

Appendix 6: Residential capacity methodology

2009-2030 Urban Growth Report

The Metro Council is expected to complete any capacity adjustments by the end of 2010 through regulations that bolster the amount of capacity in the existing UGB using urban investments and/or policy changes that increase densities or with possible Urban Growth Boundary (UGB) expansions. Dating forward 20 years yields a forecast horizon in year 2030. As interpreted from ORS 197.296 (20-year land supply statute), a 23 year time span is needed to synchronize limitations in lagged supply data from RLIS (i.e. housing capacity estimates are based on a July 2007 vacant land inventory) and state regulations that require a sufficient supply to meet a 20 year residential demand forecast.

This appendix includes a line by line annotation of the residential capacity methodology as well as additional information collected on parks SDCs and school district growth plans.

2009 to 2030 Urban Growth Report (UGR)

Residential Dwelling Capacity Range Assessment

December 2009

		Residential DEMAND Assumption		
Line No.		Low	Baseline	High
Residential Demand Estimates (in Dwelling Units)				
1a/	7-County Population Forecast (2007 to 2030)	728,200	875,000	1,024,400
1b/	7-County Household Forecast (2007 to 2030)	348,600	408,300	469,100
2/	Capture 61.8% of 7-County Forecast in Metro UGB	215,400	252,300	289,900
3/	plus: 4% vacancy rate (source: 2000 Census)	8,600	10,100	11,600
4/	Dwelling Unit Demand in the Metro UGB:	224,000	262,400	301,500
		Residential SUPPLY Assumptions		
July 2007 Vacant Land Inventory (Metro UGB):		BASELINE		
5/	Gross Vacant Land in current Metro UGB	44,800		
6/	less: Local Water Quality, floodways and Habitat Protection areas (ENV)	8,600		
7/	Gross Vacant Buildable Acres in Metro UGB (GVBA)	36,200		
8/	less: Fed., State, Municipal exempt land (actual count)	3,200		
9/	less: Acres of Platted Single Family Lots (actual count)	1,300		
10/	less: Acres for Future Places of Worship and Social Org. (actual = 600 acres)	700		
11/	less: Major Easements (Natural Gas, Electric & Petroleum) (actual count)	1,000		
12/	less: Acres for Future Streets (0%, 10%, 18.5%)	4,900		
13/	less: Acres for New Schools (H=45, M=55, E=70; actual = 1,000 acres)	1,000		
14/	less: Acres for New Parks (based on SDC fees)	1,300		
15/	less: New Urban Areas (actual net of ENV, future streets and dev. land)	7,900		
16/	Net Vacant Buildable Acres (NVBA) - total	14,800		
Net Vacant Buildable Acres (NVBA) by Type (less-New Urban Areas):		Metro UGB		
17a/	Net Vacant Buildable Acres - Mixed Use Residential (MUR)	1,000		
17b/	Net Vacant Buildable Acres - Residential	6,300		
		Residential CAPACITY Assumption		
Residential Housing Supply Assessment - Metro UGB				
		Low	Baseline	High
18/	Dwelling Unit Capacity of Vacant Land at Local Zoning (or Plan) - 2008 Q3	62,500	62,500	62,500
18a/	less: High-density MFR products not market feasible within next 20 years	(18,400)	(18,400)	
19/	add: Res. Development in vac. Mixed Use Districts (MUR)	28,600	28,600	28,600
20/	less: Capacity Lost to SFR Underbuild @ 5%	(2,200)	(2,200)	(2,200)
21a/	add: Res. Development Capacity on ENV land (no. taxlots wholly in Title 3)	100	100	100
21b/	add: Res. Development Capacity on Title 13 areas (80% of zoned capacity)	19,300	19,300	19,300
22/	add: Units from Platted Single Family Lots under 3/8 acre (actual count)	8,800	8,800	8,800
23/	add: Units from Residential Refill @ 33%	73,900	86,600	99,500
23a/	add: Units from Residential Refill @ 40% (addition of 7% more)			21,100
23b/	add: Potential Units from Subsidized Residential Refill			71,100
24/	add: Estimated Capacity from New Urban Areas	48,000	48,000	48,000
25/	less: New Urban Development not yet market feasible	(24,000)	(24,000)	
26/	Subtotal: Dwelling Unit Capacity Supply Range	196,600	209,300	356,800
		Low Supply - High Demand		Low Demand - High Supply
27/	Full range of difference between capacity and demand (dwelling units):	(104,900)	(53,100)	132,800
		Low Supply - Low Demand		Low Supply - High Demand
28/	UGR assessment of difference between capacity and supply (dwelling units)	(27,400)		(104,900)

