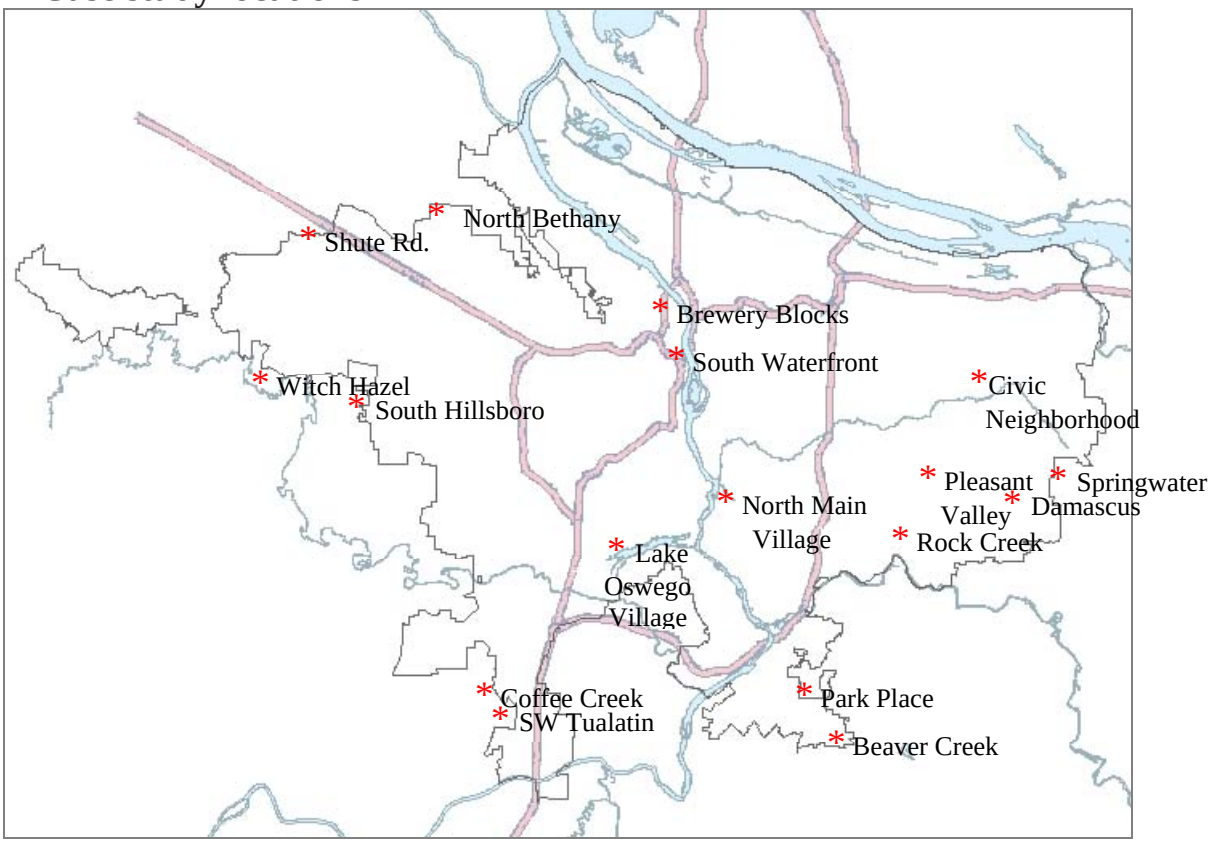
Comparative infrastructure costs: local case studies

Regional Infrastructure Analysis
Discussion draft

Purpose

In the coming years, the region will grapple with questions of where and how to grow. These decisions will have implications for the long-term costs, both environmental and financial, that will be borne by current and future residents. An understanding of the factors that contribute to variations in infrastructure costs will be essential in making these decisions. To assist in these decisions, this paper focuses on the financial costs associated with providing infrastructure. In particular, this paper places 17 local case study areas in the context of the national literature on the relationship between development patterns and infrastructure costs. These 17 case studies from throughout the Metro region include 12 areas that are newly urbanizing and 5 case studies that are in established urban areas.

Case study locations



Urbanizing areas

Recent urban growth boundary expansion areas (costs are preliminary and are taken from concept plans)

- Shute Road
- Rock Creek
- Witch Hazel
- Coffee Creek I
- South Hillsboro
- Beavercreek
- SW Tualatin
- Pleasant Valley
- North Bethany
- Springwater
- Damascus
- Park Place

Urban Areas:

Recent redevelopment projects in existing urban areas (projects are completed; costs are final)

- North Main Village
- Gresham Civic Neighborhood
- South Waterfront
- Brewery Blocks
- Lake Oswego Village Center

The focus of this work is on the following categories of infrastructure:

- Civic buildings, parking structures, public plazas
- Energy
- Parks
- Sanitary Sewers
- Schools
- Stormwater
- Transportation
- Water

Infrastructure facilities were also broken into two main categories:

- Local / community infrastructure – facilities that are most directly tied to a particular development (e.g. on-site sewer lines)

- Regional infrastructure – facilities that are cumulatively necessary for the region (e.g. highways or light rail)

Primary findings:

- The case studies summarized herein substantiate the body of national planning literature that posits that, on average, lower-density, single-family development patterns on the urban fringe are typically costlier to serve than are mixed use developments in central locations.

- On average, it is less expensive to provide services and facilities for new jobs and people in existing urban areas because such developments are, up to a point, able to utilize existing facilities.
    - The weighted average local/community infrastructure cost for the urban case studies is $51,000 per EDU, or $31,000 if the South Waterfront case study area is excluded.
    - The weighted average local/community infrastructure cost in newly urbanizing locations is $75,000 per EDU, or $72,000 if the S.W. Tualatin case study area is excluded.[1]
    - Residents of the urban case study areas are forecasted to have substantially shorter commutes than the residents of newly urbanizing case study areas (in the year 2035). Longer commute distances translate into higher regional infrastructure costs that will be shared by all.

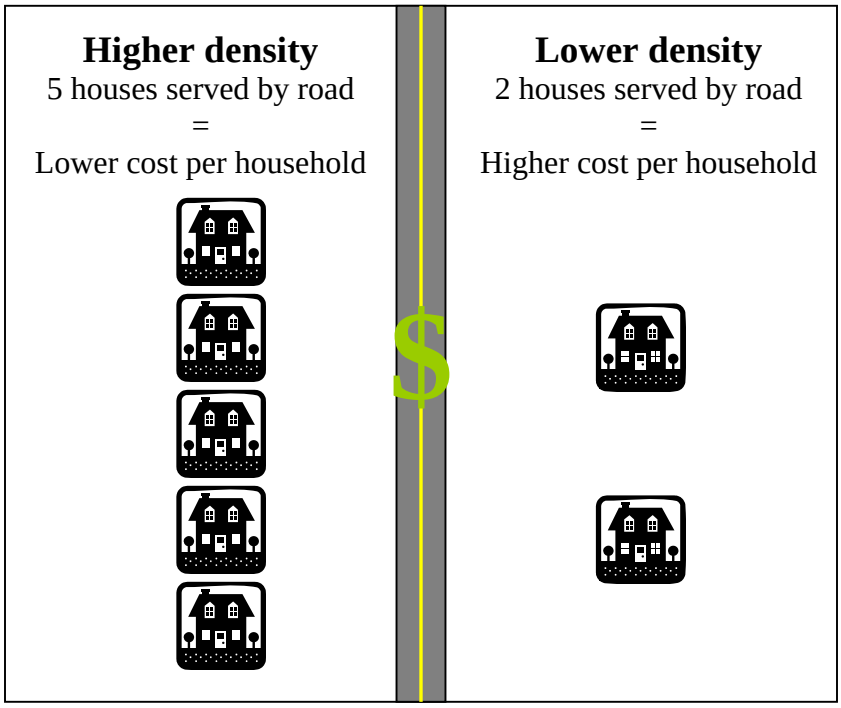
- There is a great deal of variation in local/community infrastructure costs. Factors such as amenity level, level of service, topography, and distance to existing facilities (e.g. existing sewer mains) may help explain the variation.

- Transportation infrastructure is the most substantial investment needed to accommodate growth in urbanizing areas. In urbanizing areas, developments on relatively flat land that are close to existing transportation facilities have the greatest return on investment.

[1] It should be noted that local/community infrastructure costs might approach zero for certain small-scale infill development projects that are located in areas that have available infrastructure capacity because of previous investments.

The literature on comparative infrastructure costs

A number of past studies have described the relationship between development patterns and infrastructure costs. Generally, these studies assert that the primary urban form characteristics that contribute to cost differences are density and distance from existing urban areas.



The influence of development density on infrastructure costs is fairly intuitive – larger lots require more lineal feet of pipes and pavement per household. These increased lengths translate into higher costs.

Even those costs that are initially born by the developer are eventually passed on to the general public. Upon completion, these facilities are dedicated to the public. Subsequent maintenance and replacement will typically be paid for by all tax and utility rate payers (at the higher cost that was caused by the longer lengths of pipes and pavement). Thus, all existing taxpayers have a financial interest in how new areas are developed.

However, density is not the end of the story. Collectively, longer commute distances translate into a need for more highway, bridge and transit capacity. When compared to their suburban counterparts, residents of central, urban locations have markedly shorter daily travel distances (on average, about 1/3 shorter). Ultimately, strategies that focus growth population and job growth in centers and corridors that are well connected by multiple transportation modes are the surest means of reducing commute distances and public costs (both financial and environmental).

Local case studies – methods

- Some of these case study areas include employment uses while others include residential uses. Since employees and households place different demands on infrastructure, the analysis uses a standardized measurement called an equivalent dwelling unit (EDU).

An EDU is a standard unit of measurement for infrastructure demand:

= One household (2.5 residents)

Has about the same infrastructure demand as:

= Five jobs

- Costs for the urbanizing areas were taken from concept plans. These costs are early estimates that will no doubt change as the planning becomes more refined.

- Costs for urban case studies were provided by the responsible redevelopment agencies and are for completed projects.

- The case study costs are from a span of several years. In order to provide a more fair comparison, costs for all case studies were escalated to first quarter 2008 dollars.

- Costs are broken down into two categories: local/community and regional.

    - Local/community costs are those that are most directly necessitated by a particular development and are paid for by the public (rather than the developer). Arterial roads are an example. Local/community costs are typically included in concept plans.

    - Regional costs are for facilities of regional importance such as highways, high-capacity transit, and air/water terminals. Regional costs were calculated as a function of forecasted commute distance. These distances were forecasted using MetroScope, a regional land use scenario model, and secondary construction cost data.

- Costs that were included in concept plans, but that appeared to be regional costs (e.g. state highway improvements), were deducted from local/community costs.

- Metro's consultant team, which includes FCS Group and Cogan Owens Cogan, assisted in data analysis. All local jurisdictions for which a case study is included herein had the opportunity to review and comment on the case study.

Local / community costs

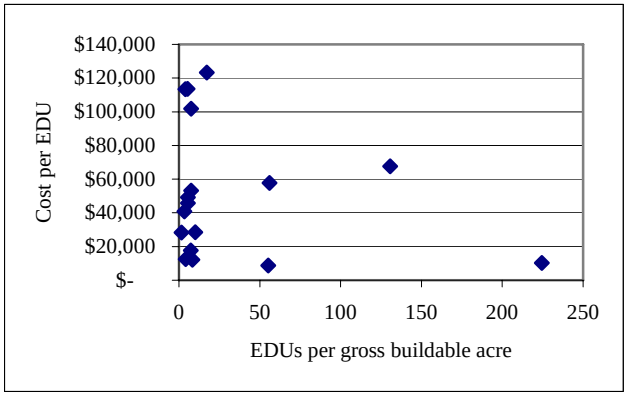
Local/community facilities are those that are most directly necessitated by a particular development that are paid for by the public (rather than the developer). The costs of these facilities are typically well documented and case studies are a useful way to understand them.

The case studies show that newly urbanizing areas typically have substantially higher per-EDU costs than do redevelopment projects in existing urban areas.

Average local/community infrastructure costs per EDU

Urbanizing areas:	$75,000	or	$72,000 (w/out SW Tualatin high-end case study)
Urban areas:	$51,000	or	$31,000 (w/out S. Waterfront high-end case study)

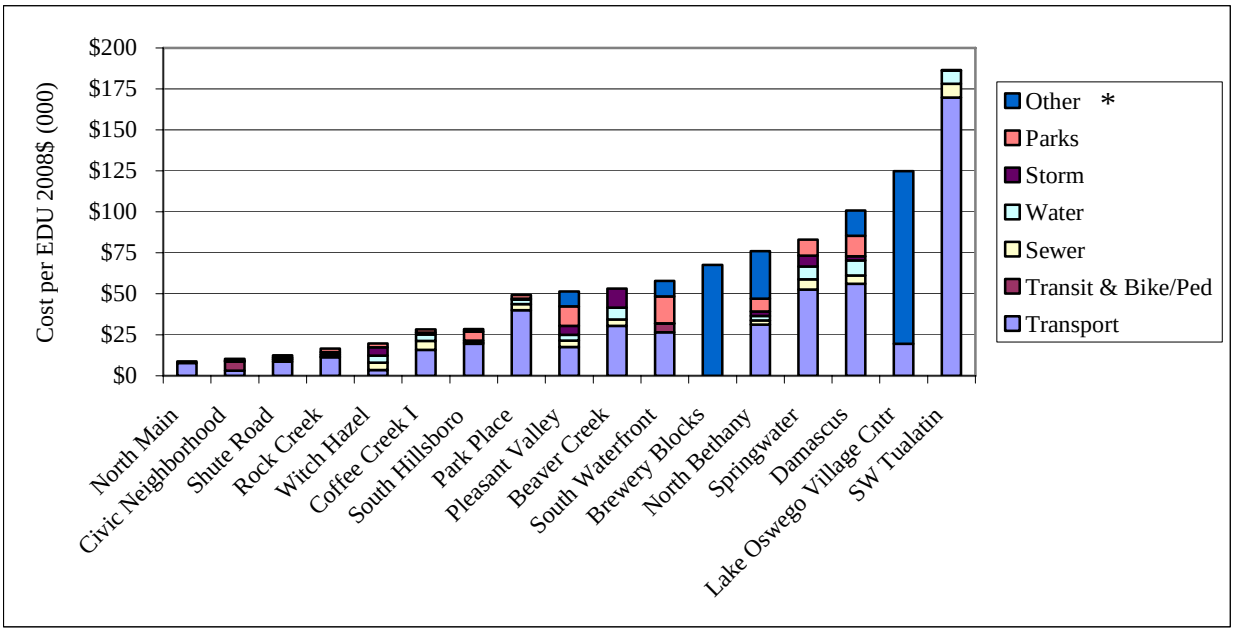
Wide variation local/community costs in lower-density case studies: Despite the clear difference in average costs for the two case study types, a relationship between density and the cost of providing local/community level infrastructure is difficult to discern when the case studies are looked at individually. In particular, this scatter plot shows a tremendous variation in costs for the urbanizing areas with lower densities. Perhaps a clearer relationship would emerge with additional case studies



and more information on the factors that affect costs. A summary of the local/community level costs for each case study is provided in Appendix 1.

