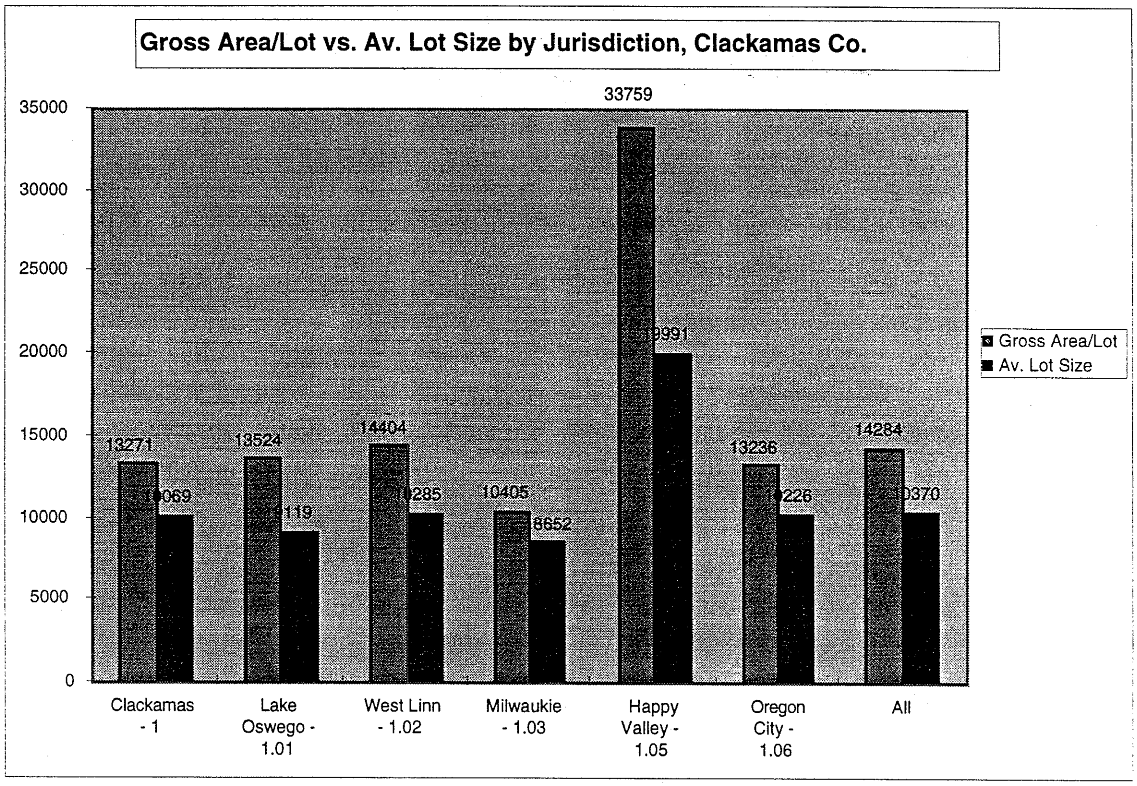


Jurisdictional patterns of land consumption are similar to those revealed in the analysis of dedicated open space. Portland uses almost as much land per lot as unincorporated

Multnomah County, despite having a smaller average lot size. Greshman and especially Troutdale use much less land per lot.



In Clackamas County, Milwaukie uses the least land per housing unit, roughly comparable to that of Troutdale in Multnomah County. Most of the other jurisdictions require close to the county average, while Happy Valley uses by far the most, at 33,579 square feet per lot. Differences in lot size and amount of dedicated open space account for most of the difference between the jurisdictions, although areas with small lots such as Troutdale use more land per lot for streets. In this sense, there is a minimum amount of street area that all subdivision developments need to allow for, regardless of the neighborhood or type of house.



Conclusions

This section of the report analyzed partition plats and subdivision plats for Clackamas and Multnomah County from 1991 to 1995. There were trends towards smaller lot sizes in both counties over the time period analyzed. Much of the trend towards smaller lots was mitigated by increases in open space and street area uses, particularly for Multnomah County. Some of this trend may be explained by increased amounts of row house development, particularly in Multnomah County.

Street area required approximately 16% of the land area used for these subdivisions, while dedicated open space required 12%. The remaining 72% of the land area reflected actual housing lots. And of that 72%, a further 6% is set aside as easements for slope, environmental, access, or utility purposes.

This section of the study was not designed to match these space requirements to legal requirements, so that the levels and percentages of area allocated to streets and open space cannot be assigned to either local government regulation or market demand. However, this does establish amounts of space being used by these developments.

Analysis of Recent Subdivision Activity and Zoning in Washington and Clark Counties

Introduction

An analysis of single-family, subdivision activity since 1990 in Clark County, Washington and Washington County, Oregon was performed. For selected jurisdictions in these counties, several indicators of land consumption were calculated. This section of the report begins with a description of the data and methodology, the indicators used, and an analysis of the overall trends and similarities between the two counties.

Data and Methodology

Data sets supplied by the two counties described jurisdictional boundaries, subdivision names, starting date, zoning and parcel level information. The analysis was performed in ArcView 2.1, a Geographic Information System (GIS) program for desktop computers. The general procedure for the analysis is as follows.

(1) Select all records that represent a single family detached housing subdivision from the subdivision data set.
(2) For each of the selected subdivisions, find all the parcels that are contained in them from the parcel data set.
3) Analyze the selected data by the land consumption indicators.

Due to the way taxlots are recorded, the data set is not complete for 1995, only the first half of years data on new construction is available. While this will effect all of the indicators, the build-out ratio will be impacted the most, as it depends on what has been built, not just what is planned to be built.

Indicators

Subdivisions of single family detached housing started after 1990 located inside the Urban Growth Boundary in Washington County, or within an Urban Growth Area in Clark county were chosen for analysis. We assumed that 1990 marked the beginning of the current upswing in the metropolitan housing market. The indicators chosen were average lot size, the distribution of lots sizes, the build-out ratio, and the net acres.