Housing Demand Calculations:

Line 1a) 7-county PMSA Population Forecast: The regional population forecast is derived from Metro's Regional macro-economic forecast model. This model forecasts population growth 30 years into the future. The regional geography for the Portland-Beaverton-Vancouver, OR-WA Primary Metropolitan

Statistical Area (PMSA) now comprises a total of 7-counties (i.e., Clackamas, Columbia, Multnomah, Washington and Yamhill counties in Oregon and Clark and Skamania counties in the State of Washington) – consistent with changes to federal data reporting standards. This is a change in geographic scope from an earlier 4-county SMSA (Standard Metropolitan Statistical Area) delineation to the present 7-county PMSA. The delineation is defined in the Federal Register by the Office of Management and Budget (OMB). “Re-drawing” PMSA delineations are required to be revised in order to reflect actual changes in the economic structure of regions as they grow and expand.

Line 1b) 7-county PMSA Household Forecast: The population forecast in line 1a is converted to a forecast of number of households using age-adjusted headship rates derived from Census information and Metro’s regional macro-economic model. [source: Metro 2008-2040 Regional Forecast]

From Census estimates, the average household size for the PMSA is 2.57 persons per household in year 2000. The formation of future households and their composition is expected to change over time as family sizes decrease and the average age of the population increases making single-person households more prevalent in the future. By 2030, the average household size in the PMSA declines to 2.46 persons per household.

The assumption that future household sizes will decline has been vetted a number of times over the course of external peer review panels convened to analyze and review the veracity of the regional forecast and forecasting models and methods. Each time, demographers and professional forecasters have affirmed the assumption that the average household in the future will be smaller than today’s household.

Line 2) Metro UGB Capture Rate (from a 7-county share): Capture rate is defined as the marginal share of future households expected to locate within the Metro UGB (with the remainder then locating elsewhere within the 7-county PMSA). The initial capture rate assumption (61.8%) is based on historical time series data obtained for 1979 to present. [source: Metro Research Center and Census data]

Table 1. Historical Capture Rate Series for the Metro UGB – 20-year Capture Rates

	2000	2001	2002	2003	2004	2005	2006	2007	Average
Rate:	62.2%	62.2%	62.2%	63.1%	62.2%	61.8%	60.4%	60.0%	61.8%

Source: Metro Data Research Center

Note: a forecast of Metro UGB capture rate can be derived from a discrete MetroScope scenario. This scenario would have the advantage of employing a capture rate that is economically consistent with a number of future policy implementations including the Regional Transportation Plan (RTP), urban renewal, other urban investment subsidy assumptions, zoning and comp plan changes, etc. Assuming an historical rate may be wrong if future policies diverge from current conditions.

However, starting with an initial UGR that assumes an historical average rate makes sense as policy makers can start from a common point and seek to redirect and bolster existing trends to align with future transportation and land use goals. As new policies emerge, they can be tested and new capture rates can be forecasted for future UGR assumptions.

Line 3) Vacancy Rate: Housing unit estimates are converted from households using a vacancy rate. Housing units are not the same as the number of households. [source: 2000 U.S. Census, Demographic Profile for the Portland-Vancouver, OR-WA PMSA]

The definition of housing units introduces differences in housing types, i.e., single family, multifamily, and manufactured housing as dwelling types that should be considered under existing housing need statutes – ORS 197.296. Goal 10 also speaks to housing types which on a consistent basis will be addressed in the Housing Needs Analysis Report.

The initial assumption for the preliminary draft residential UGR assumes 4 percent, which is in keeping with the 2002 Residential UGR assumption.