Judging from this limited number of studies, there would appear to be additional factors that influence costs per EDU. These factors may include level of service or the provision of amenities such as parks and sidewalks and other facilities such as schools. Such amenities and facilities are often already available in established urban areas, thereby reducing incremental local/community infrastructure costs for redevelopment projects.

Components of local/community infrastructure costs (per EDU)



* "Other" costs may include structured parking, land write-downs, schools, etc

Who pays, and when?

In urbanizing areas, almost all the necessary capital facilities to initiate a project are located within the project area and can be capitalized into the final product, with the cost recovered upon sale of lots or homes. Consequently, the initial infrastructure costs for urbanizing areas are often largely private. The public costs for developing and maintaining urbanizing areas are typically paid later out of a combination of revenue sources or are paid in terms of social costs such as traffic congestion.

Redevelopment projects in urban areas, by contrast, must rebuild existing facilities, the price of which is already capitalized into the land value. This circumstance necessitates that a public

agency provide the capital for the project to commence. The result is that such projects are often criticized on the grounds that there is a large public subsidy. However, when all public facility costs, including regional costs (described below), are added up, urban redevelopments are less expensive per EDU than are developments in urbanizing areas.

Regional infrastructure costs

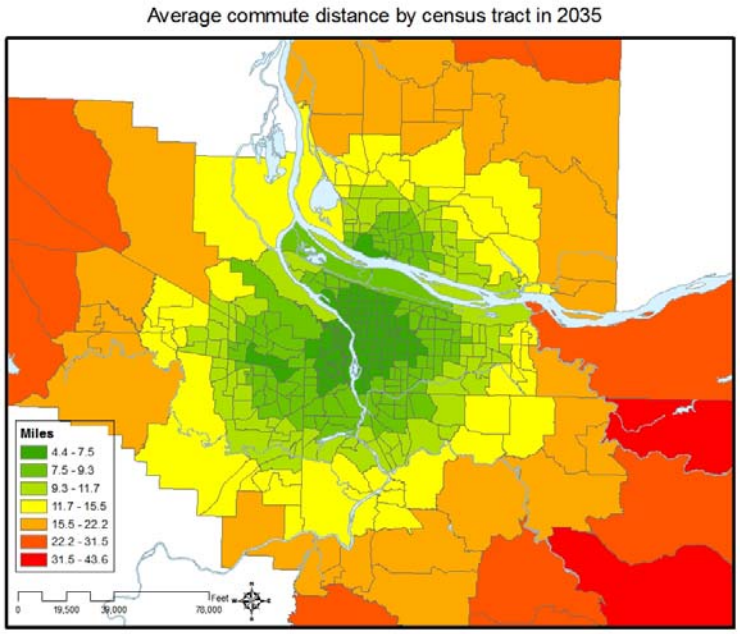
A second type of infrastructure cost, regional cost, is more difficult to account for with case studies and, for this reason, usually does not get included in concept plans. Regional infrastructure facilities include highways, light rail, bridges, and marine and air terminals. Unlike local and community level facilities, it is difficult to link any particular development with the need for a regional facility. Instead, the need for regional facilities is cumulative in nature and all residents end up paying for them indirectly. Yet, regional costs are substantial and are greatly affected by urban form.

A good proxy for gauging regional infrastructure consumption is household commute distance. In essence, households that have longer commutes consume more regional infrastructure. Jonathan Miller[2], a long-time author of the Urban Land Institute's publication, Emerging Trends in Real Estate, recommends that regions develop the ability to conduct full cost analysis and pricing of infrastructure. Miller's report posits that if the full costs of infrastructure were capitalized into real estate prices, location choices would adjust, favoring central, transit-oriented locations. This phenomenon is likely to be amplified with increases in fuel prices. Considering these full costs will be an important consideration in future growth management decisions and investments in public facilities. Thus, the case studies that follow include regional cost estimates, using commute distance as a proxy.

Using MetroScope, an econometric model that forecasts future household and employer location choices (at the census tract level), average commute distances were forecasted for each census tract in the region (for the year 2035).[3]

[2] Miller, J. (2007). *Infrastructure 2007*. Urban Land Institute. Accessed at http://www.uli.org/AM/Template.cfm?Section=Home&CONTENTFILEID=27598&TEMPLATE=/CM/ContentDisplay.cfm on June 23, 2008.

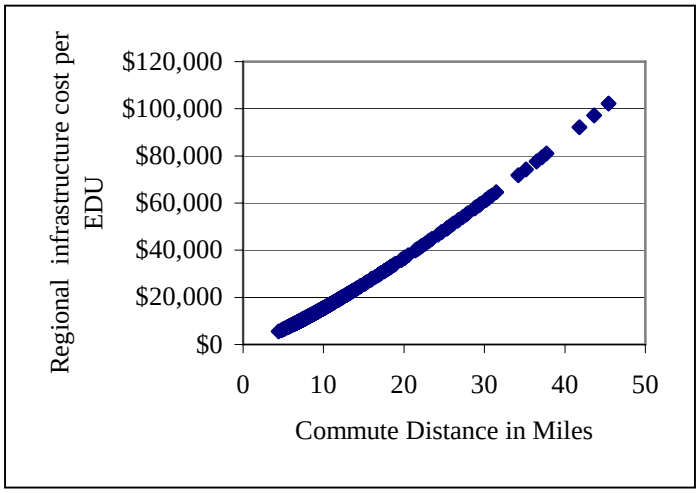
[3] Because MetroScope cannot predict future policy changes made by cities or actions taken by firms, forecasted commute distances are not a foregone conclusion. Policy changes can serve to shorten or lengthen forecasted commutes. Generally, however, MetroScope scenarios can give reliable estimates of the likely outcomes of a given set of policy choices.



Even in the year 2035, today's existing urbanized areas are likely to be home to most of the region's jobs. Generally, commute distances increase in concentric rings around the region's urban core.

Increased commute distances beget increased regional infrastructure costs:

The above commute distances were used to estimate the average per-household regional infrastructure costs for each census tract. Costs are based on national data sources.



Forecasted (year 2035) commute distances for case study areas range from:

5 miles in urban areas (minimum)

To

17 miles in newly urbanizing areas (maximum)

Compared to

12.32 miles average for the 7-county region

Regional infrastructure costs per EDU for case study areas range from:

$5,000 in urban areas (minimum)

To

$41,000 in newly urbanizing areas (maximum)

Compared to

$30,000 average for the 7-county region

Shorter work commutes save private money too:

5 mile commute:
= 10 miles per day (round trip)
= 2,600 miles per year
÷ 27 miles per gallon
= 96 gallons per year
X $4.00 per gallon
= $384 per year in gasoline

17 mile commute:
= 34 miles per day (round trip)
= 8,840 miles per year
÷ 27 miles per gallon
= 327 gallons per year
X $4.00 per gallon
= $1,308 per year in gasoline

The urban household saves over $900 in gasoline per year

…and that's just the commute!

Opportunities ahead

Focusing infrastructure investments in existing urban areas will be an important means of guiding growth in accordance with the wishes of the region's residents – in existing centers and corridors, rather than on rural land. A 2004 national poll[4] indicates that nearly nine in ten Americans (86%) want their states to fund improvements in existing communities over incentives for new development in the countryside.

[4] Belden Russonello & Stewart. (2004) *2004 National Community Preference Survey: conducted for Smart Growth America and National Association of Realtors®*. Accessed on June 27, 2008 at http://www.smartgrowthamerica.org/documents/NAR-SGASurvey.pdf

The need to prioritize funding is supported by recent changes in housing preferences. In recent years, residents are placing higher values on central locations, shorter commutes and walkable access to urban amenities. Leinberger (2008)[5] notes that, unlike twenty years ago, per square foot, urban residences command a 40 to 200 percent premium over traditional suburban neighborhoods in cities as diverse as New York City, Portland, Seattle, and Washington D.C.

These preference shifts can be attributed, in part, to demographic changes. According to Nelson (2006)[6], the demographic shifts that we have seen over the last 50 years will continue: more households without children and more single-person households, often seniors. These demographic changes point to a responsibility to build for an aging population. To provide for that population, jurisdictions in the region can focus on strengthening existing communities that are pedestrian friendly and well served by transit. Fortunately, these very design characteristics will also be a primary means of minimizing future infrastructure costs.

Finally, the prioritization of public investments in infrastructure in centers and corridors is a critical strategy for reducing the region's energy consumption and its contributions to global warming. Ewing et al (2007)[7] document the connection between urban form and travel behavior and point to studies that have found that residents of compact urban areas with interconnected streets and mixed uses drive about 1/3 less than residents of lower density, residential communities. Investments in infrastructure that supports centers and corridors will be an essential means of creating more housing choices. This strategy is also a primary means to reduce future infrastructure costs.

Limitations

- Concept plans use different methodologies, include or exclude different types of facilities, and have varying levels of detail. These differences make comparisons somewhat difficult and point to a need for standardization.
- The small sample size of case studies included herein places limitations on drawing firm conclusions.
- However, with these caveats, these case studies do point to local trends that echo the literature on the topic of comparative infrastructure costs. Generally, higher-density developments in central locations have lower infrastructure costs (local/community and regional) than do lower-density developments on the urban fringe.

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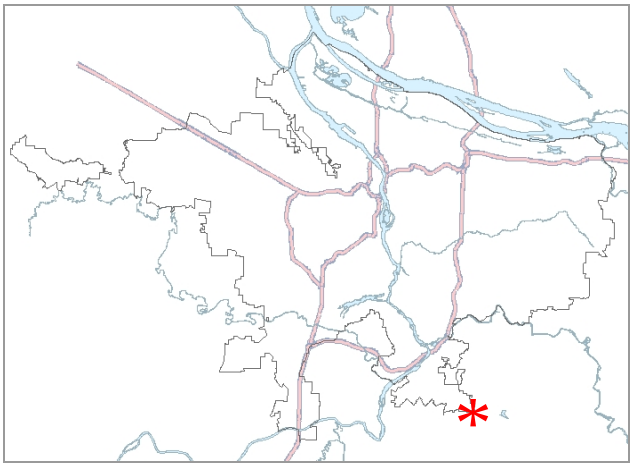
[5] Leinberger, C. (March, 2008) *The next slum?* The Atlantic Monthly. Accessed on June 27, 2008 at http://www.theatlantic.com/doc/200803/subprime

[6] Nelson, A.C. (2006) *Leadership in a new era*. Journal of the American Planning Association. 72(4). 393-407.

[7] Ewing, R., K. Bartholomew, S. Winkelman, J. Walters, D. Chen (2007) *Growing Cooler: the evidence on urban development and climate change*. Urban Land Institute. Accessed on June 27, 2008 at http://www.uli.org/AM/Template.cfm?Section=Home&CONTENTFILEID=32909&TEMPLATE=/CM/ContentDisplay.cfm

Beaver Creek concept area– urbanizing area

Oregon City, OR



Total acres:	453
Gross buildable acres:	292
Net new population:	3,624
Net new jobs:	3,652
Total EDUs:	2,180
Avg. EDUs per gross buildable acre:	7.47
Avg. commute miles in the year 2035:	17.09

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 94,000
Total:	$205,297,000

Proposed Use

The plan envisions a diverse mix of uses (an employment campus north of Loder Road, mixed use districts along Beavercreek Road, and two mixed use neighborhoods). Transit-oriented land uses are planned to increase the feasibility of transit service in the future. The concept area is adjacent to Clackamas Community College, providing workforce-training opportunities for future area residents and employees.

Existing Conditions

Transportation
The site is adjacent to Beavercreek Road and just south of the intersection between Highway 215 and 205. Traffic on Highway 213 is congested during peak rush hours. Beaver Creek road is a major local connector. There is very limited bike and pedestrian infrastructure.

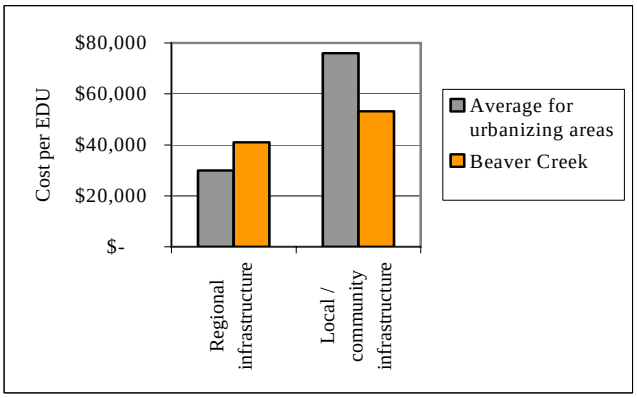
Water
Water is sourced from the Lower Clackamas River. The water system is mostly undeveloped and will need to be expanded to meet any future demand.

Wastewater
Wastewater systems are largely undeveloped. There is a 12-inch sewer trunk that runs the length of Beaver Creek road, which is insufficient for expanded use.

Stormwater
The concept plan area drains into two basins, Abernathy Creek and Caufield Creek, both of which drain into the Willamette River south of downtown Oregon City. Storm water systems are largely undeveloped.

