

Appendix 2

Methodology for determining the 2014 Urban Growth Report's buildable land inventory

Background

Under state land use regulations, Metro is required to ensure an adequate supply of buildable land inside the urban growth boundary (UGB) to accommodate 20 years of population and employment growth. Metro conducts this analysis every five years in its Urban Growth Report (UGR). The UGR is the basis for the Metro Council's growth management decision. One of the underpinnings of this report is a buildable land inventory (BLI) that includes vacant and redevelopable land supply estimates. This document provides a summary of the assumptions and methods developed for the 2014 UGR's regional BLI. During the fall of 2013, all jurisdictions in the region were provided with an opportunity to review the draft BLI and to suggest revisions to the results that reflect local knowledge about specific properties.

The Urban Growth Report goes through subsequent steps to determine how much of this buildable land inventory may be market feasible in the 20-year planning timeframe. Additional detail about market feasibility can be found in the residential and employment demand analysis appendices.

Peer review of methods

During the spring and summer of 2013, Metro staff worked closely with a technical working group that included about 25 developers, engineers, brokers, economic consultants, and planners from jurisdictions around the region to develop a regional BLI methodology. This work built on efforts undertaken to develop a BLI that was an input assumption for the 2035/40 Growth Distribution, which was adopted by the Metro Council in the fall of 2012. The BLI benefited from extensive engagement with local jurisdiction planners over the course of two years. In many instances, these advisory groups discussed the ambiguity inherent in developing 20-year capacity estimates, particularly on a regional scale. On several topics, the group advised Metro that there was not a clear "right" or "wrong" answer, but helped Metro staff to arrive at methods that are, on the whole, reasonable for a regional analysis, and that use the best available information.

Measurement Uncertainty in the BLI

The land supply and capacity estimates prepared using the procedures and methods reflected in this paper are intended to reflect up to a 40 to 50 year land supply. The rationale for this derives from being consistent with trying to model future real estate development for a 20 year span and holding up to a mandate in keeping with a 20 year land supply in the 1st and the 20th year. We say the estimate

approximates a 40 to 50 year supply because some sensitivity analysis – particularly with key factor such as redevelopment assumptions, future residential densities, right of way allowances, environmental assumptions and a host of other complex capacity calculation assumptions – indicates some uncertainty in the statistical factors to arrive at a buildable land inventory measurement. The margin of error for redevelopment and infill is greater than the vacant part of the buildable land inventory, but both categories are subject to a degree of measurement uncertainty.

General methodology

Step 1: Identify vacant tax lots (and complement developed tax lots) by zoning class

Step 2: Remove tax lots from the BLI that don't have the potential to provide residential or employment growth capacity (e.g., parks)

Step 3: Calculate deductions for environmental resources¹

Step 4: Calculate deductions for “future streets”²

Step 5: Calculate BLI estimates (BLI includes capacity estimates for vacant and redevelopment)

- a) Single Family Residential (SFR)
- b) Multifamily residential (MFR) and Mixed Use Residential Capacity (MUR)
- c) Employment (industrial³ and commercial)

Identify vacant and developed land by zoning (or comp plan)

Issue:

Previous iterations of the BLI focused only on vacant land, and capacity for redevelopment was treated separately using a refill rate⁴. The current BLI methodology treats vacant and redevelopment as separate categories for clarity and to avoid any double counting of capacity on the partially vacant lots. However, Metro's vacant lands inventory (a basis for the BLI) includes some “partially vacant” land.

Solution:

The region's buildable land inventory is sorted into *redevelopment* and *vacant* capacity (the identification screens / filters are inherently different). Tax lots that were previously categorized as

¹ Environmental resources considered include Metro's Title 3, Title 13, FEMA flood way and steep slopes over 25%.

² The BLI accounts for future streets on a tax lot-by-tax lot basis. The buildable area of each tax lot is reduced on the basis of individual tax lot size.

³ Large industrial sites (25 or more net buildable acres) were inventoried in a separate process that relied on work done as part of the 2011/2012 Regional Industrial Site Readiness Project, which was a partnership between Metro, the Port of Portland, Business Oregon, the Portland Business Alliance, NAIOP, and local jurisdictions. The inventory of large industrial sites will be completed in the spring of 2014.

⁴ The refill rate is the share of the region's future growth that is expected to be accommodated through infill and redevelopment. However, the refill rate does not identify the locations where infill and redevelopment may occur.

“partially vacant” are categorized into one or the other condition (i.e., vacant or developed for purposes of counting regional capacity). Developed tax lots are subjected to economic screens (described in this document) to determine whether they should be counted as **potential** redevelopment capacity.

Vacant land definition⁵:

- Any tax lot that is fully vacant (Metro aerial photo)
- Tax lot with less than 2,000 sq. ft. developed AND developed part is under 10% of entire tax lot
- Tax lots that are 95% or more “vacant” from the GIS vacant land inventory⁶

Developed land definition:

- Part vacant / part developed tax lots are considered developed and will be treated in the redevelopment filter

Rationale:

Categorizing tax lots as vacant or developed (and potentially redevelopable) more closely aligns the inventory approach with that of other local governments and state administrative rules, which refer to vacant and redevelopable land. Lands previously defined as “partially vacant” are still inventoried, but are simply redefined to fit into the vacant or developed categories. Tax lots with fewer than 2,000 sq. ft. developed and a developed part that is less than 10% of the entire tax lot are considered completely vacant with the understanding that tax lots with this condition resemble a fully vacant tax lot. The developed portion would minimally impact new development. In case of tax lots in employment zones that do not pass through various redevelopment filters, for relatively large tax lots greater than 1 acre, we apply a final screen to include “land banked” parcels into the BLI.

Addendum (5/14):

Oregon law requires Metro to periodically – in 5 year cycles – review and take action to ensure that the current UGB has the capacity to absorb 20 years of residential development and economic growth. It follows then that for modeling and forecasting future land development that we try to mimic to the best of current knowledge a rational expectation for UGB capacities and replenishment in each 5 year interval. We model a rolling 20-year capacity of the BLI by metering in additional redevelopment, infill and vacant capacity for each 5-year interval. To simulate this, we have to have at the outset a reasonable estimate of redevelopment for at least 40 years (20 years to begin with and another 20+ years estimated for the last year of the forecast horizon year), which we in subsequent 5-year periods

⁵Small inconsistencies in the alignment of the tax lot GIS layer and the vacant/developed GIS layer create slivers along property boundaries. In order to deal with this issue, any tax lot that is 95% or more vacant is considered “fully vacant”.

⁶GIS taxlot layers change over time as the counties update their parcel base. Because of this, over time, the vacant land layer may develop inconsistencies, resulting in slivers of vacant or developed land that intrude on adjacent taxlots. Setting a 95% threshold prevents full vacant taxlots from being categorized as “developed”.

meter in more. Urban reserves serve as additional vacant land that is also metered in at 5 year intervals to simulate future UGB expansions and so forth (though it should be noted that urban reserves are not counted in the UGR analysis).

Looking at the redevelopment (and infill) inventories in this BLI, we don't have information to tell us which tax lot(s) will redevelop and which ones won't during the next 20 years. Our recourse is to utilize a simulation approach that can identify how much of the potential inventory of redevelopment may be expected to redevelop in 20 years. We opt to use MetroScope in order to estimate redevelopment absorption and apply this scenario information to the BLI for the 20-year estimate of redevelopment.

Remove tax-exempt lots, parks, and major utility easements

Issue:

Some vacant tax lots (e.g., parks) should not be recognized as carrying capacity for employment and/or housing going into the future.

