A G E N D A

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METRO

Agenda

MEETING:	METRO COUNCIL REGULAR MEETING
DATE:	October 4, 1999
DAY:	Monday
TIME:	5:00 PM
PLACE:	Gresham City Hall Chamber

CALL TO ORDER AND ROLL CALL

I. PUBLIC HEARING ON URBAN GROWTH BOUNDARY ISSUES

- Urban Growth Report update and its potential impact on Urban Growth Boundary (UGB) Decision
- Urban Reserve Areas that could potentially come into the UGB
- Should Metro request a time extension to act on UGB pending new federal ESA listing

ADJOURN

CABLE ACCESS: Multnomah Community Television will televise this meeting as follows. These dates and times will run only in East County on Channel 30. Subject to Portland area viewing call 797-1878 for more information.

October 4, 1999 5:00pm
October 7, 1999 6:00pm
October 10, 1999 9:00pm
October 12, 1999 2:00pm
October 18, 1999 7:00pm
October 21, 1999 6:00pm

PUBLIC HEARINGS: Public Hearings are held on all Ordinances second read and on Resolutions upon request of the public. Agenda items may not be considered in the exact order. For questions about the agenda, call Clerk of the Council, Chris Billington, 797-1542. For assistance per the American Disabilities Act (ADA), dial TDD 797-1804 or 797-1540 (Council Office).

Metro Report

1997 Urban Growth Report Update

September 1999

METRO
Regional Services
Creating livable communities

If you live, work and play in the metropolitan area, Metro regional services matter to you and your family. That's because Metro is working to help ensure that you have

- access to nature
- clean air and water
- balanced transportation choices
- safe and stable neighborhoods
- access to arts and culture
- a strong regional economy
- resources for future generations

Metro serves 1.3 million people who live in Clackamas, Multnomah and Washington counties and the 24 cities in the Portland metropolitan area. Metro provides transportation and land-use planning services and oversees regional garbage disposal and recycling and waste reduction programs.

Metro manages regional parks and greenspaces and the Oregon Zoo (formerly the Metro Washington Park Zoo). It also oversees operation of the Oregon Convention Center, Civic Stadium, the Portland Center for the Performing Arts and the Portland Metropolitan Exposition (Expo) Center, all managed by the Metropolitan Exposition-Recreation Commission.

For more information about Metro or to schedule a speaker for a community group, call 797-1510 (public affairs) or 797-1540 (council).

Metro's web site: www.metro-region.org

Metro is governed by an executive officer, elected regionwide, and a seven-member council elected by districts. An auditor, also elected regionwide, reviews Metro's operations.

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Auditor
Alexis Dow, CPA

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1997 Urban Growth Report Update

Prepared by Growth Management Services Department

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Table of Contents

1997 Urban Growth Report Update – September 1999

1997 Urban Growth Report Update

September 1999

Summary

Summary of Calculations

This report estimates the following:

- If no more than the current protected riparian areas (Title 3) are subtracted from the vacant land inventory, there is a rough balance between supply and the 20-year demand for the period 1997-2017. A small 200 dwelling unit surplus is estimated in the Urban Growth Boundary (UGB) after including December 1998 amendments.

- Under the current environmental assumptions (Title 3), there is an employment surplus of about 270 acres.

- If the Endangered Species Act (ESA) provisions as well as Regional Goal 5 (fish and wildlife habitat) requirements increase the average setback to 200 feet from each side of streams and rivers in the region, additional capacity of about 15,000 dwelling units and 950 acres of employment land would have to be added to the Urban Growth Boundary (UGB). A 200-foot setback was assumed in the 1997 Urban Growth Report (UGR).

Purpose of the Urban Growth Report Update

The main purpose of this report is to update data in the 1997 UGR to verify the State Goal 14 need to amend the UGB for any anticipated amendments.

State law requires that Metro compute housing unit capacities of UGB areas to ensure a 20-year supply of land. Metro Code requires this review at least every five years. The last complete review was in 1992 and found no need for UGB amendments. The next required review was in 1997 and concluded with capacity analysis to 2017.

State law also requires implementation of UGB amendments to satisfy any outstanding need for land within two years. In December 1997, Metro Council determined a need for 32,370 dwelling units based on 1994 data. Metro, when considering UGB amendments to satisfy this need, must consider the most up-to-date data available.

This report represents an update of recent history to 1998, but also includes refinements to assumptions employed in the 1997 UGR consistent with State law and the Metro Urban Growth Management Functional Plan (Functional Plan). Since 1997, Metro staff have completed special studies of several factors. This *Urban Growth Report Update* incorporates the new findings from these special studies with updated historical data.

A tabulation of projected need for employment and housing is summarized in Tables 3 and 4. The results from this report

reveal small surpluses estimated for both housing need and employment land need.

UGR Update – What's New?
The *Urban Growth Report Update* draws data from several new special studies[1]:

- 1998 Vacant Land Analysis & Buildable Lands Study
- Residential Redevelopment and Infill Study
- Non-residential Redevelopment and Infill Study
- 1999 Employment Density Study & Zonal Employment Land Demand Analysis (ZELDA) model
- Future Streets Study

Important Changes in Assumptions from the 1997 Report

1. Up-zoning. One of the factors revised in this report is the 2040 up-zone factor. The 2040 up-zone factor is a matrix that takes vacant land and assumes future rezoning from current local zoning to land uses and densities more consistent with the Region 2040 Growth Concept. In this update, the up-zone factor is not applied to vacant land in neighborhoods and open space lands. This change is consistent with preliminary compliance reporting provided by local jurisdictions.

2. Title 3 as Basis of Environmentally Constrained Land. State law requires that capacity analysis be based on past experience or newly adopted measures (regulations). Therefore only land that is protected under Title 3 of the Functional Plan is considered to be environmentally constrained land in this report. Title 3 is the current extent of Metro's adopted measures to protect environmentally sensitive lands. This land is assumed to have very low rates of development due to regulation. Further regulation is anticipated, but the determination is uncertain at this time.

   Under the current definition of environmentally constrained land (i.e., sensitive environmental areas protected under Title 3), the area under protection has been reduced to 10,900 gross acres. This assumption increases capacity assigned by the 1997 UGR to lands between the limits of Title 3 and a previously assumed 200-foot buffer beyond the edge of stream and riverbanks in the region. In other words, the area between Title 3 and the former 200-foot environmental buffer is now included in buildable lands. The capacity of these lands is uncertain and therefore referred to as a "placeholder."

3. Steep Slopes. Since the Functional Plan does not prohibit development on steep slopes greater than 25 percent, these lands are included in the calculation of buildable land (3,400 acres) at an historically low rate of development. In the 1997 UGR, all slopes greater than 25 percent were considered unbuildable.

Demand Analysis
Residential housing demand is determined from a projection of population and household growth. A housing unit demand forecast is derived from the forecast of households. Similarly, future land demand for employment uses is determined from a forecast of industrial and commercial employment growth. The future land need of housing and employment growth is based on the trends projected in the 2015 Regional

[1] These studies were completed by Metro's Data Resource Center to update UGR data, to respond to Metro Council inquiries into these matters, and legal arguments. See Appendix B for full reference to published reports.

Forecast and Growth Allocation (January/ February 1996).

The housing unit need calculation is unchanged from the land demand assumed in the 1997 UGR. It assumes growth from 1994 to 1998 to reflect the data available at the time of the 1997 UGR and this update report.

In 1998, the number of housing units in existence is estimated to be 517,400. Future demand is estimated to be an addition of 205,200 housing units through the year 2017. This would mean a 39.7 percent increase in housing unit need or an average of 1.8 growth percent per year. This represents the remaining 19 years of the 20-year period (1997-2017). Data for 1998 are included in the existing base already.

The computation of employment land need has been refined in this report to incorporate new employment density data and to use the ZELDA model approach. However, the economic inputs use the same employment forecast in both this update and the 1997 UGR.

Employment growth is expected to increase an average of 1.7 percent per year. The Metro regional forecast anticipates an additional 340,600 jobs during the next 19 years (today's employment level is estimated to be 923,900 jobs). The existing employment data includes the first year of the 20-year period.

Supply Analysis

Gross Vacant Acres (GVA) are identified and tabulated for each vacant and partially vacant parcel inside the UGB (from 1998 aerial photography). Water features, existing public rights of ways (streets), parks and developed land are excluded from the tabulation of GVA.

Environmentally constrained land is deducted from GVA to arrive at gross vacant buildable acres (GVBA).

Table 1 illustrates deductions made to the GVBA to arrive at *net vacant buildable acres* (NVBA).[2] In total, the gross-to-net reduction is 38.6 percent.

Net Vacant Buildable Land - Residential

The 1998 Buildable Land Analysis tabulated 13,400 NVBA of vacant residential land and 8,600 acres of vacant mixed use and commercial/industrial land. NVBA is the basis for all the capacity and need calculations in the 1997 *Urban Growth Report Update*.

Net Vacant Buildable Land - Employment

Unlike the dwelling unit need analysis, employment demand is converted into an acre demand figure. ZELDA computes job demand in acres for each industry. Aggregate sub-regional sector job demand inside the UGB is projected to be just under 8,500 net acres.

[2] Net acres is a useful measure because it represents the amount of land that households and businesses actually consume for residential or non-residential purposes.

Table 1 Metro UGB Land Supply Estimates	
Gross Vacant Acres (excludes 1998 UGB amendments)	45,800
Less: Constrained Land (Title 3)	(8,200)
Gross Vacant Buildable Acres (GVBA)	37,600
Less: Federal, State, County, City Owned lands	(1,900)
Less: Acres of Platted Single Family Lots	(2,900)
Less: Streets	(5,400)
Less: Schools	(1,100)
Less: Parks	(3,700)
Less: Places of Worship	(700)
Net Vacant Buildable Acres (NVBA)	21,900

Table 2 Supply – Dwelling Units	
Dwelling Unit Capacity - current zoning	88,600
Add: Mixed Use Development	4,300
Add: 2040 Growth Concept Up-zone	36,200
Less: Underbuild	(25,800)
Less: Ramp-up	(1,300)
Add: Residential Refill	58,500
Add: Title 3 Capacity	3,200
Add: Accessory Dwelling Units	7,500
Add: Platted single family lots	16,300
Subtotal Dwelling Unit Capacity	187,500
Add: UGB Amendments	17,900
TOTAL Dwelling Units	205,400

Source Table 1 and Table 2: Metro, 1999

In aggregate, there does not appear to be any additional employment land need; however, at a sub-regional or county-level, by size, and by industry type, there is a **potential** for a disparity between land need and future available supplies.

Further Study and Policy Issues

Staff have calculated the approximate capacity of the area that may be regulated due to the ESA and application of Regional Goal 5 standards. This calculation represents a placeholder value for what the capacity reduction might be for dwelling units and employment lands. No proposed or final specifications of these requirements are available yet. The capacity analysis could be affected by:

- ESA regulations
- Regional Goal 5 Analysis and regulations
- Development Restrictions on Steep Slopes
- Additional analysis of development rates on environmentally constrained lands (Title 3).

In addition, Metro is undertaking a comprehensive jobs research program which should provide information to support policy considerations for the determination of additional employment lands.

Urban Growth Boundary Amendments and Productivity Report

In December 1998, the Metro Council amended the UGB by adding 3,549 gross acres from Urban Reserves. Capacity for these reserve areas that were added to the UGB in 1998 was estimated from the 1998 *Metro Urban Reserve Productivity Analysis*. The study determined the capacity and cost of serving each reserve. Capacity on these reserve lands for dwelling units and jobs was drawn from this report. Based on current environmental constraint assumptions (Title 3), these amendments added approximately 17,900 dwelling units capacity.

Bottom Line

With the assumptions discussed previously and capacity added from the 1998 UGB amendments, the total capacity is estimated at 205,400 dwelling units and about 8,700 acres of jobs land. This results in a small surplus for housing and jobs. Further regulation of environmentally sensitive areas is anticipated, but the determination is uncertain at this time.

Table 3
1997 Urban Growth Report Update
Dwelling Unit Estimate
Summary Table

			See Description Number on Following Page	
Residential Demand Estimates (in Dwelling Units)				
1998-2017 Capture 70% of 4-County Forecast in Metro Urban Growth Boundary			1/	205,200
Land Supply Estimates -- ACRES (Excludes UGB areas added 12/98 by Ordinance)				
Gross Vacant Buildable Acres in UGB		37,600	2/	
Less: Vacant Federal-, State-, County- and City-owned lands		(1,900)	3/	
Less: Acres of Platted Single Family Lots (16,300 Lots)		(2,900)	4/	
Less: Acres for Streets	A C R E S	(5,400)	5/	
Less: Acres for Schools		(1,100)	6/	
Less: Acres for Parks		(3,700)	7/	
Less: Acres for Places of Worship and Social Organizations		(700)	8/	
Net Vacant Buildable Acres (NVBA) in UGB without Reserves		21,900	9 /	
Residential Supply Estimates -- DWELLING UNITS				
Dwelling Unit Capacity at Current Local Zoning		88,600	10/	
Add: Residential Development in Mixed Use Areas (MUC)		4,300	11/	
Add: Units from 2040 Growth Concept Upzone	U	36,200	12/	
Less: Units Lost to Underbuild	N	(25,800)	13/	
Less: Units from Ramp-Up	I	(1,300)	14/	
Add: Units from Residential Refill	T	58,500	15/	
Add: Minimal Development Capacity on Title 3 Land	S	3,200	16/	
Add: Units from Accessory Dwelling Units		7,500	17/	
Add: Number of Dwelling Units from Single Family Platted Lots		16,300	18/	
Dwelling Unit Capacity without New UGB Amendments:		187,500		205,200
Less: Projected Dwelling Unit Demand to Year 2017		205,200		
Resulting Deficit		(17,700)		

	Change in Dwelling Units	Net Capacity		Surplus or Deficit
Dwelling Units (gained) with New UGB Amendments	17,900	205,400	19/	200
Dwelling Units (lost) from Possible Regulation of "Placeholder" area between Title 3 and 200' Buffer Zone (in UGB + UGB Amendment Area)	(15,000)	190,400	20/	(14,800)

Accompanying Line Notes to 1997 UGR Update Summary Table:

1. **Source:** 2015 Regional Forecast. The 1998-2017 estimate assumes one year of growth has passed and is part of the 20-year period. Demand forecast for 1997-2017 is 215,500 dwelling units.

2. **Source:** 1998 RLIS Vacant Land Study. Excludes: Urban Growth Boundary amendments adopted by Ordinance (see: line 19). Title 3 riparian areas, wetlands and floodplains are assumed to be unbuildable. Additional riparian areas extending to 200 feet, slopes over 25 percent and floodprone soils are considered buildable.

3. Vacant publicly-owned lands (Federal-, State-, County- and City-owned vacant lands) are removed from gross vacant buildable acres. No dwelling unit capacity is assumed on these lands.

4. Single family-zoned parcels less than 3/8 of one acre are set aside from the analysis during the gross-to-net reduction process. These parcels are assumed to be platted, and received one dwelling unit in the supply estimates regardless of zoning (see line 18).

5. Gross-to-net reduction for streets for all vacant buildable lands (residential and non-residential):
   18.5 percent for parcels > 1 acre (22 percent assumed in 1997 UGR calculations)
   10 percent for parcels between 3/8 and 1 acre
   0 percent reduction for parcels less than 3/8 of an acre.

6. The land need for future schools is based on the 2015 Regional Forecast of student population. Assumes 90 percent student capture rate for schools in the Metro region (high schools: 45 students/acre; middle schools: 55 students/acre; elementary schools: 60 students/acre).

7. The land need for future parks is based on a ratio of 20.9 acres per 1,000 persons minus existing and proposed Metro measure acquisitions outside the UGB.

8. The future land need for places of worship and fraternal organizations is estimated to be equivalent to the amount of vacant land currently owned by such organizations, approximately 700 acres. This is about 150 acres more than would have been estimated from applying the established 1997 UGR places of worship service ratio (1.4 persons per 1,000 population) to the current population forecast.

9. Conclusion of Gross-to-Net Reductions (13,400 NVBA residential and 8,500 NVBA non-residential).

10. Dwelling unit capacity is based on a categorization of local zoning into standard zoning designations. The standard zoning densities are multiplied against NVBA to arrive at the capacity based on today's zoning densities. A parcel-based approach has been used in computing zoned capacity. Slopes above 25 percent are assumed as part of NVBA. With current

zoned low densities that are equivalent to historical rates of development (6.5 dwelling units/5 acres).

11. Residential capacity in mixed use zones (MUC1, MUC2, MUC3) is estimated by applying a utilization rate to net vacant buildable land in mixed use zones. The remaining portion of land in mixed use zones is assumed to contribute to the employment land need estimated through ZELDA.

12. The *increase* in capacity from 2040 up-zoning is computed as the *total* 2040 up-zone capacity (excluding up-zoning in inner neighborhoods, outer neighborhoods and open space areas) plus steep slope capacity, minus the estimate of capacity at current zoning {[(140,000 – 19,400) + 4,200] – 88,600} = 36,200. Single family parcels less than 3/8 acre (16,300 dwelling units) were set aside from estimates of current capacity and 2040 up-zone capacity; they receive one dwelling unit per lot. 2040 up-zone capacity is estimated from the 2040 up-zone matrix, illustrated in Appendix A. Steep slope areas wee not up-zoned to recognize historical development rates.

13. The Functional Plan requires cities and counties to adopt minimum densities to zones allowing residential use. While the Functional Plan gives cities and counties flexibility in adopting minimum density standards, the common approach is to adopt minimum densities that are 80 percent of the current zoning density. An underbuild factor (20 percent) is applied to SFR, MFR and Mixed Use areas (excluding single family parcels less than 3/8 of an acre, which receive one dwelling unit per lot, regardless of zoning). Underbuild is calculated from the sum of current zoned capacity, mixed use zoned capacity and 2040 up-zone capacity.

14. The ramp-up estimate represents the last year of an assume five-year period to allow for lagging implementation of Functional Plan requirements. The figure (-1,300 dwelling units) is computed as 1/5 of the initial allowance from the 1997 UGR.

15. The Residential Refill Study observed an historical refill rate of 25.4 percent. This update continues the 1997 UGR assumption of a 28.5 percent refill rate based on input from local jurisdictions, and recognizing changes that will result from Functional Plan requirements.

16. An historical rate (8.5 dwelling units/5 acres) is applied to estimate the amount of future development that may occur within Title 3 riparian areas. This estimate may be revisited with future studies. The 1997 UGR assumed 1 dwelling unit/5 acres.

17. This estimate assumes that 1.8 percent of existing and future dwelling units will have an accessory dwelling unit. This rate was observed from the 1990 American Housing Survey for the Portland Metropolitan Area, produced by the U.S. Department of Housing and Urban Development. It is based on a sample of single family detached dwelling units.

18. **Source:** 1998 Metro DRC. Lots less than 3/8 of an acre receive one dwelling unit each with no up-zoning.

19. This figure represents the dwelling unit capacity of 3,549 acres of reserves brought into the UGB by Ordinance in December 1998. **Source:** Productivity Analysis, 1998, ECO Northwest. Metro staff adjusted the Productivity Analysis to reflect actual boundaries of urban reserve (UR) areas brought into the Metro UGB by Ordinance, in particular UR 55 and partial UR sites in the Stafford Basin areas.

20. Uncertain, estimated based on 1997 UGR assumption of 200-foot setbacks. Depends on eventual environmental protection regulations adopted.