Line 4) Dwelling Unit Demand Forecast: The resulting regional housing unit demand forecast is derived from Metro’s Regional Forecast and vacancy rate assumption in line 3. [source: UGR calculation]

Housing Supply Calculations:

Line 5) Gross Vacant Land: Vacant land inside the current (as Jan 2009) Metro UGB is calculated based on exacting manual measurements of vacant land using photogrametric techniques and supplementary GIS data (including building permits and assessor tax lot information). [source: Actual RLIS measurement]

Line 6) ENV: Environmental constraints: Undeveloped land that should be protected from future development are subtracted from gross vacant land. The land that is deducted includes Metro’s Title 3 (which includes floodplains) Title 13 (riparian areas), and floodways – as implemented by local jurisdictions. To the extent that areas with steep slopes intersect with the environmental constraints, they too are excluded from the 2007 buildable land inventory. Elsewhere, steep slopes are included in the buildable land inventory. For example, in jurisdictions located in Washington county, the deduction for environmental constraints is equal to the area delineated in maps provided by Clean Water Services. The map coverage from Clean Water Services are included in RLIS map/data layers. For further detailed explanations, please refer to the buildable land inventory GIS meta data description. [source: Actual RLIS measurement]

Line 7) GVBA: Gross Vacant Buildable Acres (GVBA) in the Metro UGB is defined as gross vacant land minus environmental constraints. [source: Actual RLIS measurement]

Gross-to-Net Calculations:

Line 8) Fed., State, Municipal Vacant Land: For purposes of measuring residential capacity per ORS 197.296, Federal, State and local municipal owned vacant land is removed from gross vacant buildable acres. [source: Actual RLIS measurement]

For calculating nonresidential land capacity, Federal, State and municipally owned land is added back into the estimation of employment land capacity.

Line 9) Platted SFR tax lots: An assumption that already platted tax lots under 3/8 of an acre in size will not subdivide into higher density housing products. [source: Actual GIS measurement] The capacity of existing SFR (single family residential) platted lots are not lost; they are returned to the calculation of residential capacity in line 22.

Line 10) Future Churches: (Only an additional 100 acres is set aside.) This is an assumption that sets aside future land supply in order to accommodate the development of future churches and social organizations. [source: Actual RLIS measurement and per capita forecast estimate]

The per capita estimate of future land need for this category is based on 1.4 acres per 1,000 future residents. [source: 1997 UGR church per capita rate assumption]

In the current baseline UGR, a total of 700 acres are needed to accommodate expected increase in church and social organization land needs. According to RLIS vacant land data, churches and social organizations already own 600 acres. The net amount that is deducted from other (i.e., residential or employment) future uses is thus calculated to be 100 acres for the 20-year forecast horizon. Per capita growth in population is derived from the 2008-2040 Regional Forecast.

Line 11) Major Utility Easements: Easements have been mapped for major utilities; this includes natural gas pipelines, petroleum pipelines and major electric lines (e.g., BPA powerlines). Pursuant to ORS 197.296, a consideration of easements is estimated to remove vacant land that is coincident with major easement lines identified in the Metro UGB as it has been deemed unsafe for future residential development in these areas. [source: Actual RLIS measurement]

Line 12) Future Streets (“skinny streets”): An assumption which sets aside a portion of the vacant land supply in order to accommodate future streets for undeveloped land inside the current Metro UGB. This assumption is calculated on a per tax lot basis:

- Tax lots under 3/8 acre assume 0% set aside for future streets
- Tax lots between 3/8 acre and 1 acre assume a 10% set aside for future streets
- Tax lots greater than an acre assume an 18.5% set aside for future streets

The basis for these net street deduction ratios derive from previous research completed by the Data Resource Center and local jurisdictions during the 2002 UGR. The current street set aside rates are based on “skinny street” assumptions for a total of 4,900 acres.

Line 13) Future Schools: (No additional lands are set aside.) This is the assumption that sets aside a portion of the future vacant land supply in order to accommodate a growth projection for land needed to build future schools in the Metro UGB. The school land demand forecast is based on a student per capita basis:

- High school – 45 students per acre
- Middle school – 55 students per acre
- Elementary school – 70 students per acre

The basis for these net school deduction ratios are compared with national school building standards and interviews with building officials at Tigard-Tualatin School District, Beaverton School District and Portland Public School District. The sets of assumptions student-acre ratios were vetted and finalized through MTAC. [source: for further details on national school standards, please refer to DLCD safe-harbor subcommittee reports].

According to the 2007 RLIS vacant land supply inventory database, school districts in the Metro UGB already own 1,000 acres of vacant land. The regional forecast includes a projection of student population and enrollment for residents inside the Metro UGB. [source: A land need forecast for future schools is calculated from the regional forecast and student-acre ratios. This forecast identified no additional land need other than what schools presently own; thus no additional set aside is assumed except for the 1,000 acres that schools have already land banked.] Review of the 16 school districts' plans shows that some anticipate growth, others see declining enrollment, and none look out over the 20-year timeframe that this capacity analysis considers. School districts are able to take advantage of special provisions under the Major UGB Amendment process to petition the Metro Council to bring land into the UGB to meet school needs that are not anticipated in five-year UGB review cycle. The Major Amendment Process may be a more appropriate means of addressing specific school district needs than can be accommodated through UGB expansions.

