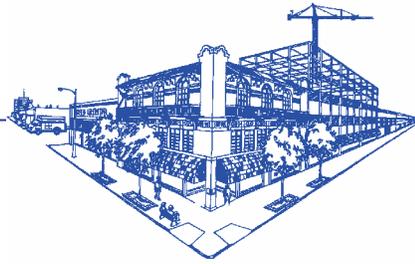


E. D. Hovee & Company, LLC

Economic and Development Services



MEMORANDUM

To: David Unsworth, Jillian Detweiler – TriMet
From: Tess Jordan, Eric Hovee
Subject: Portland Light Rail Transit Land Development Experience & Application
Date: July 28, 2008

Having opened its first light rail line in 1986, the Portland region now has a significant track record from which to draw observations concerning light rail's economic development impacts. Tracking of development by TriMet indicates that a cumulative total of more than \$6 billion of development has occurred in light rail station areas along MAX corridors.

While there have been numerous studies in Portland and nationally investigating the linkage between light rail investment and land development, much of this has been focused on documenting increases in property value. Less empirical research to date has addressed how light rail impacts the character of development.

The analysis presented in this memorandum represents an initial effort to provide quantitative documentation of this phenomenon. This report first considers how development patterns changed after light rail was introduced on the *Blue Line* running from Gresham west to downtown Portland and then continuing to Hillsboro.

For this analysis, comparisons are made between development within a one-quarter mile radius circling each light rail transit (LRT) station and development occurring within a broader corridor extending one mile on either side of the LRT alignment. Results of the MAX Blue Line experience are then applied to development characteristics observed to station areas within the proposed Portland- Milwaukie light rail extension to illustrate development that may be realized within planned station areas for this planned new alignment.

This memorandum report is organized to cover the following topics:

Summary of Findings
Research Purpose & Approach
Blue Line Analysis
Milwaukie Line Implications
Detailed Research Methodology

SUMMARY OF RESEARCH FINDINGS

The primary findings of this preliminary assessment of LRT development experience and application are summarized as follows:

1. For MAX Blue Line light rail transit station areas, development that occurred after light rail investment indicates an average development density or Floor Area Ratio (FAR) of 0.65 *more than* the average FAR experienced for development outside of station areas. *Note:* This means that for every 1,000 square feet of land area, station area taxlots that developed realized an additional 650 square feet of building area beyond the square footage realized in taxlots that developed outside of station areas.
2. The station area capture rate of corridor-wide condominium development increased from 14% to 56% after light rail investment was realized.
3. The rate of development within Blue Line station areas was 69% higher than elsewhere within a one-mile corridor extending along the LRT alignment. Rate of development was calculated as average annual square feet developed after light rail investment divided by existing building stock (in square feet) prior to light rail investment.
4. Vacant land availability does not appear to significantly affect the differences in development noted within and outside of station areas: as of 2007, significant vacant land remained in all geographies (29% of land area within station areas and 21% outside of station areas).
5. Low and moderate value lots within Blue Line station areas redeveloped at twice the redevelopment rate reported for low value lots outside of station areas.

When these results are used to illustrate potential development trends within station areas for the planned Milwaukie alignment, the result is an estimated 18.7 million square feet of projected development. Close to 5 million square feet of this development (or 27%) can be associated with the influence of light rail investment.

Other factors that influence land development within station areas and elsewhere along LRT alignments are described in the body of this memorandum.

RESEARCH PURPOSE & APPROACH

This preliminary research memorandum documents the development realized within two comparison geographies, before and after Portland's light rail transit (LRT) Blue Line was introduced. The geographies are 1) station areas, defined as taxlots within a ¼ mile radius of a light rail station, and 2) non station areas, or all taxlots within a two mile corridor encompassing the Blue Line (excluding station area taxlots). Within these two geographies, the following five variables were quantified:

1. Development density;
2. Percent of condominiums built within station areas (as a percent of total condominiums built within the wider comparison LRT corridor study area geographies);

3. Rate of development as a percentage of existing pre-LRT development (or building stock);
4. Vacant land (as a percentage of total land area) pre and post light rail development; and
5. Rate of land development as a percentage of initial low value land acreage.

This experience is then applied to planned Milwaukie light rail extension station areas. This is an *illustrative exercise* that estimates the development that may be realized within planned station areas within 20 years of light rail implementation – assuming market and other factors similar to those experienced along the existing Blue Line.

This documentation of development realized within Blue Line station areas does not assert causality. Three primary variables affecting development are the focus of this assessment: light rail implementation, proximity to a light rail station and land value.

Land development can also be expected to respond to other variables. These may include factors such as location, access, land configuration, economic cycles, and public sector involvement or incentives. However, in the absence of a more extensive hedonic or regression analysis (which aims to determine the statistical significance of influence of multiple influences), the approach taken with this report is intended to contribute to a better initial understanding of the realized interaction between light rail implementation and urban land development.

Portland's Blue Line is roughly 33 miles long, connecting to Gresham and Hillsboro as the respective eastern and western communities of the metro region. In total, this LRT line extends across 56 stations in suburban, central city and town center environments. The Portland to Gresham portion of the line was completed first (in 1986), followed by the Portland to Hillsboro extension (in 1998).

Taken together, the Blue Line LRT station areas (totaling roughly 3,000 acres) and their comparison 1-mile corridor geographies (roughly 26,800 acres) provide a high degree of variation in terms of the factors that influence real estate development. This post-development analysis is further enhanced by the length of the combined alignment and the 9-21 years since light rail's introduction.

The analysis methodology corresponds with similar research of the transit-development nexus conducted first conducted in 2005 for Portland Streetcar but limited to the Central City portion of the metro area.

BLUE LINE RESEARCH ANALYSIS

For purposes of this research project, the MAX Blue Line extending from Gresham (on the east) to Hillsboro (west of Portland) was divided into three segments for analysis:

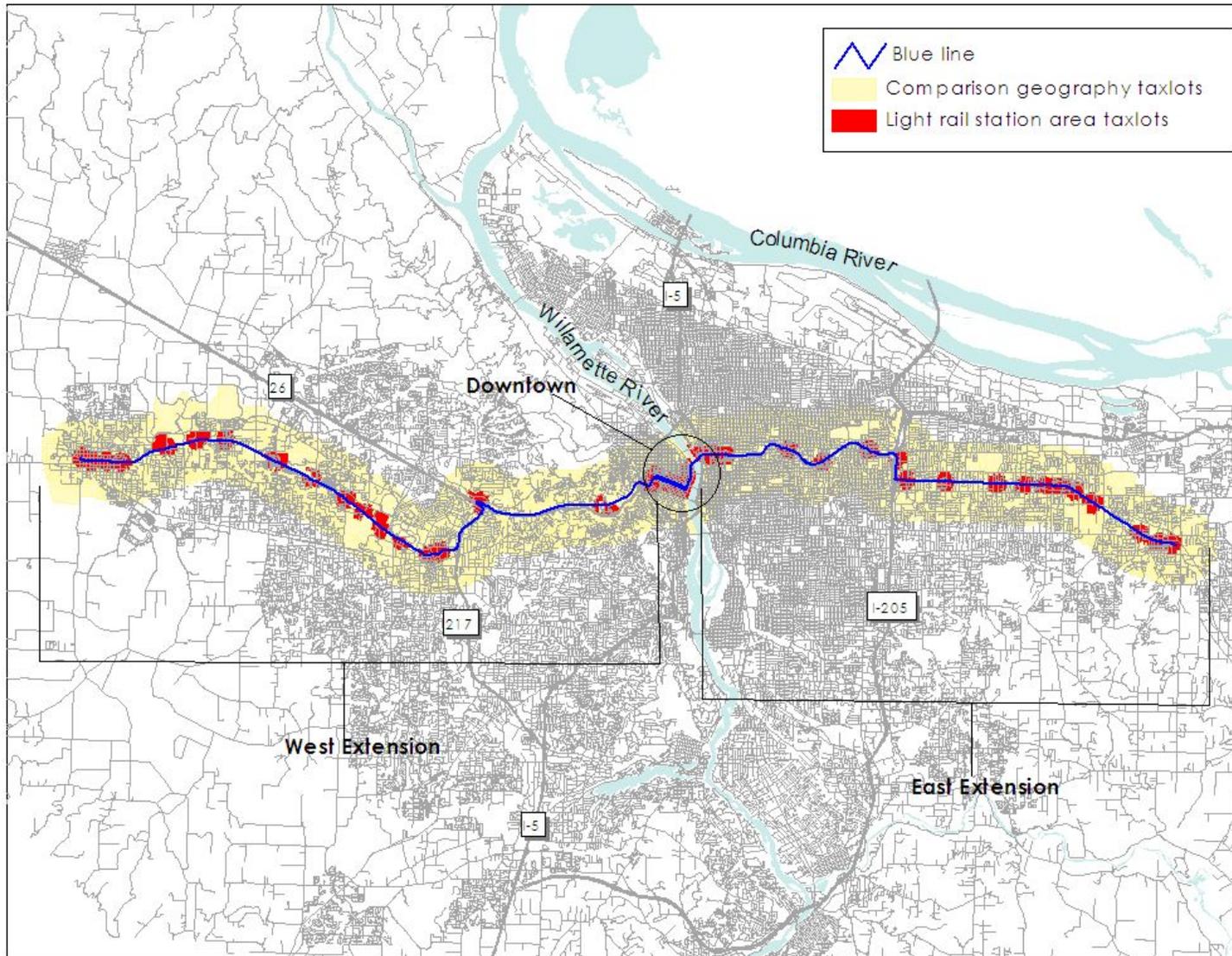
- The *east extension* was completed in 1986 and extends from Gresham west to Portland's Central Eastside, a subdistrict within its Central City. Taxlots within the east extension geography total approximately 13,500 acres (within one mile on each side of the alignment).
- The *downtown geography* encompasses Portland's Central Business District, defined by the Willamette River (to the east) and I-405 (to the west). This is the highest density geography under consideration. The Blue Line extended to the western boundary of this geography in its first phase completed in 1986.

This is the most complex geography, particularly as the only area that is also affected by other fixed rail transit (streetcar was first introduced in 1999 and runs north-south through the Central Business District and beyond). At around 500 acres for the study area considered, downtown is also significantly smaller than the suburban geographies.

- The *west extension* was completed in 1998, and connects downtown Portland with the Westside cities of Beaverton and Hillsboro. Like the east extension, this segment of the Blue Line runs through more suburban environments as well as non-CBD town centers. Taxlots within the west extension geography total approximately 15,600 acres.

Due to the distinctive character exhibited by each of these three geographies, research results are reported for each separately as well as for the Blue Line alignment in total. Results are reported in terms of *density of development* and also *rate of development*.

Figure 1. Blue Line MAX Corridor Overview



Source: RLIS, E.D. Hovee & Company, LLC.

1. Density of Development

The first variable considered addresses the character of development in proximity to LRT. With this research project development density has been calculated in term of Floor Area Ratio (FAR), the ratio of building square feet to land area. To illustrate this concept, FAR of 1.0 equates to a single story building that covers a lot in its entirety, or a two story building that covers 50% of the lot.

LRT and Increased Development Density. Light rail introduction was found to correlate with increased development density within station areas. In total, the average FAR of development within station areas after the introduction of light rail was 1.18, more than double the FAR of non station areas lots developed within the same time period (0.54).

Table 1. MAX Blue Line Development Densities (Pre- and Post-Light Rail)

	Average Realized FAR	Station Area Premium	Condo Units	Station Area Condo Capture
Total Alignment				
Post Light Rail				
Station Area	1.18	0.65	2,594	56%
Non Station Area	0.54		4,603	
Pre Light Rail				
Station Area	0.64	0.38	1,052	14%
Non Station Area	0.26		7,541	
East				
Post Light Rail	0.74	0.30	515	48%
Station Area	0.43		547	
Non Station Area				
Pre Light Rail	0.36	0.09	140	6%
Station Area	0.27		2,398	
Non Station Area				
Downtown				
Post Light Rail				
Station Area	11.06	7.20	346	13%
Non Station Area	3.86		2,735	
Pre Light Rail				
Station Area	4.18	2.02	153	8%
Non Station Area	2.16		1,853	
West				
Post Light Rail				
Station Area	0.88	0.47	1,733	57%
Non Station Area	0.41		1,321	
Pre Light Rail				
Station Area	0.43	0.24	759	19%
Non Station Area	0.20		3,290	

Source: RLIS, E.D. Hovee & Company, LLC.

The FAR variable describes taxlots that developed within the time period in question only, rather than for the landscape as a whole. The FAR variable is therefore independent of the vacant land variable: a geography can have significant vacant land and still report a high post light rail FAR average, for example, if all development that occurred after light rail was introduced was high density development.

Pre- and Post-LRT Density of Development. Prior to light rail's introduction, density of development within station areas was already greater than that of non station areas (with an average FAR of 0.64 versus 0.26). This indicates that light rail and at least some station areas were located in areas to which high density development has historically been directed. Examples include town centers (Cities of Hillsboro, Beaverton and Gresham) and the densest retail/office core portion of Portland's Central Business District.

However, the 'FAR premium' associated with light rail station areas also increased after light rail was introduced. This premium is defined as the difference between FAR within a station area versus FAR for the wider corridor. For the Blue Line alignment as a whole, the station area FAR *premium* increased from 0.38 to 0.65. (This means that after the implementation of light rail, the average FAR of station area development was 0.65 above that experienced for non station area development.)