Table 4

1999 Urban Growth Report - Summary Table for Jobs

Non-Residential (Employment)
Supply and Demand Balance Calculations:

DEMAND

Non-Residential (Employment/Jobs) Demand Estimates (in net acres): **8,364**

1998-2017 data assumes capture rate of 82% of projected job growth for Metro UGB.
Forecasted Employment Demand in the UGB (1998-2017) = 340,600 jobs.
(Jobs measurement includes full & part time wage & salary positions and self-employed workers.)
Source: Calculated land demand determined by Zonal Employment Land Demand Analysis Model - ZELDA
Metro, Data Resource Center (DRC)

DEMAND (net acres)	Clack.	Mult.	Wash.	Total
Industrial	996	1,605	1,486	4,088
Commercial (non-Industrial)	1,085	1,587	1,605	4,276
Total	**2,081**	**3,192**	**3,091**	**8,364**

SUPPLY - Long Run Inventory Capacity Estimate

Non-Residential Land Suppy Estimates (in net acres):

source: 1998 Vacant Land Study, Metro DRC

	Clack.	Mult.	Wash.	Total
Commercial - Central City	13	62	61	136
Commercial - General	138	164	331	633
Commercial - Neighborhood	4	41	32	77
Commercial - Office	79	35	220	334
Industrial - Heavy	129	2,524	740	3,393
Industrial - Light	239	715	1,884	2,838
Industrial / Commerical Mix	372	389	69	830
Town Center Mixed Use	1	143	75	219
Regional Center Mixed Use	3	36	193	231
Central City Mixed Use	0	0	0	0

SUPPLY (net acres)	Clack.	Mult.	Wash.	Total
Industrial	740	3,628	2,693	7,061
Commercial	234	302	644	1,180
Mixed Use	4	179	268	450
Total	**978**	**4,109**	**3,605**	**8,691**

Net Vacant Buildable Employment Land (before UGB Amendments):		8,691
less: Residential Development/Utilization in Mixed Use Areas (source: ZELDA analysis to avoid mixed use "double-counting")		(202)
Capacity without 12/98 UGB Amendments:		8,489
add: Employment land from UGB amendments (Productivity Analysis)		145
Non-Residential Land Suppy Estimates (in net acres):		**8,634**
Industrial	7,063 net acres	
Commercial (non-Industrial)	1,571 net acres	
	8,634	
Less: Projected Land Demand Estimate to Year 2017		8,364
Aggregate Employment Land Need: Surplus Capacity (net acres):		**271**
less: Placeholder - Title 3 and 200 foot buffer (in net acres)		(964)
Employment Land Need: Deficit Capacity (net acres):		**(694)**

Table 5
1997 Urban Growth Report Update - Dwelling Unit Capacity
Sensitivity Analysis on Selected Supply and Demand Factors

Selected Supply/Demand Factor (1999 Urban Growth Report)	Change in Factor		Change in Dwelling Unit Capacity	Basis for 1999 Urban Growth Report Assumption	Comments
	*From	To			
Capture Rate	70.00%	72.60%	-4,900	Use 70%, based on long run historic trends (20-100 years) and lack of support to project change in rate based on 5-year data (see June 15 memo).	If the capture rate (forecasted demand) increases by 2.6 percentage points (approximately 7,400 dwelling units), the number of dwelling units gained from refill also increases by 2,100 dwelling units. Because demand increases more than supply, however the final dwelling unit balance is reduced from a 200 unit surplus to about a 5,100 unit deficit (a change of -4,900 dwelling units).
Refill Rate	28.50%	25.40%	-6,400	Use 28.5%, as local jurisdictions are expected to achieve higher rates of infill and redevelopment in their efforts to comply with the Metro Urban Growth Management Functional Plan targets and requirements.	The refill rate is estimated directly from the dwelling unit demand forecasted for the area inside the UGB (captured demand). If the refill rate decreases from 28.5% to 25.4%, the final dwelling unit balance is reduced from a 200 unit surplus to about a 6,200 unit deficit (a change of -6,400 dwelling units).
Gross-to-Net Reduction for Streets	18.50%	22.00%	-4,100	Use 18.5%, as 1998 survey of platted lots reflects changed Functional Plan requirements and trend to decreasing street widths.	This component of the gross-to-net reduction for streets applies only to parcels larger than one acre. For parcels smaller than one acre, the streets reduction was applied consistently in this comparison. If the reduction for parcels above one acre increases from 18.5% to 22%, the final dwelling unit balance is reduced from a 200 unit surplus to about a 3,900 unit deficit (a change of -4,100 dwellilng units).

* Rates currently applied in the 1997 Urban Growth Report Update/Sept. 1999

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* Rates currently applied in the 1997 Urban Growth Report Update/Sept. 1999

Chapter 1
Introduction to the Report

Purpose

State law and Metro Code require periodic review of the Metro UGB's ability to accommodate future urban growth for a 20-year period. The *1997 Urban Growth Report Update* represents the technical findings needed to verify the State Goal 14 need to amend the UGB for any anticipated amendments.

The UGR is a blending of science, policy and technical assumptions in a study that estimates regional housing and employment capacity. This report uses the best available research about urban growth boundaries, capacity and economic growth to estimate regional job and housing need (demand). The supply (or inventory) estimates in this report are to the maximum extent possible grounded in scientific research and up-to-date geographic information system (GIS) data. Where data are inconclusive, Metro Council has provided policy assumptions based on regionwide goals and objectives.

State law, Metro Code, and current policy direction provided by the Metro Council are all integral to estimating supply and demand. These estimates, therefore, represent a mix of regulation, policy and technical findings. State law[3] requires at least 20 years supply of buildable land be provided for residential development. Metro also plans for a 20-year supply for commercial and industrial development.

Background

In 1997, Metro Council adopted the Regional Framework Plan and in 1996, the Functional Plan requirements. The plans provided coordinated guidance to local jurisdictions to manage future urban growth. In December 1997, the first UGR was issued and approved by Metro Council. The 1997 UGR concluded that there was a deficit of 32,370 dwelling units and a nearly 2,900 job shortfall.

Earlier in 1997, the Oregon Legislature enacted ORS 197.296[4] that required Metro to show substantial progress, within two years of identifying any supply shortfall. At least half the need had to be accommodated by the end of 1998 and the remainder by the end of 1999. Accommodating 20 years of residential capacity within the UGB can be accomplished by increasing the size of the UGB or adopting policies to increase capacity of lands within the current boundary. Metro Code requires review of the UGB capacity at least every five years. The last complete review was conducted in 1992 and determined no need to amend the UGB.

Consistent with State law, the Metro Council in December 1998 amended the UGB by adding 3,549 gross acres. The Metro Council also indicated their intent to add an additional 1,831 acres by resolution on the same date. These actions by the Metro Council met the requirement in State law to satisfy at least half of the need identified in the 1997 UGR by the end of 1998.

[3] ORS 197.299 was introduced as HB 2709.

[4] ORS 197.296 was introduced as HB 2493.

Key Points:

- *State law requires that a 20-year supply of land be provided within the UGB.*
- *The need estimates found in the UGR blend regulation, policy choices and technical findings.*

Tables 3 and 4 summarize the need analysis for housing and employment, respectively. Demand estimates and supply estimates are outlined in each table.

Table 41 details the key assumptions in the 1997 UGR and the *Urban Growth Report Update.*

The 1998 UGB expansions represented substantial compliance toward the required increase in the capacity of the Metro UGB. Now in the second year of the two-year compliance period, the same 2017 forecast endpoint is maintained.

Metro is updating the core data of the UGR with current data and additional research. The *Urban Growth Report Update* revisits the UGB analysis of the 1997 UGR to determine if additional need still exists that warrants further expansion of the UGB.

Chapter 2
1998 to 2017 Regional Forecast

Background

The employment and population projections contained in the 2015 Regional Forecast (adopted by Metro Council Ordinance No. 97-710) are the basis for determining the job and housing unit demand forecast of the UGR. This forecast was extended to 2017 and subsequently 2020 for the 1997 UGR and current Regional Transportation Plan (RTP), respectively. The forecast sets the stage for how much employment and population growth should be anticipated given a series of economic/demographic assumptions. The regional demand projections are a key factor in determining the amount of growth that needs to be accommodated within the UGB. The Metro Council Growth Management Committee has agreed that this UGR Update should continue to be based on the original assumptions behind the 2015 Regional Forecast.

Model Description

The model structure is based on a representation of the economic and demographic workings of the Portland-Vancouver economic region.[5] The basis for the regional forecast is national and global data inputs provided by a national forecast service (The WEFA Group, Eddystone, PA). Metro staff, independently, operate the regional macroeconomic model (MARIO – Metro Area Regional Integrated Output model) to project future economic and population growth.

Employment, income and wages are directly determined by the regional macro-model. A satellite population model – linked by a migration equation correlated with economic growth trends – determines future population and household formation trends. The population model employs the standard U.S. Census cohort-component modeling approach. This approach estimates future population growth by aging each population cohort (or age group) in successive years in order to project the future population size of each age cohort. In other words, in each iteration or year, people die and are subtracted from the population, and newborns are added to the population. Migrants are also added or subtracted according to the ebb and flow of people entering and leaving the region.

The regional forecast is initially prepared on a five-county basis (Multnomah, Clackamas, Washington, Clark and Yamhill Counties). Through the growth allocation process, future job and population growth are distributed to each county. The allocation process is a collaborative effort between Metro and local city and county planning agencies.[6] County population and employment forecasts are derived from the sub-county level growth allocations.

Capture Rate and Policy

Since the geographic extent of the *Urban Growth Report Update* is the UGB limits, a forecast of housing units (or dwelling units) and jobs is derived for just the portion of growth anticipated inside the UGB. The proportion of growth (or capture rate) is the fraction of dwelling units predicted to occur in the UGB relative to the total amount of growth overall in the four-county region

[5] The regional model is a recursive model based on the base and non-base regional economic theory and integrated with a regionalized input-output trade matrix that captures the flow of inter-industry transactions among regional sectors of the economy.

[6] The growth allocation process produces TAZ level job and household estimates to the 2017 and endpoint year of 2020.

(Multnomah, Clackamas, Washington and Clark Counties). The 1997 UGR assumed the capture rates for the UGB to be 70 percent for households and 82 percent for jobs on average until 2017. These estimates are based on two decades of past experience. Although past performance is no guarantee of future results, the long-run trend – dating back 100 years – for the region indicates a steady decrease in the capture rate variable. Because no accurate model exists today that can predict future capture rates, the final determination of the job and housing capture rates has been open to policy debate. The Metro Council Growth Management Committee has agreed that these capture rates should not be revised as part of this update.

Regional Economic Overview

The end of the second quarter of 1999 marks the 29th consecutive quarter without a decrease in wage and salary employment in the five-county metropolitan area.[7] Discounting the two consecutive quarters of negative growth between 1990:4 and 1991:1 (during the Gulf War), the Portland-Vancouver region has seen an unbroken string of 15½ years of economic growth. Annual growth has ranged between a low of 0.3 percent in 1991 to as much as 5.2 percent at the beginning of this upswing of the economy. In this decade, excluding 1991, employment growth has increased an average of 3.8 percent annually – over twice as fast as the national average.

Coincidentally, regional population growth during this last decade has also exceeded the U.S. average. The region's population (four-county definition) rose at annual rate of 2.3 percent a year as compared to 1.0 percent for the nation during the same period. A significant reason for the Metro area's stronger population growth has been its recent strong economic performance relative to the U.S. and in particular with its neighboring states (California and Washington).

In the last two years, the economy in California and Washington has rebounded and gained momentum. California has shown strong gains during the last two years. This may be one reason Oregon and this region have seen economic growth slow to 2.5 percent, employment growth from 4.5 to 5.0 percent and below 2 percent from 2.5 percent population growth. This is still greater than national average growth rates.

The engine of economic growth in the Portland-Vancouver region continues to be fueled by the high-tech and construction industries. The resurgence in Asian markets is likely to increase the demand for goods and services from the region's high-tech firms. Not too distantly, the meltdown in Asia was thought to mean a substantial slowdown was in store for the State and this region. However, with the general recovery in Asia, the risk to the region's high-tech industries has diminished.

The beginning of the next decade is expected to usher in a period of slower economic and population growth for the region. In the near term, the forecast anticipates a moderation in economic conditions and therefore slower growth than experienced in the 1990's. The three main drivers of the regional economy: the high-technology sector; warehouse, distribution and trade (including international trade); and the construction industry – are expected to maintain momentum and be the economic engines of this region.

[7] Five Counties: Multnomah, Clackamas, Washington, Clark and Yamhill.

Population growth is also expected to moderate to around 1.5 to 2 percent for the next few years. In the long run, the trend in population growth is that less population growth will be driven by migration; that is, natural increases (regional births) are expected to play a larger role in regional population expansion. In the early half of this decade, nearly two out of three new residents came from outside this region.

In the future, this rate of increase will swing in the other direction and two out of five new residents will migrate from another region. Migration flows are expected to decline as the region's economic growth rate slows and converges toward the national average.

Key Points:

- *Basis for the regional forecast is national and global data inputs provided by a national forecast service.*
- *MARIO - in-house regional macroeconomic model - calculates future economic and population growth for the five-county area.*
- *A capture rate of 70 percent is assumed to indicate the average proportion of residential growth that will occur within the UGB until 2017. The rates are derived from the past two decades.*
- *The capture rate is an outcome of growth management policies here and in adjacent communities.*
- *Annual growth has ranged from 0.3 to 5.2 percent. Continued growth in the region is expected with the engine of growth driven by the high technology sectors, distribution and trade, and construction industries.*
- *The next decade is expected to produce a period of slower economic and population growth trends for the region.*

National and Global Outlook

In the distant future, national growth expectations are driven by labor force growth and productivity increases. It is not likely that labor force participation rates will increase or rebound in the future. Changes in the labor force are related to growth and aging of the population. Productivity, in recent years, has been the result of the dawning of the information age. So far as these central factors of production continue to show favorably, the U.S. economy will continue to expand. The long-run assumption is that the rate of population growth and hence labor force will decline. Productivity is anticipated to moderate from

Table 6 Key National Variables to Growth

	1990-98	*1999*	*2000-2017*
U.S. GDP (1992 $)	2.6%	3.9%	2.1%
Consumption	2.8%	4.9%	2.0%
Investments- Private	6.3%	8.4%	2.3%
Public Spending (Federal, State, Local)	7.1%	2.5%	1.8%
Inflation - CPI	2.9%	2.1%	2.7%
Interest Rate (30-year U.S. Treasury Bond)	7.1%	5.5%	5.8%
Personal Income (1992 $), Disposable	1.1%	3.3%	2.2%
Population, non-institution	1.1%	0.4%	0.8%
Productivity (GDP/employee)	0.9%	2.1%	1.1%

Source: History - U.S. Commerce Dept.
Forecast: *1994 U.S. Long-term Trend Outlook*, WEFA, Eddystone, PA

its current rates too. The combination of slower labor force and productivity growth rates will tend to moderate the rate of national growth in the future as shown in Table 6.

Metro Regional Forecast is derived from WEFA economic assumptions. Forecast assumptions include sustained economic growth with U.S. and global expectations showing moderate growth rates.

Key Points:

- *Portland economic region is susceptible to economic crisis in Asian markets.*
- *Technology sector has been a key driver in the U.S. Portland has many firms poised to take advantage of growth in this sector.*
- *National growth will be driven by labor force growth and productivity increases. Expansion is likely.*

Regional Outlook

The greater Portland-Vancouver metropolitan area is treated as a single labor market, even though it is apparent that each county has its own trends and economic drivers. However, for purposes of the *Urban Growth Report Update,* the future land use need is calculated on a homogeneous regional basis.

The region is one of several key sea-going ports on the West Coast. Its location near the Columbia River affords efficient access to inland markets that other west-coast ports may not have. Because of its location, vast amounts of grain and other bulky cargo can cheaply pass through the Port of Portland to destinations around the world. As a result, economic conditions abroad and in other parts of the U.S. play important roles in the future outlook of the Portland area economy.

The region is also well situated halfway between two fast growing high-technology centers. Seattle to the north, anchored by the industry software powerhouse Microsoft, and Intel to the south in California's Silicon Valley have helped foster the emergence of a high-technology center in Hillsboro. The region is anticipated to continue its current trend of expansion for the immediate and foreseeable future. Although it is likely that the region will experience recessions during the 20-year projection period. The trend forecast and capacity estimates adopted in this report do not reflect the occurrence of a downturn(s).

A sustained average trend is assumed for the duration of the forecast period that evens out peaks and valleys over the course of future business cycles. In terms of long-range planning purposes, this is a standard approach that minimizes future cyclical uncertainties and assumes that the economy will self-correct and return to a secular growth path.

The regional forecast ties in the economic expectations drawn from the U.S. and global growth assumptions for the 20-year period.

In recent years, the region has experienced robust employment growth. This growth has coincided with an increase in population growth rates and expansion of the manufacturing sector – in particular the high-technology industries. During the early 1990's, a confluence of regional and national factors triggered a surge in migration that helped boost population growth. This period also marked the ascendance of silicon wafer and semi-conductor producers in the region. In addition, other computer hardware and related software manufacturers participated in the phenomenal growth of the region during this period.

In the early 1990's, a recession rolled through the U.S., and the California economy was particularly hard hit by the downsizing of its military-industrial complex. Many military and aerospace workers lost their jobs. A wave of highly employable professionals found their way into Oregon where the emerging high-technology firms were at the same time seeking highly skilled workers.

In the mid-1990's, the Oregon Legislature enacted the Strategic Investment Program (SIP) (the SIP is still successfully retaining and attracting high-tech firms today). The SIP helped attract and sustain the strong job growth in the high-technology industries. An initial wave, early on, brought nearly $12 billion of technology investments into the Portland-Vancouver economy. A sampling of some of the announcements are shown below in Table 7.

Key Points:

- *Region is a key seagoing west-coast port.*
- *Economic conditions abroad play an important role in the future outlook of the region due to the destination of goods shipped through the Port of Portland.*
- *Recessions during the 20-year period are likely.*
- *Emerging high technology firms growth has contributed to increased rates of migration and population growth.*
- *The SIP has been successful in sustaining growth in the high technology industries with $12 billion in investment.*

Table 8 shows the economic assumptions driving the employment and housing needs assumed by this report during the next 20-year period.