The present UGR approach does not analyze need by individual school district or regional subareas, so there may be some school districts that have a future surplus and others having a future gap. The table on the following pages describes what was learned by reviewing school district plans.

Table 2. Review of school district growth plans

School district	Information source	Time horizon	Overall growth	Plan to accommodate growth
Beaverton	Report of the long range facilities planning committee, September 2005 ¹	2004-2020 for the facilities plan, 2009-2010 to 2025-2026 for the PSU enrollment forecasts	Growth expected at roughly 2.0% per year	Use portable classrooms, consider adjusting attendance boundaries as appropriate, consider expanding existing schools where possible to meet capacity, consider building new schools when neighboring schools can't accommodate the need. Annual increases in student enrollment equate to the need for at least one elementary school or middle school each year. The District also needs to plan for a new comprehensive high school within the next few years. In the meantime, as growth exceeds available space at some schools, the District continues to use a combination of attendance boundary adjustments and portable classrooms to address overcrowding.
Centennial	Centennial Long range planning committee final report, May 2005	2005-2015	Growth is expected over this time period	Two primary schools and one middle school will be required. A new alternative school should be built to accommodate 200 students and provide appropriate space and equipment for secondary level classes. Within the next 10-20 years the district will need: <ul style="list-style-type: none"> • Two elementary schools in Pleasant Valley area • One elementary in the Damascus/Boring area • One high school in the Damascus/Boring area
David Douglas	Facilities master plan from 2007-2012 and a report from the facilities and enrollment study committee, March 2009	2007-2012	The district will serve an additional 1200 students by 2012, currently averaging 3 % per year	Identify land for future school sites, move classrooms to different school facilities, consider the use of modular classrooms, add capacity to existing schools, purchase or lease adjacent buildings to existing schools, cooperative agreements with other school districts to share facilities.
Forest Grove	Facilities task force report, April 2009, Enrollment projections	2008-2009 to 2012-2013	Yes	Replace existing elementary school, add additional classrooms to elementary schools.

¹ information on the website, <http://www.beaverton.k12.or.us/home/departments/facilities/long-range-planning-and-development/>, PSU population projections, November 2008

School district	Information source	Time horizon	Overall growth	Plan to accommodate growth
Gladstone	Average Daily Membership projections, 2009	through 2011-2012	The district is not experiencing growth-it is stagnant or losing kids	The district just completed upgrading and adding space where necessary to all school buildings. These facilities should be adequate for the next 15 to 20 years.
Hillsboro	Portland State University Enrollment forecasts, April 2006	2006-2015	Enrollment is projected to increase by: Elementary – 16%, Middle – 24%, High – 18%	The district has already done things to accommodate growth in the last two-three years including changing boundaries to accommodate the biggest school's areas. In recent years the school district has added four elementary schools and renovated an existing middle school to add extra capacity.
Lake Oswego	There is no formal facilities/growth plan		The district is experiencing flat or slightly declining enrollment	
North Clackamas				District is purchasing two tracts of land for new schools
Oregon City	Facilities Task Force Report, March 2008, PSU population forecasts, June 2009	Population projections look at 2009-2014 and Task Force Report looks out 10-20 years	While continued growth in the Oregon City area is expected, the timing of this growth is difficult to predict. According to PSU projection, from 2009-2014, K-12 enrollment is projected to decline by 1.5 %	The Task Force looked at different possibilities for future growth in enrollment through additional increments of 500 students. If this growth occurs, the task force recommends the following: adjust elementary school boundaries as needed, renovate old Main and use it for classrooms, alert community to the need for a new elementary school and second high school, renovate Jackson campus and use it to house students.
Parkrose		The district is not experiencing growth-it is stagnant or losing kids		