A review of corridor segments indicates that FARs vary significantly along the alignment. Not surprisingly, the highest FARs are indicated for downtown Portland – both within and outside of station areas. For development that occurred after light rail was introduced, the station area FAR premium was a significant 7.2 above non station area development. This compares with a 2.02 FAR premium before light rail was introduced.

More moderate results are shown for the less urban station areas along the east and west Blue Line extensions. Within station areas, average FARs fall within a fairly narrow band: averaging 0.74 for the east extension and 0.88 for the west extension. The FAR premium realized for station area versus non station area development was 0.30 for the eastside and 0.47 for the west.

The downtown Portland experience differs from that of the suburban LRT segments, especially for residential development. This is likely due to factors beyond light rail that increased the attractiveness of residential development in other parts of downtown Portland located away from LRT. Based on other research conducted in Portland's Central City, these factors appear to include streetcar investment coupled with the significant former industrial acreage (at the northern and southern ends of downtown) made available for redevelopment.

In effect, Portland's Central City provides a more complex story due in part to the interaction of multiple transit modes and corridors. The downtown area is also a much denser environment to begin with. Consequently, the FAR premium associated with light rail stations should be considered a measure relative to each station area's existing environment and development character rather than as an absolute measure that can be precisely replicated in stations areas of less similar development character and market opportunity.

In summary, this analysis indicates that the introduction of light rail correlates with density increases within station areas well above what is reported for non station area development.

2. Condo Development

Table 1 also provides information on condominium development, primarily residential condominiums. Condo development is reflected within the FAR calculations, but also reported separately to illustrate the increased capture rate that station areas of what are typically higher-density residential units achieved after the introduction of light rail.

In total, LRT station areas increased their capture of condominiums from 14% of all units developed (within the two comparison study area geographies) before light rail was introduced to 56% after light rail's introduction. This remarkable shift in where condo development occurs becomes even more significant given the increase in average number of condominium units developed annually in the post light rail period – during what has proved to be a very active period of urban residential development.

The east and west suburban extensions report very high station area condominium capture rates (48% and 57% respectively) after light rail is introduced. Downtown station areas also report increased capture, increasing from about 8% to a still relatively modest 13% after light rail was introduced. Again, this lesser rate of growth in downtown market capture can be attributed to the presence of major redevelopment sites at the periphery of downtown which have oriented to introduction of Portland Streetcar service.

3. Rate of Development

The third variable considers the total volume of development and the rate at which new development is realized (relative to the in-place, pre-LRT building stock). This measure is determined by calculating the average annual square feet developed after light rail's introduction as a percentage of the total square feet developed prior to light rail's introduction. In effect, this approach measures average net additions to the total building inventory on the ground.

Table 2 (on the following page) also reports the prevalence of vacant land within and outside of station areas, as availability of vacant land can be a factor in affecting the location of new development.

Annual Rate of Development. Across the full length of the Blue Line alignment, research data indicates that the *average annual rate* of development within station areas was 2.7% of existing development, or about 1.1 million square feet per year. This rate is 69% greater than the rate of development in non station areas (of 1.6% per year).

Station areas captured 27% of all square footage constructed post light rail. By comparison, LRT station areas comprise only 10% of the corridor-wide study area's total acreage (and 14% of vacant acreage).

Table 2. MAX Blue Line Rates of Development (Pre- and Post-Light Rail)

	Land Acres			Building Square Feet				Station Area Rate Premium
	Total Land Area	Vacant prior to LRT	% Vacant prior to LRT	Developed Post LRT	Developed Pre LRT	Developed Per Year Post LRT	Annual Rate	
TOTAL ALIGNMENT								
Station Area	2,987	1,143	38%	19,673,000	42,187,000	1,143,000	2.7%	69%
Non Station Area	26,760	6,957	26%	46,037,000	195,268,000	3,124,000	1.6%	
Total	29,748	8,100	27%	65,710,000	237,455,000	4,267,000	1.8%	
EAST								
Station Area	1,484	557	38%	9,045,000	14,480,000	431,000	3.0%	238%
Non Station Area	12,000	2,656	22%	20,663,000	111,723,000	984,000	0.9%	
Total	13,483	3,214	24%	29,708,000	126,203,000	1,415,000	1.1%	
DOWNTOWN								
Station Area	152	50	33%	7,387,000	18,502,000	352,000	1.9%	-38%
Non Station Area	345	169	49%	10,699,000	16,632,000	509,000	3.1%	
Total	497	219	44%	18,086,000	35,134,000	861,000	2.5%	
WEST								
Station Area	1,352	535	40%	3,241,000	9,205,000	360,000	3.9%	61%
Non Station Area	14,415	4,132	29%	14,675,000	66,913,000	1,631,000	2.4%	
Total	15,767	4,667	30%	17,916,000	76,118,000	1,991,000	2.6%	

Source: RLIS, E.D. Hovee & Company, LLC.

Central City & Suburban Experience. Rates of development varied across the geographies considered in a similar fashion as development density. The two suburban geographies exhibit more similarities in response to the introduction of light rail than the downtown geography.

For the east and west extension station areas, the rate of development was 3.0% and 3.9% respectively post LRT. Along the east extension, the station area rate of development was significantly higher than in non station areas (238% higher). Along the west extension, the difference was less dramatic (station areas developed 61% more rapidly).

The greater *bump* (or increase) in westside development is likely related to the greater prevalence of greenfields newly available for development on the west side of the region. Greenfield sites offered greater opportunity for more significant increases in the rate of development (on a smaller existing building stock) outside of Westside station areas compared with development outside of eastside station areas (which had less vacant land pre LRT).

In the downtown geography, the rate of development within station areas experienced after LRT introduction was actually lower than in non station areas (1.9% versus 3.1% annually). Again, this is related to factors beyond light rail that increased the attractiveness of development in competing and previously underdeveloped portions of Portland’s Central City.

Of particular note are major master planned developments in association with the streetcar corridors in the Pearl District and, more recently, South Waterfront. By comparison, downtown

LRT was constructed through the heart of the already densely developed downtown retail and office core.

4. Vacant Land Availability

Table 2 also provides information on percentage of land vacant within each geography prior to light rail's introduction. Overall, with the exception of downtown, LRT station areas are estimated to have had a higher percentage of vacant land prior to light rail's introduction (38% within station areas, versus 26% outside of station areas). However, the 26% share of acreage in non station areas that was vacant prior to light rail's introduction is still a high enough percentage to have accommodated market-driven development activity.

One test of whether availability of vacant land inhibited development within the time period studied is whether vacant land remains in the comparison geographies or if it was fully absorbed. The proportion of station area land that is vacant is estimated to have declined from 38% pre LRT to 29% within station areas as of 2007, and from 26% of total corridor land area to 21% outside of station areas.