Table 7 Announced Technology Investments During the Decade of the 1990's

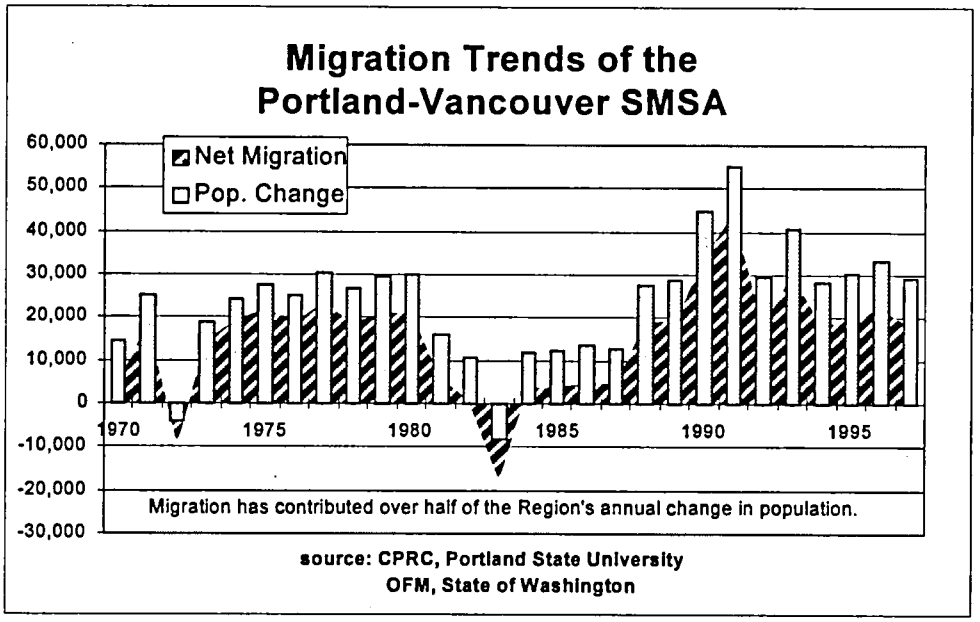
Company Name	Metro Area Site	Product	Investment	Jobs
Epson Portland Inc.	Hillsboro	Printers	$15 million	500 by 1996
Fujitsu Microelectronics		Memory chips	$1.03 billion	445 by 1998
IDT	Hillsboro	Computer chips	$800 million	975
Intel Corp.	Aloha	Microprocessor	$705 million	300
Intel Corp.	Hillsboro	Microprocessor	$2.2 billion	1,400
Linear Technology	Camas, WA	analog devices	$ 25 million	330
Sharp Lab of America	Camas, WA	R and D	$ 8 million	100
LSI Logic	Gresham	Computer chips	$4.1 billion	400 by 1997; 2000 by 2012
SHE America	Vancouver	silicon wafers	$700 million	600
Siltec	Salem	silicon wafers	$300 million	400
Wacker Siltronic	Portland	silicon wafers	$240 million	400

Source: various newspaper and magazine articles

Table 8 Regional Long-Term Forecast Outlook			
	1990-97	*1998*	*2000-17*
Wage & Salary Employment, total	3.4 %	2.5%	1.8%
Manufacturing	2.5 %	1.4%	0.6%
Durable Goods	3.1%	1.7%	0.6%
Non-Durable	1.4%	0.8%	0.6%
Non-manufacturing	3.6%	2.7%	2.0%
Construction	6.2%	1.7%	1.7%
Warehouse & Distribution	2.7%	2.1%	1.4%
Retail Trade	3.3%	2.0%	1.8%
Finance, Insurance & Real Estate	3.5%	3.0%	1.7%
Services	4.5%	3.8%	2.6%
Government	2.0%	2.0%	1.5%
Population, total civilian	2.3%	2.0%	1.5%
Household, total	2.3%	1.7%	1.6%

Source: *2020 Regional Forecast*, Metro Data Resource Center

Table 9



Demographic Assumptions & Trends

There are three components of population growth – births, deaths and migration. Migration is the most volatile and uncertain component of population growth and impacts future population trends more significantly than the other two components. The migration component is the most sensitive to economic fluctuations and trends. Economic conditions in the future are likely to affect migration patterns and regional population growth. The regional forecast predicts employment growth to exceed the national average. As a result, the forecast reflects slightly faster population and household formation than the projected national growth rate provided by the U.S. Census Bureau.

Table 10 Population Forecast by County			
County	*1998*	*2017*	*Change*
Multnomah	642,000	752,300	110,300
Clackamas	323,700	432,400	108,700
Washington	397,700	585,000	187,800
Clark	328,000	440,600	112,600

Source: Metro's Data Resource Center

County population projections are detailed in Table 10.
U.S. population growth in the long run is anticipated to increase at an average annual rate of about 0.8 percent per year.

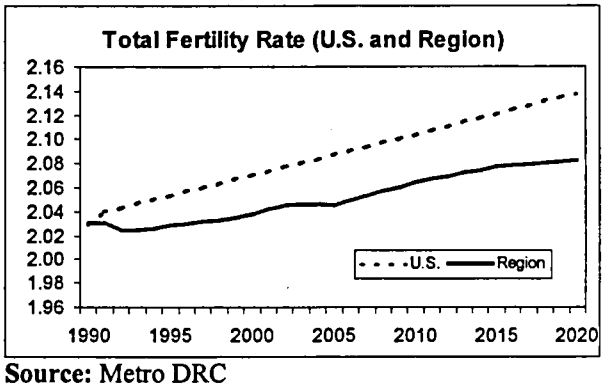
Meanwhile, regional population is expected to increase about 1.5 percent per year. About half this growth is attributed to natural increases in the base population while the remainder is due to migrants locating in the Portland metropolitan area. In comparison, during the early half of this decade, it was estimated that close to two out of three new Portland area residents was from out of state while the remaining third were children born to residents.

Fertility Assumptions
The fertility rate among the average female in the Metro area in 1990 was about 2.0 children each during her lifetime. This rate is just under the replacement rate for persons in the region. Future regional fertility rates are calibrated to the trend birth assumptions provided by the U.S. Census middle series fertility assumptions.
The previous assumption in prior decades of lower fertility rates for the future have been false – what really occurred in previous decades was a delayed start in childbearing among females. Thus, there is no reason to assume any significant change in fertility rates among women in the labor force.

The Portland area is expected not to be significantly different than national trends. Therefore, the fertility rate is expected to increase modestly from 2.03 to 2.16 children
Fertility rates were applied to women of childbearing between the ages of 10 to 49 years of age. The fertility rates were age-adjusted to reflect birth rates for women in each five-year age increment during the course of the population projection. Women between the ages of 20 to 34 were assumed to have the highest birth rates in any given year of the forecast. At the ends of the age distribution, the birth rates were lower – reflecting the lower likelihood that a woman would give birth.

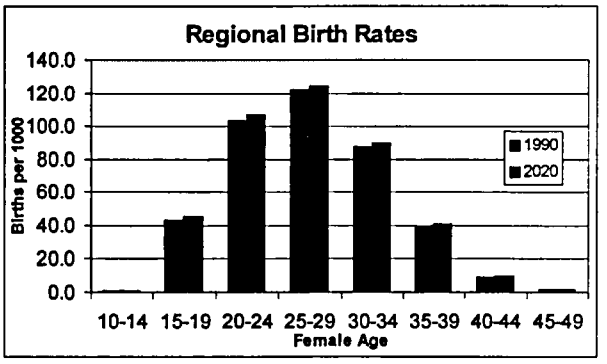
Life Expectancy
The survival rate assumed in the regional forecast is provided by middle series

Table 11



Source: Metro DRC

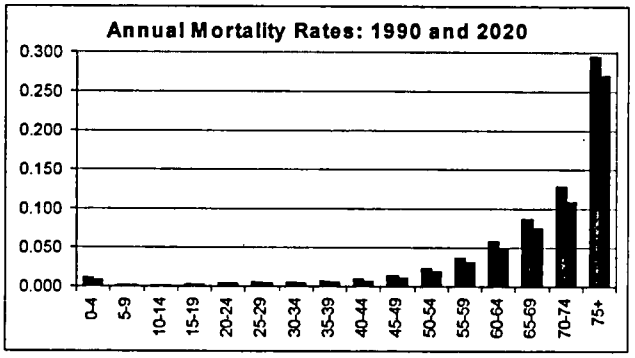
Table 12



Source: Metro DRC

mortality assumptions of the U.S. Census Bureau. Overall life expectancies are expected to rise in the future – reflecting a more healthy and active lifestyle (this is also reflected in the economic projections of the region). Survival rates were applied to men and women on an age-adjusted basis. Therefore, mortality rates are slightly higher for newborns and improve after the first year. When children advance into the teenage years, death rates increase slightly to reflect the riskier lifestyle of teens. Still the mortality rates are significantly lower as compared to older adults, reflecting the health risks of aging. As individuals age into young adults and middle adulthood,

Table 13



Source: Metro DRC

mortality rates remain fairly low until they reach age 50. At age 50 to 65, the death rate increases modestly. After age 65, the mortality rates begin climbing quickly. By the time a person reaches 90 years of age, the survival rate is about 50-50 as measured by current life expectancy assumptions.

In contrast, if an individual today reaches age 90 by 2020, he/she has an improved 60-40 chance of survival into the next period. Life expectancies during the course of the 20-year forecast are expected to improve for individuals who survive through the forecast period.

Key Points:

- *Population growth includes births, deaths and migration.*
- *Migration is the most volatile component and is influenced most by economic fluctuations.*
- *Regional population growth (1.5 percent per year) and household formation is expected to exceed the national average.*
- *Half of the population growth is due to migration and the other half is due to natural increases.*
- *Life expectancies are expected to rise in the future.*

Chapter 3
Buildable Lands Analysis - Determining the Region's 20-Year Land Supply

Land inside the UGB

Currently, the UGB contains about 236,000 acres. This is subsequent to December 1998 UGB amendments, which brought approximately 3,500 additional acres into the boundary. The areas added to the boundary are shown below in Figure 1.

Metro Urban Growth Boundary:

- Prior to December 1998 UGB amendments:

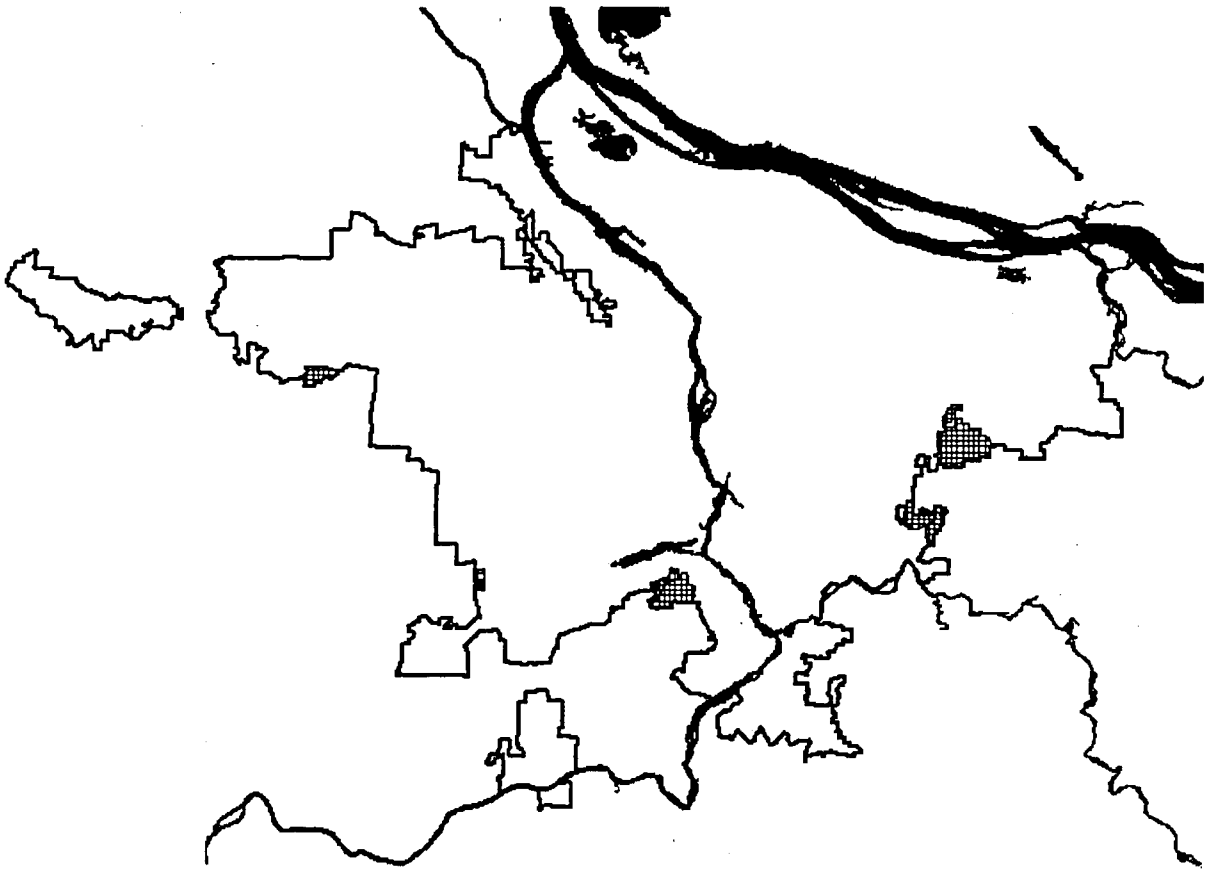
  Area = 232,394 gross acres

- After UGB amendments (3,549 acres):

  Area = 235,942 gross acres

Figure 1

Metro Urban Growth Boundary and Areas Added to the UGB by Ordinance, December 1998



Vacant Land Inventory

Metro's Data Resource Center (DRC) has been producing a regional Vacant Land Study every other year from 1990 through 1996, and each year thereafter. The most recent Vacant Land Study completed is based on digital aerial photography flown in July 1998. This study identifies fully and partially undeveloped parcels within the Metro region. As part of updating the data for the 1997 UGR, the supply of vacant land on hand is derived from the stock of vacant land data identified by the July data.

The buildable land analysis used in this report is derived from the 1998 Vacant Lands Study.

Metro defines vacant parcels as lands with no improvement value or building(s). In addition, Metro has defined partially vacant parcels as those with an undeveloped portion that is larger than ½ acre.

In updating each year's vacant lands inventory, DRC staff focus on removing areas from the previous year's inventory that have become developed. Data collected from local jurisdictions assist with this effort. DRC staff use Metro's geocoded building permit file (updated monthly from county assessor files) to help identify the parcels that have been developed. County tax assessor data are also checked to ensure that the parcel in question has no improvement value on it (an improvement value would indicate that the parcel is developed or at least partially developed).

In addition to removing developed areas from the vacant land data layer, staff may identify additional vacant lands that were undetected in the previous year's inventory. This occurred with the 1998 update. Metro's 1998 aerial photos had a much higher level of resolution (two-foot pixels) than the 1997 aerial photos (four-foot pixel), allowing greater precision in the identification of vacant areas. Each year since Metro began measuring vacant lands, the accuracy of Metro's vacant lands data has incrementally improved.[8]

Metro's definition of vacant land follows very specific guidelines. The following points clarify important attributes of Metro's vacant land analysis and tabulation methodology.

- Vacant lands do not tell whether a vacant parcel is listed on the market to be sold and developed. The vacant lands inventory process does not include a qualitative judgement about a parcel's desirability for development, or identification of issues that would affect development.

- The vacant lands data alone do not necessarily indicate that the parcel is buildable. The UGR starts with vacant lands, and using GIS, removes the areas that are considered environmentally constrained such as wetlands and floodplains (i.e., there is an important distinction between vacant lands and vacant *buildable* lands).

Key Points:

- *Aerial photography was flown in July 1998.*
- *Partially vacant land is defined as vacant parcels with an undeveloped portion of the lot that is greater than ½ an acre.*
- *Vacant land is defined as any undeveloped parcel/tax lot and any*

[8] Metro does not require that local jurisdictions review the accuracy of Metro's vacant lands inventory. However, Metro appreciates input from local jurisdictions and interested parties regarding the accuracy of all its data. The vacant land data are available by subscription or can be viewed on Metro's web site and are commonly used by private groups, citizens and local governments.

partially undeveloped lot larger than ½ acre.

- *Vacant land data do not imply a degree of development readiness or current marketability.*

Gross Vacant Acres to Gross Vacant Buildable Acres

Environmentally constrained land is deducted from GVA to arrive at GVBA. Environmentally constrained land is protected under Title 3 of the Functional Plan. Other sensitive environmental areas have yet to be completely identified or protected by Metro regulation. However, Metro's Goal 5 (fish and wildlife habitat) analysis and National Marine Fisheries Service (NMFS) ESA regulations may determine future areas of protection.

Environmentally Constrained Land
Approximately 10,900 acres of environmentally sensitive land has been identified though Metro's Title 3 process. Environmentally constrained lands as determined by Metro Council Growth Management Committee include:

Water Quality and Flood Management Areas (as defined in Title 3 of the Functional Plan), consisting of:

- **Flood Hazard Areas**, defined as: FEMA floodplains and February 1996 flood inundation areas.

- **Wetlands**, from an enhanced National Wetlands Inventory and local wetland inventories.

- **Wetland Areas,** 50 feet from the edge of wetland or 200 feet from the edge of wetland located adjacent to steep sloped areas (slopes > 25%).

- **Riparian Areas**
  Variable riparian corridor between 15 feet and 200 feet depending on the area drained by the water feature and the slope of the land adjacent to the water feature, as detailed in Title 3 of the Functional Plan.

Steep Slopes Beyond Title 3
The buildable lands analysis assumes that upland areas with slopes greater than or equal to 25 percent (outside of adopted Title 3 riparian areas) have development potential.[9] The development potential on steep slopes is assumed to be current zoning. The average housing unit density allowed on these marginal development areas is approximately 8.5 dwelling units per five acres based on a survey of developed areas.

Title 3 and Goal 5
Metro's Stream and Floodplain Protection Plan (Title 3 of the Functional Plan) was adopted by Metro Council in June 1998. It requires cities and counties for areas in the Metro UGB to meet regional performance standards relating to water quality and floodplain management. Cities and counties are required to adopt these standards by December 18, 1999.

Since Title 3 does not completely prohibit development in designated water quality and flood management areas, some minimal development is expected to occur. Metro staff have studied recent development trends in these areas, and estimated development capacity on these lands over a 20-year period. Based on this study and the amount of land protected under Title 3, the amount of potential residential development

[9] The 1997 UGR assumed these areas were environmentally constrained. The June 1998 adoption of Title 3 regulations did not protect these lands unless falling within water quality and flood management areas.

(6.5 dwelling units/5 acres) is estimated to be around 3,200 dwelling units. This figure has been added to the total supply of dwelling units.

This analysis assumes that all riparian areas beyond those defined in Title 3 (listed above) are buildable. In the past, Metro has assumed a 200-foot setback from each side of the stream and assigned a very low density (one dwelling unit per five acres) for capacity purposes.

Areas beyond those already protected by Metro's Stream and Floodplain Protection Plan (Title 3) may be regulated in the future as a result of the ESA. The NMFS listings of steelhead, chinook and chum as threatened species under the ESA[10] have also made fish and wildlife habitat protection a high priority in the region and an integral part of policy decisions. In addition, Metro is currently focusing on a regional response to the requirements outlined in State Land Use Goal 5 and may lead to the establishment of more areas that require protection. Goal 5 requires Metro to establish criteria that will be used to identify regionally significant resources for fish and wildlife habitat protection.

The amount of land that may come under protection from compliance with State Goal 5 has not been determined as of the release of this report. However, in order to assess the possible impact of Goal 5 on the region's buildable land supply, staff have considered the effect of a riparian buffer averaging 200 feet along each side of all mapped streams in the region. A GIS analysis was used to estimate the difference between areas already protected by Title 3 and the more extensive areas that may be protected by compliance with State Goal 5 or the ESA. It is estimated that this land area has a capacity of approximately 15,000 dwelling units.

When Goal 5 regulations take effect, the region's buildable land supply could be reduced by as many as 15,000 dwelling units.

This estimate is reported separately from the final supply estimates. At this time, the estimate is included only as an "environmental placeholder" for regulations that could be enacted in the future.

All of the calculations and deductions described above have been performed through a polygon-based GIS analysis (that is, each parcel of land is assessed individually). Then, a digital file of gross vacant buildable parcels is converted into a spreadsheet database to complete the remaining calculations. The major part of the remaining calculations consist of regional or sub-regional estimates applied individually to each gross vacant buildable parcel.