School district	Information source	Time horizon	Overall growth	Plan to accommodate growth
Portland Public Schools	The school district is working on a long range facilities plan called, 21st century schools, but it is not completed year	2005-2020	Enrollment is projected to level off from 2007 through 2011, but then is projected to start increasing again. In the long term, over the next 50 years, 30,000 additional students will be added to the district.	The school district is trying to figure this out as part of its current effort to develop its long range facilities plan.
Reynolds	Bond Measure Proposal, April 2008, Reynolds had planned to go out for a Bond measure June 2008, but didn't. The District needs far outweighed what the Board thought the public could or would pass.	2008-2013	Enrollment is expected to increase by: 7% (elementary), 4% (middle) and ½% (high).	Acquire new land for schools; replace Wilkes to add extra capacity for elementary school, construct east elementary, remodel Fairview; remodel middle school; remodel and expand Reynolds High School.
Riverdale	Website		Enrollment is currently growing	Renovate elementary school. The Grade School's capacity is 350 students with a current enrollment of 320 students. The High School, still a relatively new school, has grown its student body to the 200's, with a maximum of 300 students.
Sherwood	Sherwood District School Facilities Plan, 2008	From 2008 until 2015/2016, enrollment projections are from 2009-2020	Projected growth at 3% per year for the next fifteen years	In addition to building a new elementary and middle school and expanding the high school, the District purchased a number of portable classrooms now located at three elementary schools and at Sherwood Middle School. These portables have a capacity of 28 classrooms for future use. The district is also looking at ways to accommodate students with non-traditional classrooms like business locations or virtual settings.

School district	Information source	Time horizon	Overall growth	Plan to accommodate growth
Tigard-Tualatin	Tigard Tualatin School District Demographics Report, December 2008, Long Range Facilities Plan, December 2007	2009-2019	Enrollment is expected to increase by: 12% (elementary), 13% (middle) and 8% (high).	Pursue additional district owned facilities like Tigard-Tualatin school district admin center, Tigard-Tualatin school district bus yard, former elementary school-either use or sell these sites. Portable buildings, school expansions, boundary adjustments. Open a magnet school (Durham Center alternative school).
West-Linn/ Wilsonville	Long Range Facilities Plan, amended in 2005	20-year time horizon, 1996-2016	Total enrollment projected to increase by 27% over the 20-year time period	As enrollment exceeds capacity, the District constructs one or more facilities to increase capacity. Two new elementary schools and one new middle school are projected to be needed over the 20-year planning timeframe.

Line 14) Future Parks: (Based on SDC fees.) This is an assumption which sets aside a portion of vacant land supply in order to accommodate a growth projection for future neighborhood and community parks in the Metro UGB. The future park land demand forecast is based on an estimate of existing system development charges (SDC) which local jurisdictions levy on local residents. The land estimate for future parks is based on how much land SDC fees are likely able to purchase in the next 20 year period. This assumption is based on information provided by MTAC members and review of local SDC regulations to forecast future park acquisitions. MPAC endorsed this assumption for the 2002 UGR. [source: 2002 UGR assumption for new park acquisitions]

To inform the analysis in this report, current park SDC rates were inventoried for each city in the region. (Information may be found in Appendix 6.) Most of the local governments that levied parks SDCs in 2002 have increased their rates. In addition, two cities, King City and Rivergrove, have started levying parks SDCs since 2002. Also, a few local governments are currently employing a system whereby different fees are levied in different locations.

The 2002 urban growth report estimated that 1,100 acres of vacant land inside the UGB would be demanded for future parks. Like other possible approaches to estimating future park acreage inside the UGB, this SDC approach has its limitations and should be taken as a reasonable estimate rather than a precise accounting. Due to these limitations (summarized below), the updated inventory of park SDC rates does not provide a compelling reason to substantially alter this assumption:

Table 3. 2009 Park System Development Charges in the Portland metropolitan region

Jurisdiction	Single Family Residential	Multi-family Residential	Manufactured	Accessory dwelling unit	Single room occupancy	Average Multi-family and other
Beaverton	\$6,888	\$5,510	\$2,521			\$4,973
Cornelius	\$2,143	\$2,143	\$2,143			
Durham	\$1,320	\$990				
Fairview	\$1,252					
Forest Grove	\$3,000	\$3,000				
Gladstone	\$-	\$-				
Gresham:						
Gresham City	\$3,837	\$3,837				
Pleasant valley	\$8,137	\$8,137				
Springwater	\$9,039	\$9,039				
Happy Valley:						
zone 2	\$6,760	\$5,842				
zone 3	\$6,075	\$5,842				
Sunnyside village	\$4,779	\$4,425				
Hillsboro	\$4,083	\$4,083				
Johnson City	\$-	\$-				
King City	\$1,664	\$1,664				
Lake Oswego	\$10,715	\$5,959				