Solution:

Remove the following types of tax lots from the residential (and employment) BLI based on Assessor PCA code designations, owner names, assessed values and other data sources:

- Tax exempt with property codes for city, state, federal and Native American designations
- Schools
- Churches and social organizations⁷
- Private⁸ "streets"
- Rail properties⁹
- Tax lots under 1,000 sq. ft. (0.023 gross acres)
- Parks, open spaces and where possible private residential common areas

Use the best available GIS data to remove parks, rail yards and railroad properties, major petroleum, natural gas lines and BPA power line right of ways. The area defined as "utility easements" is a GIS data layer that identifies major trunk lines for petroleum, natural gas and BPA's high voltage electric lines, and excludes all else. Parks is a data layer maintained by Metro that includes all parks in the region (e.g., community parks, regional parks, open space areas, golf courses, private common areas, and cemeteries).

EXCEPTIONS:

Included in Residential Capacity Calculations the following list of exemptions:

⁷ Based solely on tax exempt codes.

⁸ This was used for SFR, MFR and MUR zoning only. It proved problematic for COM and IND zoning

⁹ The Metro Data Resource Center finished collecting and compiling together a comprehensive rail yards and railroad properties geodatabase. For the UGR study, we utilize this brand new database to filter out unbuildable tax lots from the BLI data.

- Housing Authorities (not just Portland)

Included in Employment Capacity Calculations the following list of exemptions:

- Port of Portland
- Portland Development Commission

Rationale:

Tax lots that are not capable of supporting future employment and/or housing because of use restrictions should be removed from the BLI.

Calculate Environmental Constraints

Issue:

Local governments vary in how they implement environmental regulations found in Urban Growth Management Functional Plan Title 3 (Water Quality and Flood Management) and Title 13 (Nature in Neighborhoods). Moreover, estimation of residential housing capacity of tax lots (TL) with environmental impact may vary substantially on a case by case basis. Typically, *density transfers* from the environmentally impacted portion of a tax lot to the unconstrained part of the tax lot may vary significantly depending on the environmental impact and city regulations.

The capacity calculations for environmentally constrained tax lots recognize residential density transfers and Title 13's more flexible protections, which are applied on a site-by-site basis during the development review process. Generally, under Title 13, development is to avoid, minimize, or mitigate (in that order) designated habitat areas. Typically, precise delineations of habitat conservation areas are identified during the site development process. Therefore, the data and BLI calculation methods are more appropriate at a higher geographic scale than individual tax lots. The residential capacity computation (though accurate at a regional or subregional scale) may **NOT** accurately portray the precision needed to calculate the environmental deduction for each tax lot. This may also affect the calculation for the transfer of density from the environmentally constrained area to the unconstrained part for individual tax lots, but we believe that on balance, the variance in the calculation of net density and net residential capacity offset each other over the entire region.

The BLI technical working group was asked to provide advice on how to handle capacity assumptions in Title 13 areas. The group agreed that counting full residential capacity was not appropriate, but that discounting all capacity was not appropriate either. Metro staff then sent an e-mail inquiry out to all local jurisdictions in the region to determine their jurisdictions' historic development experience in Title 13 areas. Metro staff received varied responses with many caveats that preclude meaningful summarization. In the end, this inquiry did not produce a clear answer. Aside from the fact that Title 13 gets interpreted on a site-by-site basis, another challenge is that local implementation of Title 13 is fairly recent, which means that there is not a lot of development experience from which to draw (particularly in light of the Great Recession). Given this ambiguity and the fact that Title 13 areas comprise a

relatively small portion of the region’s single-family zoned vacant land (approximately 5.5%) and even less of its multi-family zoned vacant land (approximately 0.5%), Metro staff determined that the most reasonable approach was to rely on percentages found in the Title 13 Model Ordinance. This is the best available information and is being used on the advice of the BLI technical working group.

Solution:

Most areas that are considered environmentally sensitive fall into multiple categories of overlap including Titles 3 and 13, or are in a floodway or flood prone soils, or include steep slopes or some other ecosystem feature. Metro employs an environmental hierarchy to classify the environmental features to avoid double counting the capacity deduction for the BLI. BLI reductions will reflect the higher assumed protections when environmental features are overlapping.

Methods differ for single-family, multi-family, and employment lands. Generally, using the best available GIS data:

- Remove 100% of the area of floodways
- Recognize environmental constraints such as slopes over 25% and as defined by cities and counties under Title 3 and Title 13. In many instances, the delineation of the environmental buffers are GIS modeled data; where available we utilize environmental buffers from local government GIS data
- By assumption, permit 1 dwelling unit (DU) per residentially-zoned (SFR, MFR, MUR) tax lot if environmental encumbrances would limit development such that by internal calculations no (zero) dwelling units would otherwise be permitted (“essentially avoid takings”)

As a result, we define the following land area calculations (used in formulas below):

Vacant buildable = Calculated area of TL – utility easements – parks – railroads – tax exempt sites

Net unconstrained¹⁰ = vacant buildable – environmental constraints

The “calculated area of TL” is the GIS calculation of area (sq. ft.) of the tax lot as defined in Metro’s GIS tax lot data layer. (Generally, individual tax lots are not affected by utility easements, parks, railroads or other tax exempt uses, but on a regional scale, these factors add up to be somewhat significant and therefore handled in the regional BLI calculations for the UGR capacity estimates.) Environmental constraints are handled as follows (by land use type):

Single-family residential

1. Floodways: 100% removed
2. Slopes > 25% and Title 3 treated the same way: 100% removed

¹⁰ This is the calculation for SFR, MFR and MUR. The calculation for COM and IND is a 100% deduction of environmental constraints.

- a. If tax lot > (or equal to) 50% constrained, follow the "maximum capacity rule" (defined below) to add back units¹¹
- b. If tax lot is <50% constrained, assume 90% of unconstrained area is in BLI (i.e., apply 10% discount to vacant buildable acres)¹²
3. Title 13: 50% of Title 13 constrained acres removed from BLI (consistent with Title 13 model Ordinance).
4. Assume at least one unit per tax lot, even if fully constrained

Multi-family residential

1. Floodways: 100% removed
2. Slopes > 25%: 100% removed
3. Title 3: remove 50% of the constrained land with the other 50% considered buildable
4. Title 13: 15% of Title 13 constrained acres removed from BLI (consistent with Title 13 Model Ordinance)
5. Assume at least one unit per tax lot, even if fully constrained

Industrial and commercial

Employment zoned land applies a simple approach of netting out all constrained land. This is based on the input of the BLI technical working group, which indicated that constrained areas are typically avoided altogether by new commercial or industrial employment uses.

1. Floodways: 100% removed
2. Slopes >25%: 100% removed
3. Title 3: 100% removed with the exception of the Portland Harbor Access Land where a 70% discount rate is applied¹³
4. Title 13: 100% removed

Calculate deductions for "future streets"

This BLI methodology sets aside a portion of the vacant land supply (not redevelopment supply) in order to accommodate future streets and sidewalks. 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
- Industrial (IND) zoning assumes a 10% set aside regardless of size.

¹¹ This add back represents Metro's approach for estimating / calculating the density transfer to mitigate the loss of potential development productivity for dwelling units.

¹² Based on feedback from BLI working group, including local experience.

¹³ Based on input from City of Portland staff.

The basis for these net street deduction ratios derive from previous research completed by the Data Resource Center and local jurisdictions for the the 2002 UGR.