Gross-to-Net Reductions

On a parcel-by-parcel basis, GVBA are further refined to account for future streets, schools, parks and places of worship/ fraternal organizations over the 20-year planning period.

Exempt Land

A total of 1,900 acres of Federal, State, county and city owned lands have been removed from GVBA to prevent capacity

[10] Endangered Species: Upper Columbia River spring chinook, Snake River sockeye, Upper Columbia River steelhead. Threatened Species: Columbia River chum, Lower Columbia River chinook, Upper Willamette River chinook, Middle Columbia River steelhead, Lower Columbia River steelhead, Snake River Basin steelhead, Snake River fall chinook and Snake River spring/summer chinook.

from being assigned. The method used is the same as the 1997 UGR.

Vacant Single Family – Platted Lots
All single family zoned parcels less than 3/8 of an acre (16,335 square feet) are temporarily "set aside" from the inventory of GVBA. Meanwhile gross-to-net reduction factors are applied to larger parcels to account for the future need of schools, parks, places of worship and fraternal organizations. This land, totaling 2,900 acres, consists of 16,300 individual parcels. In single family zones, capacity on these parcels is assigned one dwelling unit per parcel. The dwelling capacity on this subset of vacant land is later added back to the final supply estimates when the residential portion of net vacant buildable land is converted into a dwelling unit capacity estimate.

Lots less than 3/8 of an acre but zoned for non-residential or multi-family purposes are also not reduced in capacity by the gross-to-net reduction calculation. However, these individual parcels are included back into net vacant buildable acres to compute dwelling unit capacity for multi-family development and employment land supply respectively. This is consistent with the method used in the 1997 UGR.

Future Streets
Gross-to-net reductions for future streets are applied first. As noted above, no reduction for future streets is applied to parcels less than or equal to 3/8 of an acre in size. A 10 percent reduction is applied to parcels between 3/8 of an acre and one-acre. An 18.5 percent reduction is applied to parcels larger than an acre.

The reduction for future streets has been modified from the adopted 1997 UGR, in which a 22 percent reduction for future streets was applied to parcels one acre or larger. This refinement has been made as a result of a study of subdivision development during 1997 and 1998 on all parent parcels larger than an acre. A total of 170 platted subdivisions were reviewed from each of the three counties. Of these subdivisions, the average amount of land used for streets was 18.5 percent.

Streets: Gross to Net Assumptions
Under 3/8th of acre- 0%
3/8th to one acre-10%
Plus one acre- 18.5%

Although the rate of 18.5 percent is applied globally to all vacant land, it was derived from measuring only single family lots. From a limited study of approximately 190 acres of commercial/industrial lands in Hillsboro, it is estimated that these areas require about 8 percent of the land area for streets.

The rate of 18.5 percent applies to all street classifications. Expansion of freeway and arterial streets suggested in the draft RTP will partially occur within existing rights of way or adjacent to already developed parcels. The RTP estimates that 1,600 acres are required for these future expansions. The 18.5 percent assumption for all vacant land provides enough land for these acres because of the excess land assumed for multi-family and non-residential parcels which require substantially less than 18.5 percent for streets.

Future Public Schools
In order to estimate the amount of land dedicated for future schools, the ratio of students per acre by elementary, middle, and high school is used to calculate the school land need. These ratios were obtained from an informal survey of suburban school districts in the Metro area (Beaverton,

Hillsboro and Tigard School Districts). The method used is the same as the 1997 UGR with updated ratios.

A projection of student population growth is estimated from the regional forecast. These projections are adjusted to coincide with the UGB capture rate of 70 percent, described in Chapter 4, Residential Demand Analysis. The estimates are also adjusted to account for the number of students attending private schools or being home schooled - approximately 90 percent of all students attend public schools.

The estimates appearing in Table 14 indicate that 1,053 additional acres will be needed by school districts to accommodate the growth in student population by the year 2017. It is estimated that most future schools will be located in single-family residential areas, although some will be located in commercial and multi-family areas, and areas designated for public facilities (PF).

The total school land need for each generalized zoning category is proportionally distributed by the percent of gross vacant buildable land within each standard zone that is classified under that land use category. For example, 315 acres of commercial land is estimated to be needed for future schools (1,053 * 30%). The four standard regional zones classified as "commercial" (CC, CG, CN, CO) each receive a proportional share (deduction) of the 315 acres.

Table 14 Estimated Land Need for Public Schools to 2017

Type of School	Estimated Students/Acre	1998-2017 Population Estimate for Age Cohort	Estimated Acres Needed for Public Schools to 2017
Elementary	60	28,577	476
Middle/Jr. High	55	11,651	212
High School	45	16,402	365
Total Estimated Land Need			1,053*

Source: *Metro Regional Forecast (adjusted to 1998-2017). These estimates have been adjusted for the 70 percent capture rate, and for the estimated proportion of students attending public schools to those attending private schools (90:10). Ratios are consistent with those used in the 1997 UGR. Student ratios were obtained from interviews with local school district facilities planning officials. * Reported as a rounded number (1,100 acres).*

Table 15
Distribution of Land of Current Schools

Land Use	Percent of School need allocated*
Commercial	30%
Industrial	0%
Multi-family	10%
Parks/Open Space	0%
Rural	10%
Single- Family Res.	43%
Public facilities	7%
TOTAL	100%

*Based on observed distribution of schools by general zoning designations

In the gross-to-net calculation, all of the vacant land in the PF standard zoning category is allocated for future schools. The remaining need for schools is allocated among the standard zoning designations according to where schools have developed in the past (see Tables 15 and 16).

Future Parks

The amount of land needed for development of future parks is computed in a fashion similar to the computation of future school land need.

A park ratio of 20.9 acres of park land per 1,000 persons was surveyed for 1998 and applied for this factor (see Table 17). This rate is updated from the 1997 UGR ratio of 14.4 acres/1,000. The projected population is based on the 2015 Regional Forecast and is consistent with the household and dwelling unit formation assumption employed in this report and the 1997 UGR.

Table 16
Percent Deduction to Gross Vacant Buildable Acres for Future Schools – by Standard Regional Zoning Designation

Current Standardized Regional Zone Designation	General Land Use Category	Acres allocated to Schools
Central Commercial- CC	COM	34.15
General Commercial- CG	COM	158.48
Neighborhood Commercial- CN	COM	18.01
Office Commercial-CO	COM	105.14
Agricultural or Forestry- FF	RUR	14.52
Heavy Industrial- IH	IND	-
Light Industrial- IL	IND	-
Mixed Use Industrial- IMU	IND	-
Multi-family 1- MFR1	MFR	67.63
Multi-family 2- MFR2	MFR	13.18
Multi-family 3- MFR3	MFR	1.77
Multi-family- MFR4	MFR	0.02
Mixed Use Center 1- MUC1	MFR	10.34
Mixed Use Center 2- MUC2	MFR	12.33
Mixed Use Center 3- MUC3	MFR	-
Public Facilities- PF	PF	77.74
Parks and Open Space- POS	POS	-
Rural or Future Urban- RRFU	RUR	90.75
Single Family 1- SFR1	SFR	34.66
Single Family 2- SFR2	SFR	112.10
Single Family 3- SFR3	SFR	152.60
Single Family 4- SFR4	SFR	102.98
Single Family 5- SFR5	SFR	16.02
Single Family 6- SFR6	SFR	16.19
Single Family 7- SFR7	SFR	14.02
TOTAL		**1,052.61**

Source: Metro

The total parks land need is about 3,700 additional acres. The initial mathematical calculation is reduced by about 4,900 acres to account for the amount of Open Spaces Bond Measure land acquisitions past and on-going outside the UGB. This deduction is consistent with the method used in the 1997 UGR. Bond measure acquisitions will in part provide park land amenities to residents inside the Metro UGB.

The demand for park land is allocated to generalized zoning categories (see Table 17), and then allocated to standard regional zoning designations to complete the parcel-level computation. Approximately 70 percent of parks are assumed to locate in residential areas, 10 percent in commercial areas, and the majority of the remainder in industrial areas.

The reduction for parks in the undeveloped lands zoned POS (public open space) is constructed to "consume" all the land in this zoning category. The park land need is allocated by standard regional zone as indicated in Table 18 and Table 19.

Table 17 Park Land Calculation	
Projected Metro Area Population 1998-2017	*411,400*
Established Parks Ratio (Acres per 1,000 population)	20.9
Park Acres Needed	8,598
Less: Bond Measure Acquisitions to Date Outside the UGB	-3,633
Less: Bond Measure Acquisitions Anticipated Outside the UGB	-1,287
Adjusted for Current and Proposed Bond Measure Acquisitions	3,678*

* Reported as a rounded number (3,700)
Source: Metro

The parks land need is allocated from the generalized zoning categories (shown in Table 18) to standard regional zones (shown in Table 19), in a process similar to that used to assign gross-to-net reductions for schools.

*Table 18 Distribution of Future Parks Land Need**	
Residential	70%
Commercial	10%
Industrial	18%
Parks/Open Space	2%
	100%

* Based on ratios similar to those used in the 1997 UGR
Source: Metro

Table 19
Percent Deduction to Gross Vacant Buildable Acres for Future Parks – by Standard Regional Zoning Category

Current Standard Regional Zone	General Land Use Category	Acres set aside for Parks*
Central Commercial-CC	COM	30.36
General Commercial- CG	COM	140.90
Neighborhood Commercial- CN	COM	16.01
Office Commercial- CO	COM	93.48
Agricultural or Forestry- FF	COM	87.04
Heavy Industrial- IH	IND	308.94
Light Industrial- IL	IND	261.07
Mixed Use Industrial- IMU	IND	79.31
Multi-family 1- MFR1	RES	249.91
Multi-family 2- MFR2	RES	48.70
Multifamily 3- MFR3	RES	6.55
Multi-family 4- MFR4	RES	0.08
Mixed Use Center 1- MUC1	RES	38.19
Mixed Use Center 2- MUC2	RES	45.56
Mixed Use Center 3- MUC3	RES	-
Public Facilities- PF	RES	-
Parks and Open Space- POS	POS	86.29
Rural or Future Urban- RRFU	RES	482.65
Single Family 1- SFR1	RES	131.60
Single Family 2- SFR2	RES	425.60
Single Family 3- SFR3	RES	579.33
Single Family 4- SFR4	RES	390.95
Single Family 5- SFR5	RES	60.81
Single Family 6- SFR6	RES	61.46
Single Family 7- SFR7	RES	53.21
TOTAL		**3,678.00**

* Based on 1997 UGR distribution of parks
Source: Metro

Future Places of Worship and Fraternal Organizations

The land need for future places of worship and fraternal organizations is based upon a ratio of 1.4 acres per 1,000 persons[11] – the same assumption used in the 1997 UGR.

Based on the ratio and the population growth projections of the regional forecast, the amount of future land need for places of worship and fraternal organizations is estimated to be about 600 gross acres (411,400 persons * 1.4 acre/1,000 persons = 576 acres).

Table 20 Distribution of Land Need for Places of Worship, Fraternal Organizations

RUR	10.00%
SFR	55.00%
MFR	20.00%
COM	15.00%
IND	0.00%
POS	0.00%
PF	0.00%
	100.00%

*based on current distribution of places of worship

Source: Metro

A tabulation of the amount of vacant land currently owned by places of worship and fraternal organizations reveals that these organizations own a total of 717 acres.

The existing 717 acres of land owned by these organizations are deducted from GVBA for future need.

Rather than removing the specific parcels owned by places of worship and fraternal organizations, these parcels were retained as part of the region's buildable land supply, and 717 acres of land need was deducted proportionally from parcels of gross vacant buildable land, in the same manner as schools and parks.

Approximately 85 percent of the need for these uses is estimated to fall in residential areas, with the remaining 15 percent in commercial areas.

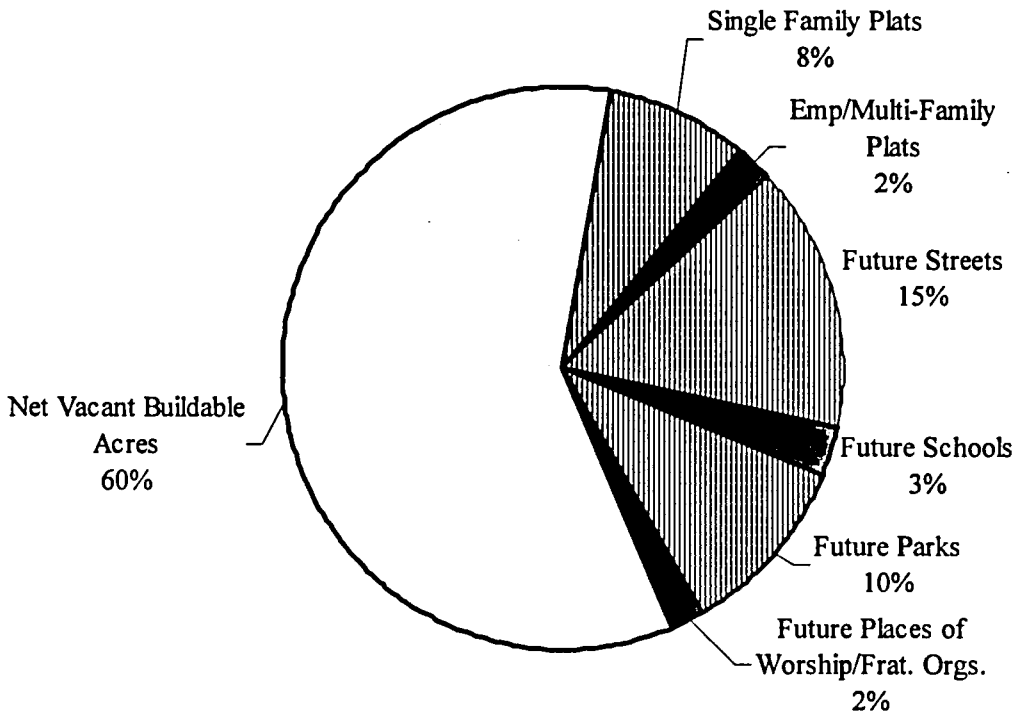
Table 21Percent Deduction to Gross Vacant Buildable Acres for Future Places of Worship/Fraternal Organizations – by Standard Regional Zoning Designation

Current Standardized Regional Zone	General Land Use Category	Acres Deducted
Central Commercial- CC	COM	11.63
General Commercial- CG	COM	53.98
Neighborhood Commercial- CN	COM	6.13
Office Commercial- CO	COM	35.81
Agricultural or Forestry- FF	RUR	9.89
Heavy Industrial- IH	IND	-
Light Industrial- IL	IND	-
Mixed Use Industrial- IMU	IND	-
Multi-family 1- MFR1	MFR	92.13
Multi-family 2- MFR2	MFR	17.95
Multi-family 3- MFR3	MFR	2.41
Multi-family 4- MFR4	MFR	0.03
Mixed Use Center 1- MUC1	MFR	14.08
Mixed Use Center 2- MUC2	MFR	16.80
Mixed use Center 3- MUC3	MFR	-
Public Facilities- PF	PF	-
Parks and Open Space- POS	POS	-
Rural or Future Urban- RRFU	RUR	61.81
Single family 1- SFR1	SFR	30.48
Single family 2- SFR2	SFR	98.56
Single family 3- SFR3	SFR	134.15
Single family 4- SFR4	SFR	90.53
Single family 5- SFR5	SFR	14.08
Single family 6- SFR6	SFR	14.23
Single family 7- SFR7	SFR	12.32
TOTAL		**717.00**

The land need for future places of worship and fraternal organizations is allocated to

[11] Based on 1994 acreage under church and fraternal organization membership.

Figure 2: Break Out of Total Gross Vacant Buildable Acres



Source: Metro DRC

Note: Single family and employment/multi-family parcels less than 3/8 of an acre are set aside from gross vacant buildable acres (GVBA) during gross-to-net reductions, but still receive capacity.

generalized zoning categories, before further allocating the need to standard regional zoning designations.

Net Vacant Buildable Land

The region's dwelling unit capacity is estimated from net vacant buildable land (NVBA) on a parcel-by-parcel basis.

New Standard Zoning Designations
A new set of standard zoning designations has been included in this update of the 1997 UGR. Previously, this analysis placed all local zoning within the region into 19 zoning categories based on comprehensive plan designations. Metro staff have a defined broader set of zoning designations to capture a greater level of detail from approximately 500 local zones that now exist throughout the region.

The 25 new standard regional zoning designations are shown in Table 22.

Gross vacant buildable land minus land needed for future streets, schools, parks, and places of worship/fraternal organizations yields NVBA. The rate of reduction from GVBA is 38.6 percent.

Table 22 Standard Regional Zoning Designations	
Standard Regional Zone	**Units per Net Acre (min. to max.)**
RRFU (Rural/Future Urban)	1.0 – 1.0
FF (Farm Forest)	1.0 – 1.0
SFR1 (Single Family Residential)	1.1 – 2.2
SFR2 (Single Family Residential)	2.2 – 3.6
SFR3 (Single Family Residential)	3.6 – 5.1
SFR4 (Single Family Residential)	5.1 – 6.7
SFR5 (Single Family Residential)	6.7 – 7.9
SFR6 (Single Family Residential)	7.9 – 10.9
SFR7 (Single Family Residential)	10.9 – 21.8
MFR1 (Multi-Family Residential)	25.0 – 11.0
MFR2 (Multi-Family Residential)	25.0 – 50.0
MFR3 (Multi-Family Residential)	50.0 – 100.0
MFR4 (Multi-Family Residential)	100.0
MUC1 (Mixed Use 1)	14.1*
MUC2 (Mixed Use 2)	25.9*
MUC3 (Mixed Use 3)	58.8*
CC (Central Commercial)	N/A
CG (General Commercial)	N/A
CN (Neighborhood Commercial)	N/A
CO (Office Commercial)	N/A
IH (Heavy Industrial)	N/A
IL (Light Industrial)	N/A
IMU (Mixed Use Industrial)	N/A
PF (Public Facilities)	N/A
POS (Parks and Open Space)	N/A

Source: **average density from 2040 up-zone matrix*

Please see Chapter 4, Residential Demand Analysis for more details.

Densities for mixed-use zones (i.e., MUC1, MUC2, MUC3) are assigned based on 2040 growth concept densities.

Employment areas do not have densities associated with them, as the employment supply estimate is conducted separately through the ZELDA model. In ZELDA, the 1998 Employment Forecast is converted into an estimate of acres of employment land needed, and compared with the existing employment land supply.

Key Points:

- *Standard regional zoning designations (SRZs) have been expanded from 19 to 25.*
- *500+ unique local zones have been collapsed into the 25 SRZs.*

Chapter 4
Residential Demand Analysis

Residential Demand – Overview

The residential housing demand forecast is derived from a population forecast produced using Metro's regional macroeconomic model, MARIO. Demand projections are all based on the results from the 2015 Regional Forecast extended to 2020. Population in the Metro Region is expected to increase at a moderate pace – 1.5 percent per year. By the year 2017, population growth is expected to add another 579,700 residents to the region (in the SMSA).[12]

In terms of the Metro UGB, population growth is expected to add 410,000 more residents or about another 198,000 households or 205,200 dwelling units (assuming a vacancy rate). These UGB figures are based on a 70 percent capture rate, assumed in the 1997 UGR.