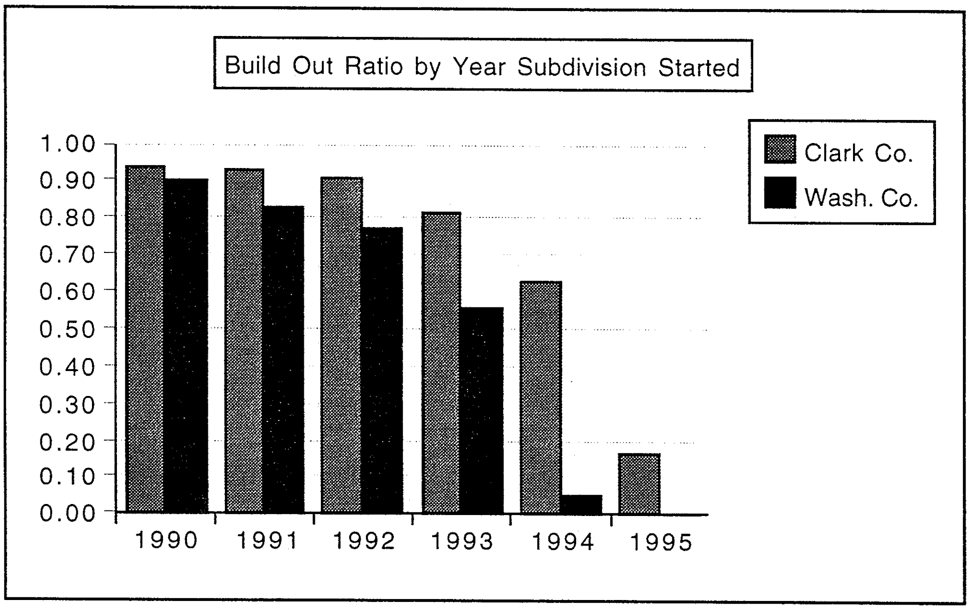
<u>Average lot size by zoning code</u> shows what developers are building in response to regulations, land prices, and perceived market demand. For future changes in zoning regulations, this could provide insight into the relationship of actual land use relative to the minimum lot size specified by the zoning.

Distribution of lot sizes by jurisdiction shows the number of lots that were constructed during the study period in several size ranges and provides an estimate of land consumption. By multiplying the number of lots within a lot size range by the upper value of that range, an upper boundary for land use is obtained. Summarizing the values for all ranges will give an estimate of the amount of land consumed in the study period for each jurisdiction.

Build-out ratio is the percentage of subdivision lots with houses already constructed. The ratio reveals the rate that new subdivisions are being built, and what is being consumed by the public. A ratio of 1 says that the subdivision has built all its lots and likely found buyers for all of them as well. Low build-out ratios might suggest that Metro's expectation that platted lots would be fully utilized is inaccurate

Analysis of Build-out Ratios

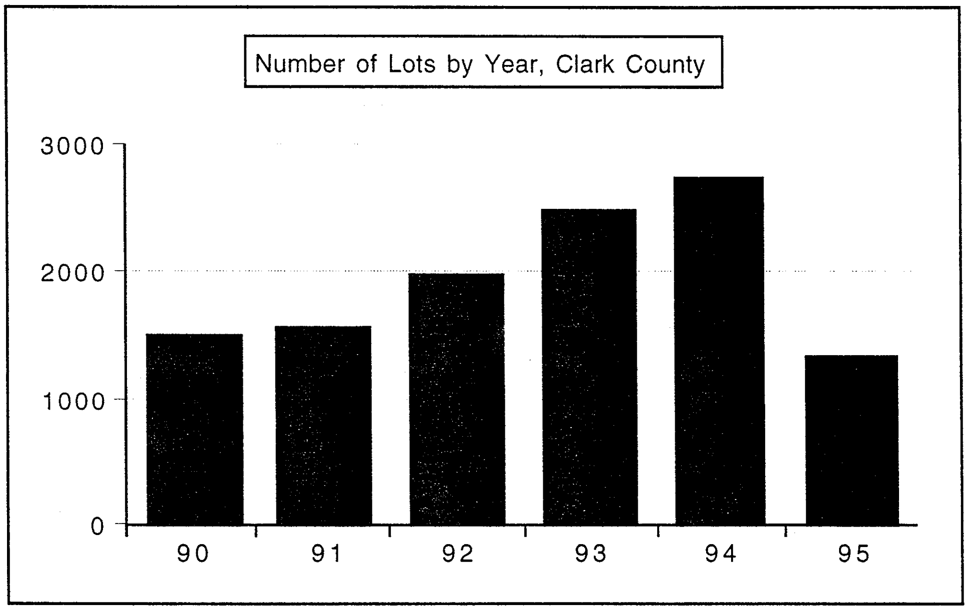
As expected, the build-out ratio shows that newer subdivisions are more likely to have unbuilt lots than older ones. Of the two counties, Clark County consistently shows a higher build-out ratio.