Calculate single-family residential capacity

Single-family residential vacant land methods:

Rationale: A multi-step approach has been developed that accounts for environmental impacts and provides a means for explicitly estimating potential transfer of density from the constrained portion of a tax lot to the unconstrained portion. The approach corrects for over estimation of partial single-family (SF) capacity by rounding down capacity estimates to a whole number.

If a vacant tax lot is unconstrained by environmental impacts, the formula is simply to compute the maximum number of whole dwelling units permitted by the zoning district.

Example: 10,500 sq. ft. tax lot and zoning district allows a minimum lot size of 5,000 sq. ft. → $(10,500 / 5,000) = 2.1$ dwelling unit capacity rounded down to 2.0 DU

Our approach for both redevelopment and vacant tax lots otherwise considers the potential to achieve transfer of density from areas in a tax lot constrained by environmental considerations. Two (2) different capacity calculations are made on vacant SF tax lots to account for environmental constraints. The DU capacity for each tax lot is the minimum calculated by the two methods, with a floor of at least 1 SF unit per tax lot¹⁴. The floor is an allowance for any vacant and fully constrained tax lot in order to recognize the development potential of 1 DU capacity in the BLI.

Calculations:

The *maximum capacity rule* is applied to single-family tax lots with environmental constraints (slopes greater than 25% and/or Title 3 constraints and/or Title 13 constraints). The rule would take the minimum number of units based on these guidelines:

1. Tax lot size / minimum zoned lot size; or
2. Unconstrained portion of lot / 2000 sq. ft. (1000 sq. ft. in Portland)¹⁵

Example of environmental conditions of two typical tax lots:

- 11,000 sq ft lot
- 5,000 sq ft minimum lot size zoning

¹⁴ Note: This only applies to vacant tax lots. If a tax lot is already developed and environmental constraints would not allow any additional units to be built, it can have a minimum capacity of zero additional units.

¹⁵ Assuming 2,000 sq. ft. in the above calculations was a recommendation of the 2035 Growth Distribution subcommittee (and 1,000 sq. ft. for areas in Portland), which was based in part on a review of regulation, physical dimensions (i.e., building footprint) of a prototypical higher density SFR development form, and practical development knowledge.

Scenario A:

- 6,500 sq ft unconstrained
- 4,500 sq ft environmentally constrained
- If unconstrained: $11,000/5,000 = 2$ units maximum
- With constraint: $6,500/2,000 = 3$ units possible
- Applying maximum capacity rule: 2 units (zoning maximum takes precedence)

Scenario B:

- 2,500 sq ft unconstrained
- 8,500 sq ft environmentally constrained
- If unconstrained: $11,000/5,000 = 2$ units maximum
- With constraint: $2,500/2,000 = 1$ unit possible
- Applying maximum capacity rule: 1 unit possible (constraint overrides zoning maximum)

Single-family residential developed land methods (infill):

Rationale: There are a finite number of single-family tax lots in the region. As a result, over the next 20-year period, it may become increasingly attractive for homeowners of oversized SF tax lots to subdivide. Any single family zoned tax lot with a developed SF home was subjected to 1) an oversize tax lot screen to determine if the tax lot exceeded today's zoned minimum lot size (per Metro's regionalized zoning crosswalk table); 2) if the ratio of entire tax lot square footage to the minimum zoned lot size is between 2.5 and 5, an additional economic-based filter is used to remove from the BLI any lots with high-valued SF homes meeting this criteria. A \$300,000 building value is assumed as an appropriate threshold for removal from the SF infill supply. The intent is to recognize that owners of large tax lots with relatively expensive homes are not likely to subdivide their tax lot.

SF Infill Filters:

- Must have single family zoning (per Metro's standardized regional zone class)
- If the tax lot is zoned SFR and classified by Metro as developed, it was assumed that one (1) SF unit presently exists on the tax lot regardless of what's indicated on the assessor's land use code. The one exception to this rule is for tax lots in SFR zoning that have current land use for an apartment (according to Metro's MF database), and these parcels were not considered in calculating infill potential for single family infill supply (Rationale for this was that any infill of such land use would by zoning yield a SFR unit with the concomitant loss of the MFR units, which we believed unlikely).
- Lot size threshold > 2.5 times the minimum zoned lot size (2.2 for City of Portland only); lots greater than 2.5 times (or 2.2 for Portland) would be added to the SF infill supply, except:
- Lots that meet the size thresholds are run through an additional economic eligibility filter before being included in the SF infill supply. In addition to meeting the size threshold, the assessor's real market building value must be below \$300,000 to be counted in the SF infill supply. Rationale: lots with really expensive homes would be excluded from the SF infill supply.

- Tax lots with an oversize threshold exceeding 5 (anywhere in region) are passed through into the infill supply regardless of building value. Rationale is that the remaining buildable area is close to an acre or more and real estate economics being what we expect would very likely see significant infill pressures.

Example: an existing developed SF tax lot that's 13,000 sq. ft. and a minimum lot size for the zone class of 5,000 sq. ft. → $13,000 / 5,000 = 2.6$; this TL is eligible for infill with the capacity for 1 more DU ($2.6 - 1 = 1.6$ → rounded down yields 1 more infill unit).

Calculations of eligible infill tax lots and the additional net DU added:

The net additional infill SF DU is the minimum of calculated by the following 2 computations. Many SF tax lots end up with zero additional infill units.

1. Additional DU infill = (Calculated area of TL – max lot size) / min lot size (rounded down to a whole number); can equal 0
2. Additional DU infill = (net unconstrained sq. ft. / 2,000 sq. ft. (1000 sq. ft. in Portland)), rounded down to a whole number; can equal 0

Calculated area of TL = GIS calculation of the tax lot

Max lot size = in the GIS tax lot layer database, each single family zone class has, by definition, a top-end value for lots to be classified for each SF residential category

Min lot size = in the GIS tax lot layer database, each single family zone class has, by definition, a low-end value for lots to be classified for each SF residential category (please refer to the Metro “Standardized Regional Zone Class” table.

Net unconstrained¹⁶ = vacant buildable – environmental constraints

Calculate multi-family residential capacity (including mixed-use residential)

Method for Vacant and Redevelopment Capacity Calculation (MFR and MUR)

If the tax lot is zoned MF (or MUR) and vacant, the BLI capacity estimate is simply the number of units per acre permitted by the zoning class multiplied by the vacant buildable acres, which in the case of the unconstrained tax lot is the area of the tax lot.

If the tax lot is zoned MF and vacant, but it is partly constrained by an identified environmental set aside (such as local ordinances implementing Title 3 or Title 13), the formula for estimating the BLI capacity tests the available size of the unconstrained part of tax lot to determine how much *theoretically* permissible density could be transferred to the unconstrained half. (See formula in this section.)

¹⁶ This is the calculation for SFR, MFR and MUR. The calculation for COM and IND is a 100% deduction of environmental constraints.

Redevelopment Rationale: The following redevelopment filters are first applied to each developed tax lot within a regional MF or MUR zone class. In order to be added to the multifamily redevelopment BLI, redevelopment would have to add at least 50% more units over the number of units which already exist, or produce at least 3 units total. The rationale is that developers would not tear down and redevelop an apartment or condo units unless he could yield a significant gain in rents and dwelling units. A threshold of 50% was recommended by the subcommittee that advised Metro staff on the BLI assumptions for the 2035/40 growth distribution.