The key component behind the relatively strong population growth trends in the SMSA is net in-migration. Migration accounts for about half of the future population growth. People between the ages of 20 and 34 represent the biggest age group that tends to migrate. School or work changes account for the main reasons behind migration for most adults. Studies indicate that well educated individuals are more likely to migrate to new jobs than more poorly educated individuals. Because of the in-migration in this population segment (between the ages of 20-34), this will tend to offset the rising average age of the population. The aging baby boomer segment of the region's population will continue to exert demographic pressure. Historically, migration rates are subject to extreme changes. The Regional Forecast assumes a conservative migration rate that nearly replicates the average of the region's historical migration rate.

Key Points:

- *MARIO estimates moderate population growth through the forecast period.*
- *By 2017, resident population will increase in the Metro UGB by about 410,000 people.*
- *Represents a 40 percent increase over the 20-year period.*
- *Net in-migration will continue to spur above national average population growth in this region.*

Regional Forecast - A 20-year Outlook

The Regional Forecast was released in 1996 with 1994 as the last year of history. The population and household forecasts used to estimate residential demand continue to track closely with independent population estimates by the State of Washington and Portland State University. The Regional Forecast for the four-county area is within 300 persons of current estimates for 1998 indicating that the Metro projections are very close to the State's actual figures for the metropolitan area.

The 20-year period for this capacity analysis is 1997-2017. The last year, 2017, is the same as the 1997 UGR. Since this update includes 1998 data, the analysis is based on capacity need for the remaining 19 years.

In 1998, the number of housing units in existence is estimated to be 517,400. Future demand is estimated to be an addition of 205,200 housing units through the year 2017. This would mean a 39.7 percent increase in housing unit need or an average of 1.8 growth percent per year.

[12] SMSA four counties include Washington, Multnomah, Clackamas and Clark County.

Table 23 2020 Regional Forecast- Population Comparison In the Four-County Metropolitan Area				
	Actual	**Forecast**	**Difference**	**% Difference**
1994	1,565,800	1,565,800	0	0.0%
1995	1,596,100	1,597,100	-1,000	0.1%
1996	1,629,200	1,625,000	4,200	-0.3%
1997	1,658,500	1,656,100	2,400	-0.1%
1998	1,691,400	1,691,100	300	0.0%

Source: *Portland State University, CPRC; Washington State, OFM; Metro, The Regional Forecast, p. 13-1*

Capture Rates

The dwelling unit capture rate through 2017 is assumed to be 70 percent consistent with the 1997 UGR. The capture rate represents the amount of future residential growth that is expected to occur within the Metro UGB (includes any expansion of the boundary) in relation to the forecast for the four-county metropolitan area (i.e., SMSA). It is assumed that the remaining residential growth will locate to Clark County, unincorporated portions of the tri-county area, and cities located beyond the Metro UGB (e.g., Banks, Barlow, Canby, Estacada, Gaston, Mollala, North Plains and Sandy).

The capture rate is determined by combining technical information on economic, demographic and transportation analysis of expected growth trends and folding in policy decisions. Changes in policies during the forecast time period could change the capture rate. Policy decisions may influence housing location choices. The capture rate does not necessarily have to be constant, but at this point without more concrete statistical information, the rate is assumed constant in the UGR.

Due to the limited availability of data to measure the actual dwelling unit capture rate, proxy data series have been consulted. Capture rates are measured in households

Table 24 Capture Rates Using Households: 1985-98			
	Metro Boundary	**Four-County Area**	**Capture Rate✧**
1980	376,177	477,455	78.8%
1985	395,718	506,047	68.3%
1986	400,282	513,143	64.3%
1987	406,823	522,011	73.8%
1988	415,984	535,009	70.5%
1989	426,064	548,702	73.6%
1990	426,298	553,107	5.3%*
1991	439,750	571,079	74.8%
1992	445,128	578,982	68.1%
1993	455,164	594,160	66.1%
1994	461,233	604,372	59.4%
1995	478,076	627,937	71.5%
1996	486,982	640,188	72.7%
1997	493,624	649,010	75.3%
1998	502,394	660,229	78.2%

* Probable estimation error between 1989 and 1990 census value.
✧ Capture rate = marginal change (UGB)/ change (SMSA)
Sources: *Data Resource Center; Portland State University- Center for Population Research and Census; Washington State Office of Financial Management*

Table 25 Capture Rates Using Households: 1985-98			
	Metro Boundary	Four-County Area	Capture Rate✧
1980-98	126,217	182,774	69.1%
1990-98	76,096	107,122	71.0%
1994-98	41,161	55,857	73.7%

✧ Capture rate = marginal change (Metro)/ change (SMSA)
Sources: *Data Resource Center; Portland State University- Center for Population Research and Census; Washington State Office of Financial Management*

and building permits to approximate the capture rate for dwelling units. Household capture rates are similar to dwelling unit rates except for a vacancy rate.

From data shown in Table 24, average capture rates over various time periods are shown in Table 25. The point of Tables 24 and 25 is to indicate that on any individual year, the capture rate may swing widely. However, when many years are computed together over various time periods, an average or central tendency emerges. As shown in Table 25 the capture rate appears to hover between a range of 69.1 percent to 73.7 percent.

In a separate study, less precise information dating to the early 1900's indicates a Portland urban capture rate (proxying the current Metro UGB because the present land use system did not exist prior to 1970) which shows a 100-year secular decreasing slope.

Without precisely knowing the future, the capture rate is likely to swing widely subject to various economic conditions including the occurrence of a recession or two. As a result, without further information to the contrary, it has seemed technically prudent to choose a capture rate that mirrors the average occurrence of the past 20 years.

More recently, the short-term measurement of the capture rate for the 1994-98 update period indicates a 73.7 percent rate.

Building permit data provide an alternative data set to compare to the household data presented previously. The building permit data fluctuate more than household capture rate data. Although building permit data measures units constructed during the time period, there could be much more variation due to interest rates, market conditions and demand for housing types. Building permit capture rates range from a low of 61.6 percent to a high of 89.4. Since 1995, the capture rate has ranged between 71.2 and 72.1 percent (see Table 26).

Table 26 Capture Rate Estimates with Building Permits					
	Four-County Area		Metro Boundary		
	Multi-Family	Single Family	Multi-Family	Single Family	% Metro Capture Rate
1990	6,658	8,315	5,292	5,274	70.6%
1991	2,413	7,062	1,906	6,560	89.4%
1992	2,367	8,739	1,434	5,405	61.6%
1993	2,818	9,941	1,816	6,152	62.5%
1994	5,266	10,408	3,838	6,296	64.7%
1995	6,804	9,760	5,678	6,262	72.1%
1996	7,736	11,039	6,548	6,846	71.3%
1997	7,855	10,597	6,667	6,462	71.2%

Source: Metro Data Resource Center, Portland State University

The figure of 75.3 percent shown in Table 27 below means that 75.3 percent of the dwelling units were developed inside of the UGB while 24.3 percent occurred in Clark County and cities and counties outside of the UGB.

In summary, a 70 percent capture rate approximates a median or average statistic of past performances and has been selected by Metro Council as an assumption to be used in the calculation of the residential demand during the forecast period.

Key Points:

- *The overall residential capture rate assumed in the 1999 UGR is 70 percent.*
- *Capture Rates computed with building permits range from 61.6 to 89.4 percent.*
- *Single-year capture rate estimates with households range from 59.4 to 78.2 percent.*
- *Since capture rates fluctuate widely from year-to-year, it use useful and illustrative to estimate average capture rates over different economic spans. Using this average approach, capture rates show a tendency between 69.1 and 72.6 percent.*

Residential Refill Rates and the Capture Rate

Generally, there is an inverse relationship between residential refill rates and the capture rate, although this relationship can be affected by a number of different factors. The inverse relationship between these rates means that as the capture rate in the region increases the production of refill (redevelopment and infill) units will fall.

However, there are data available from the Vancouver BC region that suggests that both higher rates of refill and capture rates are possible in areas that have policies that favor redevelopment and infill, and have a relative scarcity of nearby competing areas with substantial vacant land coupled with high demand for residential units. Limited data are available on the metropolitan area to explain the limitations of this relationship between refill and capture rates.

Residential Demand Determination

The resulting residential demand for the period (four-county forecast within the UGB) between 1998-2017 with a 70 percent capture rate assumption is estimated at 205,200 dwelling units.

Table 27 Dwelling Units Capture Rate

	Inside the UGB	Four-County Area	Capture Rate
1994	451,300	604,400	
1997	484,900	649,000	75.3%

Source: Metro Data Resource Center

Chapter 5
Residential Supply Analysis

Itemized Accounting of Residential Dwelling Unit Capacity

The calculation of residential capacity follows the method used in the 1997 UGR unless specified otherwise.

After adjusting GVBA by various gross-to-net factors (i.e., exempt land, platted lots, future streets, schools, parks and places of worship), the amount of vacant land remaining becomes net vacant buildable acres (NVBA). This is the vacant land that residential dwelling units can be constructed upon (also available for employment uses). The land that is zoned for residential purposes is separated to create the supply of vacant residential land for capacity calculation. There are 13,400 vacant net residential acres.

1. Dwelling Unit Capacity at Current Local Zoning Densities

The first step is conversion of the residential NVBA into a residential capacity denominated in dwelling or housing units. This operation is performed using local zoning (generalized to standard regional zoning categories) to convert the vacant land into an estimate of future housing capacity in dwelling units.

Local zoning data (generalized to SRZ) is used in this report. The DRC received and compiled zoning data from cities and counties. These data are up to date for changes through May 1999. A number of local jurisdictions have completed zone changes to reflect Title 1 requirements which would be reflected in the local zoning data they submitted to the DRC.

As a result of implementation of Functional Plan requirements by some local jurisdictions, part of the local zoning data would already reflect densities consistent with Functional Plan requirements. Therefore the basis chosen for computing current capacities is local zoning instead of comprehensive plan designations. This is a departure from the 1997 UGR, which had used comprehensive plan designations instead of current zoning to compute capacity.

Dwelling capacity based on these current zoning densities is 88,600 units.

2. Residential Development in Mixed Use Areas

This step is particularly important in order to avoid double-counting the density and capacity of mixed use areas that allow a blend of housing and employment uses. In addition to computing employment land need, ZELDA also computes an estimate of land area in mixed used zones that is expected to develop for residential uses. This residential capacity estimate is subtracted from employment capacity and passed to the residential supply analysis without further calculations.

Additional housing unit capacity from residential development in mixed use areas is estimated at 4,300 units.

3. 2040 Residential Up-zoned Density

Because not all local jurisdictions have fully completed their re-zoning to comply with Title 1 of the Functional Plan, additional estimates of future residential capacity is added to current capacity (see step 1) to represent the potential up-zones of local zoning codes. Most local jurisdictions have received extensions to the Functional Plan deadline of February 1999 for local compliance. Many of these extensions apply

to zoning of areas where significant up-zoning is anticipated.

The 2040 Growth Concept Map assumes higher densities along transit corridors, main streets, and mixed used centers (i.e., regional centers, town centers and city centers). Local codes are expected to be revised to reflect the 2040 Growth Concept goals.

The density assumptions assumed under the 2040 Growth Concept are incorporated into a 2040 up-zone density matrix. This matrix was developed based on 1994 data for the up-zoning factor in the 1997 UGR. The 2040 up-zone matrix represents Metro's interpretation of local zoning upgrades (refer to Appendix A). Local jurisdictions may determine their own alternate means of achieving 2040 capacity goals under its compliance reporting studies and re-zonings.

For purposes of this capacity assessment, the up-zone matrix is used to compute the potential increases in capacity resulting from complete compliance by local jurisdictions. As more jurisdictions implement Title 1, Functional Plan requirements through local code amendments and zone changes, this step of up-zoning should be unnecessary in future UGRs.

One of the more significant changes to the updated 1997 UGR is the adjustment to the 2040 up-zone matrix. There is now no 2040 up-zone factor applied in the neighborhood and open spaces categories of the up-zone matrix. This change is consistent with preliminary compliance reports by local jurisdictions and recognition that many cities are substantially complying with the Functional Plan targets, though minimum density requirements already assumed in the current zoning capacities.

2040 up-zoning represents an addition of 36,200 dwelling units to capacity.

Key Points:

- *Current zoning has been updated through May 1999.*
- *Current zoning not comprehensive plan is used for 2040 up-zone analysis.*
- *Result: a more realistic representation of progress toward 2040 implementation is measured.*
- *Existing single-family and parks and open space are removed from up-zoning.*

4. Underbuild Rate

Underbuild represents a statistical estimate of the dwelling unit capacity lost due to residential development at less than permitted densities in subdivisions. Underbuild can be attributed to market preferences, poor access, steep slopes, small or odd shaped lots and objections from neighborhood associations.

For this report, the underbuild rate is assumed to be constant. However, due to various factors, the underbuild rate can vary over time and across jurisdictions. The supply of unconstrained, easily developable land is gradually being consumed within the Metro UGB. As a result, the land remaining may have obstacles which are difficult to overcome.

Moreover, regulatory permissions by local preferences may also affect how much underbuild may exist. Flexible local codes may allow the market to respond more efficiently to physical constraints. Higher market demand for residential lots may make it more economical to develop solutions to constraints.

Market conditions play a role. Higher land prices have the effect of decreasing underbuild because there is a greater profit

incentive to use land more efficiently and build closer to maximum densities.

In the 1997 UGR, the Metro Council adopted a rate of 21 percent underbuild as a result of a study conducted in 1995. Since the 1997 UGR was adopted, Functional Plan policies relating to minimum densities have been adopted and implemented by local jurisdictions.

Under the Functional Plan, Title 1, regulations establish a minimum density requirement that specifies that residential developments must at least be constructed at 80 percent of the maximum density. This requirement was adopted by Metro Council in November 1996 and is being implemented by local jurisdictions through code changes. In effect, the Functional Plan provides assurance that underbuild will be no more than 20 percent for residential development within the UGB.[13]

Underbuild is reported as a loss of 25,800 dwelling units from capacity.

5. Ramp-up Factor

Ramp-up is a factor that has been used to compensate for the lag time in fully implementing the 2040 Growth Concept objectives. Capacity is deducted until full implementation is required (a five-year period was assumed in the original UGR). Ramp-up is applied over a five-year time period beginning in 1994 through 1999. The Functional Plan compliance deadline was February 1999.

Ramp-up primarily affects residential zones and takes into account the difference between current and 2040 densities.

The 1997 UGR reduced capacity by 6,430 dwelling units to account for five years of ramp-up. 1999 is the last year of ramp-up and represents 1/5 of the original 6,430 dwelling units.

Ramp-up in the 1997 Urban Growth Report Update is calculated at 1,300 dwelling units.

6. Overview of Residential Refill Study Findings

The Residential Refill Study was completed last year. "Redevelopment" occurs when a structure is demolished and another is constructed in its place. Infill occurs when development takes place on land that has previously been considered developed but not occupied with a structure. Redevelopment and infill have been combined and called "Refill" since both increase the residential capacity of the existing developed area.

Data collected from this study permit an estimation of the rate of dwelling units that are produced through refill as opposed to new construction on vacant land. The assumed rate of refill has a direct bearing on the amount of additional land required for residential development within the UGB.

The Residential Refill Study produced a point estimate of 25.4 percent on 1995-96 data. This rate has been adjusted to match the total distribution of new residential building permits issued within the UGB during that time period.

[13] Measurements of the underbuild rate from recent development data suggest rates below the regulatory rate (20 percent). It appears that higher land prices are allowing developers to maximize their returns under current conditions. These data are confirmed by several other jurisdictions that independently performed their own assessment of residential underbuild as part of their compliance reporting requirements. The majority of jurisdictions performing this analysis had an underbuild of 20 percent or less.

The refill rate was calculated during a period in which the Metro region produced a relatively greater share of the region's housing output than is assumed over the course of the 20-year projection period. The capture rate assumed during this period is 70 percent. Findings from the Residential Refill Study suggest that fluctuations in the capture rate are likely to induce changes in the refill rate also.

Consequently, the residential refill rate is expected to rise and fall in the future with economic cycles and fluctuations in the capture rate. Over the next 2-5 years, the refill rate could vary between 20 percent and in excess of 30 percent. Overall the expectation is that the refill rate will increase over time as the 2040 Growth Concept takes effect.[14] Input from local jurisdictions is supportive of this conclusion.

However, we presently do not have the ability to accurately forecast future refill rates. Therefore, a constant refill rate based on the historical data and Functional Plan requirements is assumed in the residential capacity analysis. The 1997 UGR assumed a residential refill rate of 28.5 percent and this rate is continued for this update, on the direction of the Metro Council Growth Management Committee.

The residential refill rate has been assumed as 28.5 percent for the 20-year period. This rate adds 58,500 more dwelling units to capacity.

Table 28 shows the approximate stock of infill and redevelopment land available during the forecast period. Infill and redevelopment stocks are separated out to estimate the supply and are expected to increase as the 2040 Growth Concept plan is implemented. A greater percent of infill capacity is anticipated to be consumed (41.4 percent) than redevelopment stock (19.0 percent) over the 20-year period.

[14] Technical Report, Residential Refill Study, Metro, 2/10/99.

Table 28 Summary of Infill and Redevelopment Stock Estimates	
Infill Estimates:	
Infill Supply:	
- tax lots 3 to 10 times larger than zoning	26,342
- potential infill capacity	116,400 units
Infill Demand:	
Present UGB Dwelling Unit Need- 205,200	
Infill: refill (0.285) – redevelopment (0.050) => 0.235 x 205,200	48,200 units
Percent of Infill Capacity Used (48,200 / 116,400)	*41.4%*
Redevelopment Estimates:	
Redevelopment Supply:	
- amount of redevelopment acres	8,810
- potential redevelopment capacity	54,200 units
Redevelopment Demand:	
Present UGB Dwelling Unit Need- 205,200	
Redevelopment: refill (.285)- infill (0.235) => 0.050 x 205,200	10,300 units
Percent of Redevelopment Capacity Used (10,300 / 54,200)	*19.0%*

Source: Metro Data Resource Center, Refill Study

Areas with high refill rates tend to have less total residential output. The Metro data, Vancouver BC data and other inter-regional data imply that there is an inverse relationship between the residential refill rate and total dwelling output. In the Metro study, 17 of 37 sample areas had refill rates in excess of 50 percent but contributed less than 19 percent of the total housing output. Vancouver BC is an anomaly because even with a refill rate in excess of 40 percent the overall residential output is still maintained at a high level.

Policy changes can also affect the refill rate. For example, allowing more units on developed land will increase the refill rate and will not adversely affect total residential output. Limiting the supply of vacant land increases the rate of refill. Similarly, increasing residential real estate prices also increase the refill rate. Under most circumstances, limiting supply and increasing real estate prices will decrease the overall residential output.

Key Points:

- *Refill (redevelopment and infill) was measured in a study from August 1997 to October 1998.*
- *The point estimate on refill was 25.4 for that period in the Metro region.*
- *The refill rate can be expected to vary with economic cycles over the 20-year period.*
- *The capacity analysis assumes a rate of 28.5 percent on average for the 20-year period.*
- *A greater percent of infill stock is anticipated to be used (41.4 percent) than redevelopment (19.0 percent).*
- *A higher refill rate may lead to a lower level of housing production.*

7. Development on Environmentally Constrained Land

Environmentally constrained lands do not have the same development capacity as buildable lands. These types of land include steep slopes, flood plains, wetlands, natural resource and riparian areas. Development potential on environmentally constrained land in this update has been treated differently than in the 1997 UGR.