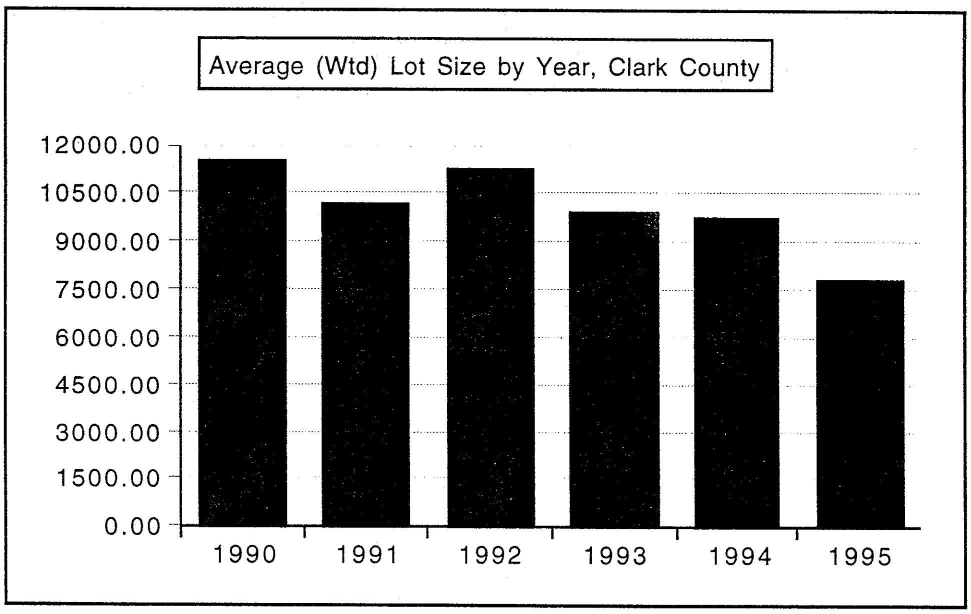
The lower values for Washington County can be partially explained by the way subdivisions are recorded in the data and the way they were analyzed. The County's data listed subdivision name, date recorded, jurisdiction and number of lots. While different phases of a subdivision are shown with this data, the data file that has subdivision area shows only the complete subdivision, not the area of each phase. Because of that, the phases of a development were aggregated using the first recording date as the recording date for the subdivision as a whole. This means that if a subdivision was started in 1992, all the phases of that subdivision would be recorded under 1992, even if the phase was platted and construction started in 1994. This will reduce the build-out ratio for 1992, as it will consider not just the lots platted and constructed in 1992, but the lots platted and not constructed in 1994. We conclude Metro's assumption that platted lots will be fully utilized over the 20-year planning period is probably correct.

Analysis of Lot Sizes in Clark County

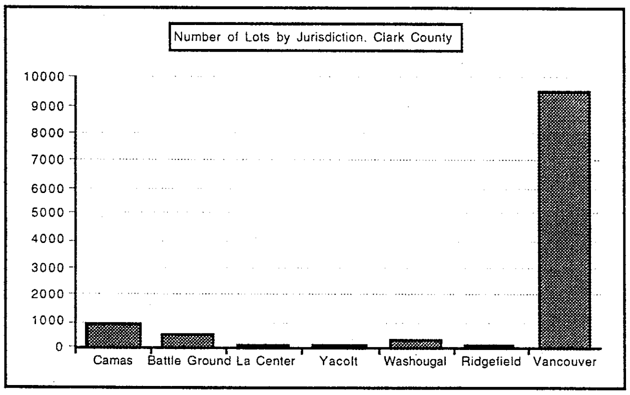
The data below shows that about 2,000 lots per year were developed in Clark County between 1990-95. The number of lots per year was fairly constant for the first three years, then experienced a sharp upturn in 1993. Assuming that the second half of 1995 has the same profile as the first half, we expect that 1995 will have similar characteristics to 1993 and 1994.



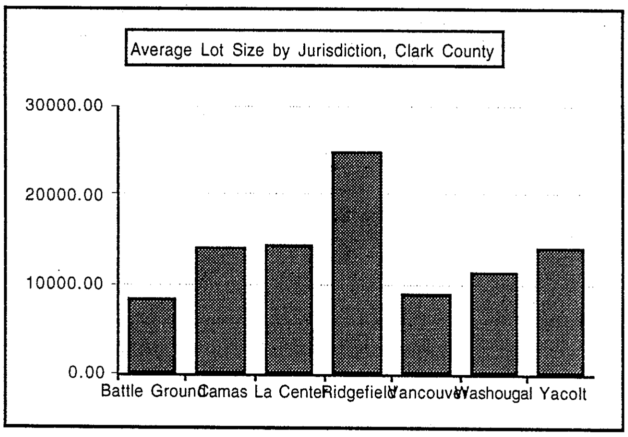
While the number of lots developed increased in 1993, that year also marked a reduction in the average size of lots. This resulted in a reduction in net acres consumed for 1994. The average lot size fell from 11,000 square feet in 1992 to 9,000 square feet in 1994. The partial data for 1995 shows the average lot to be slightly more than 7,000 square feet. Hence, the data from Clark County provides evidence that rising land prices and rapid development encourages smaller lot sizes.



We can also examine the number of lots developed by jurisdiction. As the data below indicates, the overwhelming majority of the lots developed were in Vancouver.



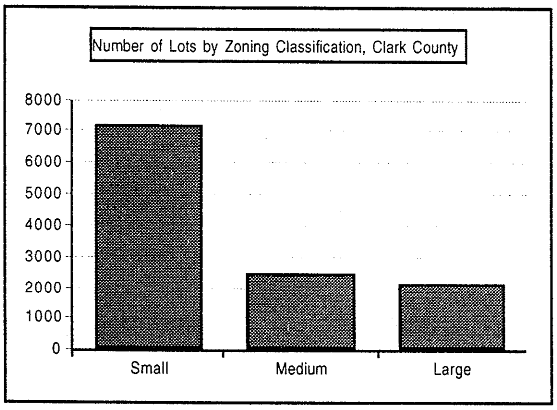
In terms of average lot size, Battle Ground and Vancouver have the smallest lots, with the rest of the jurisdictions averaging over 10,000 square feet. Hence, as more development starts to occur outside of Vancouver, there my be a relative increase in lot size.