- Redevelopment of multi-family structure must add at least 50% more units; if it doesn't, the tax lot is not eligible for redevelopment
- If the structure is a commercial (or industrial) building or single family dwelling unit (in an MFR or MUR zone), the redevelopment must yield at least 3 or more dwelling units
- Redevelopment must pass through an economic filter first before evaluation of additional DU through redevelopment (see below for economic filter thresholds)

Different economic redevelopment thresholds are assumed to determine which sites in today's MUR or MFR zone classes might be eligible for adding to the redevelopment portion of the BLI. These economic filter thresholds are described next.

Multifamily and Mixed Use Residential Redevelopment filter:

The economic screen for determining which tax lots could potentially be candidates for redevelopment is based on a ratio of total real market value¹⁷ (land and improvements) to area of the tax lot (square feet). If the real market value per square foot is less than the strike price, the tax lot is assumed eligible for redevelopment. The rationale for the strike price thresholds is that developers have a profit motive. For the purposes of this BLI, it is assumed that developers may want to redevelop a property if the potential profit justifies property acquisition costs. Strike price values were developed in consultation with economic consultants and the BLI technical working group, which included developers with market knowledge. The strike prices are based on current market conditions, but are pushed to a modest degree to acknowledge that demand (and willingness to pay) will increase over the 20-year timeframe. As depicted in Table 1 and Figure 1 below, strike prices vary by market subarea. Additional analysis was completed on historic redevelopment to determine whether these strike prices are reasonable. The analysis found in the addendum at the end of this document indicates that the strike prices used for completing the BLI are reasonable given what has been observed with actual redevelopment.

¹⁷ Source: county tax assessors

Table 1: Residential redevelopment strike prices by market subarea (for MFR and MUR zone classes)

Market Subarea ¹⁸	Redevelopment strike price per square foot (land and improvements)	
	Multi-family zoning	Mixed-use residential zoning
Central City	\$130	\$130
N/NE Portland central corridors	\$70	\$80
Eastside urban	\$70	\$80
Suburban	\$10	\$12

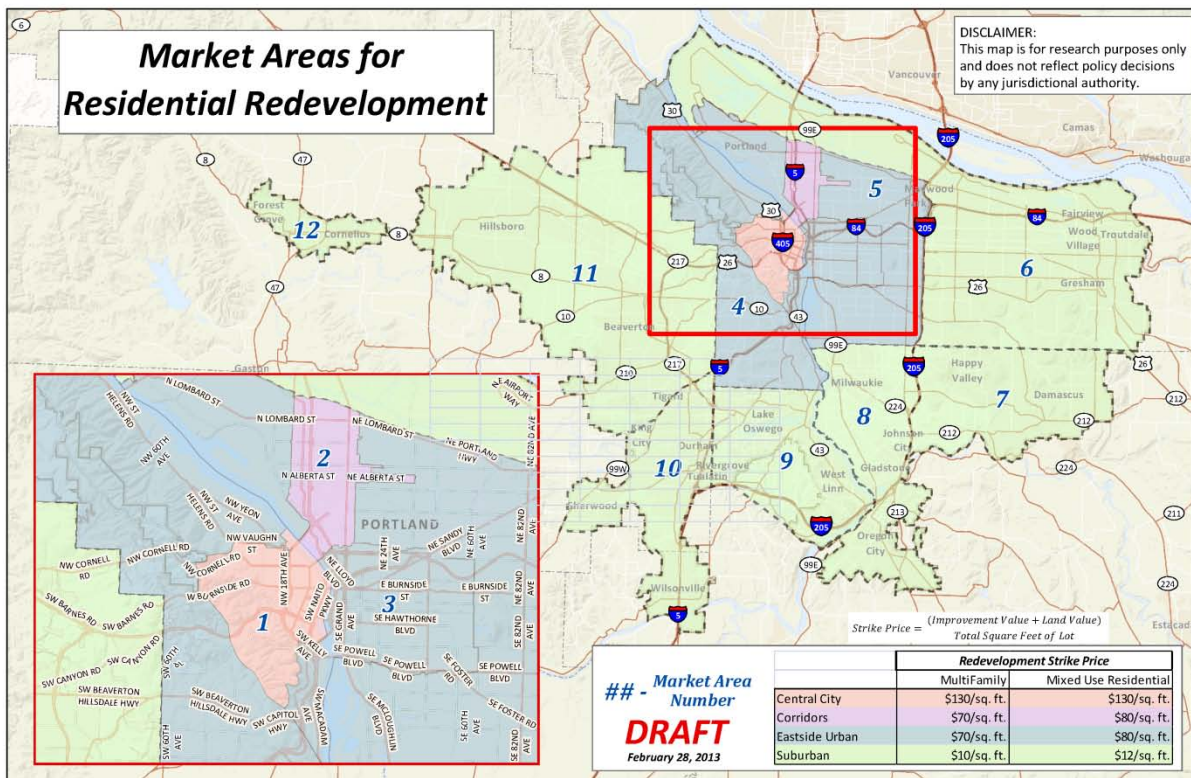


Figure 1: Mixed-Use Residential and Multi-Family Residential redevelopment market subarea analysis geographies

These economic filters define the BLI's supply of tax lots that may redevelop over a 20-year timeframe. The UGR goes through a separate step of using land use and transportation modeling to estimate what portion of that redevelopment supply is likely to redevelop over the 20-year timeframe. Using these numbers, this redevelopment supply is then expressed as a range in the UGR.

¹⁸ During Local Review, the City of Portland identified the Gateway district as an area that did not fit these general rules for redevelopment. Therefore, a strike price of \$24/sq. ft. was applied in Gateway based on several real-world redevelopments that have recently occurred in Gateway.

Formula for calculating density transfers on environmentally constrained tax lots (for MFR and MUR Redevelopment and Vacant tax lots):

The formulas below make a distinction between low density vs. high density zoning for MFR and MUR categories of zoning. In Metro's standardized zone class designations, high density zoning refers to classes: MFR 7 and MUR 8 to MUR 10. Both sets of calculations consider how much additional BLI capacity can be gained with respect to tax lots that have identified environmental constraints.

1. Low Density (LD) MFR or MUR zoning capacity calculation formula:

LD => if (1,000 sq. ft < unconstrained part < 5000 sq. ft.) => min (allowed by zoning or 1 DU / 1000 sq. ft.)
LD => if (unconstrained part > 5,000 sq. ft.) => apply zoning density to entire tax lot.

2. High Density (HD) MFR or MUR zoning capacity calculation formula:

HD => if (unconstrained part <10,000 sq. ft.) => 1 DU/1000 sq. ft. of unconstrained area.
HD => if (unconstrained part >10,000 sq. ft.) => apply zoning density to entire tax lot.

Net unconstrained = Vacant buildable – env. constraints

Note: the deduction for environmental constraints is defined in previous sections of this report.

For a tax lot with low density MFR or MUR zoning, if the unconstrained portion of the lot is at least 5,000 sq. ft., then the DU capacity for that lot is calculated by simply applying zoning density to the entire buildable area of the tax lot (net of utility and park areas and other allowed easements). This approach assumes a full density transfer from any constrained portions of the lot to the unconstrained portion of the lot would theoretically be achievable if the unconstrained area is at least 5,000 sq. ft. The same applies for high density MFR and MUR zoning, except that the unconstrained area must be at least 10,000 sq. ft. to achieve a full density transfer. If the unconstrained portion of the tax lot is under the specified limits (5,000 or 10,000 sq. ft. – these thresholds were suggested by the TAZ subcommittee as a reasonable threshold), the number of dwelling units theoretically buildable is the minimum of: 1) the number of DU permissible based on zoning multiplied by the number of buildable acres (*buildable = Calculated area of TL – utility easements – parks*); or 2) net unconstrained sq. ft. / 1000 sq. ft. (*net unconstrained = TL sq. ft. – utility – parks – env. constraints*).