Jurisdiction	Single Family Residential	Multi-family Residential	Manufactured	Accessory dwelling unit	Single room occupancy	Average Multi-family and other
Maywood Park	\$-	\$-				
Milwaukie	\$3,985	\$3,608				
Oregon City	\$3,422	\$2,707	\$2763			\$2,964
Portland (central city)	\$4,076	\$2,621	\$3,967	\$2,297	\$2,344	\$3,061
Portland (non-central city)	\$3,986	\$2,616	\$3,712	\$2,172	\$1,801	\$2,857
Rivergrove	\$500	\$500				
Sherwood	\$7,205	\$5,407	\$7,717			
Tigard	\$5,370	\$4,316	\$4,257			\$4,287
Troutdale	\$7,137	\$7,137				
Tualatin	\$4,530	\$4,530				
West Linn	\$8,376	\$5,923				
Wood Village	\$-	\$-				
Wilsonville	\$4,602	\$3,535	\$2,962	\$1,726		\$3,206
Clackamas Co						
zone 2	\$6,760	\$5,842				
zone 3	\$6,075	\$5,290				
zone 3a	\$4,779	\$4,425				
Multnomah Co	\$-	\$-				
Washington Co	\$6,888	\$5,510				

To maintain an approach that is consistent with the one recommended by MPAC in 2002, an implied parks level of service was calculated as follows. The 2002 Urban Growth Report forecasted growth of 220,700 dwelling units over the 20 year period and identified that 1,100 acres should be deducted from the vacant land supply for future parks for the same time period. The implied level of service was 1,100 park acres for 220,700 new dwelling units. The current Urban Growth Report forecasts 262,400 new dwelling units in the UGB over the next 20 years (baseline assumption). Applying the same implied level of service standard as used in 2002 ($1,100 / 220,700 * 262,400$) results in a deduction of 1,300 acres from the region's vacant land supply to address future park demand.

Line 15) New Urban Areas: This is a new line added to the 2009 Residential Urban Growth Report. The purpose of this line item is to recognize that new urban areas which were amended to the Metro UGB have yet to receive urban zoning densities – zoning still retains rural residential zoning densities or other rural designation. Including new urban areas through the conventional land density calculation and assuming rural densities would provide an inaccurate assessment of future residential capacity of new urban areas. A more accurate means of forecasting residential capacity for the new urban areas is to rely on the initial concept plan density assumptions.

The future capacity of new urban areas is not lost, but is added back in line 24. Please see line 24a thru line 24o for individual capacity assumptions for the new urban areas.

Related: see explanation for line 25.

Line 16) Gross-to-Net total (Net Vacant Buildable Acres - NVBA): An internal UGR calculation step which is a subtotal amount that is the net vacant buildable acres inside the Metro UGB (less new urban areas) after subtracting for line items 8 thru 15.

Line 17 a-d) Detailed NVBA by Type: Line 17 verifies the subtotal shown on line 16. Lines 17 a-d show details of line 16 categorized by general zoning class in the amount of vacant buildable acres. The buildable acres in line 17b and 17c (part) will carry over to the Employment UGR. Lines 17a (part), 17c (part) and 17d (all) carry into line 18 and line 19 for calculation of residential capacity (see below for additional details).

Also carrying over the employment UGR is the capacity found implicit in government owned land. The acreage amount totals up to an additional 3,200 gross buildable acres.

Line 18) Maximum Housing Capacity from SFR and MFR Zones: Maximum residential dwelling unit capacity is calculated from local zoning and comp plan designations (i.e., comp plans applied only to Portland and Wilsonville) and based on the net vacant buildable acres shown on line 17a (part), 17b (all), and 17c (part).

Dwelling unit density assumptions from various forms of net vacant buildable acres by type:

Capacity from Line 17a) Only half (50%) of the vacant acreage zoned for mixed use residential development (i.e., MUR) is assumed available for residential capacity. The remaining half is assumed not to be used for residential development owing to horizontal mixed use development in designated mixed use districts. Maximum densities vary from 8.9 DU/net acre up to 350 DU/net acre. Amounts vary based on vacant land in each mixed use zoning class. The residential capacity in mixed use residential districts is reported separately on line 19 and amounts to estimated capacity of 29,100 dwelling units.