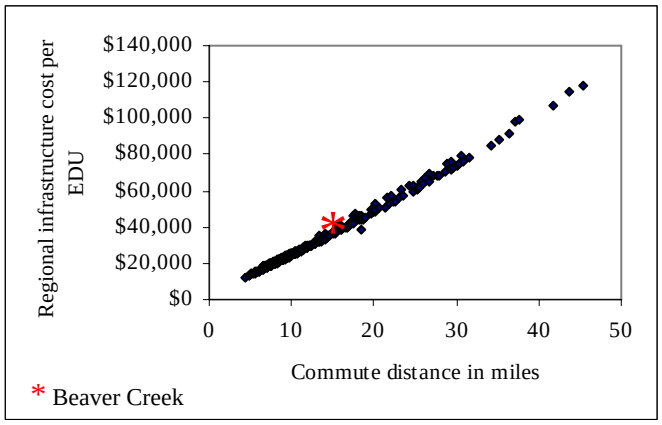
Parks, plazas, public places
There are no existing public parks or open spaces within the plan area.

How do Beaver Creek's infrastructure costs compare to the regional average?



Beaver Creek's regional infrastructure costs (highways, bridges, transit, etc) are significantly higher ($11,000 more per EDU) than average for the 7-county region. Its local/community infrastructure costs are about $22,000 less per EDU than the regional average for urbanizing areas. Improvements to highway 213 are not included in the local/community costs.

What are the factors that influence infrastructure costs in the Beaver Creek area?



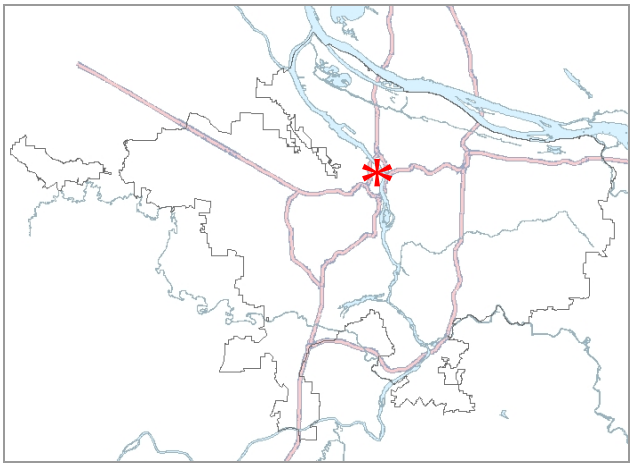
Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tract that comprises the Beaver Creek area are forecasted to have an average commute distance of 17.09 miles in the year 2035, significantly higher than the 7-county average (12.32 miles).

Topography: The Beaver Creek area is flat with one creek.

Parks: No parks are included in the concept plan (and its cost estimates).

Brewery Blocks – urban area

Portland, OR



Total acres:	4.6
Gross buildable acres:	4.6
Net new population:	282
Net new jobs:	2,440
Total EDUs:	601
Avg. EDUs per gross buildable acre:	130.65
Avg. commute miles in the year 2035:	4.99

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 73,000
Total:	$43,652,000

Proposed Use (completed project)

The Brewery Blocks development is a mix of high-density residential and commercial.

Existing Conditions

Transportation
An urban street grid exists. The streetcar system was developed as a part of the larger River District redevelopment.

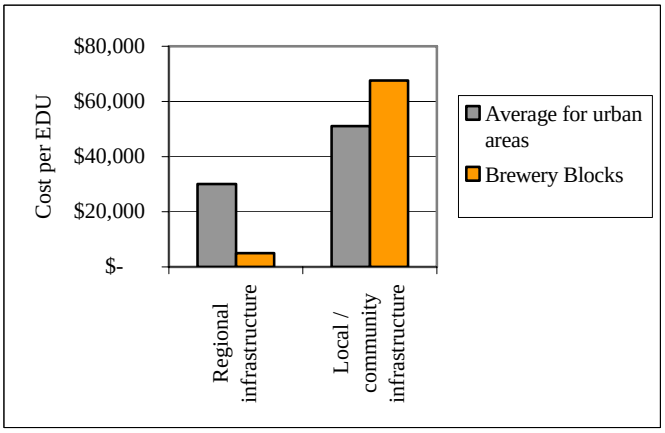
Water
Sufficient water facilities already exist within the area.

Wastewater
Sufficient wastewater facilities already exist within the area.

Stormwater
Sufficient stormwater facilities already exist within the area.

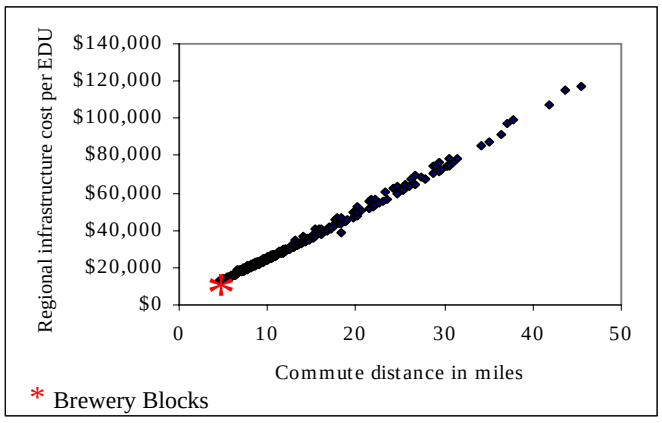
Parks, plazas, public places
Though there are no public parks within the Brewery Blocks, the development is able to take advantage of an existing park system that includes the North and South Park Blocks, Jamison Square, and Tanner Springs.

How do the Brewery Block's infrastructure costs compare to the regional average?



The Brewery Block's regional infrastructure costs (highways, bridges, transit, etc) are considerably lower ($25,00 less per EDU) than average for the 7-county region. Its local/community infrastructure costs are about $17,000 more per EDU than the regional average for urban areas.

What are the factors that influence infrastructure costs for the Brewery Blocks?



Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tracts that include the Brewery Blocks are forecasted to have an average commute distance of 4.99 miles in the year 2035, considerably shorter than the 7-county average of 12.32 miles.

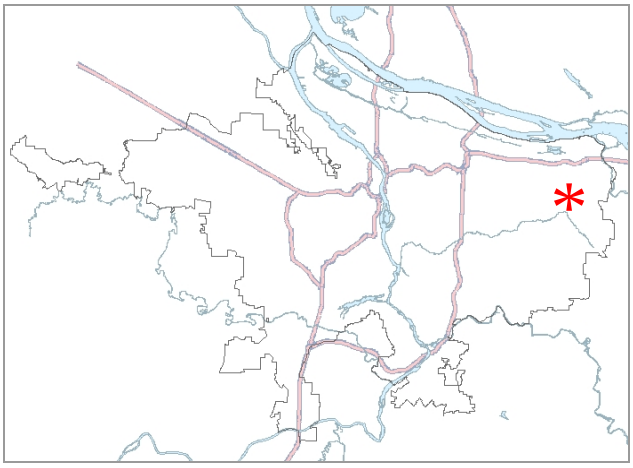
Topography: The Brewery Blocks are a redevelopment project. The entire parcel is buildable.

Existing facilities: The Brewery Blocks are able to take advantage of existing facilities, including transit, sewer, water, parks, and streets.

Structured parking and other improvements: The infrastructure costs associated with the Brewery Blocks redevelopment were accrued by the construction of structured parking, provision of street furnishings, and sidewalk improvements.

Civic Neighborhood– urban area

Gresham, OR



Total acres:	5
Gross buildable acres:	5
Net new population:	1,589
Net new jobs:	2,433
Total EDUs:	1,122
Avg. EDUs per gross buildable acre:	224.4
Avg. commute miles in the year 2035:	11.13

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 37,000
Total:	$41,824,000

Proposed Use

The Civic Neighborhood area is a mix of residential, retail, and office uses that is served by transit.

Existing Conditions

Transportation

The site is bisected by a light rail line and is served by four-lane major arterials and one local connector: Burnside Road, Division St., Eastman Parkway and the two-lane Wallula Road. Division St. was recently improved.

Water

The site is well integrated into Gresham's water infrastructure.

Wastewater

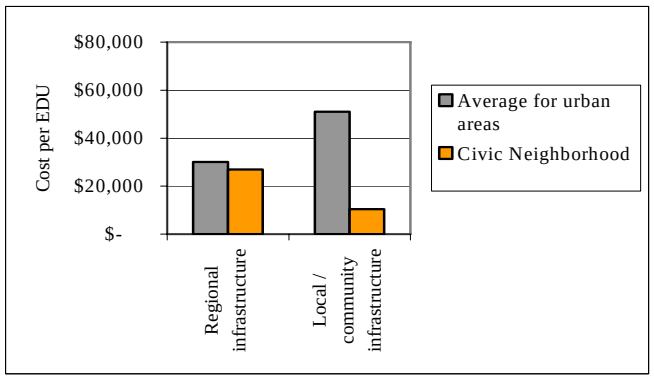
The site is well integrated into Gresham's sewer infrastructure.

Stormwater

Stormwater is handled by existing City of Gresham infrastructure.

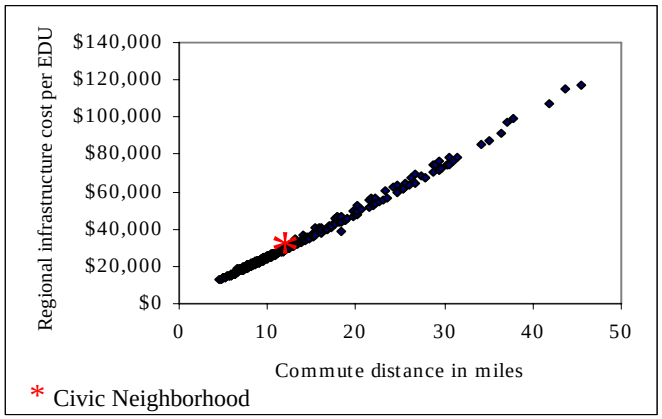
Parks, plazas, public places
Though there are no parks within the Civic Neighborhood area, it is being developed with a pedestrian orientation.

How do Civic Neighborhood's infrastructure costs compare to the regional average?



Civic Neighborhood's regional infrastructure costs (highways, bridges, transit, etc) are lower than average for the 7-county region. Its local/community infrastructure costs are also considerably lower (about $41,000 less per EDU) than the regional average for urban areas.

What are the factors that influence infrastructure costs in Civic Neighborhood?



Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tract that includes Civic Neighborhood are forecasted to have an average commute distance of 11.13 miles in the year 2035, shorter than the 7-county average of 12.32 miles.

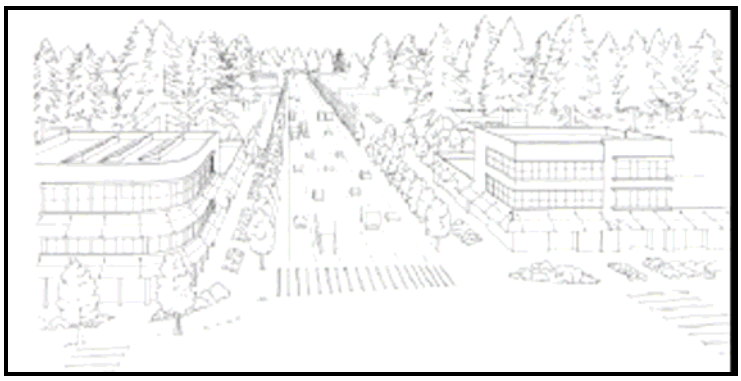
Topography: Civic Neighborhood is a redevelopment project. The entire parcel is buildable.

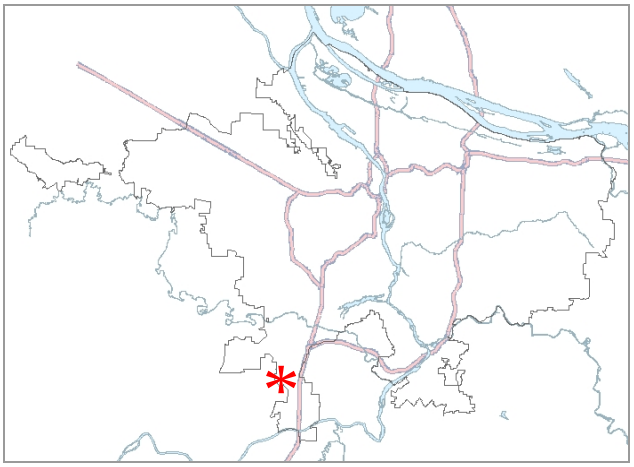
Existing facilities: Civic Neighborhood is able to take advantage of nearby facilities, including light rail.

Transit and street improvements: The bulk of Civic Neighborhood's costs are attributable to transit ($6,194,000) and transportation ($3,413,000) improvements.

Coffee Creek (1) master plan area– urbanizing area

Wilsonville, OR





Total acres:	216
Gross buildable acres:	196
Net new population:	(25)
Net new jobs:	1,474
Total EDUs:	295
Avg. EDUs per gross buildable acre:	1.51
Avg. commute miles in the year 2035:	12.82

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 59,000
Total:	$16,932,000

Proposed Use

Coffee Creek is being planned as a Regionally Significant Industrial Area.

Existing Conditions

Transportation

The area is within 1/2 mile of the Wilsonville I-5 North Interchange, with vehicle access via SW Lower Boones Ferry Road, Day Road and SW Grahams Ferry Road. There are few existing bicycle and pedestrian facilities and no transit service within the Coffee Creek Master Plan area. The closest transit stop is located nearby with a SMART bus line that provides stops along 95th Avenue and Commerce Circle (within ½ mile of the Master Plan area).