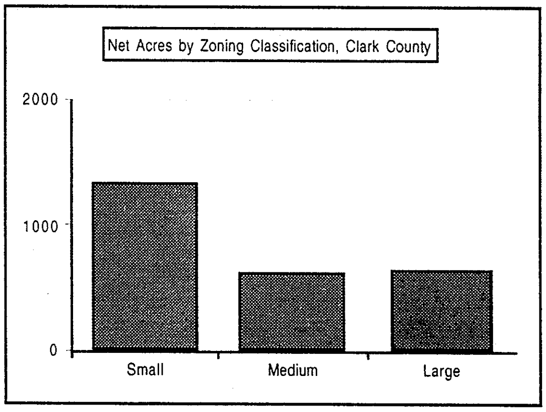


Analysis of Lot Sizes and Zoning in Clark County

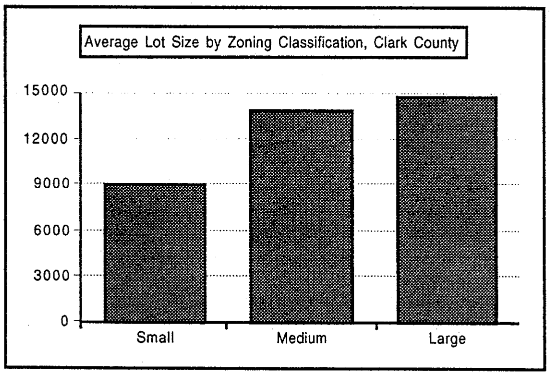
A further way to analyze lot size is to compare average lot size to the density permitted by zoning classification. We have divided the zoning classifications for Clark County into three categories:

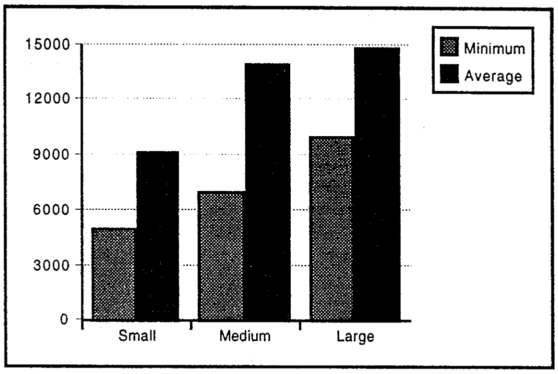
* Small: 5000 to 7000 square feet
* Medium: 7001 to 10000 square feet
* Large: 10001 to 40000 square feet





Most subdivision lots were developed in small lot (high density) zoned areas. The medium and large lot zoned areas amounted to about half the land area developed for single family homes, but only about 40% of the lots.

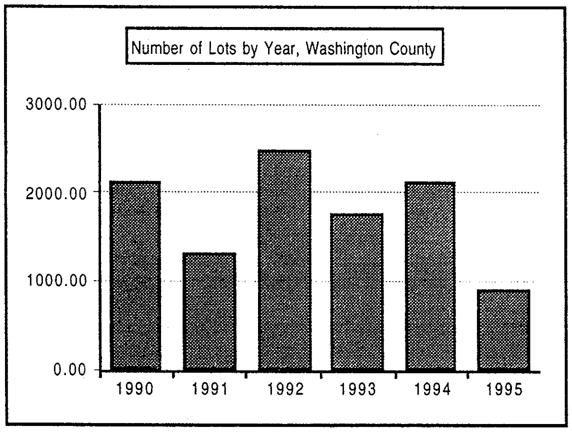




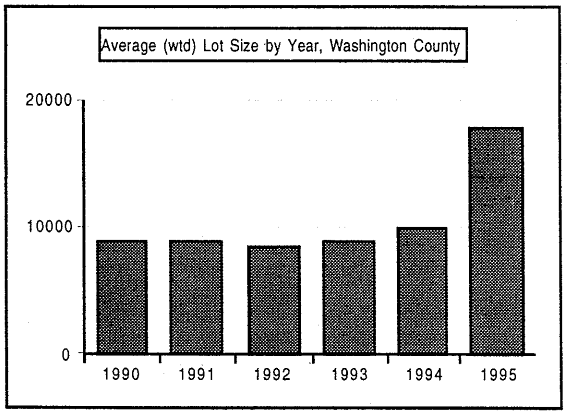
As expected, the average lot size for the small zoning classification is less than for the medium or large categories. However, for the small and medium categories, the average lot size is well above the top of the range of the zoning category. In the small-lot zoning category, for example, where the minimum lot size is between 5,000 to 7,000 square feet, the average lot size is actually 9,000 square feet. Hence, the reduction in lot sizes seems to date to be more a response to market forces than to zoning minimums.

Analysis of Average Lot Sizes in Washington County

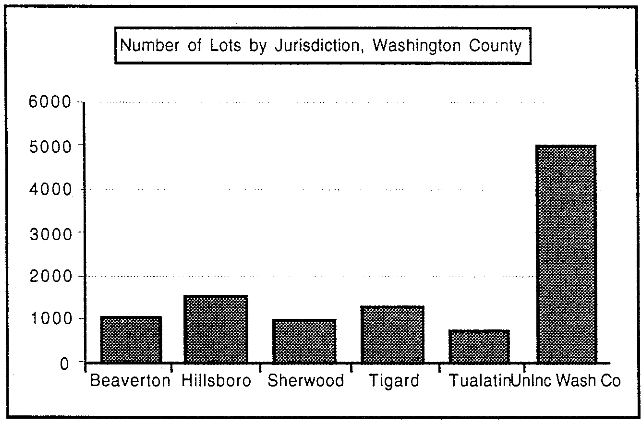
The production of new lots in Washington County was highly variable during the study period. The number of lots produced each year varied from 2,500 lots in 1992 to 1,300 lots in 1991, with no clear trend. Again, the data for 1995 is incomplete.