Vacant land has decreased over the time period studied, but significant vacant land remains for both the immediate station area and wider LRT corridor geographies. This suggests opportunities for continuing higher density development in proximity to light rail in the years ahead.

5. Rate of Development of Low Value Lots

As a final measure, the rate of development was also calculated as the percentage of low value lots that redeveloped. Two value categories for redevelopment sites were identified and utilized:

- The first category is termed 'low value', and corresponds to an improvement to land value ratio of less than 0.5 (meaning that any building on a property is worth no more than half of the underlying land value).
- The second is termed 'moderate value' and corresponds to an improvement to land value of 0.5-1.0 (meaning that any building on a property is worth over half the land value but no more than the property's value land).

Data for land and improvements valuation represents real market valuations as determined by respective County assessors. As illustrated by the following chart, the overwhelming majority of lots that have experienced redevelopment fall within these two categories, with about two thirds falling in the lowest value category (of less than 0.5 improvements to land valuation).

This variable is calculated as a basis for application to prospective future development along the Portland-Milwaukie alignment. By adjusting experience of the Blue Line to the varied existing built environments this proposed new light rail corridor, it is possible to better account for the distinctive characteristics of land supply surrounding each station for this new LRT corridor.

A limitation of this approach is that it is based upon a smaller subset of lots as historic value data was not available for all 114,000 taxlots within the MAX Blue Line data set. Lots without

historic data are likely newly created lots through land divisions, land aggregations, or condominium development.

This limitation proved more problematic in some geographies than others. Along the west extension after 1998, for instance, only 5% of station area development is associated with value data. Tax lot data for post light rail development within east extension station areas, in contrast, is 74% populated – making this more useful as a basis for projection of new LRT corridors.

Because the *east extension* (east of downtown) is best populated with value data, its rate of redevelopment for low value land is used as the basis for estimating the redevelopment rate for low value land surrounding the Milwaukie alignment.

Table 3. Eastside Blue Line Redevelopment of Low Value Lots

	Improvement : Land Value Ratio			Total	No Value Data
	Low Value: <0.5	Moderate Value: .5 - 1	High Value: 1+		
Station Area					
Total Acreage	299	122	927	1,348	90
Acres that redeveloped	37	7	11	54	22
Percent redeveloped	12%	6%	1%	4%	25%
Annualized	1.7%	0.8%	0.2%	0.6%	3.5%
Non Station Area					
Total Acreage	1,662	617	8,858	11,136	451
Acres that redeveloped	132	18	24	174	147
Percent redeveloped	8%	3%	0%	2%	33%
Annualized	1.1%	0.4%	0.0%	0.2%	4.7%

Note: The annualized rate divided the percent of acres redeveloped by the applicable number of post light rail years (for the east extension, this is 21).

Source: RLIS, Multnomah County Division of Assessment & Taxation, E.D. Hovee & Company, LLC.

Interaction of Station Proximity & Low Value Lots. In addition to low value lots serving as the source of the majority of development post LRT, not surprisingly these properties also experience the highest rates of redevelopment. Low value lots experience a redevelopment rate of 1.7% per year within station areas, while high value lots redevelop at a rate of only 0.2%.

However, this table also indicates that station area redevelopment cannot be solely explained by a greater prevalence of low and moderate value lots: 12% of low value acreage redeveloped within east extension Blue Line station areas compared with a lower 8% figure for low value non station area acreage. Similarly, 6% of moderate value acreage redeveloped within east extension Blue Line station areas compared with 3% of moderate value non station area acreage.

While there are differences in redevelopment rates due to existing value of improvements, proximity to the LRT station also clearly plays a role. It is the interaction of these two variables – station area proximity and improvement to land value ratios – that are applied to project development potentials for the proposed Portland-Milwaukie alignment. Implications of Table 3 are further discussed in the Portland-Milwaukie Line Implications section of this memo.

PORTLAND-MILWAUKIE LINE IMPLICATIONS

As proposed, the Milwaukie line will extend light rail transit from the southern end of the downtown transit mall (currently under construction), across the Willamette River on a new transit bridge, and south past the City of Milwaukie. The line will total approximately 7.5 miles.

Eleven stations are currently under planning consideration for this line – including eight east of the Willamette (eastside) and three within Portland’s Central City on the west side of the Willamette (Westside). The alignment is illustrated on the following page, along with the ¼ mile station area geography.

To illustrate how light rail transit investment may influence development trends, two elements of the Blue Line experience and analytic methodology have been applied to projections of potential development reasonable to expect with the proposed Portland-Milwaukie line:

1. Rate of redevelopment of low and moderate value taxlots within station areas, and
2. FAR premium associated with station area proximity.