Water

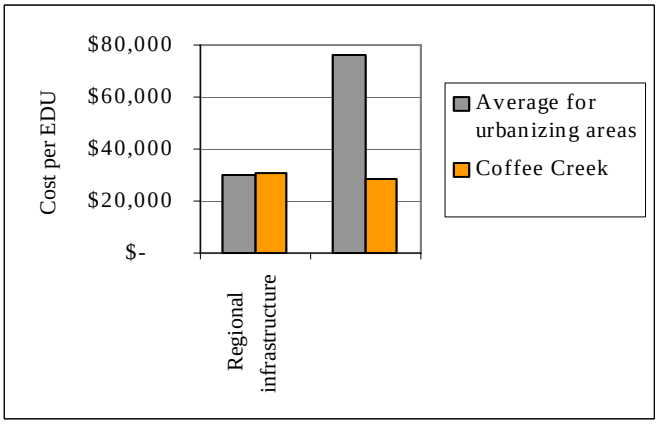
Water main transmission supply lines exist through the central and southern portions of the Master Plan area. An additional reservoir would be needed at some point to provide adequate peak capacity prior to build out of the Master Plan area.

Wastewater
The Coffee Creek Master Plan Area is located in the City of Wilsonville's United Disposal Interceptor sewer trunk line basin subarea. Sewer Main trunk links are located within the central portion of the Coffee Creek Master Plan area. Site survey work will need to occur and the City will need to update its sewer system model to determine on and offsite sewer system improvements and trunk line size/location, pump station requirements, and cost.

Stormwater
The Coffee Creek Master Plan area is located within the Coffee Lake Creek Basin. The north tributary to Basalt Creek is located south of Day Road. Basalt Creek drains into Coffee Creek Lake and extends north of Day Road into the City of Tualatin UGB. The master plan area is relatively flat with topography that varies 1-5 feet in elevation, and gently slopes from north to south. The City requires each new development within the Coffee Creek Industrial Master Plan area to detain and treat run off.

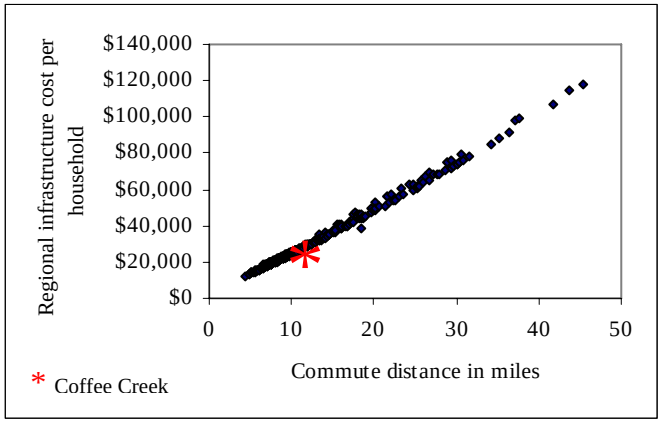
Parks, plazas, public places
There are no existing park facilities within the Master Plan area.

How do Coffee Creek's infrastructure costs compare to the regional average?



While Coffee Creek's regional infrastructure costs (highways, bridges, transit, etc) are about average for the 7-county region, its local/community infrastructure costs are about $47,000 per EDU lower than the regional average for urbanizing areas.

What are the factors that influence infrastructure costs in Coffee Creek?



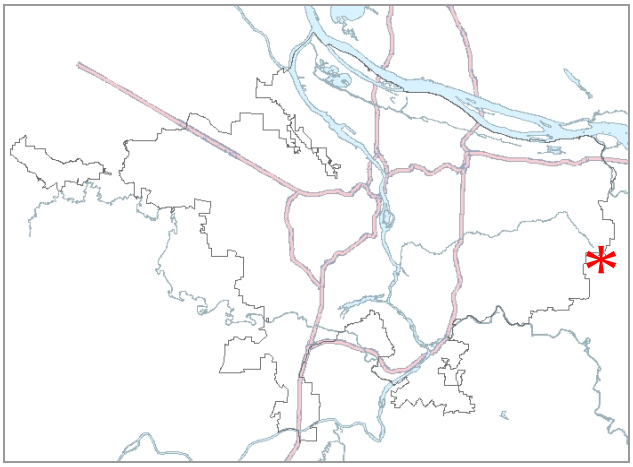
Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tract that includes Coffee Creek are forecasted to have an average commute distance of 12.82 miles in the year 2035. This distance is slightly higher than the average for the 7-county region (12.32 miles).

Topography / natural features: The Coffee Creek area is flat, making the area relatively less expensive to serve.

Transportation: Over half of Coffee Creek's local / community level infrastructure costs ($4,518,000) are attributable to transportation improvements.

Damascus Concept Plan– urbanizing area

Damascus and Happy Valley, OR



Total acres:	12,200
Gross buildable acres:	5,739
Net new population:	54,836
Net new jobs:	45,000
Total EDUs:	30,934
Avg. EDUs per gross buildable acre:	5.39
Avg. commute miles in the year 2035:	13.5

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 134,000
Total:	$4,147,851,000

Proposed Use

The Damascus area is being planned as a new community that will include a variety of housing densities, mixed-use areas, and employment zones.

Existing Conditions

Transportation

The area is served by a transportation system that was designed for farm-to-market travel purposes. The street system is primarily made up of narrow, two-lane roads that carry urban levels of traffic. Highway 212, 172nd Avenue, Foster Road, 242nd Avenue, 222nd Avenue and Sunnyside Road are the primary routes that connect the communities of Damascus and Boring to other parts of the region. Most roads perform adequately during rush hour, except for segments of Highway 212, Highway 224 and Sunnyside Road. Significant congestion and safety issues exist in the current Damascus city center (where Sunnyside, Highway 212, and Foster Road converge). Streets do not have bicycle and pedestrian facilities, except for sidewalks along limited sections of Highway 212 in the Damascus and Boring rural centers. Transit service is limited to two bus lines; a park-and-ride lot is located in Carver. The majority of the study area is located outside of the TriMet service boundary.

Water

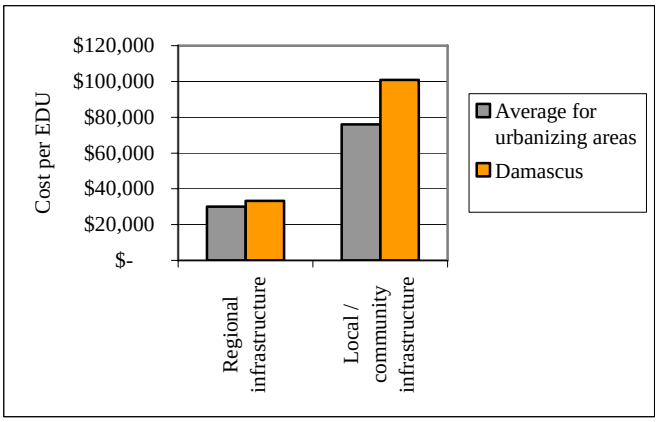
Two water districts, the Boring Water District and the Sunrise Water Authority, serve portions of the study area. Substantial portions of the area have no public water service.

Wastewater
Most of the primary study area has no sanitary sewer service. Only the far eastern edge of Damascus (Rock Creek corridor) has sanitary service. There are no sanitary sewage treatment facilities within the primary study area. There is a small, publicly-owned sanitary sewage treatment facility in the Boring rural center, but it is not available for additional hook-ups.

Stormwater
There is no existing public stormwater service in the study area.

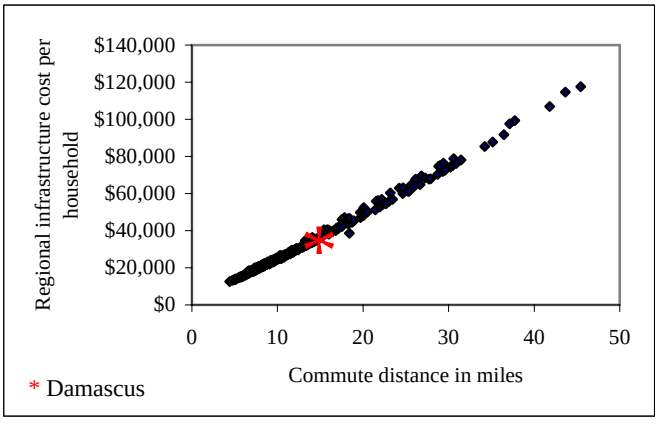
Parks, plazas, public places
North Clackamas County contains a wide range of regional, state, county, community parks and recreation facilities. Metro owns a parcel in the Damascus Buttes area. Clackamas County, the City of Portland, and the state own the right of way for the Cazadero and Springwater trails, which are currently undeveloped. Clackamas County provides parks near the study area, including Barton Park, a 116-acre county park located along the Clackamas River.

How do Damascus' infrastructure costs compare to the regional average?



Damascus' regional infrastructure costs (highways, bridges, transit, etc) are slightly higher than average for the 7-county region. Its local/community infrastructure costs are about $26,000 per EDU higher than the regional average for urbanizing areas.

What are the factors that influence infrastructure costs in Damascus?



Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tracts that comprise the Damascus area are forecasted to have an average commute distance of 13.5 miles in the year 2035. This distance is higher than the average for the 7-county region (12.32 miles).

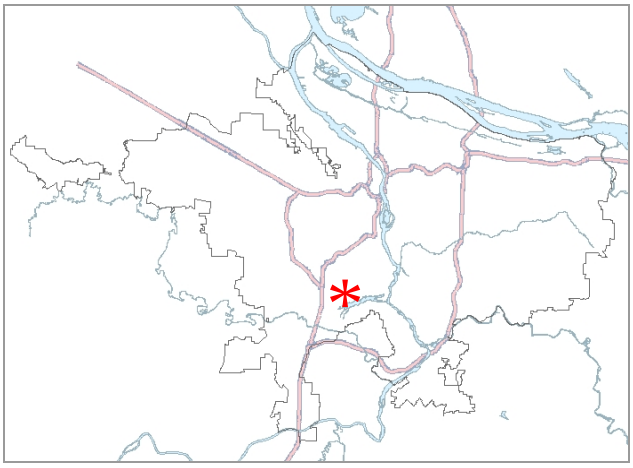
Topography / natural features: Buttes and transition areas (15-25% slopes) cover large portions of the Damascus area. Riparian areas are also found throughout the concept plan area. These features reduce average densities, making the area more expensive to serve. The topography will split the wastewater system to the east and to the west, resulting in increased cost of collection and conveyance. Existing treatment facilities are located some distance from the urban centers.

Transportation: $1,731,623,000 (2008$) of the local / community level infrastructure costs for Damascus are for transportation improvements. Regional transportation facilities (Sunrise Hwy) have been deducted from the costs.

Lake Oswego Village Center– urban area

Lake Oswego, OR

Photo: Todd Chase



Total acres:	2.39
Gross buildable acres:	2.39
Net new population:	0
Net new jobs:	207
Total EDUs:	41
Avg. EDUs per gross buildable acre:	17.15
Avg. commute miles in the year 2035:	8.83

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 147,000
Total:	$6,023,000

Proposed Use (project completed)

Redevelopment as a mixed-use (restaurant, retail, office) area with structured parking.

Existing Conditions

Transportation
An existing street network serves the area.

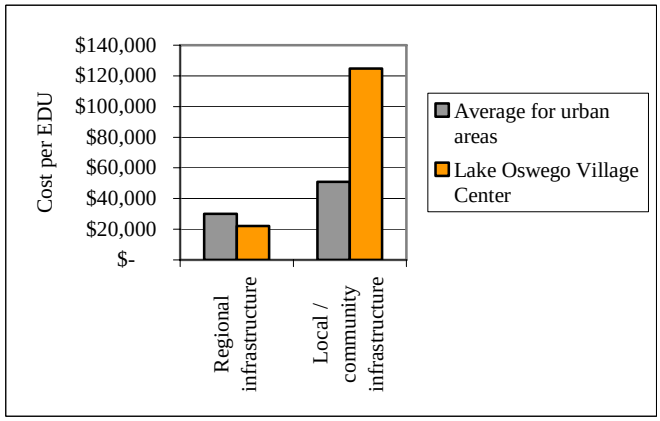
Water
Adequate water supply exists for the plan area.

Wastewater
Adequate sewer capacity exists in the plan area.

Stormwater
Adequate capacity to handle stormwater exists in the plan area.

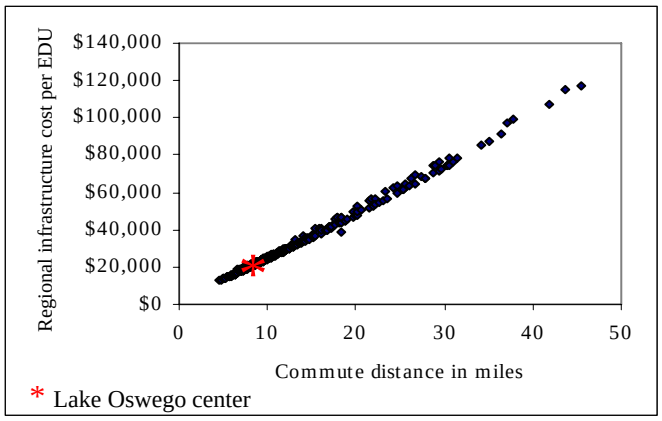
Parks, plazas, public places
Millennium Plaza Park is in the vicinity of the project area.

How do Lake Oswego Village Center's infrastructure costs compare to the regional average?



Lake Oswego center's regional infrastructure costs (highways, bridges, transit, etc) are lower than average for the 7-county region. Its local/community infrastructure costs are about $74,000 more per EDU than the regional average for urban areas.

What are the factors that influence infrastructure costs in Lake Oswego Village Center?



Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tracts that include Lake Oswego village center are forecasted to have an average commute distance of about 8.83 miles in the year 2035, lower than the 7-county average of 12.32 miles.

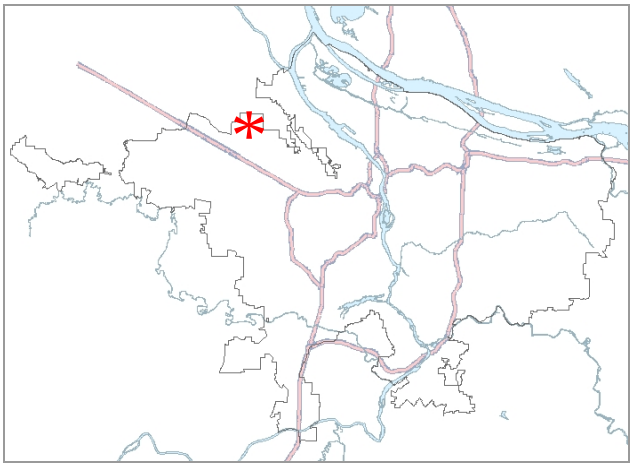
Topography: Lake Oswego center is a redevelopment project. The entire parcel is buildable.