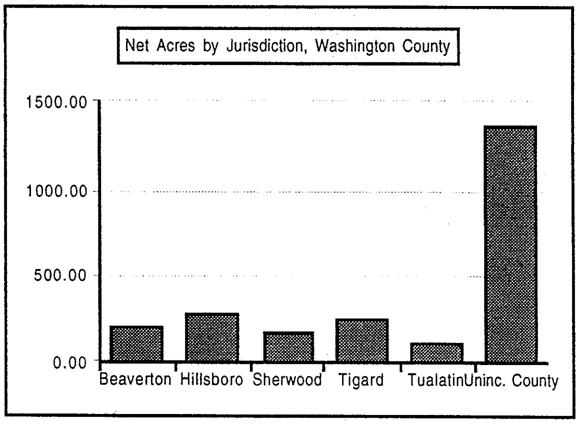
Average lot size has stayed fairly constant at about 9,000 square feet, at least until 1995. Again, the small amount of data for 1995 may explain this increase. And as will be shown in the next set of graphs, the dominating force in Washington County is the unincorporated areas. To a large extent, the yearly production characteristics in the unincorporated sections define the overall picture of the county will look like.



When looking at the jurisdiction of the subdivision location, the unincorporated areas of Washington County attract the largest share of new development. Of the incorporated areas, the largest number of lots were developed in Hillsboro, Tigard, and Beaverton, respectively.



Average lot sizes for subdivision developments tended to be somewhat smaller for the incorporated areas, averaging 8,500 square feet, while the unincorporated area of Washington County had an average lot size of 11,500 square feet. Hillsboro, the jurisdiction located furthest from the center of the metropolitan area, had the largest average lot size of the incorporated jurisdictions.

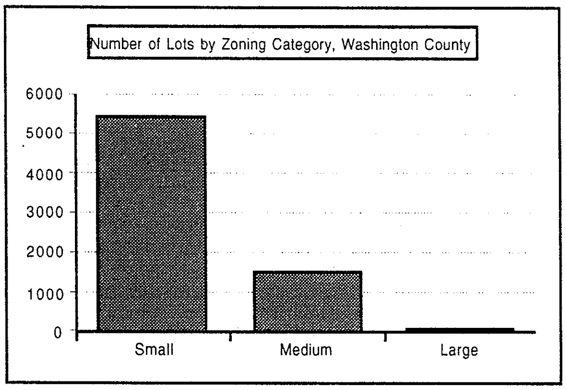


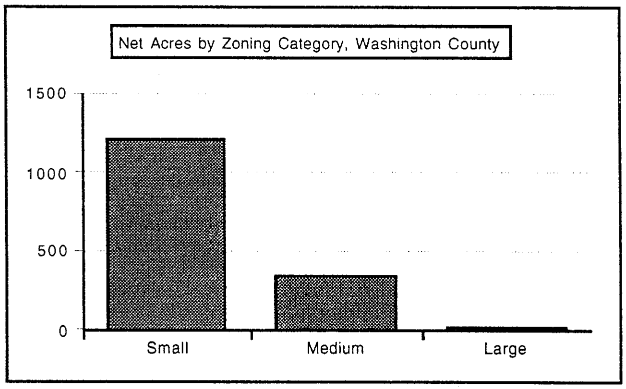
Analysis of Lot Sizes and Zoning in Washington County

As we did for Clark County, the subdivisions are categorized according to the density allowed by zoning. Again, the minimum lot size for the three categories are summarized as follows:

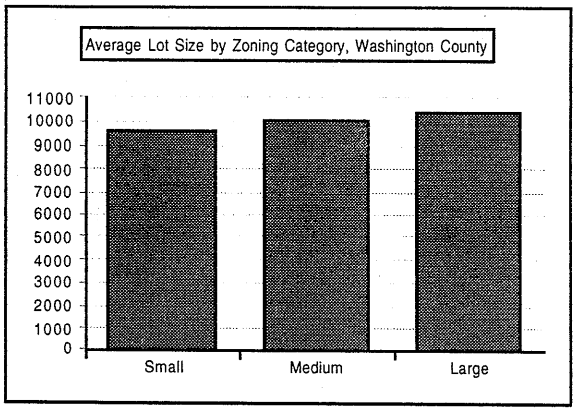
* Small:	5000 to 7000 square feet
* Medium:	7001 to 10000 square feet
* Large:	10001 to 40000 square feet

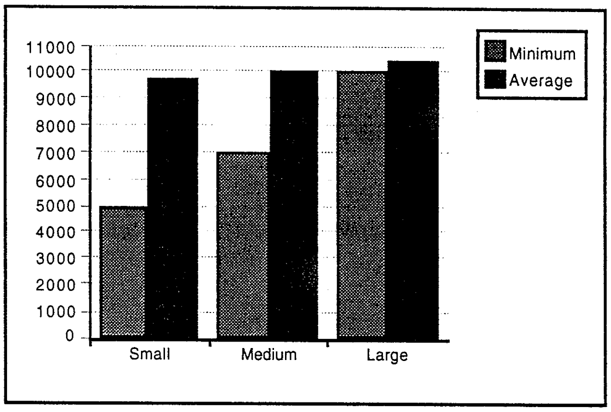
We note that some areas in Washington County are zoned for smaller minimum lot sizes than 5,000 square feet and are not included in the analysis below. For that reason, the values for number of lots and net acres will not equal the values given in the previous graphs.





Unlike Clark County, large lot zoning essentially does not exist in Washington County. Roughly 80% of the subdivision land and 75% of the subdivison lots that were developed in Washington County were on land zoned for small lots, 5000 to 7000 square feet.





However, the average lot size is practically the same for the three zoning categories, with the three categories having average lot sizes of 9,500, 10,000, and 10,500, respectively. As the graph above right shows, while the average lot size in the large zoning category is just over the minimum, for the small zoning category it is almost double the minimum. Note also that the average lot size for land zoned for small lots is essentially the same in Washington County and in Clark County. The main difference in lot sizes between the two counties occurs in the medium and large lot size categories.

Conclusion

This study has presented a number of indicators of land consumption, showing the effect of recent subdivision activity in Clark and Washington counties. The results have shown that developers are building on lots that are larger than the minimum specified by the zoning code. The study found that although subdivisions were largely built out in three to four years, even after six years 5-10% of the lots platted in single-family subdivisions were undeveloped.