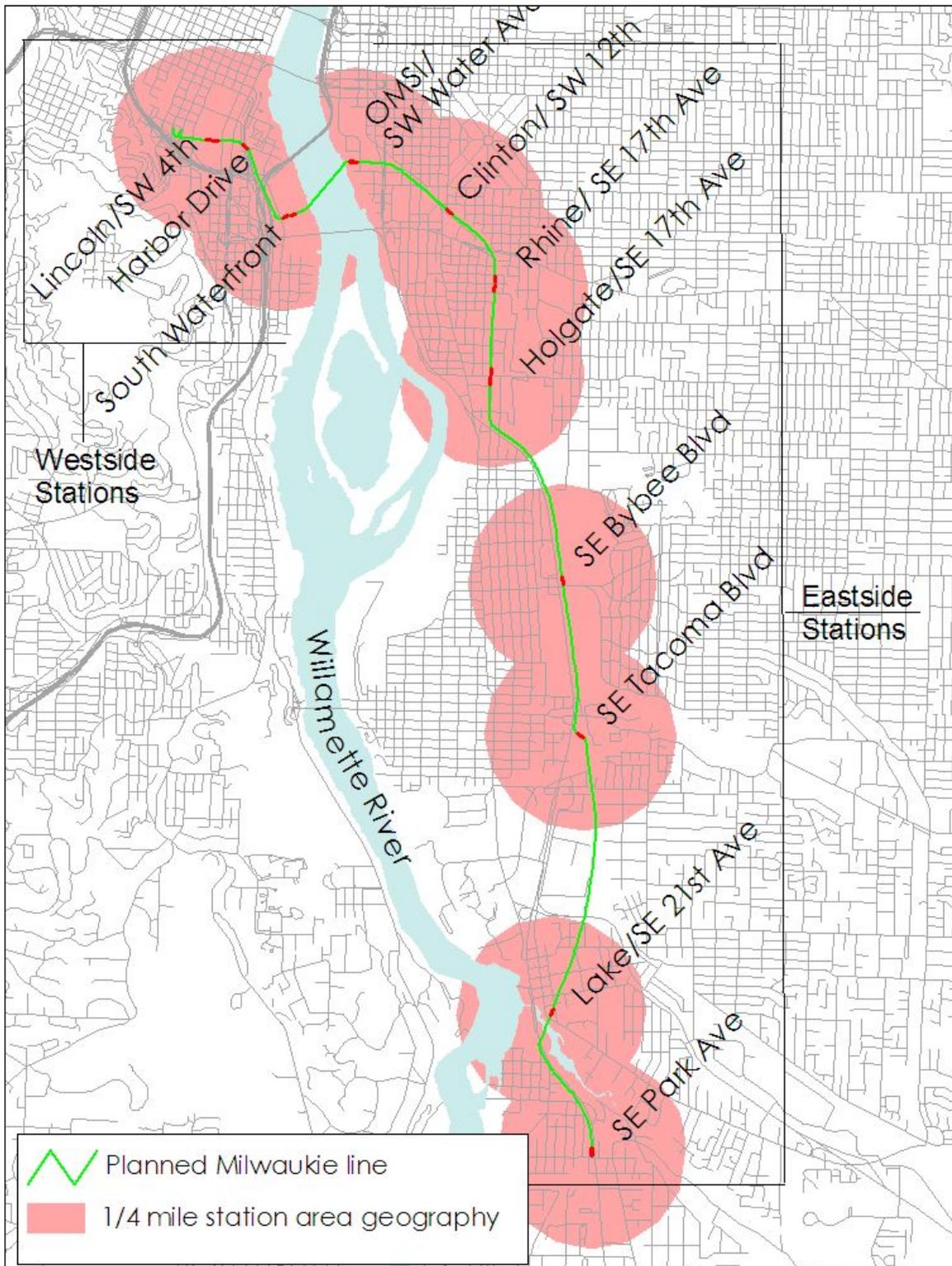
The first variable takes into account land availability within proposed station areas. Observed patterns of development indicate that the bulk of land that redevelops falls within certain low and moderate improvement to land value ratios. Future development within Milwaukie station areas will in part be driven by the availability of sites within these value ratios.

The second variable illustrates the likely character of development that may be anticipated within proposed station areas. This in turn influences the total square footage that may be realized on lots that redevelop.

Observed development in existing station areas also indicates that station areas have achieved higher densities than surrounding development. This premium has been *added to* the average FAR of development surrounding the Portland-Milwaukie line. The formula utilized is:

$$(\text{Land to Redevelop}) \times (\text{Projected FAR}) = (\text{Square Footage of Added Development})$$

Figure 2. Portland-Milwaukie Line Station Areas



Source: RLIS, Tri-Met, E.D. Hovee & Company, LLC.

Land Availability

Within a one-quarter mile radius of the Portland-Milwaukie line’s eight eastside station areas there are a total of 210 acres identified as being of low and moderate value (in terms of improvement to land value ratios). In its three Westside station areas there are 93 acres, for a total of 303 acres within all station areas.

Table 4. Low Value Lots within Portland-Milwaukie Station Areas

Acres per Station Area: Eastside Station Areas									
Improvement: Land Value	Park	Lake	Tacoma	Bybee	Holgate	Rhine	Clinton	OMSI*	Subtotal
Low Value: <0.5	15.4	30.7	28.7	1.0	12	12.0	11.5	14.5	126.1
Moderate Value: 0.5 - 1.0	28.9	3.3	18.2	1.3	10	10.2	8.5	3.8	83.8
Total	44.3	34.0	46.9	2.3	22.0	22.2	19.9	18.3	210.0

*Note: Low value land owned by OMSI has been removed from this area, as institutional development has been projected through a separate methodology described below.

Source: RLIS, Tri-Met, E.D. Hovee & Company, LLC.

Land Exclusions. Land owned by two institutions – Oregon Museum of Science and Industry (OMSI) and Oregon Health & Science University (OHSU) – has been removed from this tally, as institutional development is expected to reflect institutional planning and funding availability rather than more typical market-driven and generalized economic/development trends. Development potential for the OMSI/OHSU sites is estimated separately.

Redevelopment Potential. The redevelopment rate for low and moderate value land observed within Blue Line east extension station areas has been applied to Portland-Milwaukie station areas. The result illustrates the total acreage that could reasonably be expected to redevelop within Portland-Milwaukie station areas over an approximate 20 year time period.

The annual rate of redevelopment observed for the east Blue Line extension as applied to the Portland-Milwaukie line for low value acreage is 1.7%, twice the redevelopment rate for moderate value acreage (0.8%). Application of these observed eastside rates results in close to 100 acres of Portland-Milwaukie station area development over 20 years, at which point about 200 acres of low and moderate valued land would remain undeveloped (or not redeveloped).

Table 5. Potential Redevelopment within Portland-Milwaukie Station Areas

Improvement : Land Value	Acres per Station Area: Westside Station Areas				Total Low Value Acres	Total Alignment		Remaining Low Value Acres
	South Waterfront*	Harbor Drive	Lincoln	Subtotal		Development Rate	Total Acres Developed	
Low Value: <0.5	34.0	14.7	18.2	67.0	193.1	1.7%	79.9	113.3
Moderate Value: 0.5 - 1.0	3.0	9.1	14.0	26.2	110.0	0.8%	18.6	91.3
Total	37.0	23.9	32.3	93.1	303.1	1.4%	98.5	204.6

*Note: Low value land owned by OHSU has been removed from this area, as institutional development has been projected through a separate methodology described below.

Source: RLIS, Tri-Met, E.D. Hovee & Company, LLC.

Resulting Station Area Development

The density of development that 100 acres of land may produce is illustrated through both observed FARs and the FAR premium realized within Blue Line station areas. The current FAR of station areas varies significantly between eastside and downtown stations. Lots developed within eastside Blue Line stations indicate low, suburban densities of 0.24 whereas downtown lots report densities nine times as high (2.21).

An FAR *premium* of 0.35 – the average of the east and west Blue Line extensions – was applied to both geographies of the proposed Portland-Milwaukie alignment. While Blue Line downtown stations reported an FAR premium of 7.2, the more conservative suburban average was utilized instead given the complexities of development impacts and varying FAR limits within the downtown geography (as previously described).

Table 6. Illustrative Development for Portland-Milwaukie Station Areas

Geography	Current FAR	LRT Premium	Post LRT FAR	Acres to Redevelop	Post LRT Building SF	Building SF Without LRT	Building SF Premium
Eastside Station Areas	0.24	0.35	0.58	210.0	5,330,000	2,171,000	3,159,000
Westside Station Areas	2.21	0.35	2.55	98.5	10,958,000	9,476,000	1,482,000
Institutions							
OMSI (Eastside)				25.5	450,000	200,000	250,000
OHSU (Westside)				7.7	2,000,000	1,898,000	89,000
Total	2.45	0.69	3.14	341.7	18,726,000	13,745,000	4,980,000
<i>Light Rail Premium (added to SF w/o LRT)</i>							+ 36%

Source: RLIS, Tri-Met, OMSI, OHSU, E.D. Hovee & Company, LLC.