The 1997 UGR assumed a 200-foot buffer for riparian areas had limited development capacity. The buffer was measured from the centerline of streams and from the banks of major rivers. The 200-foot buffer area was established to approximate the riparian areas needed for conservation of fish and wildlife habitat but was not related to an area that is currently regulated.

State law requires use of past experience or newly adopted measures when calculating capacity. The 1997 UGR Update uses the Title 3 areas which are the current extent of Metro's adopted measures to protect environmentally sensitive lands, as opposed to the area previously defined by a 200-foot buffer area. Future efforts to complete Goal 5 work and ESA regulations may require larger buffer areas than required by Title 3. Increases in buffer areas due to completion of Goal 5 work or the ESA regulation would reduce buildable lands and dwelling unit capacity.

Although environmentally constrained land is not included in the net vacant buildable land inventory, some low density development has occurred in these areas historically. The 1997 UGR added a low density development rate into the capacity calculation based on an assumption of one dwelling unit per five acres.

The 1999 UGR calculates capacity by environmental land components, i.e., Title 3 outside of floodplains, steep slopes and floodplains. Lots located wholly within Title 3 areas continue to be allotted one dwelling unit per lot to eliminate the possibility of a taking claim. If Title 3 regulations were imposed on a property that removed all value, it is possible that a taking claim could be made.

An informal study of recent development (using 1995 to 1998 building permit activity) revealed an average lot size for these recent housing developments that are within the Title 3 areas.

This average was then used to compute the amount of potential dwelling capacity that could occur inside the currently defined Title 3 areas. However, some important caveats were first applied to account for likely development obstacles in Title 3 areas. First, the development yield in Title 3 areas is reduced to account for gross-to-net reduction factors for streets and other facilities. From this net land supply figure, the historical development rate was applied (i.e., average lot size).

An underbuild factor was not applied, as this is implicit in the historical development rate. In addition, it was assumed that the special environmental constraints of these areas would prevent parcels under 10,000 square feet from receiving capacity.

A resulting historical development rate was applied to Title 3 areas located outside of floodplains. The historical development rate has been calculated at 8.5 units per 5 acres on these lands, which results in the addition of 3,200 dwelling units.

Capacity in environmentally constrained lands is estimated at 3,200 dwelling units.

Additional Technical Notes on Capacity Estimates

Steep Slopes

Steep slopes are defined as those areas greater than 25 percent slope. In the past (1997 UGR), these areas have been considered unbuildable. These lands are more expensive to develop, are less efficient to develop because of topographic constraints and may have life and property safety concerns due to landslides. The historical rate of development of steep sloped areas has been estimated by examining building permit data from 1995 through 1998 for areas already developed. The historical rate and current zoned capacities on these lands are approximately the same at 4,236 units or 6.4 dwelling units per 5 acres.

Floodplains

Floodplains are defined as areas located within the 100-year floodplain and indicated on the Federal Emergency Management Administration's (FEMA) maps.[15] Structures located in the floodplain can cause life and property losses in the floodplain and downstream. Most jurisdictions allow construction in the flood plain as long as the finished floor elevation is located at least one foot above the FEMA flood elevation. Title 3 allows construction outside of the 15-50 foot vegetated corridor in the floodplain with balanced cut and fill. Balanced cut and fill requirements may decrease future construction in the floodplain.

Key Points:

- *1999 UGR uses regulated Title 3 area versus a 200-foot riparian buffer. Goal 5 and ESA may require larger buffer areas that would reduce the supply of buildable lands.*
- *Capacity for these lands is calculated by environmental land components: Title 3, steep slopes and floodplains.*
- *Title 3 areas outside of floodplains - 8.5 dwelling units per 5 acres (3,121 DU).*
- *Steep slopes – 6.4 dwelling units per 5 acres (4,236 DU).*
- *Floodplains, within the 100-year floodplain but located outside of the 15-50 foot vegetated corridor are assumed to develop at zoned capacity.*

8. Accessory Dwelling Units

In November 1996, Metro Council adopted the Functional Plan with a requirement that cities and counties not prohibit the construction of at least one accessory dwelling unit within any detached single family dwelling. Local governments had a deadline to amend their codes accordingly by February 1999.

As previously noted, the up-zone factor in this update has not been applied to neighborhood areas. But based on this requirement in the Functional Plan, the updated capacity analysis provides for accessory units as a proportion of the total number of single family dwellings.

The American Housing Survey for the Portland Metropolitan Area, 1990, indicated about 1.8 percent of sampled single family dwelling units are accessory units. Based on this survey, the same factor is applied to the anticipated total supply for an estimate of 7,500 accessory dwelling units for this 20-year period.

[15] Maps issued by the Army Corps of Engineers.

9. Residential Supply and Demand Balance – Need Analysis

Residential Demand

Moderate population growth is anticipated during the forecast period. The residential population will increase approximately 40 percent over the 20-year period and will have grown by a total of 410,000 people. Based on demand projections from the 2015 Regional Forecast an additional 205,200 dwelling units are needed to accommodate residential growth within the UGB. This estimate of 205,200 dwelling units is based on a 70 percent capture rate of the four-county forecast.

Residential Supply

The UGB contains 235,942 acres after the December 1998 amendments by the Metro Council. There were 37,600 gross vacant buildable acres remaining in the UGB area preceding the 1998 amendment. Capacity is assigned to net acres after deductions for future facilities. Net vacant buildable acres have been reduced by the amount of land needed for future facilities like streets, schools, parks and places of worship. Based on current zoning densities and an estimate of 21,900 net vacant buildable acres, 88,600 dwelling units can be accommodated (see Table 1).

Allowing for up-zoning of these lands to 2040 densities, discounts for underbuild and ramp-up, and additional capacity gained from refill, Title 3 development, accessory units and single family platted lots the net capacity is 205,400 dwelling units (see Table 2).

Comparing the supply (205,400 dwelling units) and the demand (205,200 dwelling units) yields a surplus of 200 dwelling units (see Table 3).

Further regulation of environmentally sensitive lands is anticipated, but the determination is uncertain at this time. The placeholder calculation indicates a potential loss of 15,000 dwelling units, depending on the nature of future regulation.

Chapter 6
Non-Residential Demand Analysis – Using the Zonal Employment Land Demand Analysis Model

What is Non-residential Demand?

In determining whether additional UGB amendments are required, there are "two sides to the equation" which determines future land need: 1) a measure of supply or capacity of land for absorbing an anticipated job need and 2) an estimate of land demand based on job growth projections. Non-residential capacity is based on the amount of vacant land and redevelopment and infill sites in the regional supply estimate for absorbing future employment needs (determined by the Vacant Land Study & Buildable Lands Analysis).

There are as many different zoning codes for classifying non-residential land as there are cities and counties in the region. Zoning for non-residential need is generally designated as commercial, office or retail. Standard regional zoning (SRZ) categories[16] have been created to classify common local zoning codes.

Non-residential demand is the expected amount of land designated to accommodate the projected growth in the work force. This expected land need expresses the forecast of the future job growth into an expectation of non-residential land demand. Any difference between the mathematical estimation of land supply and the land demand projection is expressed as a shortage (or deficit) if land demand exceeds land supply, or a surplus if land supply exceeds land demand.

[16] Standard regional zoning categories do not have any legally binding restrictions. They are merely an artifact of local zoning used only for purposes of mathematically computing the regional land supply.

ZELDA Overview

Prior to this update of the current version of the UGR, estimates for non-residential land need were calculated on the basis of an employment surplus or deficit. A job demand forecast was derived from the regional forecast, but after this point the methodology between the 1997 UGR and this update begins to differ.

The 1997 UGR stopped at the employment forecast and did not convert the job projections into a demand for industrial and commercial space as is done in this report. In the 1997 UGR, the approach was to convert the commercial and industrial supply into a job capacity estimate. As a result, the 1997 method concluded the non-residential need in terms of a jobs surplus or deficit.

The ZELDA approach uses updated employment density parameters which have been reviewed and confirmed by industry experts, consultants and organizations familiar with density ratios such as floor-to-area ratios and square foot per employee density rates. The ZELDA methodology underlies a more transparent and observable approach that uses industry ratios which can be confirmed. This approach affords the opportunity for additional research that can be validated and lends greater credibility to the results (see Table 32 for a summary of density assumptions and other non-residential land demand factors considered in this report).

ZELDA is now the land demand approach used for estimating future commercial, retail, office and industrial land need. ZELDA estimates the amount of land

needed to accommodate the projected employment growth based on the predictions from the regional economic forecast. The regional forecast estimates how much job growth could occur during the next 20 years given a set of assumptions regarding global, national, and regional factors and conditions which are likely to exist in the distant future. The job growth forecast is then converted into a "jobs land" need using ZELDA.

The basis for the land estimating parameters in ZELDA are developed from a recently completed Employment Density Study. The Employment Density Study represents the Metro area's most complete and comprehensive assessment of current density conditions throughout the urbanized portion of the tri-county area. Employment data used in the Study are the ES-202 data series from Oregon's Employment Department and land data are from county assessor data compiled by Metro's Regional Land Information System (RLIS) database. The Employment Density Study also provided in-depth analysis of various segments of the region by industry and sub-county level to verify density data.

Employment Land Demand

The Employment Density Study determined the average building densities (measured by gross square feet per employee) and floor-to-area-ratios (FARs - measure the ratio of building space to parcel area).

Equation 6.1, below, illustrates how the employment forecast is converted into a demand forecast of land need. Figure3 illustrates the conceptual framework of the land demand forecast model and process.

Equation 6.1 (generalized)

Land Demand = (Employment Growth) * (SF/Employee) * (1/FAR)

The amount of land needed (or demanded) for future employment-related growth is determined based on several inputs:

- Forecast of regional economic (employment) growth
- Allocation of the regional growth into sub-areas
- Employment Density information
- Building Densities
- FARs - floor to area ratios
- Vacancy Rates
- Percent of workers in each industry by land use type

Combining these inputs provides a projection of land demand or need by different land types: 1) industrial, 2) retail, 3) office and 4) other commercial uses. Depending upon the degree of refinement, for example, total industrial land demand could be further subdivided into high-tech flex, warehouse and distribution, and general industrial use types. Mixed use is not a land type demand that firms or industries demand. Rather, mixed use is a product that local jurisdictions can incorporate into their zoning plans as a means of supplying industrial, office, retail or residential land for development purposes. Mixed use is factored into this analysis as a subset of the vacant land stock supply to a combination of industrial, office, retail and housing demand.

The final land category, other commercial, includes a variety of land uses ranging from medical (e.g., hospitals, clinics and others) to government facilities (e.g., local, State, and Federal).

The results, derived using ZELDA, are projections of land need by industrial, retail, office and other commercial demand. Multiple models and processes are employed before ZELDA can provide estimates of land demand. First, a regional employment forecast is required to provide the overall economic drivers that describe the future growth path of the economy. The regional forecast is determined from a regional macroeconomic model (MARIO). The regional forecast is then disaggregated into sub-areas by industry. The allocation is determined by a modified Delphi approach – in other words the allocation is based on information from RELM, a series of stochastic sub-area regression models, and expert judgement from a panel of local land use and transportation planners.

ZELDA uses the job density parameters from the Employment Density Study to populate the density assumptions that convert the regional employment forecast/allocation into an estimate of future building space need. Projected building space need is then translated into the amount of land needed by each industry sector. This industry land need is then converted into the projection of land demand by land use type.

There are three main policy levers contained in the ZELDA model:

- Floor-to-area ratios
- Building Densities
- Percent workers in each industry (SIC) by land use types.

The first, FARs, present the most straightforward policy link. For the most part, FAR requirements are a regulatory statement about a community's desire for density. FAR requirements tend to define the architectural style of an area, or the amount of open space between buildings, height of buildings, structured parking and in general physical features regarding density.

However, the observed FARs computed from the Employment Density Study may not necessarily reflect current regulatory FARs. Many of the structures in existence today represent a legacy of building activity dating back to the early 1900's. As a result, the densities that have been measured by this study have evolved over a period of many years and may not necessarily reflect today's zoning plans. FARs are a key policy lever in the ZELDA model, as they impact the efficiency of future land need.

Building densities tend to fluctuate widely due to economic conditions and business cycles. Normally, during a business cycle, building densities increase as firms more efficiently use existing space. But as production increases, the marginal rate of productivity declines with each additional unit added. Eventually businesses may expand or move to larger facilities. The effect of this in the latter half of a business cycle is that average building densities tend to decrease as more floor space is added. From a policy perspective, building densities could be adjusted for the future forecast based on aspirational targets. However, because of the variations due to market factors, this line of policy reasoning could be spurious. Building densities can be used as a policy lever in the ZELDA model.

The percent of workers in industries by land use type is historically determined by detailed analysis and assumptions in the four-digit SIC level of employment data. Some assumptions must be made about what proportion of any industry's workforce, for example, goes into industrial workspace versus office space. The long-range trend is for fewer manufacturing workers. This may imply that the remaining manufacturers

require more (or less) land per worker due to increases in productivity. Robotics and computers may replace the need for humans, but the building densities might decline per employee because fewer workers are needed to produce the same or more output.

ZELDA, MARIO, and the allocation model (see Figure 3) represent tools that policy makers can use to provide information to determine if amendments to the UGB are necessary. Policy makers can direct the model(s) to test for the sensitivity of various policies or test different scenario assumptions. MARIO to a limited extent can test policies or different scenarios. The allocation model currently in use is not able to provide this sensitivity testing because it has not been formulated yet as a mathematical model that has policy capability. ZELDA, on the other hand, is designed to model various policy scenarios.

The data currently used in ZELDA are based on the observed density findings from the Employment Density Study. Presently, observed FARs and building densities are input into ZELDA. Also, historical vacancy rates and percent of the workforce by land use type are being used in ZELDA. However, policy officials can choose aspirational targets or current regulatory zoning parameters in place of observed parameters. By altering the density assumptions contained in ZELDA, policy makers can test alternative assumptions.

Key Points:

- *ZELDA is a new land demand model that estimates future commercial, retail, office and industrial land needed for the next 20 years.*
- *The basis for ZELDA is the Employment Density Study.*
- *The Employment Density Study combines employment data, county assessor data to determine average building densities.*

Density Assumptions: Building Square Feet per Employee & FARs

The following tables document the density assumptions in the calculation of non-residential land demand using the ZELDA model. These densities differ slightly from the densities cited in the 1999 Employment Density Study. Adjustments were made to the building densities and FARs because of possible sampling biases identified by an informal panel of industry experts and another industrial density study. It was also noted that the employment estimates used in computing building density may not have included all types of employment and as a result the computed densities would show less density.

Table 29 Composite Building Densities By Industry Classifications

	Gross Square Feet Per Employee
General Industrial	650
Warehouse & Distribution	1900
High/Tech Flex	470
Retail	480
Office	350
Other Government & Commercial Structures	700

Source: Metro DRC - *Employment Density Study and various industry experts*

Table 30 *Floor to Area Ratios By Regional Design Types* *(2040 Growth Concept Plan)*	
	Floor to Area Ratios
Central City	4.00
Regional Centers	0.50
Town Centers	0.40
Corridors	0.40
Main Streets	0.40
Station Communities	0.62
Employment Areas	0.37
Industrial Areas	0.32

Source: *Metro's Data Resource Center*

Spatial Allocation of the Regional Forecast – County Subarea Disaggregation

County and sub-county land demand is determined from a disaggregation of the regional employment forecast into smaller geographic subareas of employment growth. This growth has been allocated to subareas based on a GIS model of vacancy and long-run land capacity estimates.

Table 31 describes the county-level employment forecast by industry classification.

Table 31 Sub-county Employment Forecast			
Multnomah County	**1998 jobs**	**2017 jobs**	**Change: 1998-2020**
Non-farm Total	529,200	596,700	67,500
Manufacturing	61,581	52,126	-9,455
High-Tech	9,961	8,087	-1,874
Other	51,619	44,039	-7,580
Non-manufacturing	467,619	544,547	76,955
TPU	49,842	55,123	5,281
Wholesale Trade	35,446	35,812	365
Retail Trade	80,307	90,535	10,227
FIRE	44,150	51,844	7,694
Services	188,950	240,624	51,674
Government	50,728	52,608	1,880
Clackamas County	**1998 jobs**	**2020 jobs**	**Change: 1998-2020**
Non-farm Total	167,500	283,100	115,600
Manufacturing	22,869	28,499	5,630
High-Tech	8,906	11,360	2,454
Other	13,963	17,140	3,177
Non-manufacturing	144,631	254,601	109,970
TPU	6,264	10,829	4,565
Wholesale Trade	12,431	19,876	7,445
Retail Trade	38,907	64,563	25,656
FIRE	8,898	15,055	6,157
Services	52,829	104,219	51,390
Government	12,547	19,663	7,116
Washington County	**1998 jobs**	**2020 jobs**	**Change: 1998-2020**
Non-farm Total	254,900	408,900	154,000
Manufacturing	59,735	77,715	17,980
High-Tech	38,662	51,049	12,386
Other	21,073	26,667	5,594
Non-manufacturing	195,165	331,185	136,020
TPU	8,698	14,846	6,148
Wholesale Trade	20,482	29,425	8,942
Retail Trade	47,635	74,253	26,618
FIRE	13,561	20,983	7,423
Services	78,800	148,066	69,266
Government	10,949	20,208	9,259

Source: *Bureau of Economic Analysis and Metro's Data Resource Center*

Non-residential Refill Rates – Study Summary

An analysis recently completed by Metro's DRC indicates that a portion of employment growth gets absorbed within existing developed business units. This increase in jobs on non-vacant land is characterized as infill or redevelopment. Infill is the case of a firm adding/absorbing more employees in existing structures without redeveloping and expanding the size of an existing building. Redevelopment is the case of a firm that takes out a construction permit to expand its existing plant.

The Non-residential Refill Study finds that 21 percent of new industrial jobs become absorbed in existing businesses without expanding onto vacant land. Of new non-industrial jobs, 52 percent are absorbed within already considered developed parcels. On average, 40 percent of all job growth is absorbed either through redevelopment or infill.

As a result of this study and analysis, 40 percent of future projected employment is assumed to occur on developed land. Therefore, the ZELDA non-residential land need computation does not calculate any jobs land demand for 4 of every 10 new jobs in the future (disaggregated to 2 out of 10 for industrial and 5 out of 10 non-industrial).

Key Points:

- *Twenty-one percent of new industrial jobs are absorbed on developed land without expanding on vacant land.*
- *Fifty-two percent of non-industrial jobs are absorbed on developed land.*
- *On average, 40 percent of all jobs are either redevelopment or infill.*

School Employment Factor

It is estimated that about 42 percent of all government jobs are related to some actual type of employment located inside schools. Another 8 percent are assumed to be employed in non-school buildings such as school administration. The dedication of land "set aside" for schools is computed through the gross-to-net reduction prior to any calculation of land need. School employment is not included into the ZELDA calculation of employment land need. Hence, with ZELDA, the land demand requires only the accommodation of non-school related government jobs. The land demand for other government jobs is calculated in a fashion identical to private sector employment needs.

This finding on school employment results in 42 percent of the total projected government employment excluded from the non-residential jobs land need calculation under the ZELDA land analysis approach. This factor avoids over-estimating or double counting school land need when school land need is already factored elsewhere in the buildable land analysis.

Home Occupation/Employment Factor

A similar reduction in future employment land need includes the consideration of employees and self-employed individuals that work out of their home. In this case, these home occupations do not add to additional jobs land demand. Therefore, a reduction in future jobs is applied to adjust for this consideration. The home occupation factor is estimated to be between 2.5 percent to 15 percent depending upon industry classification. Table 32, next, details the home occupation reduction factor by SIC.