Existing facilities: The project is able to take advantage of existing water, stormwater, and wastewater facilities.

Structured parking: Most of the local / community level infrastructure costs are attributable to the construction of a structured parking garage.

North Bethany concept area– urbanizing area

Washington County, OR



Total acres:	800
Gross buildable acres:	680
Net new population:	12,500
Net new jobs:	276
Total EDUs:	5,055
Avg. EDUs per gross buildable acre:	7.43
Avg. commute miles in the year 2035:	11.92

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 105,000
Total:	$530,299,000

Proposed Use

The North Bethany area is planned as a primarily residential community with some employment uses. The employment uses are commercial and institutional and are ancillary to the residential uses.

Existing Conditions

Transportation

Major transportation facilities in the vicinity of the plan area include Springville Rd., Kaiser, 185th, and Germantown Rd. There is bus service on Springville, 185th, and Kaiser.

Water

The current source of water in the concept area is private wells. Once fully developed, the area will be served by Tualatin Valley Water District.

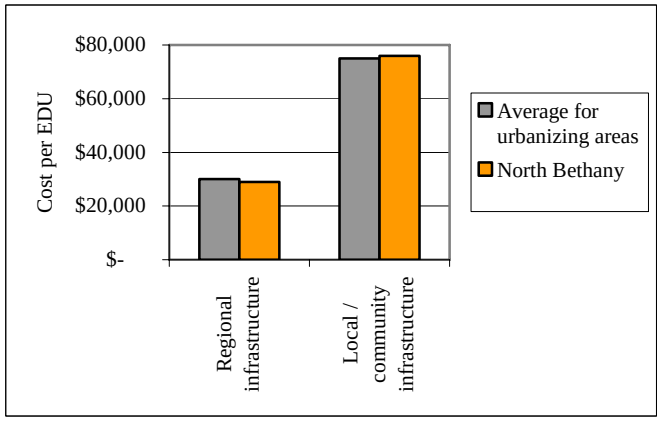
Wastewater

Wastewater is currently handled on-site through the use of septic systems.

Stormwater
Storm water runoff from the project site follows the natural topography, and is generally managed by several stream channels and the occasional culvert. The western end of the project site drains directly to Rock Creek. The remaining project site is the headwaters of small drainages that are tributaries to Abbey Creek and Bethany Creek.

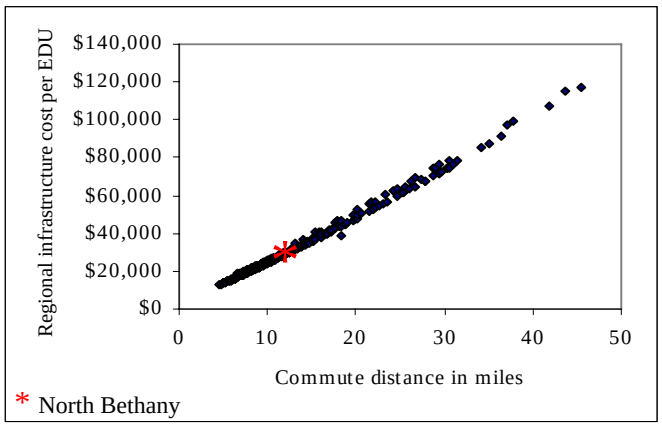
Parks, plazas, public places
Though there are a number of open spaces, trails, and parks in the vicinity of the plan area, there are no such areas that currently exist within the concept plan area.

How do North Bethany's infrastructure costs compare to the regional average?



North Bethany's regional infrastructure costs (highways, bridges, transit, etc) are about average for the 7-county region. Its local/community infrastructure costs per EDU are also about average for urbanizing areas.

What are the factors that influence infrastructure costs in the North Bethany area?



Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tract that comprises the North Bethany are forecasted to have an average commute distance of 11.92 miles in the year 2035, slightly lower than the 7-county average (12.32 miles).

Topography: The North Bethany area is relatively flat with the exception of the northern portion, which is sloped. A number of riparian areas are in the area.

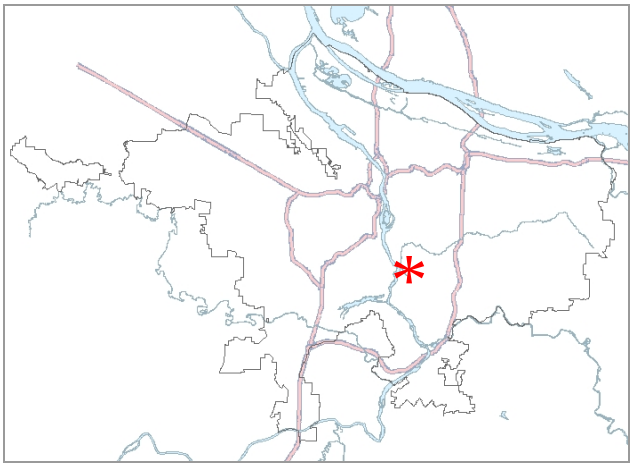
Amenities: The North Bethany area has been termed a "Community of Distinction" and the plan entails a number of amenities including significant amounts of parkland ($38,800,000). These parks would match Tualatin Valley Park and Recreation District's level of service standards.

Schools: North Bethany's local / community level infrastructure costs include the construction of 3 schools ($90 -$111 million). These costs include land and construction.

Off-site improvements – The costs include off-site improvements such as the Bethany Blvd. / US 26 overpass have been deducted from N. Bethany's total local/community costs since they are regional facilities.

North Main Village– urban area

Milwaukie, OR



Total acres:	1.9
Gross buildable acres:	1.9
Net new population:	228
Net new jobs:	40
Total EDUs:	105
Avg. EDUs per gross buildable acre:	55.26
Avg. commute miles in the year 2035:	7.99

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 28,000
Total:	$2,958,000

Proposed Use (completed)

The North Main Village project is located in downtown Milwaukie, OR and consists of thirteen three-story townhomes, each with a garage and ground floor commercial element with two stories of living space above. The project also includes twenty condominium units.

Existing Conditions

Transportation

North Main Village's location in an already urbanized setting affords it access to existing transportation facilities including the Milwaukie Transit Center. However, transportation improvements are necessary to serve the area's growth.

Water

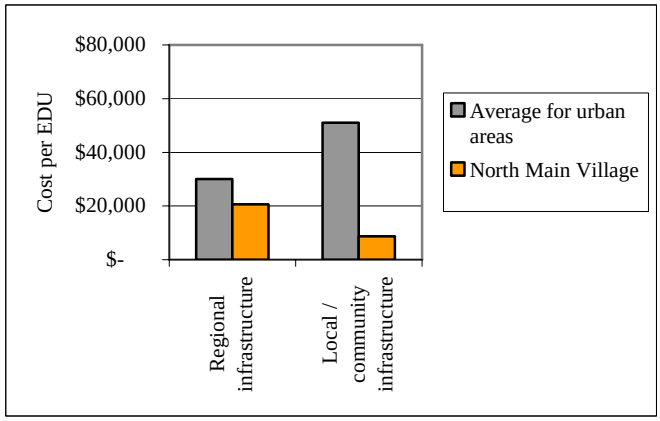
Existing water facilities are sufficient to serve North Main Village.

Wastewater
Existing wastewater facilities are sufficient to serve North Main Village.

Stormwater
Existing stormwater facilities are sufficient to serve North Main Village.

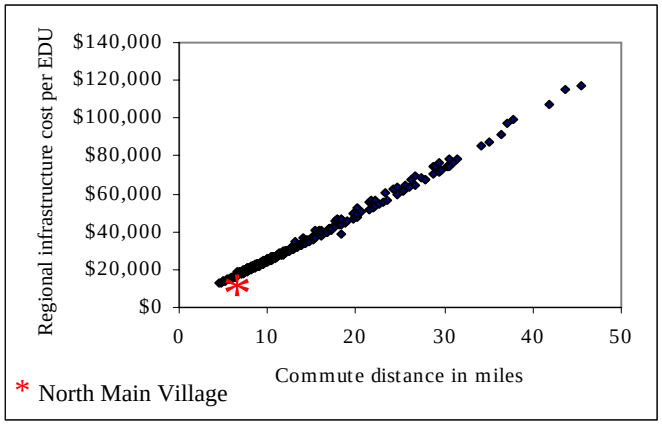
Parks, plazas, public places
North Main Village has no on-site parks, but a number of parks are nearby: Milwaukie Riverfront Park, Scott Park, and Dogwood Park.

How do North Main Village's infrastructure costs compare to the regional average?



North Main Village's regional infrastructure costs (highways, bridges, transit, etc) are about $9,000 per EDU lower than average for the 7-county region. Its local/community infrastructure costs are also about $42,000 per EDU lower than the regional average for urban areas.

What are the factors that influence infrastructure costs in North Main Village?



Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tract that includes North Main Village are forecasted to have an average commute distance of 7.99 miles in the year 2035, considerably lower than the 7-county average of 12.32 miles.

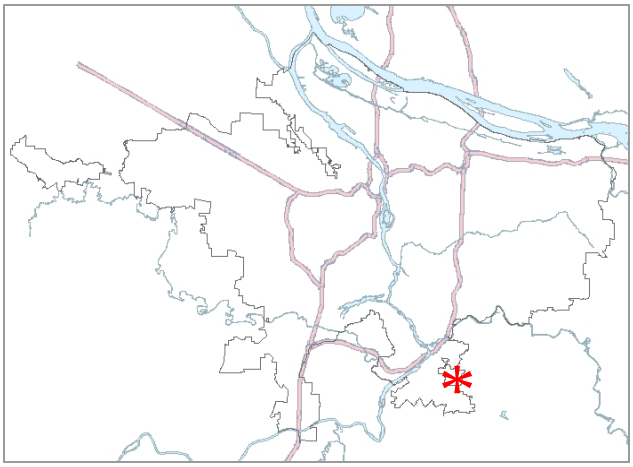
Topography: North Main Village is a redevelopment project. The entire parcel is buildable.

Transportation: The bulk of the local / community costs associated with North main village are transportation-related ($811,000).

Land write-downs: About $108,000 is attributable to land write-downs (appears in "other" costs in Appendix 1).

Park Place concept area – urbanizing area

Oregon City, OR



Total acres:	480
Gross buildable acres:	266
Net new population:	3,645
Net new jobs:	0
Total EDUs:	1,458
Avg. EDUs per gross buildable acre:	5.5
Avg. commute miles in the year 2035:	12.27

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 79,000
Total:	$115,222,000

Proposed Use

Park Place is being planned as a residential community. A developer has recently been consolidating ownership of over half of the plan area. It is hoped that that consolidation will simplify the provision of public facilities.

Existing Conditions

Transportation

Isolated portions of the roadway system experience congestion and delays. The Highway 213 corridor is approaching capacity, particularly on the segment between Redland Road and the I-205 interchange. The public transit system provides limited service to this low-density, suburban location. The bicycle and pedestrian systems are incomplete, but plans exist to make incremental improvements.

Water

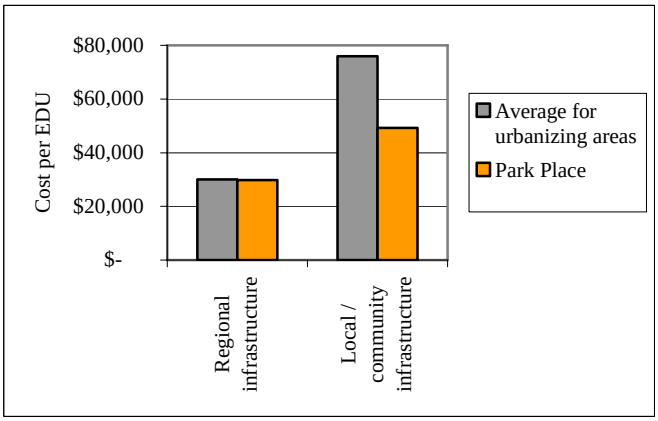
Water conveyance facilities are limited within the study area. The Oregon City water system has sufficient water supply to serve the study area.

Wastewater
Limited wastewater collection exists within the study area. However, most properties are on septic systems. Two-trunk interceptor lines, owned by the Tri-City Sewer District, pass through the study area. These two interceptors connect with the Highway 213/ Newell interceptor, which conveys their flows to the wastewater treatment plant. These interceptors and the treatment plant have capacity to serve future development within the study area.

Stormwater
Stormwater is currently managed with roadside ditches and natural drainage channels. No other major stormwater infrastructure facilities exist onsite. All stormwater within the study area is conveyed to Abernethy Creek, Newell Creek, and Livesay Creek. Abernethy Creek and Newell Creek are subject to occasional flooding.

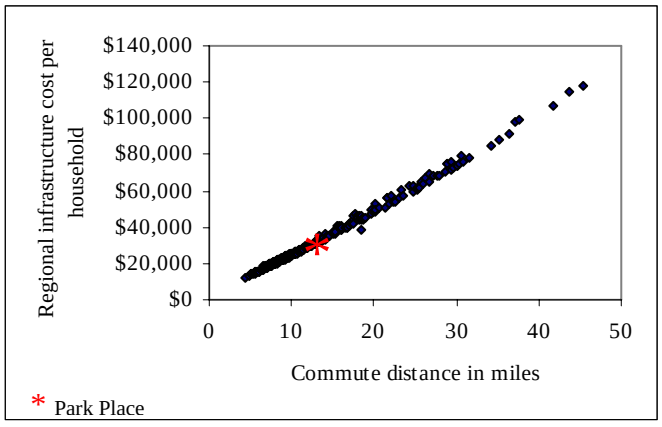
Parks, plazas, public places
Clackamas County and Metro own open spaces within the concept plan area.