The resulting illustrative FAR of future Portland-Milwaukie station area development is 0.58 for eastside station areas and 2.55 for downtown station areas. Application of these FARs results in a combined estimate of 18.7 million square feet of new development within Portland-Milwaukie LRT corridor station areas.

A portion of this potential development square footage is associated with a light rail transit premium corresponding to the light rail FAR bonus. The building square footage that may be realized *without* light rail investment has been calculated as [Acres to Redevelop x Current FAR].

The difference between this number and the Post Light Rail Transit building SF [Acres to Redevelop x Post LRT FAR] is dubbed the *light rail premium*. In total, this premium accounts for 27% of post light rail development, or *an added 36%* of development above what could be expected to occur in the absence of LRT development.

The estimated LRT premium is considerably higher for Milwaukie-Portland line eastside station areas (estimated at an added 146%). By comparison, the Milwaukie-Portland line westside station area premium is considerably lower (estimated at an added 16%). This is in part due to a larger *institutional bump* associated with the OMSI master plan (eastside) than for OHSU (westside). Institutional development adjustments are further described further below.

This can be viewed as an inherently conservative approach, because it projects the results of past development trends forward into a new and increasingly urban era of development. For example, it can be expected that the development environment will be increasingly land-constrained, leading to densities of development above those projected based on historical experience to date.

Institutional Development. As noted, institutional development has been treated separately, due to the presence of the OMSI and OHSU institutions – each with significant vacant acreage in close proximity to two planned light rail stations:

- OMSI controls over 25 vacant acres within the OMSI station area. The institution’s plans call for two phases of future development. Phase I plans call for a 100,000 square foot museum expansion and a 100,000 square foot science academy to be run in partnership with Oregon Health & Science University and attract high school students from throughout the state.

Phase II plans expand the institution’s current initiatives into office development compatible with its science focus. Construction is currently planned for the 2013-2014 time period. Current zoning would enable the development of over one million square feet. To err on the conservative side, this analysis assumes that one-quarter as much square footage is actually developed over a 20-year period.

Of OMSI’s future planned development, the estimated 250,000 square feet associated with Phase II has been attributed to light rail development due to the pivotal role that light rail will play in connecting OMSI’s property directly with OHSU – across the Willamette River – and surrounding CBD office development. OMSI’s light rail premium is high due to the dramatic increase in connectivity that light rail investment will bring between Portland’s Central Business District and the OMSI campus. This LRT premium can be deemed as pivotal in OMSI’s plans to venture into a new development arena.

- OHSU controls close to eight vacant acres within the South Waterfront station area, an area with a high base FAR zoning limit of 6:1. A March 2008 draft program summary for

this acreage – known as the Schnitzer Campus – calls for almost 2 million square feet of development at full built out.

Of this development, 4.5% has been attributed to light rail based upon mode split projections obtainable at the time this memo was completed. DKS Engineering has estimated transit ridership in the northern section of the South Waterfront district at full build out (2030).

In 2030, nine percent of employees are projected to arrive at work via transit in this district with limited road access capacity. Planned transit includes buses, streetcar and light rail. Due to its greater ridership capacity, LRT service is assumed to accommodate about half of these commuters, or 4.5% of employees. As a percentage of building square feet, this equates to 89,000 square feet. The light rail premium estimated for OHSU based on this analysis is therefore significantly more conservative than that estimated for OMSI’s planned development.

Institutional land ownership has been projected separately for the Portland-Milwaukie station areas because development of this land can be expected to respond to institutional master planning and institutional funding availability more than general economic trends in job and housing growth. The two station areas that are dominated by institutional land ownership within the proposed Portland-Milwaukie alignment can be considered as unique to the MAX light rail system.

Similar patterns of extensive institutional land holdings in direct proximity have not yet occurred to the same degree along the east or west extensions of the Blue Line. There are examples of institutions near Blue Line stations, such as Providence and Adventist Hospitals or the Gresham and Hillsboro civic center complexes – but not in as direct proximity nor with the same degree of land available for added institutional expansion.

Valuation of Development

Cumulative market valuation associated with new development potentials identified over an approximate 20-year post-LRT time period is estimated at \$3.86 billion for Portland-Milwaukie station areas. Without light rail, the added property valuation anticipated estimated is \$930 million less at \$2.93 billion. Valuation estimates are expressed in terms of real market value (RMV) based on current construction and related development costs for similar project types and locations in the Portland metro area.

Table 7. Potential Valuation of New Development in Portland-Milwaukie LRT Station Areas

	Millions of 2008 \$
Total Potential w/LRT	\$3,860
Without LRT	\$2,930
LRT Premium	\$930
LRT Premium %	+32%

Source: E.D. Hovee & Company, LLC.

In effect, potential valuation increases by nearly one-third (32%) above what could be expected in the absence of the planned LRT investment. This 32% add-on represents the *LRT premium* for a more rapid rate and higher density of development that could reasonably be anticipated with Portland-Milwaukie LRT consistent with observed Blue Line development experience.

Portland-Milwaukie Line Implications Summary

In total, the 342 acres of low and moderate value land associated with Portland-Milwaukie line station areas as illustrated are projected to support an estimated approximately 18.7 million square feet of new residential and employment development within 20 years of light rail investment. In the absence of light rail investment, the new development estimate decreases to 12.5 million square feet.

The difference between these two estimates is close to 5 million square feet. This difference equates to a 36% increase above baseline projections without LRT. This can be considered as the *development premium* potentially associated with Milwaukie line transit oriented investment.

Additional Development Influences

As stated in the introduction to this MAX light rail and development analysis, land development typically responds to a wide range of influences. This analysis has focused on three of importance for the LRT system: light rail investment, proximity to light rail stations and land value.

Several additional influences are discussed below to provide a brief overview of how these factors may also affect future development that may accompany Portland-Milwaukie line transit investment in ways that vary with observed development surrounding Blue Line stations.

- **Economic cycles:** In general, both land development and real estate appreciation will respond positively to overall regional job growth. East extension development encompasses a time frame (1986-2007) that includes significant regional job growth during the mid and late 90s. Some of these growth years also correspond to the post light rail period for the Westside extension (1998-2007), especially for residential and associated mixed use. The Westside experience is moderated in part by regional job losses in 2002 and 2003.

Given the fairly long time frames utilized for this analysis – of 9-21 years that the west and east segments of the MAX Blue Line experience represent and the 20 year time horizon as applied for projected Milwaukie line investment – economic cycles are not expected to significantly distinguish observed development trends from future development trends over this longer term (two decade) planning horizon.