Capacity from Line 17b) All 6,400 acres of residential land in line 17b are calculated into residential capacity and shown in total on line 18. This residential capacity is based on maximum zoning (or comp plan) density per local zoning ordinances as of the 3rd quarter 2008 RLIS database. Zoning capacity and densities vary for SFR1 (1 unit per acre) thru SFR16 (16 units per acre) and MFR1 (13.3 units per acre) thru MFR 7 (53.5 units per acre). [source: Metro Standardized Regional Zone Classification System (RLIS: zoneclass)]

Capacity from Line 17c) Farm and Forest designated land in UGB (not in new urban areas) = 10 units per net acre [source: 2002 UGR]. 65% of RRFU designated land is assumed to go towards future residential capacity. The rest will go towards employment uses. This assumption is based on a cross tabulation of vacant RRFU land and 2040 design types. 65% of RRFU vacant land is designated in

design types that accommodate residential development. This residential capacity is reported in line 18 and the capacity amounts to approximately 17,300 dwelling unit.

Capacity from Line 17d) No residential capacity assumed on industrial, commercial, and mixed use employment (MUE) areas / zoning. (MUE zoning is defined as mix of commercial and industrial; not to be confused with MUR zoning that is a mix of commercial and residential – typically office/retail and multifamily development)

Based on the RLIS vacant land inventory, UGR gross to net reductions and zoning density assumptions, the maximum residential dwelling unit capacity derived from residential vacant land produces about 46,300 dwelling units. Average DU density from line 18 is about 7 units per net acre, which averages in RRFU, SFR and MFR vacant land and zoning assumptions.

Table 4. Summary Dwelling Unit Capacity from environmentally unconstrained vacant land:

RRFU	17,300 units	10 units per net acre
Single Family (SFR)	28,200 units	5 units per net acre
<u>Multifamily (MFR)</u>	<u>18,100 units</u>	<u>26.5 units per net acre</u>
SUBTOTAL (line 18)	63,600 units	7.9 units per net acre
Mixed Use Res. (line 19)	29,100 units	28.5 units per acre
TOTAL	92,700 units	10.8 units per net acre

Line 18a) High-Density MFR feasibility factor: Market feasibility is derived from a discrete MetroScope scenario. This factor is a capacity discount for high density multifamily (MFR7, MUR8 to MUR10) product that is forecasted not likely to fully develop in the course of the next 20 year growth horizon. This housing product is a non-performing capacity asset that cannot be utilized by the market because its zoning is far ahead of projected market demand. [source: MetroScope]

In the “high” supply capacity scenario assumption, the supply deduction of high density multifamily (and mixed use residential) housing units from the supply is removed. In order to achieve this assumption, it is assumed that policy actions implemented today will help close the gap between the demand for living in high rise apartments and the construction costs of high density development. In order for this outcome to materialize, MetroScope scenarios indicate that achievable rents necessarily must significantly rise in order to help close the gap between the supply and demand for this segment of housing product.

Line 19) MUR Zoned Capacity: Mixed use residential density and capacity are calculated from zoning (or comp plans) and reported on this line. Mixed use districts recognize vertical and horizontal forms of mixed use. There is evidence that mixed development to date include both forms of mixed use development. There is very little regionally representative data to base how much horizontal mixed use is actually occurring. Nevertheless, in order to recognize that horizontal mixed use does and will occur in the future, we assume a 50% ratio of the two forms of mixed use development. The result for purposes of calculating capacity in line 19 is to halve the vacant land capacity for future residential development. [source: UGR 2009 assumption]

The estimated residential unit capacity from 500 (derived from 1,000 acres X 50% MUR ratio = 500 acres) acres of MUR zoned vacant land represents 29,100 dwelling units. The average DU per acre is approximately 28.5 units per net acre.

The total dwelling unit capacity and density from unconstrained vacant land totals a maximum yield of 92,700 units for a DU/acre of approximately 10.8 units per net acre.

Line 20) Underbuild (physical development constraints): The underbuild is based on physical constraints that make practical development up to 100 percent of maximum zoned density to be impractical. Capacity lost to single family residential underbuild assumes a 5 percent loss from maximum capacity as calculated from the single family DU capacity embedded in the calculation of line 18. The 5 percent rate is an assumption synthesized from oral communication provided by MTAC members. [source: oral statements from MTAC members]

Line 21a) Title 3 Capacity "add back": Title 3 protects the water quality of the region by delineating development setback rules that prohibit development along streams, rivers, floodways and flood prone areas. This setback varies depending upon conditions along the waterway, such as steep slopes. The Title 3 "no build buffers" are defined by maps maintained by the Data Resource Center RLIS database.