How do Park Place's infrastructure costs compare to the regional average?



Park Place's regional infrastructure costs (highways, bridges, transit, etc) are about average for the 7-county region. Its local/community infrastructure costs are about $26,000 less per EDU than the regional average for urbanizing areas.

What are the factors that influence infrastructure costs in Park Place?



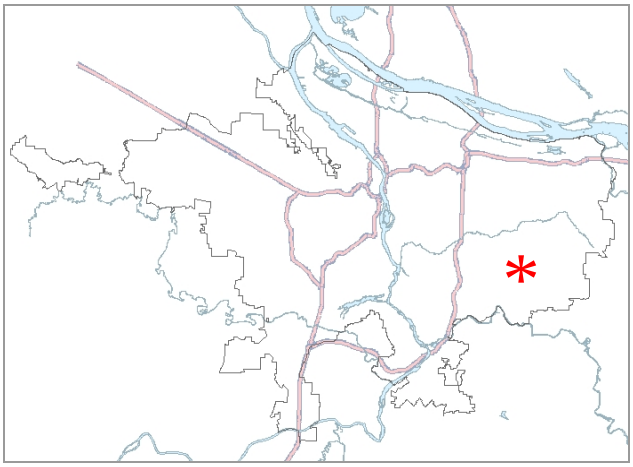
Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Park Place residents are forecasted to have an average commute distance of 12.27 miles in the year 2035. This distance is about average for the 7-county region (12.32 miles).

Topography / natural features: Large portions of the Park Place concept area are not developable because of constraints such as steep slopes and wetland areas.

Transportation: Park Place's transportation costs amount to $58,400,000 and make up the bulk of the area's local / community level infrastructure costs.

Pleasant Valley concept area– urbanizing area

Gresham, OR



Total acres:	1,530
Gross buildable acres:	1,071
Net new population:	12,315
Net new jobs:	4,935
Total EDUs:	5,913
Avg. EDUs per gross buildable acre:	5.5
Avg. commute miles in the year 2035:	10.8

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 77,000
Total:	$457,811,000

Proposed Use

The Pleasant Valley area is planned as a new community with a town center, residential neighborhoods, and employment zones.

Existing Conditions

Transportation
Foster Blvd., a two-lane rural road, is the main road that currently provides access to the area.

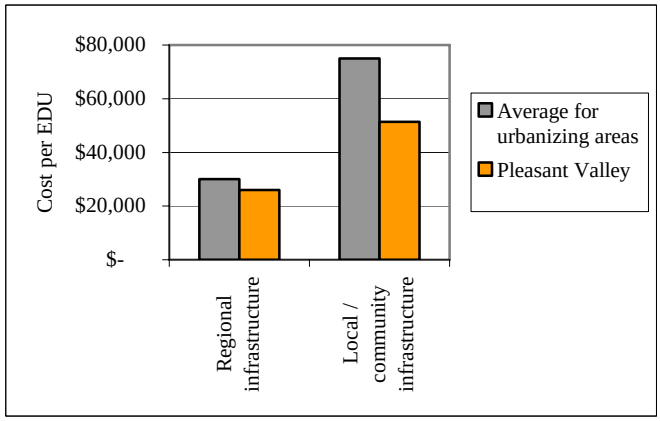
Water
The area is primarily served by private wells.

Wastewater
Wastewater is handled with private septic systems.

Stormwater
Stormwater is currently directed to ditches along local roads.

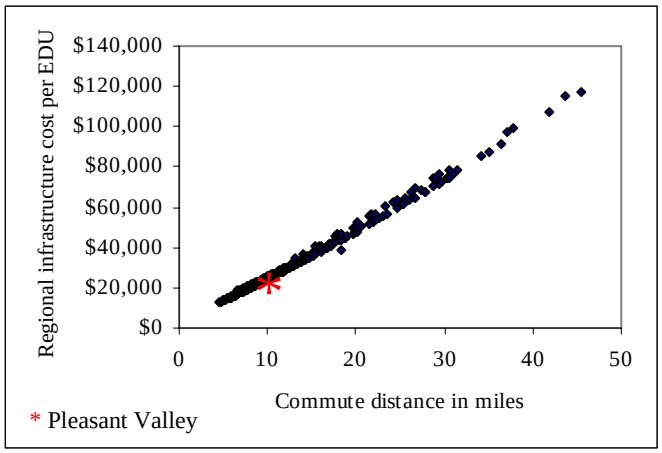
Parks, plazas, public places
The Springwater Corridor, a regional trail, passes through the Pleasant Valley plan area. There are no other existing parks within the area, though there is open space associated with Pleasant Valley Elementary School (existing).

How do Pleasant Valley's infrastructure costs compare to the regional average?



Pleasant Valley's regional infrastructure costs (highways, bridges, transit, etc) are slightly lower than average for the 7-county region. Its local/community infrastructure costs per EDU are about $24,000 less than the regional average for urbanizing areas.

What are the factors that influence infrastructure costs in the Pleasant Valley area?



Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tracts that comprise the Pleasant Valley area are forecasted to have an average commute distance of about 10.8 miles in the year 2035, lower than the 7-county average (12.32 miles).

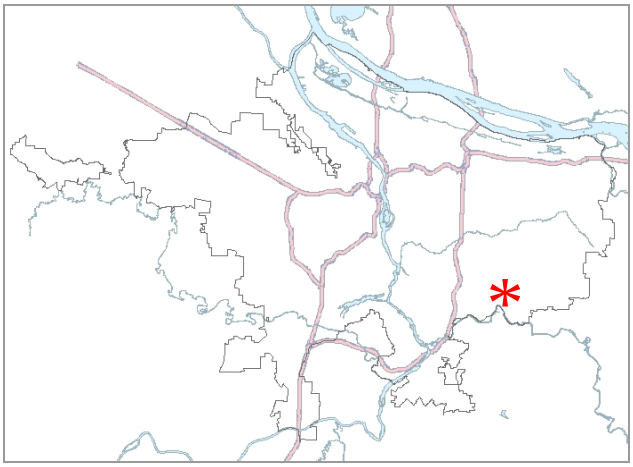
Topography: The Pleasant Valley area is mostly flat, but has a number of riparian areas.

Green practices: Most of the streets will be green streets. Though there are not additional capital costs associated with these streets, it is anticipated that there will be higher maintenance costs. All stream crossings will use bridges (no culverts)

Parks: About ¼ of Pleasant Valley's local / community level costs are attributable to parks ($70,186,000).

Rock Creek concept area– urbanizing area

Happy Valley, OR



Total acres:	670
Gross buildable acres:	357
Net new population:	7,037
Net new jobs:	619
Total EDUs:	2,939
Avg. EDUs per gross buildable acre:	8.23
Avg. commute miles in the year 2035:	10.72

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 43,000
Total:	$126,680,000

Proposed Use

The Rock Creek area is planned as a community with residential, mixed-use, and employment uses.

Existing Conditions

Transportation
Two-lane rural roads with soft shoulders and roadside drainage ditches are typical in the plan area.

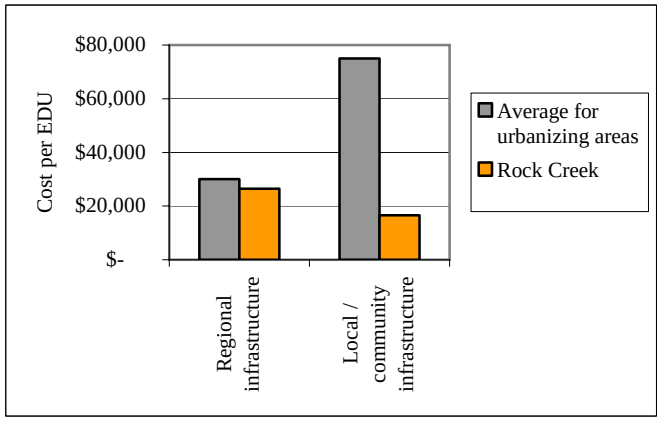
Water
Two wells and water from the Clackamas River supply the area with water. According to the Mt. Scott Water District, all necessary facilities are in place for any new developments in the planning area with the exception of a 12-in water line for the higher areas.

Wastewater
There are three points of connection to the existing sewer system. There will need to be additional pumps installed in order to get the effluent to a point where a gravity flow system will work.

Stormwater
Storm drainage in the area is mostly over land, with some culverts under existing roads and ditches running alongside these roads. The area is split into two drainage areas that flow into Rock Creek and Sieben Creek.

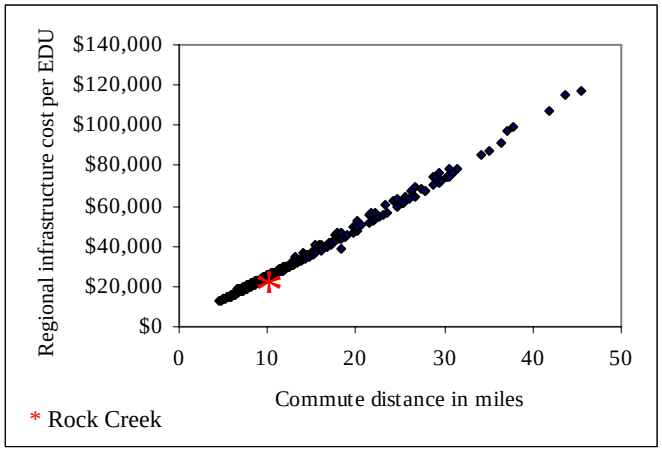
Parks, plazas, public places
The area does not have any existing parks.

How do Rock Creek's infrastructure costs compare to the regional average?



Rock Creek's regional infrastructure costs (highways, bridges, transit, etc) are slightly lower than average for the 7-county region. Its local/community infrastructure costs are about $58,000 per EDU cheaper than the regional average for urbanizing areas.

What are the factors that influence infrastructure costs in the Rock Creek concept area?



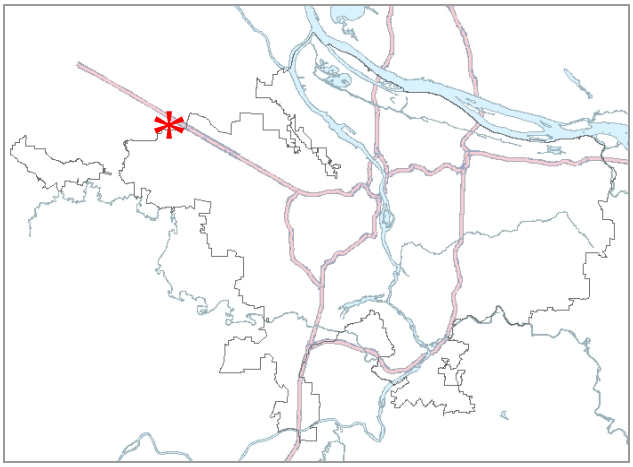
Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tracts that include the Rock Creek area are forecasted to have an average commute distance of 10.72 miles in the year 2035, lower than the 7-county average (12.32 miles).

Topography: The Rock Creek area has slopes to the north (over 30% slopes) and Rock Creek and its tributaries flow through the area. South of Sunnyside Rd., the area is flat.

Transportation: Approximately 2/3 of Rock Creek's local / community level infrastructure costs are attributable to transportation improvements ($33576,000). Roads, including Sunnyside Road, and 147th Avenue, have been improved to urban standards to provide multimodal access.

Shute Road concept area– urbanizing area

Washington County, OR



Total acres:	203
Gross buildable acres:	175
Net new population:	0
Net new jobs:	3,660
Total EDUs:	732
Avg. EDUs per gross buildable acre:	4.18
Avg. commute miles in the year 2035:	13.99

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 46,000
Total:	$33,623,000

Proposed Use

The Shute Rd. concept area is being planned to provide large lots for industrial uses. Genentech, an international biomedical manufacturer, has acquired nearly half of this site (85 acres). Genentech has developed phase 1 facilities and will provide 300-400 jobs in the first phase.

Existing Conditions

Transportation

The site is adjacent to the Shute Road exit of the Sunset Highway. Shute Road and Evergreen Road, both five lane local connectors intersect at the southwest corner of the site.

Water

Water mains run along Shute Road and Evergreen road adjacent to the site.

Wastewater

There are currently no sanitary lines running though the site. One trunk line runs up Evergreen Road to the corner of the site and another line dead-ends into Shute Road near the center of the site.

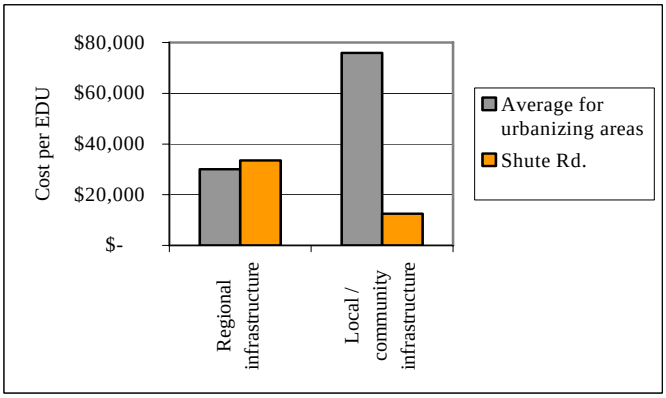
Stormwater

Storm lines parallel water lines along Shute Road and Evergreen Road.

Parks, plazas, public places

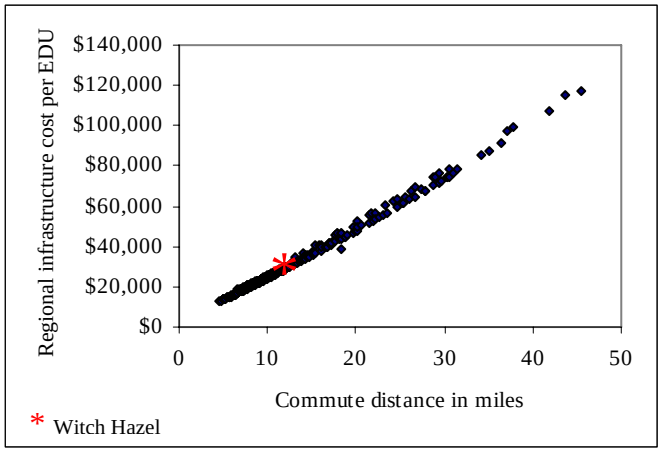
There are no existing public parks or green spaces within the site.