Key Points:

- *Forty-two percent of government jobs are related to schools and has been accounted for in terms of the land need for future schools.*
- *Future job need is reduced by the amount of jobs estimated as home occupations.*

Table 32 Home Occupation Factor

Standard Industrial Classification	Home Occupation Factor Reduces Jobs Land Need by SIC
Construction and Mining	12.5%
Manufacturing Sector	2.5%
Transportation, Communications & Utilities	6%
Wholesale Trade	5%
Retail Trade	8%
Finance, Insurance & Real Estate	12.5%
Services	15%
Government	0%

Source: *Metro's Data Resource Center*

ZELDA Demand Analysis

Demand for non-residential land is estimated to be 8,364 net acres. This is based on a net calculation of Metro employment growth of 340,600 more jobs between 1998 to 2017 locating inside the Metro UGB. Today's employment level is estimated to be 923,900 jobs.

The economic basis for the ZELDA land demand estimate originates from a jobs projection estimate for the four-county region (Multnomah, Clackamas, Washington and Clark Counties). This projection of a larger geographic area is reduced to the Metro UGB. A capture rate is applied to reduce the regional forecast down to the area within the UGB. An 82 percent capture rate is assumed on the 20 years of projected job growth forecast. In other words, the Metro area forecast assumes that for every 100 new jobs in the four-county area, 82 jobs will locate inside the Metro UGB.

In the context of the UGR, the employment capture rate is an estimate of how much of the region's future job growth will occur inside the Metro UGB. The remainder of the region's (four-county SMSA) employment growth is assumed to fall outside the UGB in neighboring Clark County, in adjacent unincorporated parts of the tri-county or in neighboring cities.

Unlike dwelling units, the definition of employment is less clear. Employment as defined in Metro studies includes all non-farm related employment activity as listed in the *Standard Industrial Classification Manual.* Employment figures include all wage and salary employees plus all self-employed proprietors and partnerships.[17]

A capture rate of 82 percent has been determined from various studies analyzing the share of jobs occurring in the Metro UGB or Metro Boundary – since job

[17] Therefore, the employment figures used in Metro reports will show larger job figures that count self-employed workers.

Table 33 Capture Rates Using BEA Jobs: 1980-97			
	Metro Boundary	Four-County Area	Capture Rate✧
1980	590,346	672,839	
1985	608,621	704,545	57.6%
1986	624,571	725,064	77.7%
1987	644,596	749,421	82.2%
1988	675,543	789,030	78.1%
1989	702,758	822,282	81.8%
1990	729,045	855,907	78.2%
1991	737,645	869,594	62.8%
1992	752,604	888,443	79.4%
1993	772,291	916,277	70.7%
1994	802,964	956,008	77.2%
1995	N/A.	1,010,990	N/A.
1996	881,099	1,049,169	84.0%
1997	902,400	1,085,700	76.1%

✧ Capture rate = marginal change (UGB)/ change (SMSA)
Sources: *Data Resource Center; BEA employment, REIS*

range between 57.6 to 84 percent when using the Metro Boundary data or 88.3 percent using shorter period with UGB data.

The capture rate is likely to vary widely in the future as a result of changing economic conditions which may include a recession or two. A conservative estimate of 82 percent was determined for the 1997 UGR. This assumption falls within the range of historical capture rates previously described.

The Metro Council Growth Management Committee determined not to change this capture rate assumption for this update.

estimates below the county-level have been tabulated.[18] Table 33 shows annual capture rate figures computed for the last two decades, but only for the Metro Boundary.

Employment data for the UGB exist only for 1994 to 1997. Table 34 indicates a higher capture rate of 88.3 percent for the last four years of data for the UGB. In contrast, capture rate estimates based on the Metro Boundary indicate a rate closer to 82 percent for the same period and a 77 percent rate for nearly a 20-year period (derived from Table 33).

Since the issue of capture rates is a matter of forecasting and the future certainty is unknowable, the best data we have to rely upon are historical data. The data suggest that employment capture rates have had a

Table 34 Employment Capture Rate			
	In UGB	SMSA	Capture Rate
1994	797,200	966,500	
1997	902,400	1,085,700	88.3%

Source: Metro's Data Resource Center; BEA employment, REIS

Summary Methods

The captured portion of the regional job forecast is filtered through the ZELDA land use demand model to determine how much building space and corresponding acreage is required to accommodate the future work force. Some of the demand will go to meet industrial job growth, while another portion is allocated to accommodate the need of commercial, retail and office growth. Locationally, this land need will develop at different rates between counties as well as different job growth trends which are calculated for each county by industry mix and type.

[18] A difference of 98 square miles exists between the Metro UGB and Boundary. The area between the two are generally scarcely populated in terms of jobs and housing.

The net effect of the refill rate, school employment factor and the home occupation factor also reduces the amount of employment land demand by explicitly recognizing that not all the forecasted employment requires additional vacant lands. As mentioned before, some fraction of future jobs will locate in residential areas. As a result, the ZELDA jobs land demand forecast nets out the segment of future employment growth that is not expected to consume additional land. The key assumptions imposed in the ZELDA employment land calculation are summarized in Table 35.

Table 35 summarizes in broad aggregate categories the mix of employment land demand by county and by type. As the figures in this table are compared to the supply estimates determined by the Vacant Land Study & Buildable Lands Analysis, a supply and demand imbalance becomes evident.

Table 35.

Urban Growth Report 1997 Update - ZELDA Assumptions

ZELDA takes the Regional Forecast of Jobs and computes the amount of net acres necessary to satisfy the projected employment demand.

Revised Model Assumptions as of 6/16	Prior Data & Sample Assumptions as of 5/18

1/ Forecast Years: 1998 to 2017 Projected Demand

Assumes as part of 20 year period that 1 year of growth has already passed
Source: *2020 Regional Forecast* consistent with 2020 Regional Transportation Plan
Metro Data Resource Center (DRC)

Capture Rate	
82%	no change

2/ Capture Rate - Future Employment/Jobs

Clark county's capture rate is about 16 % of the 4-County employment demand
Source: *2020 Regional Forecast* consistent with 2020 Regional Transportation Plan
Metro DRC
Note: The capture rate has been accepted by Growth Management Committee, MPAC and MTAC

3/ Non-Residential Redevelopment and Infill Rate (Re-Fill)

Re-Fill Rate	
21%	no change
52%	no change
40%	no change

Industrial Re-Fill Rate (includes: General ind., High/tech flex and Warehouse/distribution)
Commercial Re-Fill Rate (includes: Office, Retail, and all other commercial)
Aggregate Re-Fill Rate:
Source: *1999 Non-Residential Re-Fill Study*/Metro DRC

4/ Building Density (gross square feet per employee)

Composite Building Densities derived from 1999 Employment Density Study
Sources: *1999 Employment Density Study*/Metro DRC
* Study sources: *1999 Regional Industrial Land Study*/Todd Chase, Otak;
** Industry Sources: BOMA; Jerry Johnson, Hobson & Johnson Assoc.; Dave Leland, Leland Consulting; Mark Fraser, Grubb & Ellis. Density adjusted per added input from industry sources.

Composite Building Densities by Aggregate Industry Category:	**Sq. ft. per employee**	
General Industrial	650	660
Warehouse Distribution	1900*	2,200
High/Tech Flex	470	475
Retail	480*	560
Office	350**	660
All Other Commercial	700*	1,050

5/ Floor to Area Ratios - (FARs)

Parcel area includes: parking, required setbacks & landscaping; Floor space is measured as the gross building area or floor space contained in the building.
Sources: *1999 Employment Density Study*/Metro DRC
Adjusted based on input from local jurisdictions (Washington and Clackamas County)

Average FARs by 2040 Growth Concept Design Types:	**FARs**	
Central City	4.00	4.00
Regional Centers	0.50	0.40
Town Centers	0.40	0.46
Corridors	0.40	0.43
Main Streets	0.40	0.46
Station Communities	0.62	0.62
Employment Areas	0.37	0.37
Industrial Areas	0.32	0.32

6/ Non-Residential Vacany Rate

Sources: Colliers International and Otak

Vacancy Rate	
6%	no change

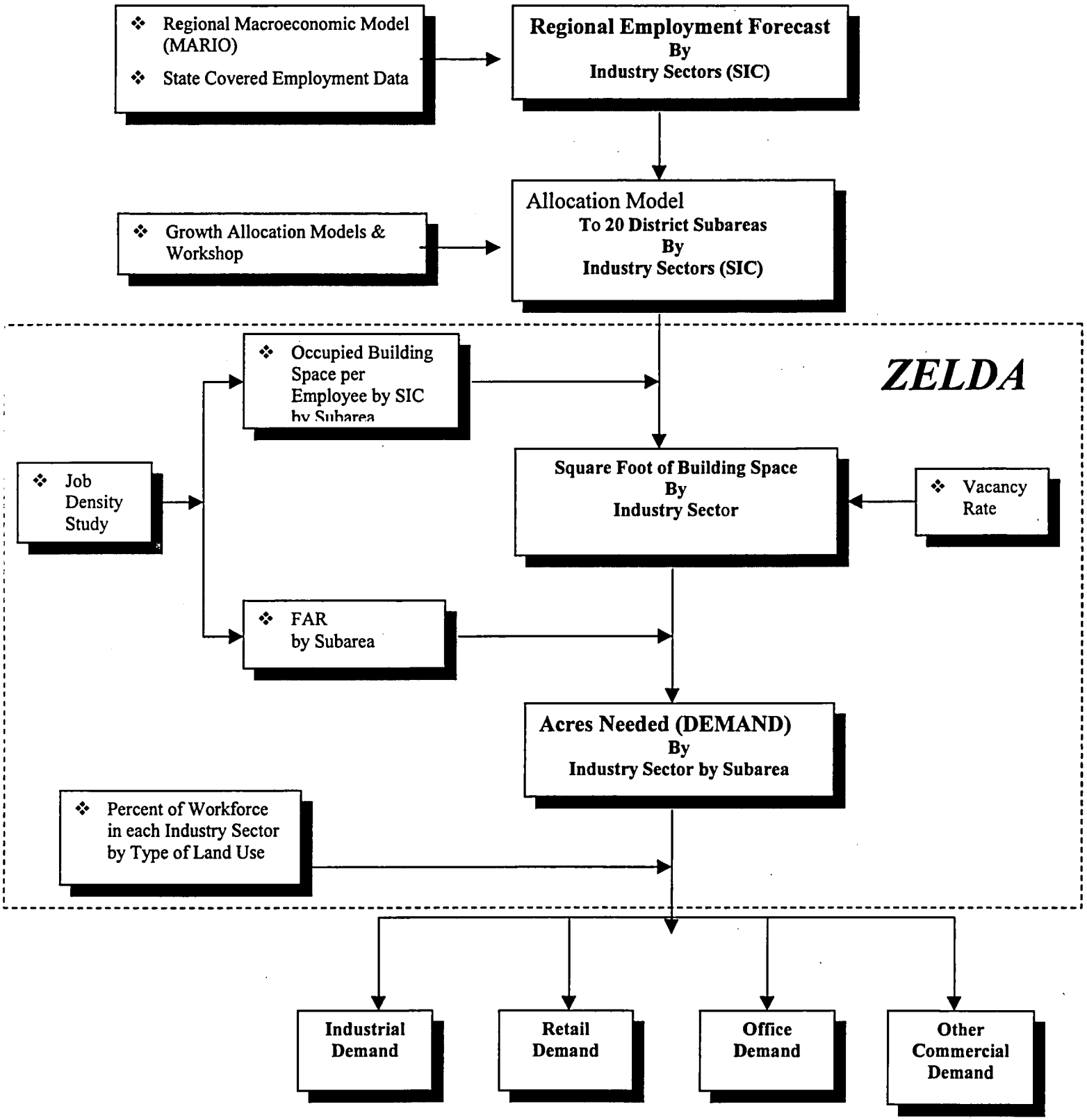
7/ School Employment (see: Land Need for Schools in Gross to Net figures)

To avoid double counting the school land need, school jobs are deducted from the ZELDA land demand computations. School land need is determined in the Gross-to-Net calculations.
Rate was changed to 42% because a part of education jobs are located outside of schools - instead in offices.

Adj.School Double-Count	
42%	50%

Source: Metro DRC

Figure 3.
Zonal Employment Land Demand Analysis (ZELDA)



Chapter 7
Non-residential Supply Analysis

Non-residential Land Supply: 1998 to 2017

Inventory and capacity estimates for non-residential land are measured through the Vacant Land Study and the Buildable Lands Analysis. First, the Vacant Land Study identifies and tabulates all vacant land on a parcel-by-parcel basis. Second, the Buildable Lands Analysis statistically deducts various factors that reduce the capacity of the land supply, such as subtractions from the gross capacity for environmental constraints; tax-exempt land owned by state, cities and counties; streets, parks, and places of worship, and so forth. The result is an estimate closer to the amount of land actually consumable for residential or non-residential purposes.

The last step in the buildable lands analysis is to use current zoning from local jurisdictions in order to identify and divide the net vacant buildable acres into residential and non-residential land and to subdivide non-residential land into categories (i.e., industrial, commercial or mixed use).

In the 1997 UGR, there was the additional step of converting the estimated supply of non-residential acres designated for employment purposes into a capacity estimate in terms *job capacity.*

This is no longer the case under the new approach using the ZELDA land demand forecast framework. As described in the previous chapter, the demand calculation for non-residential purposes is mostly handled in the ZELDA computations.

The advantage of the ZELDA approach is now estimation of non-residential land need can be conducted in actual units – i.e., net acres. This approach allows us to do additional capacity analysis not previously available in the 1997 UGR method.

We are now able to conduct more precise analysis of where vacant parcels exist (location), size of parcels, and type (e.g., industrial vs. commercial). These findings are described in tables shown later in this chapter.

Mixed Used Centers and Residential Utilization Rates

Mixed use centers and areas which allow development of both residential and non-residential properties are anticipated to become more prevalent in future years. Currently, the amount of mixed use land zoned for mixed use centers such as town centers, regional centers and the city center is about 450 net acres.

Table 36
Inventory of Mixed Used Land
(in net acres)

Clackamas County	4
Multnomah County	179
Washington County	268
TOTAL:	**451**

The land identified under this category is mostly zoned (according to local zoning codes) for commercial/office development uses.

Mixed use can be characterized as either the allowance of so called "horizontal mixed use" or "vertical mixed use." As the name implies, an example of vertical mixed use is the instance of retail establishments on the

ground floor and residential apartments above-ground.

Horizontal mixed use, as an example, could include a percent of a parcel area designated for residential only and the remainder for retail, office or other employment-related use – each consuming space on the ground-level. In order to avoid the potential of double-counting the capacity of mixed use land for either residential or non-residential uses only, a factor has been calculated to reduce the residential component from job capacity considerations.

About 450 net acres of vacant mixed use land have been identified in the supply analysis. About 200 acres (or 45 percent) is estimated capacity for development of residential units. The remainder, 250 net acres, is accounted as non-residential capacity.

Non-residential Underbuild

Unlike the calculation of residential capacity, an underbuild is not an explicit line-item that reduces capacity. Non-residential underbuild is not considered a significant factor.

It could be argued that the component of underbuild is subsumed in the density ratios assumed under the ZELDA approach. Insofar as the survey analysis in tabulating the density parameters included buildings that were "under-occupied" relative to their ultimate capacity, the underbuild component if it existed in the first place would already be averaged into the density statistics.

Also, a vacancy rate is applied to the building space estimates. This variable also functionally captures any underbuild or "under-use" of the land at any given time in the forecast period. In sum, underbuild is already a component of the density assumptions.

Non-residential Supply and Demand Comparison – Need Analysis

The land need to accommodate projected employment growth on an aggregate basis for the next 20-year period is estimated to be nearly balanced. The amount of land demand is about 8,400 net acres while the inventory of non-residential land is measured near 8,600 acres. The difference after rounding is about 270 net acres surplus.

Table 37
Aggregate Non-Residential Need: 1998-2017
(in net acres)

Demand		8,364
Supply	8,634	
Less: mixed use	(202)	
Plus: UGB amend.	145	
Total Supply:		8,634
Land Need Surplus:		**271**
Potential Placeholder for added environmental buffer:		(964)
Potential Deficit:		(694)

Source: Metro

Placeholder. However, there is considerable uncertainty about this land need estimate with additional Goal 5 and ESA work underway. The potential disruption to current inventory estimates could amount to almost 1,000 net acres subtracted from the capacity estimates. Of course, we do not know what the final deletion from the inventory will be. The 1,000 acres represents an estimate – the amount could be considerably more or less than the placeholder value.

The placeholder value is based on the difference in employment capacity estimated

between the extent of the Title 3 area and a 200-foot buffer adjacent to streams and rivers. The 1997 UGR assumed a 200-foot setback.

The results of this study are roughly comparable (but not exactly because of the ZELDA methodology) to the need determination in the 1997 UGR. The 1997 UGR concluded that a 2,900 employment (job) deficit existed – in other words a near balance conclusion. The current findings also suggest similarly a range surplus or deficit depending on the placeholder value.

Non-residential Supply Findings: Potential Existence of Sub-regional land Distribution Imbalances

Though in aggregate, the non-residential need estimate implies a small surplus (or a deficit with the placeholder), there is the potential at a sub-regional basis for an imbalance between supply and demand.

The ZELDA analytic approach delivers results (as yet preliminary because additional research is needed to confirm various demand factors) that suggest that there is the potential for deficits in parts of the region that do not appear at an aggregate regional-level.

The potential need imbalance(s) appear in disaggregate when calculating both commercial and industrial need. An imbalance potentially exists on a county basis too (see Table 38).

Availability. Metro's vacant land tabulation lacks an attribute that determines whether a vacant parcel is available or not. Metro has assumed all vacant land over the course of 20 years or more will eventually become available for future development purposes. There have been recent attempts to quantify the nature of availability of previously identified vacant land parcels. This study completed by OTAK (Lake Oswego, Oregon consultants) under the direction of a consortium of industrial land developers and public agencies[19] collected additional land use information at the sub-regional level which may lead to further examination and identification of additional non-residential land need (or deficit).

Table 38
Sub-regional Non-Residential Need: 1998-2017
(in net acres)

DEMAND by County

	Clack.	Mult.	Wash.	Total
Industrial	996	1,605	1,486	**4,088**
Commercial	1,085	1,587	1,605	**4,276**
TOTAL:	**2,081**	**3,192**	**3,091**	**8,364**

SUPPLY by County

	Clack.	Mult.	Wash.	Total
Industrial	740	3,628	2,693	**7,061**
Commercial	234	302	644	**1,180**
Mixed Use	4	179	268	**451**
TOTAL:	**977**	**4,109**	**3,605**	**8,691**

Source: Metro

The Regional Industrial Land Study (RILS) identified the potential for a shortage in available land to serve current and short-run projected demand. The Study provided particularly good information and insight into the readiness or availability of vacant

[19] CREEC, Port of Portland, Oregon Economic Development Department, Regional Strategies Board, Portland Development Commission, PGE and others commissioned this study. Metro and several other organizations provided information and technical assistance in the formation of the study parameters and scope of work.

land for immediate or near term development use.

The vacant land parcels in the region's industrial land inventory were sorted into four categories. According to the study the so-called Tier A land represented about a 9-year supply of immediately useable industrial land. About another 11-year supply of not-yet ready industrial land was also confirmed and is a part of the vacant industrial land supply.