Capacity for 1 dwelling unit is assumed for each tax lot wholly inside the Title 3 buffer and zoned for future residential development. This line adds back minimal capacity resulting from subtracting environmental (ENV) land from line 6.

Precedent from prior UGR studies determines this allowance on the assumption that land owners have the ability to exercise the right to build 1 dwelling unit on land that governments have designated for protection of an environmental resource. [source: 2002 UGR assumptions]

Line 21b) Title 13 Capacity "add back": Implementation of Title 13 differs significantly from Title 3 in that Title 13 is implemented as a voluntary set back requirement. Land owners may comply with Title 13 by mitigating the impact future development may have on the environment.

Delineation of exact Title 13 environmental areas for this UGR is based on individual analysis and tabulation of local ordinance and implementation of Metro's Title 13 code. Local jurisdictions that have adopted Title 13 code language have been precisely mapped into the tabulation. For local jurisdictions that have not yet adopted Title 13 code language into city ordinances, the environmental delineation is based on Metro's modeling of Title 13 implementation.

This line adds back 80% of the residential capacity from Title 13 that was deducted in line 6. Please note that line 6 combines Title 3 and 13 ENV as one deduction, but the more detailed GIS data distinguishes which tax lots are in (or intersect) Title 3 and which ones are in (or intersect) Title 13. For purposes of calculating the capacity added back for Title 13 delineated vacant land, the residential capacity is based on local zoning less 20% capacity to account for mitigation efforts. [source: local jurisdiction ordinances and information]

Line 22) Platted SFR “add back”: The count of tax lots under 3/8 of an acre are tabulated and recorded on line 23. This line corresponds to the “add back” in dwelling units associated with the net acre deduction in line 9. [source: Actual RLIS measurement]

Line 23) Residential Refill Demand: Residential refill is the combination of expected amount of future redevelopment and infill (it is not the available capacity). It is a “demand” estimate. It is predicted estimate of what we anticipate will be the number of future dwelling units that will be accommodated on land that the RLIS database considers as developed land in the year 2007. A refill rate is derived from a discrete MetroScope scenario. This rate is then multiplied against future housing unit demand to arrive at a projection of residential refill. This refill is a forecast.

The amount of refill fluctuates between a low and high demand housing forecast. In this preliminary draft residential UGR, the refill rate may vary depending upon demand assumptions. Forecasting a future refill rate is part art and part science. Taking into consideration past refill rates, shifts in housing preferences, scenario results and the stated objectives of the region’s citizens, it is estimated that current policy direction and investment trends will produce an average refill rate of approximately 33 percent through the year 2030 (shown in line 4).

Line 23a) Upper range of possible refill: This is redevelopment and infill that could materialize above what the refill rate based on current investment policies and trends would assume as possible refill capacity. Scenario tests with alternative land use capacity and growth forecast assumptions indicate the future refill rate could top 40%. We assume that this may be a realistic top-end of the refill rate range. This is a “high” capacity residential supply assumption. [source: MetroScope Scenarios (2008)] This tranche represents uncertainty in the supply capacity for dwelling units inside the existing UGB. In fact, it is more likely that the size and steepness of this tranche will be less. The table and chart represent what it is estimated to be the likely high-end of the refill range supply.

Line 23b) Potential Units from Subsidized Residential Refill: This represents potential redevelopment and infill IF local governments take additional actions today to bolster residential demand and supply in designated 2040 centers and corridors. This is a “high” capacity residential supply assumption that requires policy action in order to realize any capacity towards the UGR. At this point, the estimate of this subsidized refill amount is highly speculative and should not be counted as actual supply that the region can count on in order to meet future housing demands. The assumptions involved include investments in all of the regional and town centers in the region.

Line 24) Estimated Capacity from New Urban Areas: This is a subtotal of lines 24a to 24o.

Line 24 a-o) New Urban Area Capacity Assumptions: These group of line items detail the theoretical buildout capacity assumed for individual new urban area addition to the Metro UGB during previous periodic reviews. [source: Various Concept Plans]

Line 25) New Urban Area market feasibility factor: New urban areas are not expected to yield full development in the next 20 years due to infeasible market conditions, lack of infrastructure and/or

financing ability to render urban development densities to occur. Market feasibility is derived from a discrete MetroScope scenario.

Line 26) Dwelling Capacity / Supply: Total Dwelling Unit Capacity tallied from lines 18 to 24

Line 27) Residential Gap Assessment: Deficit (or surplus) housing supply