- **Housing boom:** The rapid rise in housing prices experienced through mid-2007 surpassed all housing booms on record (since roughly mid century). This generated high rates of housing development as investors sought new instruments for their money and took advantage of the buying power provided by historically low interest rates. While the pace of residential development experienced during the peak years of the recent housing

boom will not likely be replicated within the 20 years of Portland-Milwaukie line light rail investment, the fundamentals of continued residential demand appear to be in place once the housing market rebounds.

An aging population combined with continued in-migration means that housing needs will continue to change, albeit in ways that may be less predictable than in recent years. Consequently, this variable should be considered as a risk factor that may serve to depress the future pace of development below observed development trends.

- **Land configuration/lot size:** Land configuration influences development because larger, regularly shaped lots are generally easier to develop than smaller and/or irregularly shaped lots. This is not a factor that has been directly evaluated or documented as part of this analysis.

For Blue Line station areas that were constructed through greenfield areas (as with Orenco Station and Gresham Town Center), large site master planning helped to facilitate development that could best respond to light rail investment. However, while a handful of Blue Line station areas were largely undeveloped, the majority of stations were introduced into largely built environments (as in the downtowns of Beaverton and Hillsboro and the residential neighborhoods of east Portland and Gresham).

Most of the Portland-Milwaukie station areas can also be described as largely built out, but also representing a variety of land uses and with at least 30% of their combined acreage estimated to be vacant. Due to the variety represented with the existing 56 Blue Line stations and 11 prospective Portland-Milwaukie line stations, this variable is not considered a substantial risk factor that would cause future Milwaukie development to diverge substantially from observed Blue Line development.

- **Access and proximity to households, employment and retail amenities:** Development is more attractive – yielding higher returns to developers and investors – when locational amenities are high. Nearby retail represents an amenity increasingly sought by both housing (particularly non single family housing) and employment uses. Station area development can be expected when amenity-rich environments are provided.

Within Blue Line station areas, amenity levels varied widely. Blue Line stations include smaller, historic downtowns and shopping districts struggling to attract and retain tenants and as well as stations within downtown Portland, the region's largest office market and the primary source of the region's recent and dramatic investment in condominium development.

The proposed Portland- Milwaukie line station areas encompass a similar diversity of environments. These include the City of Milwaukie's historic downtown, newly available formerly industrial land in southeast Portland, the successful neighborhood shopping district of Bybee-Sellwood, and two stations currently dominated by vacant institutional land ownership. In effect, varying amenity levels are not considered a risk factor causing future development to diverge from observed development.

- **Public-private partnerships:** Public planning commitment and investment can propel development sooner and at greater densities than the market would otherwise deliver on its own. These partnerships have been important in the Central City, especially with major master planned developments as with Hoyt Street Yards in the Pearl District and the Central District in South Waterfront.

While comparably sized site developments have not been as widely experienced outside the Central City, other public-private partnerships scaled to the properties available, local government capacities and the market have played a role along the Blue Line. Examples range from Orenco Station in Hillsboro to Russellville in East Portland and the Civic Station in Gresham.

With this analysis, it is assumed that similar efforts may be made in Milwaukie station areas, especially within Urban Renewal Areas (which encompass the downtown Portland station areas and the OMSI station area). These efforts will be particularly important in the early years after light rail is introduced – for early phase catalyst projects.

- **Regulatory constraints:** Development throughout the metro area must respond to local jurisdiction comprehensive planning and zoning. This generally is not considered a limiting factor, as zoning along the Blue Line generally allowed for far greater development (higher FARs) than was actually realized. An exception is noted for station areas with high proportions of single family use for which land use designations remained largely unchanged.

A brief review of zoning within Milwaukie station areas indicates that zoning constraints along this planned alignment also generally should not limit planned development, at least as far as building size is concerned. Whether zones are otherwise conducive to development in terms of the uses allowed and site design requirements has not been directly evaluated as part of this overview research assignment.

Parking requirements have been eliminated for properties in Portland adjacent to light rail. Similarly, the City of Milwaukie has minimum and maximum parking requirements that give transit-oriented development more flexibility in providing parking, a factor that can otherwise be a potentially significant constraint for the development community in achieving higher transit-supportive densities.

DETAILED RESEARCH METHODOLOGY

The methodology for this analysis is separated into documentation of Blue Line development trends and the transference of these trends onto the Milwaukie station areas.

Observed Development Trends: Blue Line

Two study areas were employed:

1. Existing station areas, defined as taxlots with their center within one-quarter of a mile of an existing light rail station. Taxlots within station areas comprise 2,987 acres.
2. Non station areas, a comparison geography defined as a corridor extending one mile on either side of the Blue Line, excluding station areas. In total, taxlots within the non station area geography total 26,760 acres.

Together, the study areas total roughly 114,000 taxlots. The following attributes were determined for each taxlot:

1. Whether developed. A taxlot was classified as undeveloped if:
 - It had no associated year built or building square footage data, and
 - Building value was \$35,000 or less
 - Lots that could be identified as parks – through ownership or property class ID – were removed from the tally of vacant or undeveloped land.
2. If developed, in what year (to determine if developed pre or post light rail.)
3. If developed, total square footage
4. Estimated market value of taxlots, 1999 and 2007

Taxlots were divided into three databases that correspond both to different light rail opening years and development contexts. These databases are:

1. East of the Willamette (Gresham to Portland's Central Eastside, light rail opened in 1986);
2. Downtown (the Central Business District, light rail opened in 1986); and
3. West of I-405 (from the CBD to the City of Hillsboro; light rail opened in 1998).

The break off for 'pre' or 'post' light rail development thus differs along the alignment.

Table 8. Blue Line Study Areas Taxlot Summary

	East of the Willamette	Downtown	West of I- 405	Total
Excludes condos				
Post Light Rail				
Station Area	790	43	866	1,699
Non Station Area	4,246	106	6,859	11,211
Pre Light Rail				
Station Area	3,042	425	1,566	5,033
Non Station Area	42,512	419	24,972	67,903
Undeveloped Lots				
Station Area	737	158	440	1,335
Non Station Area	3,685	219	4,074	7,978
Lots with Insufficient Data				
Station Area	52	25	393	470
Non Station Area	168	47	1,153	1,368
Public Use Lots (Washington County only)				
Station Area			179	179
Non Station Area			1,266	1,266
Total Lots	55,218	1,442	41,768	98,428
Condo units only				
Post Light Rail				
Station Area	515	346	1,733	2,594
Non Station Area	547	2,735	1,321	4,603
Pre Light Rail				
Station Area	140	153	759	1,052
Non Station Area	2,398	1,853	3,290	7,541
Total condos	3,600	5,087	7,103	15,790

Source: RLIS, E.D. Hovee & Company, LLC.