Employment Capacity Calculations for Commercial and Industrial

Method for Vacant and Redevelopment Capacity Calculation

The vacant land supply is identified using Metro's vacant land inventory, which is derived annually from aerial photo information. Capacity to accommodate employment is determined by zoning (i.e., industrial, commercial, multiple use employment and mixed use residential zone classes). Similar to the residential BLI, the employment BLI estimate includes capacity from vacant land and potential redevelopment.

The employment BLI removes a select set of tax lots (vacant and developed) that for a variety of reasons should not receive any capacity calculations (e.g., parks and open spaces and other defined easements). These tax lots are removed from the employment inventory much like the residential inventory. They receive no carrying capacity for employment (or residential) uses.

The supply of employment land is measured in acres. All tax lots with commercial and industrial zoning were subjected to a series of preliminary screens first, as for residential, to exclude the following types of properties, for example:

- Tax exempt properties (except for Port and PDC codes)
- Schools¹⁹
- Rail properties
- Parks and open spaces²⁰

The unconstrained buildable area, net of environmental and other constraints was calculated as follows:

Vacant buildable = Calculated area of TL – utility easements – parks

Net unconstrained = Vacant buildable – 100% of environmentally constrained area

Tax lots that have been identified as part vacant (at least ½ an acre undeveloped) are considered developed and go through a set of redevelopment screens/filters in order to identify which tax lots have the potential to redevelop during the next 20-year time horizon.

Because “part vacant” land is now being classed as “developed” in this approach, there remain some tax lots with large vacant pieces that do not get through the economic filters and into the redevelopment supply. The assumed economic threshold values which identify which tax lots have potential to be redeveloped are not well suited and calibrated to identify partially developed tax lots with significant amounts of undeveloped real estate. A final screen for these so called “land banked” parcels was applied by adding back into the redevelopment supply the *net unconstrained* vacant portion of any lot with at least 1 acre of unconstrained vacant land.

In these cases, these two steps, the preliminary screening calculation of unconstrained area, are sufficient to identify the employment capacity on vacant land. For the redevelopment supply, the developed tax lots are subjected to a set of economic criteria shown in Table 2 and Table 3. Tax lots must meet both criteria (size and strike price) to be considered eligible for the redevelopment supply in the BLI. To be included in the BLI, the unconstrained area of a tax lot must be larger than the threshold acreage AND it must have a square foot value less than the applicable strike price.

¹⁹ Metro maintains a school GIS data layer which will be used in screening out land for the BLI. Note: abandoned school properties or school sites that are no longer actively used as a school (and considered surplus) will be included in the BLI.

²⁰ Metro maintains a parks and open spaces GIS data layer (i.e., ORCA = open recreation and conservation area) which will be the data source used in screening out land for the BLI.

The rationale for the tax lot size thresholds is that a developer would be less likely to redevelop a small tax lot because there are likely to be higher construction costs associated with fitting the development on a small parcel. Additionally, by their very nature, small parcels are not likely to produce redevelopment supply that is significant in the context of a regional BLI.

The rationale for the strike price thresholds is that developers have a profit motive. They may redevelop a property if the potential profit justifies property acquisition costs. Redevelopment strike prices were developed with the assistance of economic consultants and the BLI technical working group.

Table 2: Commercial redevelopment economic filter by market subarea

COMMERCIAL LAND			
		Redevelopment strike price (\$/sq ft for land and improvements)	
Zone class	Tax lot size (acres) greater than	Regional Centers, Town Centers, Station Communities²¹	Everywhere else in UGB
Central Commercial (CC)	.249	\$15	\$12
General Commercial (CG)	.249	\$15	\$12
Commercial Neighborhood (CN)	.249	\$15	\$12
Commercial Office (CO)	.249	\$15	\$12

Note: Downtown Portland is zoned MUR, so is handled with the residential redevelopment methods. Real market value from county assessors is used for calculating values

²¹ Officially adopted center boundaries were used where possible. In other cases, analysis geographies were used. In the case of Station Communities, the Station Community buffers, as depicted on the 2040 Map, were used.

Table 3: Industrial redevelopment economic filter by market subarea

INDUSTRIAL LAND				
Zone class	Tax lot size (acres) greater than	Redevelopment strike price (\$/sq ft for land and improvements)		
		Entire UGB	Subarea #3 ²²	Everywhere else in UGB
Light Industrial (IL)	.99	\$5	-	-
Heavy Industrial (IH)	.99	\$5	-	-
Office Industrial (IO)	.99	-	\$10	\$7
Campus (business park) Industrial (IC)	.99	-	\$10	\$7

Note: Real market value from county assessors is used for calculating values

These economic filters define the BLI’s supply of tax lots that may redevelop over a 20-year timeframe. The UGR goes through a separate step of using land use and transportation modeling and historic data to estimate what portion of that redevelopment supply is likely to redevelop over the 20-year timeframe. Using these numbers, this redevelopment supply is then expressed as a range in the UGR.

Mixed Use capacity estimates (splitting residential and commercial capacity on MUR zoned tax lots)

More and more tax lots in the region are designated in mixed use residential (MUR) zones. Predicting whether MUR-zoned areas throughout the region will be developed as residential or commercial (or what mix of the two) is a challenge. MUR districts in the Metro region almost universally do not require *vertical mixed use*, which is to say ground floor retail/service or office uses with above floor apartments (or condos). Horizontal mixed use, on the other hand, are a mix of retail, service, office and residential apartments – a mix then of employment and residential land uses usually on separate tax lots.

Issue: In past modeling and forecasting efforts, Metro assumed that all MUR zones were 100% vertical mixed use. This meant that for purposes of counting employment BLI and residential BLI, the equivalent of one story of capacity would be counted in the employment BLI and the remaining capacity would be counted in the residential BLI. This is the theoretical maximum capacity for each MUR district. However, over the last 10 to 15 years, there have been few examples of vertical mixed use occurring in suburban MUR districts. Anecdotal evidence suggests that at most 5% residential and 95% employment was more the norm in some suburban mixed-use development in recent years.

²² As depicted in Figure 1.

MUR residential/non-residential capacity split formula:

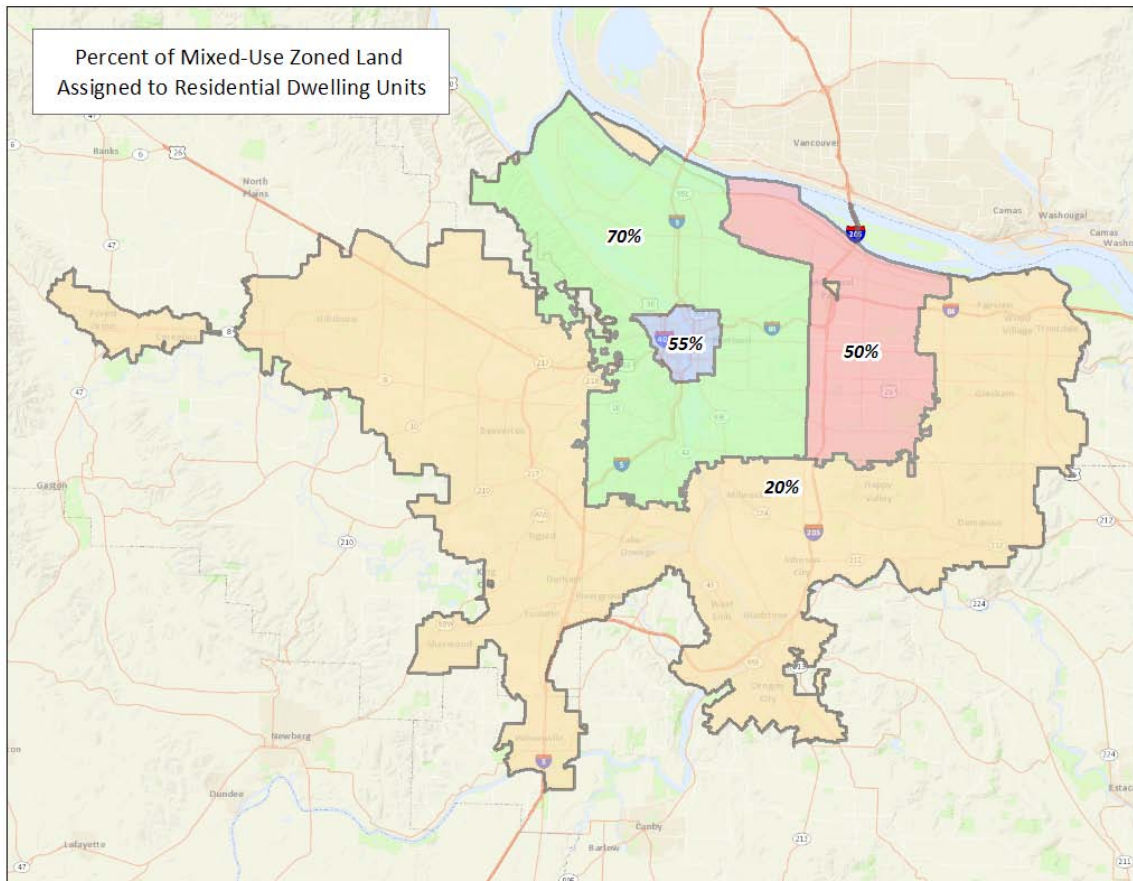
Employment capacity in mixed use residential areas, measured in acres, is calculated from the dwelling unit capacity determined in the residential supply. For tax lots with MUR zoning:

- Total effective acres = Total additional units allowed if 100% of lot is used for residential * acres per unit required at maximum zoned density
- Residential effective acres = ResSplit * Total effective acres
- Employment effective acres = EmpSplit * Total effective acres

Assume: Residential split = 20% (Portland**: see map)²³

Non-residential split = 80% (Portland**: see map)

** The split in Portland’s mixed use residential zone classes varied by area based on evidence from historic and on-going development trends. A map below depicts these locations and the individualized split formula for each subarea of the city.



²³ In the event that applying a split factor reduces the number of available residential units below 1 (i.e. 2 units x 20% = 0.4 units) the number of residential units is rounded up to 1.

Rationale: For purposes of modeling and forecasting, we opt for a greater suburban residential split of 20% to foreshadow the possibility that future market trends may drive more residential development than present trends would otherwise suggest. If projected market demand forces do not materialize during the forecast, this oversupply will not materially skew projections.

New urban area capacity

“New urban areas” are those areas that have been added to the UGB in recent years that do not yet have urban zoning or adopted comprehensive plans²⁴. Consequently, planning documents, rather than GIS analysis, are typically the basis for how capacity in new urban areas is handled in the BLI. Possible sources of information include:

- Draft comprehensive plans
- Adopted concept plans
- Draft concept plans
- Conditions of approval that were attached to the UGB expansion.

The UGR goes through a subsequent step of determining, in consultation with local jurisdictions, what portion of the region’s capacity is likely to be developed in the 20-year timeframe. Examples of sources of information that can inform those determinations are local staff knowledge, status of planning and infrastructure provisions, market-based modeling, and the 2035 Growth Distribution. Please refer to the GIS shapefile for case-by-case capacity estimates when comprehensive plans or zoning plans were not used in calculations (i.e., in deference to other local input).

²⁴ This marks a change from the 2009 UGR, which asserted that any area that was added to the UGB from 1998 onward was a new urban area, even if zoning ordinances had been adopted. The new method considers a narrower set of areas to be new urban areas. All other areas are handled according to the standard BLI methods described in this paper.

Addendum: assessment of historic multifamily redevelopment strike prices

Multifamily housing accounts for about half of the new residential units that were constructed in the Portland region from 2007 to 2012. More than 60% of multifamily development over this period came through redevelopment and infill on previously developed parcels, so this segment of the housing supply is a critical component in determining residential land needs over the next 20 years. The buildable lands inventory (BLI) that has been developed for the current UGR includes a redevelopment component in order to account for this trend in the growth forecast. This analysis reviews the criteria that were selected as “filters” for including tax lots in the redevelopment supply by examining the multifamily redevelopment and infill that have actually occurred in recent years.

Building permit and assessor data, as well as Metro’s multifamily housing inventory, were used to identify new multifamily construction over the study period and determine the previous state of the land before the most recent development. Developments were broadly divided into vacant, redevelopment and infill. If there was no evidence of an existing structure on the tax lot going back to the year 2003, the lot was considered vacant prior to the new development. If an existing structure was torn down to make way for the new development, this is considered redevelopment. If the existing structure was not torn down and new development was added, with or without subdividing the tax lot, this is considered infill.

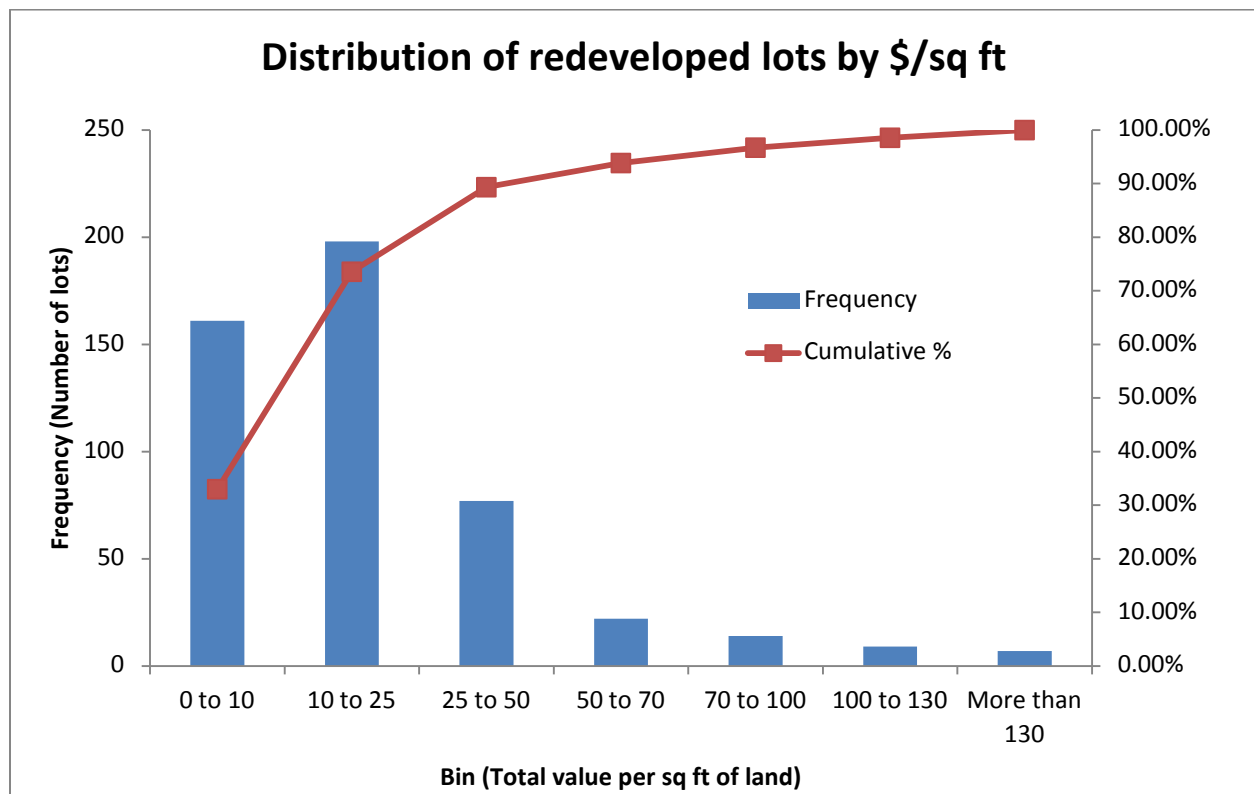
For developments that were identified as redevelopment and infill, the tax lot information from prior years was joined to look at the assessed values, land use and other attributes of the lots before they were redeveloped. In order to look at the land before any transactions or subdivisions toward redevelopment took place, the 2003 tax lots were chosen as the “pre-redevelopment” state of the land. For developments where the tax lots were not reconfigured during the redevelopment, it is fairly straightforward to directly join the old data to the new development. For developments where tax lots were assembled for the new development, it is also fairly straightforward to add up the values of the underlying land, however some developments had multiple uses prior to redevelopment. However, for the case where large lots were subdivided into multiple uses during redevelopment, it is harder to quantify the attributes of the land that was redeveloped and what portion should be assigned to any individual development on the property.