For Clark County, Washington, average lot size has declined during the study period, while Washington County has seen average lot sizes stay fairly constant, except for 1995, for which the data is incomplete. In both counties, the majority of the lots produced since 1990 were in areas zoned for small minimum lot sizes. But this had little effect on final lot size. For developers in both Washington and Clark Counties, 9,000 to 10,000 square foot lots were the most common lot sizes, even when the zoning permitted much smaller lots.

These results have a bearing on deciding the extent to which the Urban Growth Boundary should be expanded. The "oversizing" of lots relative to minimum lot sizes means that for a given number of households, more land will be needed to house them, than minimum lot size would indicate. If the future regulations just specify smaller minimum lot sizes without incentives for developers to build at these higher densities, these past trends are expected to continue.

Market Based UGB Expansion Process

Introduction

Oregon Statewide Planning Goal 14 lists seven factors to be considered for changes in the urban growth boundary. Number four is "Maximum efficiency of land uses within and on the fringe of the existing area." Economic theory provides for some guidance on how the maximum efficiency goal can be met.

Demand and Supply of Land For Urban Uses

We can separate the factors that affect the demand for urban land from the factors that affect the supply of land to urban uses. The aggregate demand for urban land is determined largely by the growth of the urban area, but this growth will generate differential demand for specific parcels. Land that is near other desirable urban uses will be more attractive for urban development than land that is not. Further, characteristics of specific parcels will affect their usefulness in urban applications. These include the ability to build on the land, with important consideration of the slope of the land, its potential for flooding, and many other characteristics. Hence, each parcel will have a value based on the value of the developed land in urban uses and the difficulty of developing the land for these uses.

The supply of land for urban uses depends to a large extent on the value of land in other uses. Land that is very valuable for farming or that is valued for historical purposes will have to receive a high price to convert it to another use, but land that is not very productive nor suitable for other uses will be offered for low prices. Further, the cost and availability of public infrastructure affect the feasibility of converting land to urban uses. While the cost of such conversion does not enter directly into the private decision, the timing of infrastructure development and the availability of key services have an important impact on the ability to develop land for urban uses.

As the demand for urban land increases over time, market forces provide some incentive for efficient development. Without restrictions on development, land that has the greatest increase in value when it is converted to urban uses will typically be converted first. This means that land with little non-urban value may still not be converted because it has little urban value while land with high non-urban value may still be converted because of its very high urban value. In general, it is the difference in value between the urban and non-urban uses that determines development. For example, steep slopes are difficult to develop, and they are typically among the last parcels in an area to be developed even though they have limited value in alternative uses. On the other hand, productive farmland may be converted if its value in urban uses is also very high. Often, the same characteristics that make land good for farming make it attractive for building, e.g., level ground.

Impact of Urban Growth Boundary

There seems to be a tendency in the boundary expansion discussion to treat all land within the urban growth boundary as having the same value for urban uses, but this is clearly not correct. Some land is closer to desirable locations (proximity) than other land, and it may be easier to develop and serve with urban infrastructure. However, restrictions generated by the urban growth boundary have increased the value of all land in urban uses. Hence, almost any land will have a large increase in value if included inside the boundary, but not all land is equally efficient in terms of addition to urbanizable land. The most efficient expansion will take account of the difference in value between current uses and urban uses.

An example may be helpful. If two parcels are equally suitable for residential development, but one is near a rapidly expanding employment center while the other is far from employment opportunities and not well served by transportation options, then the value of the property near the rapid employment growth is likely to exceed the value for urban use of the more isolated land. Alternatively, two parcels equally proximate to the employment growth may have very different characteristics. One may be relatively flat with good drainage while the other is on a steep grade with no stable base. These characteristics affect the efficiency of including land in the urban growth boundary. With the price differential created by the urban growth boundary, owners of each parcel may want them to be classified as urbanizable; however, efficiency would be served by picking the one with the greatest increase in value over the value in its current use. This increase will also depend on the cost of providing publicly financed infrastructure to the various sites.

Identifying the Most Efficient Additions

One method to achieve the efficiency impact of market orientation toward land development would be to have the existing land owners bid on how much they would be willing to pay to get their land included in the boundary expansion. Those who have land that would be valuable in urban uses and less valuable in non-urban uses would have an incentive to bid the most for the chance to be included in the urban boundary. Those parcels that are either not very valuable for urban uses or with valuable alternative uses would generate low bids.

The problem with this mechanism is that each parcel can not be developed in isolation. Rather, groups of contiguous parcels owned by different people must be included together. Hence, owners of individual parcels might find it in their best interest to bid less than it would be worth to them to change use in the hopes that other bidders will bid enough to get the whole set of parcels included. These actions distort the information needed to get the parcels with the greatest net addition incorporated into the boundary expansion.

A second problem arises because the individual land owner does not take account of the full cost of providing needed infrastructure to meet the demands of the users of the newly developed property. Hence, other taxpayers may be required to pay part of the cost of building new schools and providing certain other infrastructure. Since this cost can vary depending on a variety of circumstances, the land for which the owners would bid the most may not be the land that would most efficiently be included inside the boundary.

Examples of differences in infrastructure development cost include items like roads and schools as well as capacity improvements that might be needed for water and sewer systems. Some areas may have excess capacity or lower cost of expansion of this infrastructure relative to other areas. The public sector cost should be part of the decision process.

Using Land Value Information

Both information on efficiency improvement and the public cost of development could be roughly incorporated into the expansion decision process by the following procedure. Estimates of the value of land in its current uses would be compared to estimates of its value in urban uses. The estimate of value in current uses can typically be generated from assessed value records of the county assessor. Some property will not be assessed at market value and adjustments will have to be made for the value of such property. The estimate of value for urban uses can be approximated by the value of similar land just inside the urban growth boundary. Estimates of the cost of providing major infrastructure improvements should be provided by the appropriate public agencies. This process would ensure that land included in the expansion contributes to the urban uses while not taking land that is relatively more valuable in non-urban uses.