How do Shute Rd.'s infrastructure costs compare to the regional average?



Shute Rd.'s regional infrastructure costs (highways, bridges, transit, etc) are slightly higher than average for the 7-county region. Its local/community infrastructure costs are about $63,000 per EDU lower than the regional average for urbanizing areas.

What are the factors that influence infrastructure costs in the Shute Rd. concept area?



Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tract that comprises the Shute Rd. area are forecasted to have an average commute distance of 13.99 miles in the year 2035, higher than the 7-county average (12.32 miles).

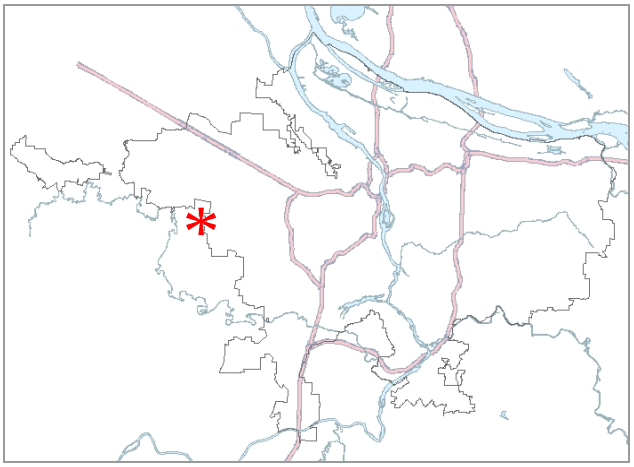
Topography: The Shute Rd. concept area is relatively flat with a small riparian area associated with Waibel Creek. The area around the creek is non-wetland.

Employment use: Shute Rd. will be an employment area. Employment uses tend to place fewer demands on infrastructure than residential uses.

Transportation: Approximately 2/3 of Shute Rd.'s local / community level infrastructure cost is attributable to transportation improvements ($6,350,000).

South Hillsboro concept area– urbanizing area

Hillsboro, OR



Total acres:	1,565
Gross buildable acres:	1,030
Net new population:	25,455
Net new jobs:	879
Total EDUs:	10,358
Avg. EDUs per gross buildable acre:	10.05
Avg. commute miles in the year 2035:	12.2

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 58,000
Total:	$600,591,000

Proposed Use

The South Hillsboro area will be a community including residential, retail, and office uses.

Existing Conditions

Transportation

Current transportation facilities generally consist of two lane sections without curbs. Drainage crossings are primarily culverts with some minor retaining / transition structures. At grade railroad crossings connect the study area to Tualatin Valley Highway.

Water

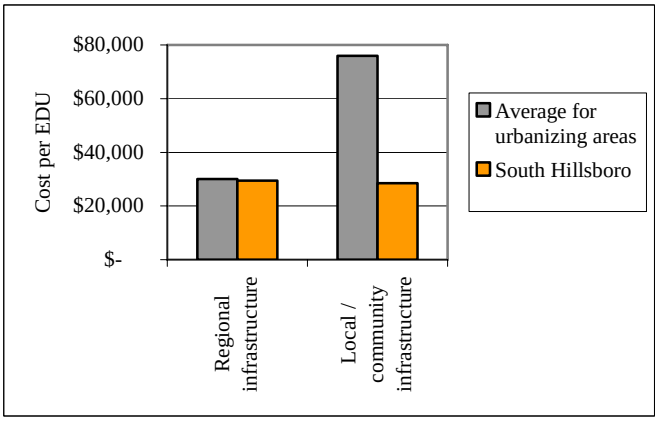
Existing 8” and 10” waterlines to the northwest of the study area provide distribution to current development in that area and will eventually be connected to the grid for the South Hillsboro planning area. An existing 42” transmission line is located at the south side of the railroad tracks along the north edge of the South Hillsboro planning area. Connection to this line will be made to serve south into the planning area.

Wastewater
A 24" trunk sewer in Davis Road extending from the River Road Pump Station to SW 234th Avenue is currently being constructed. The trunk sewer is designed to serve 525 acres including a significant portion of the South Hillsboro planning area. Area 71 is within this service area. The Clean Water Services "Aloha Pump Station" on SW 209th Avenue near SW Stoddard Drive and the Cross Creek Pump Station further south on 209th Avenue near SW Murphy Lane can serve Area 69 of the South Hillsboro planning area.

Stormwater
Development to the west and north of the study area includes storm drainage conveyance, storage and treatment of the areas consistent with standards in place at the time of the respective land use action. Outfall from these systems is to natural drainage tributaries of the Tualatin River. Throughout the South Hillsboro planning area, ditches provide storm water management along roadways. Large agricultural tracts have surface ditches that direct flow to natural conveyances.

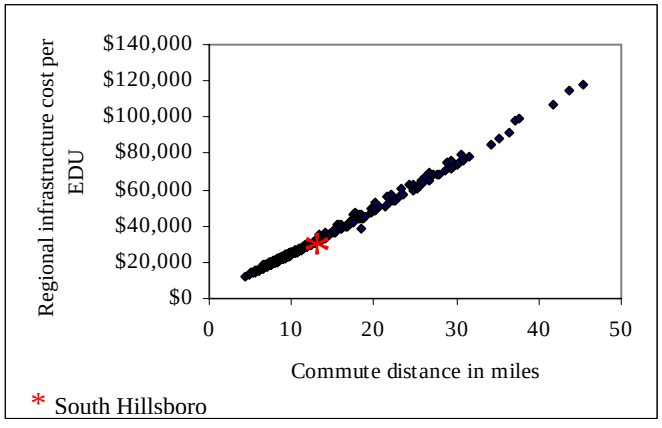
Parks, plazas, public places
The City of Hillsboro currently has no park or recreation facilities located within the South Hillsboro Community Plan Study Area. The Bonneville Power Administration right-of-way north of Tualatin Highway extends south into the study area and could accommodate a trail.

How do South Hillsboro's infrastructure costs compare to the regional average?



South Hillsboro's regional infrastructure costs (highways, bridges, transit, etc) are about average for the 7-county region. Its local/community infrastructure costs per EDU are about $46,000 less than the regional average for urbanizing areas.

What are the factors that influence infrastructure costs in the South Hillsboro area?



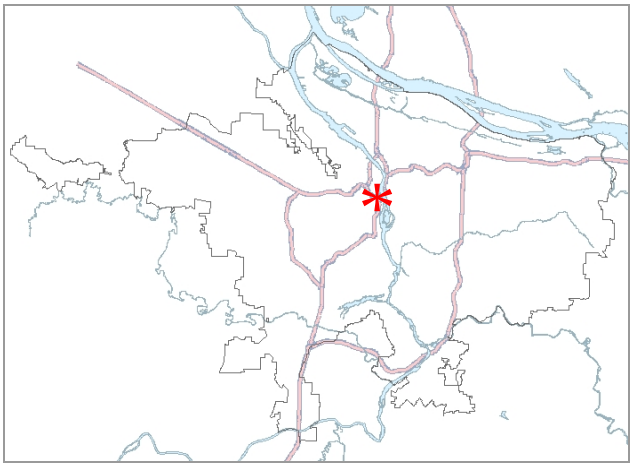
Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tract that comprises the South Hillsboro area are forecasted to have an average commute distance of 12.2 miles in the year 2035, slightly less than the 7-county average.

Topography: The South Hillsboro area is flat. Several Tualatin River tributaries flow west/southwesterly through the site, including Gordon Creek, Butternut Creek, a Butternut Creek tributary, Rosedale Creek (also referred to as Hazeldale Creek), and an unnamed tributary.

Stormwater: There are no stormwater costs associated with the South Hillsboro area.

South Waterfront – urban area

Portland, OR



Total acres:	130
Gross buildable acres:	100
Net new population:	9,000
Net new jobs:	10,000
Total EDUs:	5,600
Avg. EDUs per gross buildable acre:	56
Avg. commute miles in the year 2035:	5.33

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 72,000
Total:	$401,857,000

Proposed Use

The South Waterfront District offers a unique opportunity for redevelopment as it provides the largest block of vacant or underutilized land within the city's core. The district will have a mix of urban-scale offices, housing, hotels, parks and retail uses. The area will be served by a multimodal transportation system and may serve as a transit hub for south downtown. Redevelopment in the district is meant to serve as a catalyst for the creation of a larger science and technology-based economy in the Central City.

Existing Conditions

Transportation

Though the South Waterfront's central Portland location affords it extensive transportation connections, a substantial amount of redevelopment is contemplated.

Water

Existing water facilities are sufficient to serve South Waterfront.

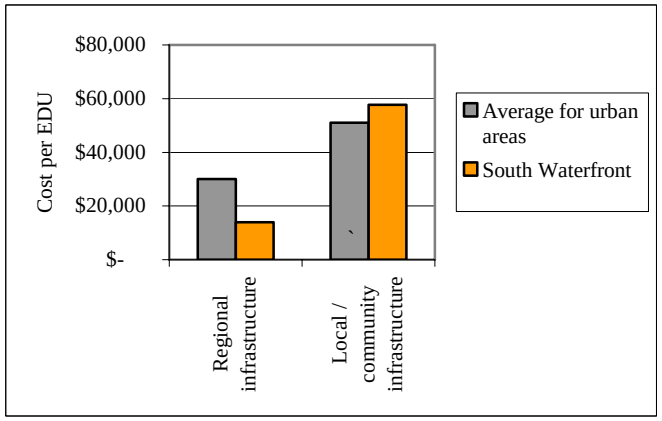
Wastewater

Existing sewer facilities are sufficient to serve South Waterfront.

Stormwater
Upgrades to the areas stormwater system will be necessary to serve the planned development.

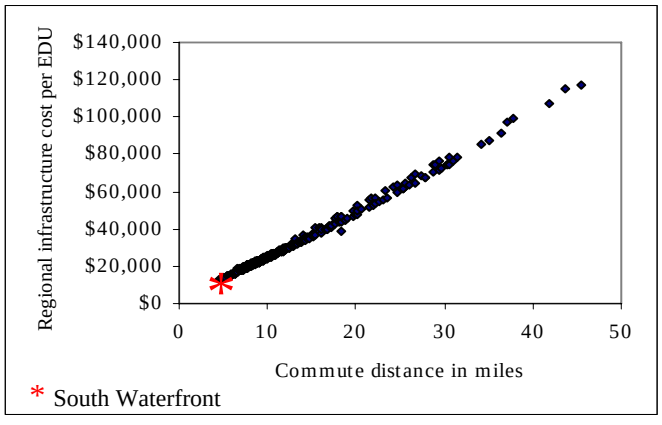
Parks, plazas, public places
There are no existing parks within the plan area. The plan includes the creation of a Willamette River Greenway. Given the area's central location, numerous parks and trails are in the vicinity.

How do South Waterfront's infrastructure costs compare to the regional average?



South Waterfront's regional infrastructure costs (highways, bridges, transit, etc) are about $16,000 less per EDU than average for the 7-county region. Its local/community infrastructure costs are about $7,000 more per EDU than the regional average for urban areas.

What are the factors that influence infrastructure costs for South Waterfront?



Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tracts that include South Waterfront are forecasted to have an average commute distance of 5.33 miles in the year 2035, considerably shorter than the 7-county average of 12.32 miles.

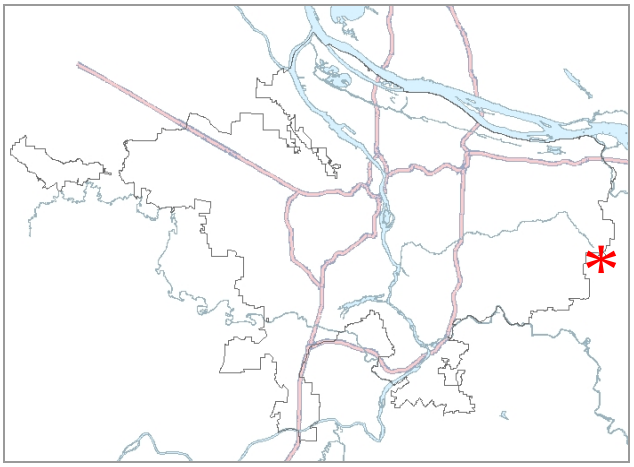
Topography: South Waterfront is a redevelopment project. The portion closest to the Willamette River will not be developed, but will be restored as a greenway.

Existing facilities: South Waterfront is able to take advantage of existing streets, sewer, and water facilities.

Most local / community costs are attributable to transportation ($148,445,000), transit / bike / pedestrian ($29,900,000), park ($92,553,000), and affordable housing requirements.

Springwater Community Plan– urbanizing area

Gresham, OR



Total acres:	1,272
Gross buildable acres:	762
Net new population:	4,022
Net new jobs:	15,330
Total EDUs:	4,522
Avg. EDUs per gross buildable acre:	5.9
Avg. commute miles in the year 2035:	12.82

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 114,000
Total:	$471,254,000

Proposed Use

The Springwater area is planned for industrial/high-tech campuses. To augment the mixed-use theme of the City as a whole, a village center with mixed retail and housing, and low-density residential development are also planned for areas too sloped for industrial use.

Existing Conditions

Transportation

The existing transportation system was designed primarily to serve rural residential and farm to market uses. The arterials are generally fast moving with most intersections either having no traffic control or only stop signs. Highway 26 is the major thoroughfare that traverses the study area, connecting Gresham with both Portland (to the west) and Sandy (to the southeast). Hogan Road/242nd Avenue also provides a north/south connection through the western portion of Springwater.