So instead of looking backward from the perspective of the new developments, tax lots that redeveloped from the 2003 data were selected and joined with forward-looking data from the new developments. The only information that could be consistently used from the new development data was the year of redevelopment and whether it was redevelopment or infill. The primary economic filter for inclusion in the redevelopment supply is total assessed value per square foot of land. Other attributes of interest may include lot size, previous land use, year built and building value. The following

statistics are based on the 2003 tax lots that were converted to multifamily residential use through infill and redevelopment over the period 2007 to 2012. Values in 2003\$ were converted to 2013\$ using the CPI factor 1.266, so 2013\$ = 1.266 * 2003\$.

The following histogram displays the distribution of the redeveloped (and infilled) lots by the total assessed value per square foot of land. It is important to note that more expensive lots are typically developed at much higher densities and therefore produce more than their share of residential units compared to the number of lots that are redeveloped. The table of strike prices used for the redevelopment supply in the BLI is included following the histogram.

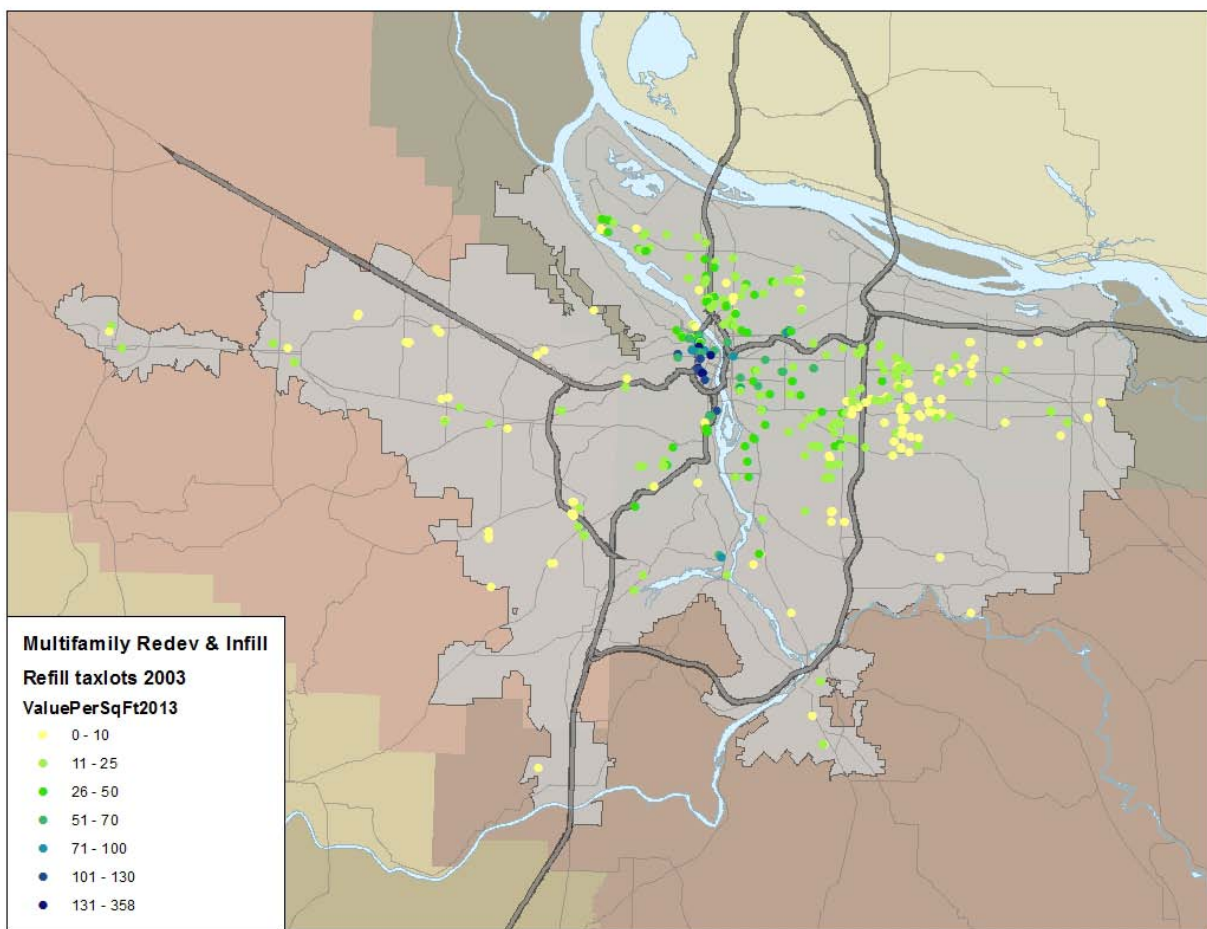
<i>Bin</i>	<i>Frequency</i>	<i>Cumulative %</i>
10	161	32.99%
25	198	73.57%
50	77	89.34%
70	22	93.85%
100	14	96.72%
130	9	98.57%
More	7	100.00%



Redevelopment strike price per square foot (land and

Market Subarea ²⁵	improvements)	
	Multi-family zoning	Mixed-use residential zoning
Central City	\$130	\$130
N/NE Portland central corridors	\$70	\$80
Eastside urban	\$70	\$80
Suburban	\$10	\$12

The spatial distribution of the lot values is as expected, with the highest values in downtown Portland, intermediate values in inner Portland and Lake Oswego, and lower values in outer Portland and the suburbs. The City of Portland also experienced the greatest overall level of multifamily redevelopment.