Taxlots attributed were determined via RLIS data (Regional Land Information System), May 2008 update, packaged by Metro Regional Government. Less than 2% of taxlots – excluding condos – had insufficient data to determine the year in which the lots was developed and its total built square footage. These lots were removed from the tally of developed lots, from which the rate and density of post and pre light rail development was calculated.

Condominiums: Condominiums were identified via tax assessor property class (several property classes describe different types of condominiums). Condominium taxlots were then identified as land or building via Geographic Information Systems (GIS) software, so that this property type could be used in Floor Area Ratio calculations.

Within the downtown geography – which has realized the greatest numbers of new condominiums in recent years – if some units within a building were missing year built or building square footage data, this was supplied. If no units had year built or building square footage information, the condo was excluded from the analysis. This was the case for approximately 65 downtown condominium units, likely very recently completed.

Converted space was not included in the condominium tally, only newly built square footage. This means that condominium projects that were formerly warehouses or apartments were not counted, as the focus of this analysis is change in the characteristics of net added development rather than use change.

Floor Area Ratio Calculations: Reported Floor Area Ratios are weighted for property/building size by summing up building square feet within a geography and timeframe (e.g. station areas pre light rail) and dividing by the sum of land area within the same geography.

Value Data: Value appreciation was calculated between 1999 and 2007 as 1999 was the earliest year for which historical assessment data was readily available. Historic data was provided by Multnomah County Division of Assessment and Taxation and by Washington County Department of Assessment and Taxation. Historic data could not be provided for lots created after 1999 (for instance, taxlots created through land divisions, or condominiums, which create a taxlot for each unit). Historic value data was provided for 75,601 taxlots out of 85,839 taxlots identified as developed (88%).

Rate of Low Value Lot Development: Historic value data was also used to determine the value of lots prior to their development. Lots that developed between 2000 and 2007 for which historic value data was available were classified into low and moderate value pre-development. These are defined through an improvement to land value ratio, the ratio of building value to the value of the land with which the building is associated.

The rate of low value lot development was based upon a smaller subset of taxlots, because historic value data was not available for a significant number of taxlots, particularly lots within Washington County (within the ‘westside’ database).

Beyond value data, lots were also removed that could readily be identified as parks as well as land owned by transportation organizations, railroads and utilities including Portland General Electric, as these ownerships correlate with a significantly reduced likelihood of land redevelopment.

Table 9. Developed Taxlots with Historic Value Data

Geography	Percent of Developed Taxlots with Value Data			
	East	Downtown	West	Total
Post Light Rail				
Station Area	74%	65%	5%	34%
Non Station Area	86%	69%	29%	45%
Pre Light Rail				
Station Area	98%	99%	87%	95%
Non Station Area	99%	99%	91%	96%

Source: RLIS, E.D. Hovee & Company, LLC.

The significantly lower percentage of Westside lots with associated historic value data could be due to a greater prevalence of lot divisions in that geography, particularly within station areas.

Projected Development Trends: Portland-Milwaukie Line

Only land within Portland-Milwaukie station areas (one quarter mile surrounding each station) was considered for this analysis. This equates to roughly 6,200 taxlots (including condominiums) comprising roughly 701 acres. The attributes assigned to these taxlots include:

1. Whether developed
2. If developed, total square footage
3. Whether a condominium
4. Improvement and land value 2007

The criteria for determining these attributes are as described for the Blue Line analysis.

A detailed break down of land availability within Milwaukie station areas is provided below by zone, although zone was not a variable utilized in this analysis. The table includes low value lots only (improvement to land value ratio of 0.5 or less).

Added valuation is projected based on current construction and related development (i.e. soft) associated with similar product types as of mid-2008. Square foot averages are applied to the development uses indicated as typical for eastside and westside residential and commercial uses plus institutional activities as represented by OMSI and OHSU. Construction cost data is from published estimates of the cost estimating firm Rider Levett Bucknall for the Portland metro area, as of the 2nd quarter of 2008.

Potential appreciation in land values that might occur with higher density development is not included with the estimates provided. From this perspective, the LRT development premiums calculated can be viewed as conservative estimates of the added valuation that might be realized.

Table 10 Portland-Milwaukie Station Area Low Value Lot Detail

Zone	Park Ave		Lake Rd		Tacoma		Bybee		Holgate		Rhine		Clinton		OMSI		South Waterfront		Harbor Drive		Lincoln		Total	
	Lots	Avg Size	Lots	Avg Size	Lots	Avg Size	Lots	Avg Size	Lots	Avg Size	Lots	Avg Size	Lots	Avg Size	Lots	Avg Size	Lots	Avg Size	Lots	Avg Size	Lots	Avg Size	Lots	Avg Size
R1B			3	0.1																			3	0.1
CL			1	0.2																			1	0.2
M					24	0.3																	24	0.3
DO			12	0.6																			12	0.6
DOS			17	0.8																			17	0.8
DR			3	0.4																			3	0.4
DS			5	0.2																			5	0.2
R2			6	1.2																			6	1.2
R5	5.0	0.3	3	0.1	10	0.4																	18	0.3
C3	14	0.7																					14	0.7
HDR	3	0.2																					3	0.2
MR1	2	0.2																					2	0.2
R10	10	0.2																					10	0.2
R7	10	0.2																					10	0.2
CG					13	0.3			10	0.6	18	0.1	10	0.1									51	0.2
CO2																	6	0.2	5	0.2			11	0.2
CS													2	0.1							9	0.1	11	0.1
CX																	9	2.1	24	0.6	1	0.0	34	1.0
EG1								4	0.1	11	0.1	3	0.2			2	0.1						20	0.1
EG2					4	2.1									1	1.2							5	2.0
EX													18	0.1	25	0.2							43	0.2
IG1								8	0.5	50	0.2	24	0.3										82	0.2
IG2					2	0.2									10	1							12	0.6
R1							1	0.1	14	0.1	1	0.9	2	0.0									18	0.2
R2					4	0.1							2	0.1			1	0.0					7	0.1
RH																	2	0.1					17	0.2
RX																					15	0.2	57	0.3
R2.5								1	0.1	1	0.1	4	0.1										6	0.1
R5							3	0.3	37	0.3	2	0.1	3	0.0									45	0.3
Total Lots/ Acreage Low Value % of Total Acreage	44	15.1	50	30.7	57	24.2	4	1.0	74	24.6	83	11.9	68	11.5	36	14.5	20	20.4	29	14.7	82	22.6	547	191.3
		20%		36%		42%		1%		7%		15%		15%		27%		32%		23%		41%		18%

Note: Grey shading indicates single family residential zones.
 Source: RLIS, E.D. Hovee & Company, LLC.