The findings from the RILS point to two key issues that need further comment:

1. The role of Periodic Review in meeting future land demand
2. Land Readiness/Availability – the need to identify/explore avenues for converting non-Tier A land into a state of ready for development to meet current and projected near-term demand.

The role of periodic review in meeting future land demand is crucial in this context. Metro Code requires a review of the UGB capacity every five years. State law also requires periodic review of this capacity. This report updates data from the last determination of need by Metro Council in December 1997. Metro Council will be reviewing the UGB regularly and adding employment land as necessary to ensure a 20-year supply at each review.

In the context of the UGR, the RILS study confirms Metro's recent industrial land findings. That is, in aggregate, there is sufficient vacant industrial inventory to serve the industrial land needs for the next 20 years.

However in view of the preliminary sub-regional data provided through the ZELDA analytic process and the information suggested by the RILS report, there is sufficient data to warrant further examination of non-residential land need from the viewpoint of the following criteria:

- Land need by location,
- Land need by size,
- and Land need by type.

In addition, further analysis is needed to verify the land use requirements of non-residential users. This examination has been initiated by Metro as part of a body of "jobs research" for upcoming months.

Additional vacant land data are shown in Tables 39 and 40. This data show the supply of vacant land tabulated by Metro by jurisdiction and use-type, and by vacant parcels ordered by size categories.

As the second table indicates, there is a particularly small number of vacant parcels larger than 50 acres (net). These data are preliminary because further analysis is needed to determine the degree of parcelization that might exist in the region. By parcelization, we mean the degree in which individual parcels can be assembled to form a larger parcel. Analysis for this report was not able to determine how many smaller and adjacent parcels could be joined together to form potentially more useful larger parcels. This is under investigation as part of a larger body of jobs research.

Furthermore, additional refinement of the ZELDA non-residential land demand model is underway to improve the precision of the employment demand forecast by location. In addition, new employment density parameters are being estimated in order to measure the possible impact of land use policies. This could affect locational decisions in the future.

The tools contemplated will go much further into resolving the non-residential land

demand question. The sub-regional information presented now seems insufficient and too preliminary to determine anything concrete from the sub-regional level.

The sub-regional analysis in this report is a departure from the 1997 UGR, but is an important evolving step to understand the dynamics that maintain the livability of the region. Land is a necessary factor input into the production of goods and services.

Table 39
Existing Supply of Non-residential Vacant Buildable Land by Jurisdiction
(in net acres)

City/County	Industrial	Commercial	Mixed Use	TOTAL
Beaverton	80	54	53	187
Clackamas Co., uninc.	378	70	1	449
Cornelius	71	27	0	98
Durham	0	4	0	4
Fairview	81	10	53	144
Forest Grove	156	24	0	180
Gladstone	1	12	0	13
Gresham	919	90	82	1,092
Happy Valley	0	0	0	0
Hillsboro	1,276	335	191	1,801
King City	0	3	0	3
Lake Oswego	4	28	2	34
Maywood Park	0	0	0	00
Milwaukie	11	6	2	19
Multnomah Co., uninc.	207	0	0	207
Oregon City	74	28	0	103
Portland	2,191	136	41	2,367
Sherwood	201	48	0	249
Tigard	75	45	24	144
Troutdale	186	63	0	248
Tualatin	485	25	0	510
Washington Co., uninc.	338	73	0	411
West Linn	14	31	0	45
Wilsonville	269	63	0	332
Wood Village	45	3	2	49
SUBTOTAL	**7,061**	**1,180**	**451**	**8,691**
Less: Residential MU				(202)
Plus: UGB amendments				145
TOTAL:				**8,634**

Source: Metro

Table 40

Existing Supply of Non-residential Zoned Vacant Buildable Land by Size

(table shows number of parcels sorted by net acre)

City/County	Under ½	½ to 1	1 to 4	5 to 9	10 to 24	25 to 49	50 to 74	75 to 99	100 plus	TOTAL
Beaverton	178	35	35	5	0	1	0	0	0	254
Clackamas Co., uninc.	392	95	116	6	1	0	0	0	0	610
Cornelius	136	20	22	3	0	0	0	0	0	181
Durham	13	3	0	0	0	0	0	0	0	16
Fairview	151	23	25	4	0	1	0	0	0	204
Forest Grove	102	25	15	4	4	1	0	0	0	151
Gladstone	29	4	3	0	0	0	0	0	0	36
Gresham	650	115	132	37	11	6	0	0	0	951
Happy Valley	6	0	0	0	0	0	0	0	0	6
Hillsboro	477	122	197	48	21	7	3	0	1	876
King City	12	1	0	0	0	0	0	0	0	13
Lake Oswego	51	12	4	1	0	0	0	0	0	68
Maywood Park	0	0	0	0	0	0	0	0	0	0
Milwaukie	54	4	4	0	0	0	0	0	0	62
Multnomah Co., uninc.	4	5	2	0	1	0	0	1	1	14
Oregon City	95	13	18	2	1	0	0	0	0	129
Portland	2,728	245	297	65	29	8	2	0	0	3,374
Sherwood	15	27	48	3	4	1	0	0	0	98
Tigard	236	30	25	1	2	0	0	0	0	294
Troutdale	151	30	53	6	4	0	0	0	0	244
Tualatin	40	47	71	13	11	2	0	0	0	184
Washington Co., uninc.	227	33	82	7	5	1	0	0	0	355
West Linn	51	8	13	0	0	0	0	0	0	72
Wilsonville	76	35	41	14	4	1	0	0	0	171
Wood Village	31	12	10	2	0	0	0	0	0	55
SUBTOTAL	5,905	944	1,213	221	98	29	5	1	2	8,418

Note: Parcel size labels are in net acres. Gross to net factors were applied to each parcel, therefore the gross parcel size for each vacant parcel in this table is on average about 40 percent larger.

Source: Metro

Chapter 8
Comparison of 1994 vs. 1998 Data

Table 41 provides a detailed summary of the specific differences in the data that were included in the 1997 UGR and the 1997 UGR Update. The 1997 UGR was based on 1994 data and the 1997 UGR Update was based on 1998 data. Some of the changes between the two reports are a result of refreshing the database with current numbers, improvements in the accuracy of data or the development of new sources of information. Formative changes also result from methodology and policy revisions in the structure of the 1997 UGR Update.

Four Years of Absorption

Absorption or consumption of land for development over the four years resulted in the reduction of about 9,000 acres of land from the gross vacant buildable land supply. Land is consumed for the development of housing, jobs, public facilities, streets, schools, parks and places of worship and fraternal organizations. As a result of this development, land is converted from vacant to developed.

UGB Amendments

The capacity to accommodate approximately 17,900 dwelling units has been added to the UGB as a result of action taken by the Metro Council on December 17, 1998. At the time of the ordinance adoption, the capacity of the UGB amendments was reported as 15,718 dwelling units and 6,294 jobs. The increase in capacity results from the revised environmentally constrained land assumption.

A resolution of intent adopted by the Metro Council states intent to include additional areas within the UGB after inclusion within the Metro Boundary. After annexation to the Metro Boundary the Metro Council may choose to adopt an ordinance bringing these areas into the UGB.

New Policy Assumptions

In June 1998, Metro Council adopted Title 3 Water Quality and Floodplain protection requirements. State law requires use of past experience or newly adopted measures (regulations) when calculating UGB capacity. The adoption of Title 3 as the only Metro regulation of environmentally sensitive areas alters what is considered environmental constrained for the purpose of estimating dwelling unit capacity. By reducing the area considered environmentally constrained from 200-foot setbacks to the area regulated by Title 3, about 3,500 net acres have been added to the buildable land supply.

With the ESA listing and Goal 5 regulation, the buffer (setbacks) could be increased. If it were in the 200-foot range, that could reduce the dwelling unit capacity by approximately 15,000 units. This amount has been considered a "placeholder."

Vacant Land Inventory

Each year, vacant land in the Metro region is identified from digital photography registered to the RLIS tax lot base map. The resolution of the digital photography has been vastly improved from 1994 to 1998. In 1994, a four-foot pixel resolution was used in the regional photography. The 1998 data was based on a two-foot pixel resolution. This improvement allows a finer grain of analysis and more accurate identification of

lands that are classified as vacant. All land within the UGB is defined as vacant, developed, or partially vacant. The vacant acres become the basis for the gross buildable land supply in the UGR.

Local Zoning Update

The current zoning data layer has been updated to reflect local zoning changes through May 1999. Zoning updates are received from local jurisdictions when the local government has formally adopted changes. The 1997 UGR was based on comprehensive plan designations.

Standard Zoning Categories

The standard zoning categories that are used to aggregate the region's different zoning classifications into comparable zoning categories have been refined. Additional zoning categories have been added to capture new zoning that implements 2040 Growth Concepts and to add more categories to refine the process. There are now 25 categories.

Refreshed Data and Map Refinements

The 1999 UGR is an update (using 1998 data) of the 1997 UGR that is based on 1994 data. A number of data sets in RLIS have been refreshed as new information is available. The regional park coverage has been refined to include recent development of parks and additional lands classified as parks, school playgrounds used as parks and bond measure purchases. Some local jurisdictions have made tax lot mapping improvements that include re-mapping areas along rivers and water features and tying platted subdivisions to global position points to improve accuracy.

2040 Up-zone

One of the most significant changes to the updated 1997 UGR is the adjustment to the 2040 up-zone factor. There is now no 2040 up-zone applied to neighborhoods and parks and open space lands. This change is consistent with preliminary compliance reports by local jurisdictions and with 2040 policies of concentrating growth in town centers and regional centers.

Summary

Table 41 summarizes and explains the changes in each factor between the two reports.

The preceding items highlight the main differences by theme.

Table 41

SUMMARY TABLE – DWELLING UNIT CAPACITY COMPARSION

1997 Urban Growth Report and the Update – September 1999

	*December 1997 UGR**	*1997 UGR Update – September 1999**		*Explanation of Changes between the 1997 and Urban Growth Report Update*
Residential Dwelling Unit **Supply and Demand Comparison**	**** based on 1994 data***	****based on 1998 data***	***Net Change***	*All factors have included refreshed data when available, although ratios used have remained constant.*
Residential Demand Estimate				
▪ 70% Capture of Four-County Forecast ▪ 1997 UGR Period from 1994-2017 ▪ UGR Update Period from 1997-2017	249,800/ du	205,200/du	-44,600	• Update assumes the first year of growth has passed and 12,455 dwelling units were permitted. • The forecast used in the 1997 UGR covered three additional years.
Land Supply Estimate	**ACRES**	**ACRES**		• Excludes Urban Reserves added to UGB by Ordinance in 12/98.
Gross Vacant Buildable Acres in UGB, (GVBA)	39,090	37,600	-1,490	• Update includes 3,300 acres of steep slopes and the area between Title 3 and 200 feet (5,400 acres). • The vacant lands database includes re-mapping refinements, reclassification of vacant land and increased precision in developing the buildable lands inventory. • Four years of absorption or conversion of vacant land to developed land (9,000 GVBA).
Less: Acres for public Facilities	(1,130)	(1,900)	+770	• Update deducts all Federal, City, State and County owned vacant lands.
Add: Dwelling units – Platted Lots	10,900	16,300	+5,400	• The same method is applied in both reports.
Less: Acres for future Streets	(8,200)	(5,400)	-2,800	• 1999 survey verifies Functional Plan changes and trends of decreasing street widths.
Less: Acres for future Schools	(1,990)	(1,100)	-890	• The same method was used, additional acreage reflects higher student per acre ratios.
Less: Acres for future parks	(3,060)	(3,700)	+640	• Service levels for parks have been refreshed. • The current ratio of 20.9 acres/1,000 persons is applied in the Update. • Parks land need was credited for bond measure purchases located outside of UGB. • Update method is consistent with the 1997 UGR in assuming current service levels and credits for bond measure acquisitions.
Less: Acres- future places of worship and social organizations	(700)	(700)	0	• Land amount in ownership used for need.
Net Vacant Buildable Acres in UGB (NVBA) w/out UGBA	22,420	21,900	-520	• Same calculation is applied in the Update and 1997 UGR.

continued

Table 41 – *continued*

SUMMARY TABLE – DWELLING UNIT CAPACITY COMPARISON

1997 Urban Growth Report and the Update – September 1999

Dwelling Unit Supply Estimate	*December 1997 UGR*	*1997 UGR Update September 1999*	*Net Change*	*Explanation of Changes between the 1997 and Urban Growth Report Update*
	Dwelling Units	**Dwelling Units**		
Net Dwelling Unit Capacity (with Current zoning)	117,600	88,600	-29,000	• Update assumes Title 3 setbacks from streams not 200 feet. • Between 1994 and 1998, approximately 40,000 units were built on vacant land. • 1997 UGR capacity analysis did not include upland steep slopes (4,200 dwelling units).
Add: Residential Development in Mixed Use Areas (MUC)	0	4,300	+4,300	• The Update reports mixed use separately due to the use of the ZELDA model.
Add: Units from 2040 Up-zone	57,830	36,200	-21,630	• New regional zoning categories are added in Update. Neighborhoods and park areas are not up-zoned.
Less: Units lost from Underbuild (20 percent) on parcels > 3/8 acre	(36,850)	(25,800)	-11,050	• Update assumes a 20% rate which is consistent with the Functional Plan. • 1997 UGR applied a rate of 21%.
Less: Units from Ramp-Up	(6,430)	(1,300)	-5,130	• The Update includes the last year of the five-year ramp-up period. • 1997 UGR: applied 5 years of ramp-up.
Add: Units from Residential Refill	71,190	58,500	-12,690	• Update applies the same 28.5 percent rate as the 1997 UGR. • About 12,000 refill units were built between 1994-1998.
Add: Development Capacity on Constrained lands	3,190	3,200	+10	• Update assumes historical development rates on Title 3 lands. • 1997 UGR assumed a 200-ft setback for environmentally constrained lands and a development rate at one unit per five acres; slopes were included as constrained land.
Add: Units from Accessory Dwelling Units (1.8 %	0	7,500	+7,500	• Update includes capacity on accessory dwelling units due to Functional Plan requirements. • In the 1997 UGR no capacity was added for accessory dwelling units.
Add: Dwelling units – Platted Lots	10,900	16,300	+5,400	• The same method is applied in both reports.
Capacity without New UGB Amendments	**217,430**	**187,500**	-29,930	
Capacity with 12/98 UGB Amendments	-----	**205,400**	-----	17,900 dwelling units added from urban reserves.

APPENDIX

Appendix A
2040 Growth Concept Upzone Matrix for Dwelling Unit Supply Estimates

2040 Growth Concept Design Types ↓	Standard Zoning Designations →																							
	CC	CG	CN	CO	FF	IH	IL	IMU	MFR1	MFR2	MFR3	MFR4	MUC1	MUC2	MUC3	PF	POS	RRFU	SFR1	SFR2	SFR3	SFR4	SFR5	SFR6	SFR7
Central city	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3	PF	POS	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3	MUC-3
Corridors	MUC-1	CN	CN	MUC-1	SFR-3	CN	CN	CN	MFR-1	MFR-2	MFR-2	MFR-2	MUC-1	MUC-2	MUC-3	PF	POS	SFR-3	SFR-3	SFR-3	SFR-3	PUD	PUD	PUD	PUD
Employment areas	MUEA	MUEA	MUEA	MUEA	MUEA	MUEA	MUEA	MUEA	MFR-1	MFR-2	MFR-2	MFR-2	MUC-1	MUC-2	MUC-3	PF	POS	MUEA	SFR-2	SFR-2	SFR-2	SFR-2	SFR-2	SFR-3	SFR-3
Industrial areas	IH	IH	IH	IH	IH	IH	IH	IMU	IH	IH	IH	IH	IH	IH	IH	PF	POS	IH	IH	IH	IH	IH	IH	IH	IH
Inner neighborhood	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Main streets	MUC-2	MUC-1	MUC-1	MUC-2	MUC-1	MUC-1	MUC-1	MUC-1	MFR-1	MFR-2	MFR-2	MFR-2	MUC-1	MUC-2	MUC-3	PF	POS	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1
Open spaces	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Outer neighborhood	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Park	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	PF	POS	POS	POS	POS	POS	POS	POS	POS	POS
Regional centers	MUC-2	MUC-2	MUC-2	MUC-2	MUC-2	MUC-2	MUC-2	MUC-2	MUC-2	MUC-2	MUC-2	MUC-2	MUC-1	MUC-2	MUC-3	PF	POS	MUC-2	MUC-2	MUC-2	MUC-2	MUC-2	MUC-2	MUC-2	MUC-2
Station community	MUC-1	MUC-1	CN	CO	SFR-3	MUEA	MUEA	CN	MFR-1	MFR-2	MFR-2	MFR-2	MUC-1	MUC-2	MUC-3	PF	POS	SFR-3	SFR-3	SFR-3	PUD	PUD	PUD	PUD	PUD
Station community core	MUC-2	MUC-1	MUC-1	MUC-2	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1	MFR-2	MFR-2	MUC-1	MUC-2	MUC-3	PF	POS	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1
Town centers	MUC-2	MUC-1	MUC-1	MUC-2	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1	MFR-2	MFR-2	MUC-1	MUC-2	MUC-3	PF	POS	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1	MUC-1
2040 Upzone Designations - Determined by 2040 Growth Concept Design Type and Standard Zoning Designations																									

2040 Upzoning Designation	Maximum Zoning Capacity	Description
FF	-	Farm and Forest, agricultural commercial uses
RRFU	-	Rural or Future Urban, 1 acre or larger
SFR-1	-	Single-family residential (10,000 to 40,000 sq. ft.)
SFR-2	7.30	Single-family residential (7,000 to 10,000 sq. ft.)
SFR-3	9.60	Single-family residential (5,000 to 7,000 sq. ft.)
MFR-1	21.20	Multi-family 8 to 25 units per acre
MFR-2	47.10	Multi-family 25 or more units per acre
PUD	12.80	Planned Unit Development/Mixed Use
CN	9.40	Neighborhood Commercial, floor space 5,000 to 10,000 sq. ft.
CG	-	General Commercial, large scale commercial districts
CC	-	Central Commercial, central business districts
CO	18.80	Office Commercial, office uses and mixed uses
IL	-	Light Industrial (warehousing and light processing/fabrication)
IH	-	Heavy Industrial (light processing and heavy manufacturing)
IMU	7.10	Mixed use Industrial (mix of light manufacturing, office and retail uses)
POS	-	Parks and Open Space
PF	-	Public Facilities
MUC-1	14.10	Mixed Use Center 1 (least intense center - Floor Area Ratio of .5 to 1)
MUC-2	25.90	Mixed Use Center 2 (moderate intensity center - Floor Area Ratio 1 to 3)
MUC-3	58.80	Mixed Use Center 3 (highest intensity center - Floor Area Ratio 3+)
MUEA	2.40	Mixed Use Employment Area (light industrial, warehousing, office, some residential)
IS	-	Industrial Sanctuary (low intensity industrial employment area)

Source: Metro Growth Management Services

Appendix B
References for Additional Information

1. Metro Data Resources Center, *Technical Report: Residential Refill Study,* February 10, 1999.

2. Metro Data Resources Center, *1999 Employment Density Study: Technical Report Presented to the Metro Council*, April 6, 1999.

3. Metro Data Resources Center, *The 2015 Regional Forecast, January 1996.*

4. Metro Data Resources Center, *The 2015 Regional Forecast and Urban Development Patterns*, February 1996.

5. Metro Data Resource Center, *Future Streets Study* (unpublished data).