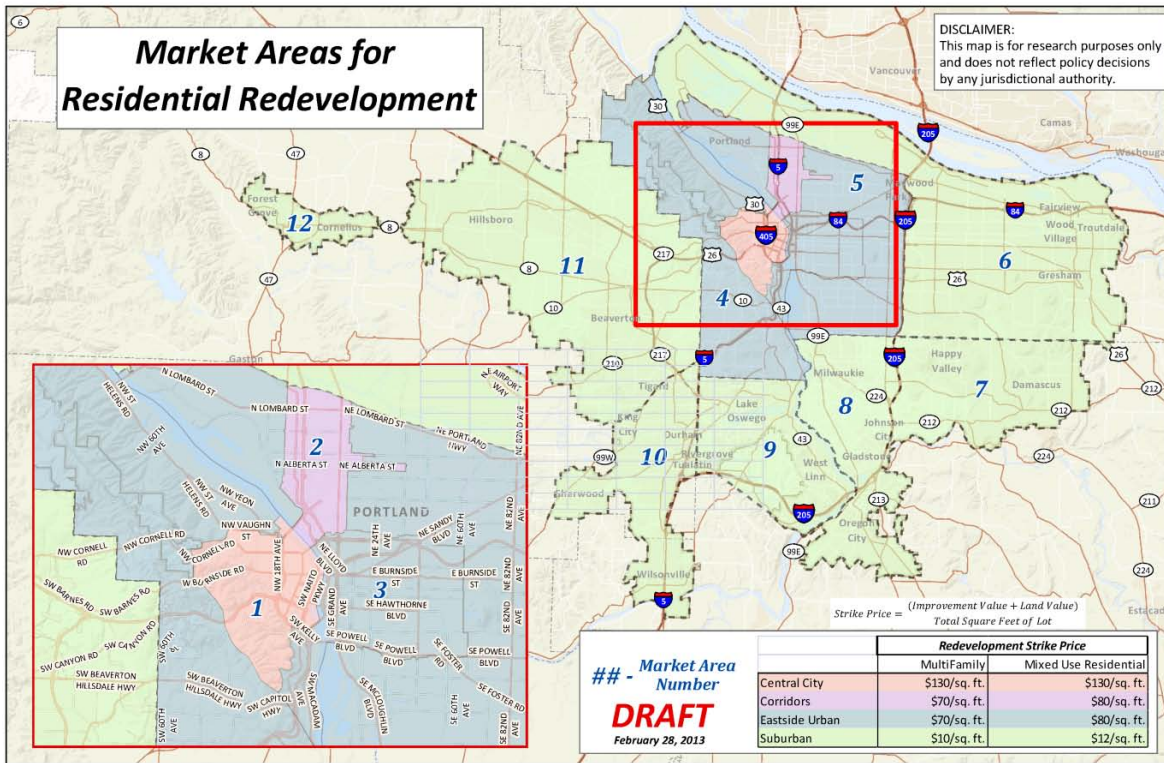
²⁵ During Local Review, the City of Portland identified the Gateway district as an area that did not fit these general rules for redevelopment. Therefore, a strike price of \$24/sq. ft. was applied in Gateway based on several real-world redevelopments that have recently occurred in Gateway.

The following tables show the number of redeveloped tax lots and the average value per square foot by the jurisdiction and the year of redevelopment.

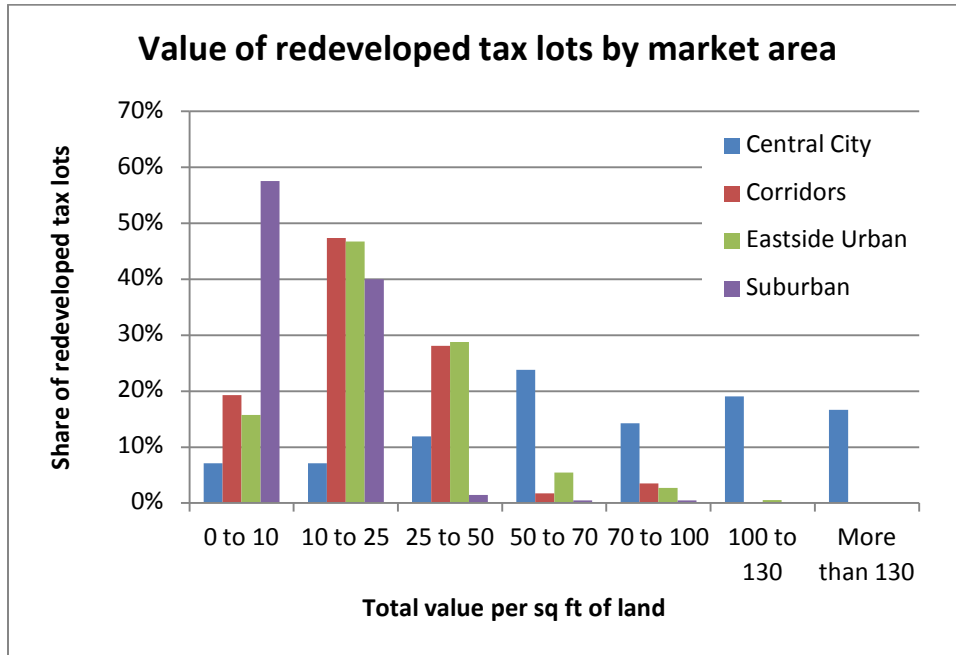
Jurisdiction	Number of lots			Average value per sq ft of land		
	Infill	Redev	Total	Infill	Redev	Total
CLACKAMAS	2		2	3.43		3.43
FAIRVIEW	1	1	2	7.14	9.81	8.48
GRESHAM	4	11	15	9.36	9.44	9.42
LAKE OSWEGO	2	4	6	13.67	45.55	34.92
MILWAUKIE	2	9	11	10.07	9.76	9.81
OREGON CITY	3	1	4	9.90	20.63	12.59
PORTLAND	70	328	398	19.95	29.59	27.89
Unincorp Washington County	8	41	49	12.33	8.55	9.16
WILSONVILLE		1	1		0.02	0.02
Total	92	396	488	17.65	26.42	24.76

Year built	Number of lots			Average value per sq ft of land		
	Infill	Redev	Total	Infill	Redev	Total
2007	20	101	121	18.83	21.59	21.13
2008	30	119	149	14.18	21.16	19.75
2009	11	75	86	13.17	43.05	39.23
2010	9	25	34	14.85	16.16	15.81
2011	7	39	46	19.64	21.48	21.20
2012	15	37	52	27.03	34.92	32.65
Total	92	396	488	17.65	26.42	24.76

The market subareas for the redevelopment thresholds are defined in the following map. These geographies were joined to the redeveloped tax lots to generate a histogram of values for each market area. The table shows the total number of redeveloped tax lots in each value bin, while the chart shows the percentage distribution among value bins.



Bin	Eastside			
	Central City	Corridors	Urban	Suburban
0 to 10	3	11	29	118
10 to 25	3	27	86	82
25 to 50	5	16	53	3
50 to 70	10	1	10	1
70 to 100	6	2	5	1
100 to 130	8	0	1	0
More than 130	7	0	0	0
Total	42	57	184	205



Urban renewal and other development incentives also contribute to redevelopment through direct subsidies, tax abatement, neighborhood improvements that increase achievable rents, and other mechanisms. The following table shows the distribution of multifamily redevelopment in urban renewal areas using three different measures. 28.5% of the 2003 tax lots that redeveloped over the period 2007-2012, and 27.3% of the new multifamily developments, fell within urban renewal areas. These developments are typically higher density than multifamily units elsewhere in the region, so they accounted for 47.1% of the multifamily units that were added over the study period.

Share in urban renewal areas	
2003 taxlots redeveloped	28.5%
MF developments	27.3%
MF units added	47.1%