Financing Required Infrastructure

Any expansion of the urban growth boundary will generate an increase in value for the land whose status is changed. It has been proposed that the owners of this land be subject to a charge to reflect the increased value ["Let's tax the profits from urban growth," by Richard H. Carson, Oregon Planners Journal (November 1995), p. 8]. While this suggestion was intended to capture some of the windfall associated with the change in value, both equity and public finance principles may be well served by having the new districts pay a substantial part of the cost of providing urban infrastructure. Under current financing, there appears to be a tendency to under-finance the infrastructure needed to accommodate growth. Increasing taxes on existing property to pay for expansion of urban infrastructure also creates additional pressure for new development rather than redevelopment. There are a variety of mechanisms that could be used to impose more of the cost of such infrastructure development on the owners of the newly developed property, but the one that appears most consistent with current laws and constitutional constraints would be the use of development impact fees. Impact fees are charges levied on development to recover part of the cost of needed off-site public infrastructure development. They are authorized in Oregon for most uses other than school construction, but they are not utilized as much as in many other states.

Impact fees in Oregon are not utilized to cover substantial amounts of the cost of new infrastructure. For example, Washington County has a traffic impact fee that is estimated to generate less than twenty-five percent of the cost of providing new road capacity associated with new development, and impact fees for construction of new schools are prohibited. Clearly, new development should be given credit for taxes that will be paid for existing infrastructure, such as taxes that will contribute to paying off existing school construction bonds; but there is room for much more emphasis on impact fees.

By tying the cost of new infrastructure into the development process, the impact fee approach would create a financial incentive to slow the pace of new fringe development. This would be coupled with the equity of having the recipients of the windfall associated with being brought into the urban growth boundary contribute to the services needed to develop the property. Further, properly specified impact fees can create incentives to minimize the impact that development has on the infrastructure needed. For example, traffic impact fees could be lower for residential developments that focus more on mass transit than automobile use.

Appendix A:
Sensitivity Analysis of the 2015 Regional Forecast

2015 Regional Forecast

	2040			
	Base Case	High	Medium	Low
1994	604,358			
1995	608,328	636,000	634,400	633,800
2015	849,235	1,105,600	917,000	855,900

The figures from the 2015 Regional Forecast are shown here for reference. The moderate forecast (referred to here as "medium") is used by Metro as the yardstick to measure the adequacy of UGB capacity.

2015 Regional Forecast:
Range of Analysis

	High	Med + 5%	Medium	Med - 5%	Low
2015	1,105,600	932,632	917,000	901,368	855,900
1994 Base	604,358	604,358	604,358	604,358	604,358
Difference	501,242	328,274	312,642	297,010	251,542

Where the medium range represents the baseline figures for Metro's Capacity Analysis.

The range of analysis shown here demonstrates the wide range in estimates of population growth. The sensitivity analysis shown here varies the expected population increase of 312,642 by five percent.

Urban Household Increase
by Expected Percent Urban

Expected			Urban		
% Urban			(Difference * % Urban)		
Base - 5% (66.5%)	333,326	218,302	207,907	197,512	167,275
Baseline (70%)	350,869	229,792	218,849	207,907	176,079
Base + 5% (73.5%)	368,413	241,281	229,792	218,302	184,883

Where 218,849 represents the baseline figures for Metro's Capacity Analysis.

The expected percent urban is used by Metro to determine what portion of the regional growth will occur within the UGB. Metro assumes that 70% of growth will occur in the UGB. A higher percentage implies that more growth occurs in the UGB than expected, while the lower percentage assigns more growth outside of the UGB.

Urban Dwelling Unit Increase:
Expected Percent Urban
by
Expected Vacancy Rate

Expected Vacancy Rate	High	Med + 5%	Medium	Med - 5%	Low	Expected % Urban
Base + 15% (2.65%)	342,400	224,245	213,566	202,888	171,829	
Baseline (2.3%)	341,173	223,441	212,801	202,161	171,213	(66.5%)
Base - 15% (1.96%)	339,990	222,667	212,063	201,460	170,620	
(2.65%)	360,421	236,047	224,807	213,566	180,873	
(2.3)	359,129	235,202	224,001	212,801	180,225	(70%)
(1.96%)	357,884	234,386	223,225	212,063	179,600	
(2.65%)	378,442	247,849	236,047	224,245	189,916	
(2.3)	377,086	246,962	235,202	223,441	189,236	(73.5%)
(1.96%)	375,778	246,105	234,386	222,667	188,580	

Where 224,001 represents the baseline figures for Metro's Capacity Analysis

The final table shows the effect of varying the estimated vacancy rate of housing units in the UGB. The rate used by Metro is a blended rate that assumes 1% vacancy for owned units and 5% vacancy for rentals. The 2.3% rate assumes a 2:1 ratio of owned to rented units. The higher vacancy rates shown here correspond to a larger proportion of rental units while the lower rates imply a larger proportion of owned units, compared to Metro's assumption.

Appendix B:
Sensitivity Analysis of the Buildable Lands and Capacity Analysis

Acreage Adjustments

	Step 9: Net buildable vacant land (residential)	Step 12: Zell factor deductions (residential)	NEW Total: Adjusted buildable land (step 9 - step 12)	Ramp-up density
sfr2	4,007	872	3,135	5.8
sfr3	5,649	1,274	4,375	7.6
mfr1	1,467	178	1,289	18.0
mfr2	35	4	31	39.2
pud	2,177	252	1,925	10.8
cn	2,003	151	1,852	7.0
co	36	3	33	14.8
imu	434	11	423	2.0
muc1	651	69	582	10.8
muc2	321	32	289	20.0
muc3	55	5	50	47.5
muea	2,761	135	2,626	1.7
Totals	19,596	2,986	16,610	

The acreage adjustment begins with the net buildable vacant land identified in Step 9 of the BLCA. The total acres shown are for residential land only. This acreage figure is then discounted by the Zell factor reductions identified in Step 12. The remaining acres are listed as adjusted buildable land.

Density Adjustments: Underbuild

	NEW Step 10: Density with 15% underbuild	NEW Step 13: Ramp-up density with underbuild	Vacant Land Capacity
sfr2	5.3	5.0	15,793
sfr3	7.0	6.6	28,874
mfr1	15.3	15.3	19,722
mfr2	34.0	34.0	1,054
pud	9.3	9.3	17,835
cn	6.8	6.0	11,118
co	13.6	12.8	424
imu	5.1	2.0	846
muc1	10.2	9.3	5,434
muc2	18.7	17.3	4,987
muc3	42.5	41.3	2,063
muea	1.7	1.4	3,767
TOTAL			111,916

The density adjustment begins with a new underbuild factor, listed as the NEW Step 10. This adjustment is a 15% reduction in the effective yield densities that have been used in 2040 Growth Concept modeling and planning. This adjustment is made on the assumption that at least some jurisdictions will not be successful in meeting the 2040 effective yield density targets.

An adjustment is then made for ramp-up, as defined in Step 13 of the BLCA. The same methodology is used, but the ramp-up calculation is applied to the underbuild densities rather than to the effective yield densities.[1] The capacity of adjusted buildable land is then calculated by multiplying the ramp-up densities by the adjusted acreage totals

The same procedure is followed below for the sensitivity analysis of underbuild at 12% and at 18%.

Sensitivity Analysis: 12% Underbuild

	NEW Step 10: Density with 12% underbuild	NEW Step 13: Ramp-up density (12% underbuild)	NEW Vacant Land Capacity (12% underbuild)
sfr2	5.5	5.2	16,280
sfr3	7.2	6.8	29,772
mfr1	15.8	15.8	20,418
mfr2	35.2	35.2	1,091
pud	9.6	9.6	18,465
cn	7.0	6.2	11,489
co	14.1	13.2	437
imu	5.3	2.0	846
muc1	10.6	9.6	5,609
muc2	19.4	17.8	5,146
muc3	44.0	42.5	2,125
muea	1.8	1.5	3,898
TOTAL			115,575

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[1] For some categories, the underbuild density was less than current plan densities. To be consistent with Metro calculations, no ramp-up discount was applied to these categories.

Sensitivity Analysis: 18% Underbuild

	NEW Step 10: Density with 18% underbuild	NEW Step 13: Ramp-up density (18% underbuild)	NEW Vacant Land Capacity (18% underbuild)
sfr2	5.1	4.9	15,307
sfr3	6.7	6.4	27,977
mfr1	14.8	14.8	19,026
mfr2	32.8	32.8	1,017
pud	8.9	8.9	17,206
cn	6.6	5.8	10,747
co	13.1	12.4	410
imu	4.9	2.0	846
muc1	9.8	9.0	5,259
muc2	18.0	16.7	4,828
muc3	41.0	40.0	2,000
muea	1.6	1.4	3,635
TOTAL			108,258

The capacity additions below show Metro's estimate of infill and redevelopment, to which are added units on lands already platted. Metro's baseline estimates are shown for comparison to the sensitivity analysis presented below.

Capacity Additions: Metro Analysis

	Step 14: Net Redevelopment	Step 15: Infill at 16.8% rate	Step 11: Platted Lots	Total: step 14 + step 15 + step 11
ff		2,457		2,457
sfr1			128	128
sfr2		4,914	4,112	9,026
sfr3	3,597	7,371	6,654	17,622
mfr1	3,470	2,457		5,927
mfr2				
pud	9,209			9,209
cn	6,347	4,914		11,261
co				
imu				
muc1	10,973	2,457		13,430
muc2	13,740			13,740
muc3	14,203			14,203
muea	1,778			1,778
reallocation	(9,110)			(9,110)
TOTALS	54,207	24,570	10,894	89,671

Capacity Additions: Sensitivity Analysis

Sensitivity Analysis of step 14: Redev. at 20% rate	Sensitivity Analysis of step 14: Redev. at 15% rate
44,800	33,600
Sensitivity Analysis of step 15: Infill at rate of .168 - 20%	Sensitivity Analysis of step 15: Infill at rate of .168 + 20%
19,656	29,484

Capacity additions are added to the estimates of vacant land capacity to give an initial estimate of overall capacity for the UGB. The various possible combinations of vacant land and capacity additions are not shown here. Some of the possible combinations are modeled in Part IV.

Farm Use Assessment Acres: Capacity Adjustments

	2040 Plan Acres (residential)	Gross to Net (25% reduction)	Housing Units by Category	Net Acres at 80% Development	Housing Units at 80% Development	Net Acres at 60% Development	Housing Units at 60%
sfr2	1,595	1,196	6,954	957	5,563	718	4,173
sfr3	1,581	1,186	9,042	949	7,234	711	5,425
mfr1	523	392	7,061	314	5,648	235	4,236
mfr2	3	2	88	2	71	1	53
pud	596	447	4,806	358	3,844	268	2,883
cn	667	500	3,504	400	2,803	300	2,102
co		0	0	0	0	0	0
imu	63	47	95	38	76	28	57
muc1	270	203	2,195	162	1,756	122	1,317
muc2	68	51	1,020	41	816	31	612
muc3		0	0	0	0	0	0
muea	910	683	1,150	546	920	410	690
TOTALS	6,276	4,707	35,914	3,766	28,731	2,824	21,548

The sensitivity analysis of FUA acres shows Metro's estimate of capacity on these acres, and models some alternative assumptions that would account for decreased availability of this land. These adjustments are included in the capacity estimates in Part IV.