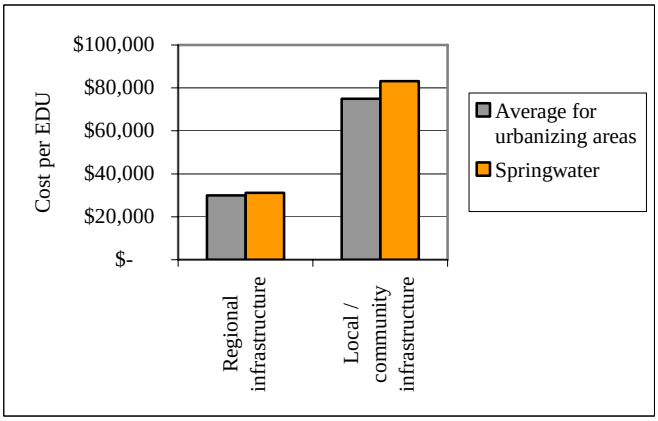
Water
The area has no public water system. Private wells serve the area.

Wastewater
The area has no public sewer system. Waste is directed to private septic systems.

Stormwater
The area has no public stormwater system. Stormwater is directed to creeks and to drainage ditches along roads.

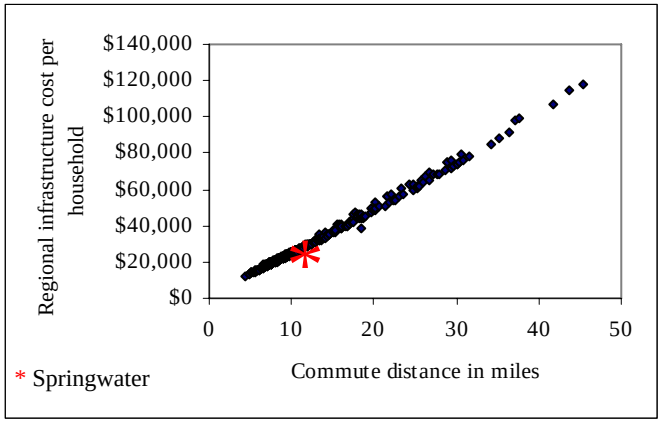
Parks, plazas, public places
The area has no public parks, but is bisected by the Springwater Corridor, a regional trail that connects Portland to Boring.

How do Springwater's infrastructure costs compare to the regional average?



Springwater's regional infrastructure costs (highways, bridges, transit, etc) are about average for the 7-county region and its local/community infrastructure costs are about $8,000 per EDU higher than the regional average for urbanizing areas.

What are the factors that influence infrastructure costs in Springwater?



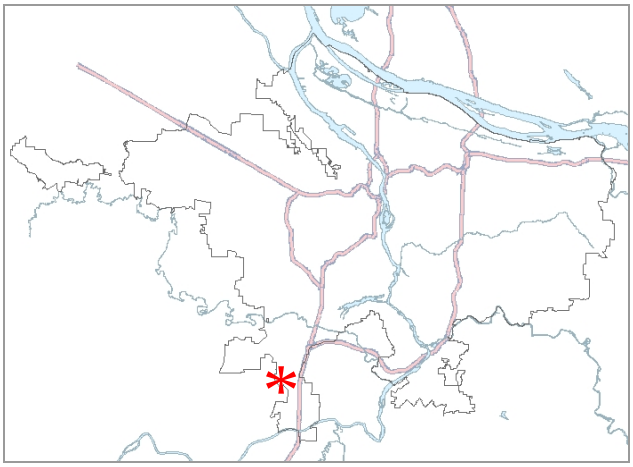
Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tract that includes the Springwater area are forecasted to have an average commute distance of 12.82 miles in the year 2035. This distance is slightly higher than the average for the 7-county region (12.32 miles).

Topography / natural features: With the exception of its western portion, the Springwater area is relatively flat. The sloped, western portion of the area will be low-density residential. The concept area also has a number of riparian areas. These features reduce average densities, making the area more expensive to serve.

Transportation: Almost 2/3 of the local / community costs ($237,231,000) associated with Springwater are attributable to transportation improvements.

SW Tualatin Concept Plan– urbanizing area

Tualatin, OR



Total acres:	431
Gross buildable acres:	352
Net new population:	0
Net new jobs:	5,760
Total EDUs:	1,152
Avg. EDUs per gross buildable acre:	3.27
Avg. commute miles in the year 2035:	12.36

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 216,512
Total:	$249,422,000

Proposed Use

The SW Tualatin area is planned as an industrial area.

Existing Conditions

Transportation

SW Tualatin-Sherwood Road, SW 115th Avenue and SW 120th Ave to the north and SW Tonquin Road and SW Waldo Way to the south serve the SW Tualatin concept area. A future SW 124th Avenue arterial connection is planned to connect Tualatin-Sherwood Road with SW Tonquin Road, and would become a primary point of vehicle access in the future. This connection would be regarded as a community level facility as it would serve both Tualatin and Sherwood. SW 115th Avenue will serve as a secondary north-south access between SW Tualatin-Sherwood Road and SW Tonquin Road. A railroad line boarders the east boundary of the study area.

Water

There are no public water lines in the study area.

Wastewater

No sanitary sewer system of adequate size to serve the proposed development exists on or near the study area.

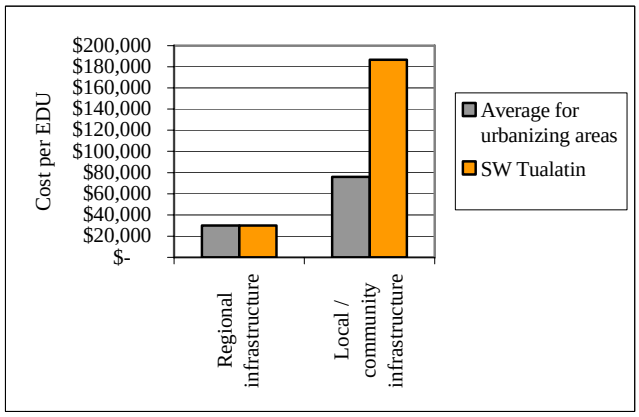
Stormwater

No storm water system exists within the study area. The plan area rises gradually in elevation. Drainage is imperfect, but generally toward the north and toward the south, with a break point at approximately the middle of the Concept Plan area. Drainage in the northern portion around and in the quarry infiltrates through the fragmented basalt. Drainage to the south flows toward Coffee Lake Creek/Seely Ditch, which flows to the Willamette River.

Parks, plazas, public places

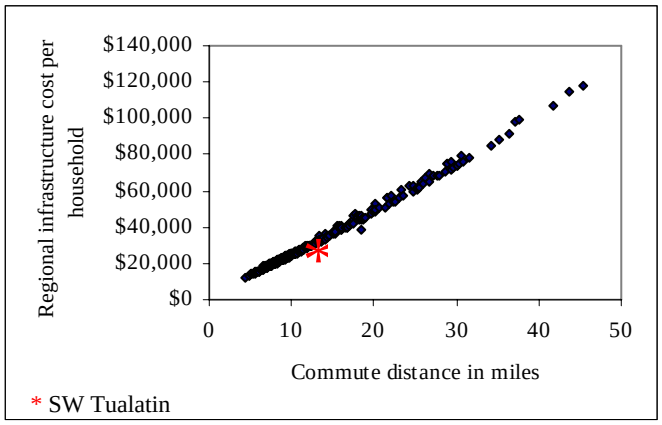
There are no existing parks within the concept area. However, there are long-term plans for a regional trail that would follow the Bonneville Power Administration easement through the area. Additionally, a forested area is envisioned west of a railroad line located in the eastern boundary of the study area to create a transition from residential to industrial uses.

How do SW Tualatin's infrastructure costs compare to the regional average?



SW Tualatin's regional infrastructure costs (highways, bridges, transit, etc) are average for the 7-county region. Its local/community infrastructure costs are about $112,000 per EDU higher than the regional average for urbanizing areas.

What are the factors that influence infrastructure costs in SW Tualatin?

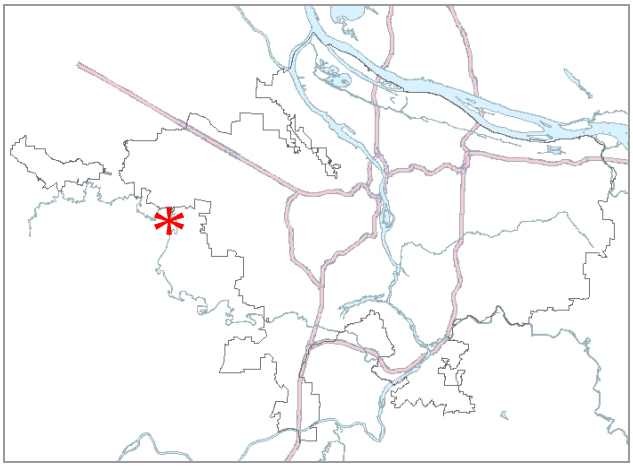


Commute distance: Residents of the census tract that comprises the SW Tualatin area are forecasted to have an average commute distance of 12.36 miles in the year 2035, similar to the 7-county average (12.32 miles).

Transportation: A substantial portion of the local / community infrastructure costs for SW Tualatin are attributable to transportation improvements. Since the writing of the concept plan, estimated costs for 124th Avenue have gone up significantly. Other transportation projects have also increased in cost since 2005, including SW 115 Avenue, SW Blake Street, SW 120 Avenue, Tonquin Road and Waldo Way. Total transportation costs are now estimated at $195,431,000, or about 91% of the total infrastructure costs for the concept area.

Witch Hazel concept area– urbanizing area

Hillsboro, OR



Total acres:	318
Gross buildable acres:	270
Net new population:	5,000
Net new jobs:	0
Total EDUs:	2,000
Avg. EDUs per gross buildable acre:	7.41
Avg. commute miles in the year 2035:	12.20

Estimated capital costs (2008$, including regional costs)

Per EDU:	$ 49,000
Total:	$98,465,000

Proposed Use

The Witch Hazel area is planned as a residential community with mixed-use zones.

Existing Conditions

Transportation

Direct north-south access to the Witch Hazel Village plan area is provided by three county roadways: SW River Road (along the western edge), SW 247th /Brookwood Avenue (at the center), and SW 234th/Century Boulevard (along the eastern edge); and east-west access is provided by one city roadway, SE Alexander Street (along the northern edge). Except for River Road, which has a bike lane, the roads are without sidewalks, curbs and bike/ped infrastructure.

Water

Current residents are on private well systems. When the plan area is annexed to the City and is urbanized, water will be supplied by the City of Hillsboro.

Wastewater

With the exception of the new Witch Hazel Elementary School (which has sewer service), all developed properties within the plan area are currently served by private septic systems.

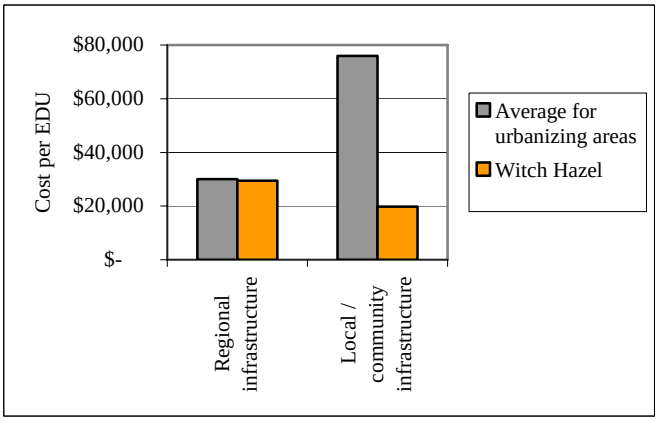
Stormwater

The existing stormwater system within the plan area includes pipes/culverts, subsurface tiling, overland flow, natural swales, irrigation and roadway drainage ditches, all of which flow to Witch Hazel Creek or Gordon Creek, eventually draining to the Tualatin River.

Parks, plazas, public places

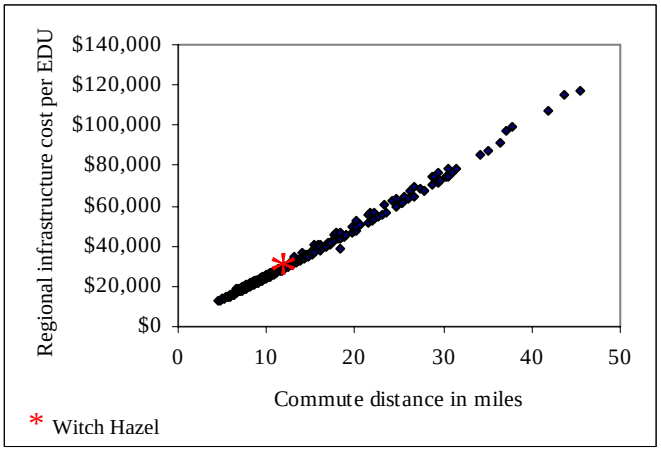
There are no existing public parks within the Witch Hazel Village plan area. However, Clean Water Services owns a wetland area in the northwest portion of the concept area.

How do Witch Hazel's infrastructure costs compare to the regional average?



Witch Hazel's regional infrastructure costs (highways, bridges, transit, etc) are average for the 7-county region. Its local/community infrastructure costs are about $55,000 lower per EDU than the regional average for urbanizing areas.

What are the factors that influence infrastructure costs in Witch Hazel?



Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tract that comprises the Witch Hazel area are forecasted to have an average commute distance of 12.2 miles in the year 2035, similar to the 7-county average (12.32 miles).

Topography: The Witch Hazel area is fairly flat with no substantial riparian zones.

Proximity of existing services: Water and sanitary sewer services exist to the north of the area. There is an existing school on site.

Appendix 1

Preliminary capital costs (000) escalated to 2008$[8]

	Transport	Transit & Bike/Ped	Sewer	Water	Storm	Parks	Subtotal	Other	Total
Coffee Creek I	$4,518	$0	$1,530	$1,140	$300	$570	$8,058	$0	**$8,058**
Springwater	$237,231	$0	$28,894	$35,032	$29,993	$44,642	$375,791	$0	**$375,791**
Damascus	$1,731,623	$0	$162,240	$282,843	$75,712	$390,203	$2,642,621	$476,674	**$3,119,295**
SW Tualatin	$195,431	$0	$9,674	$9,224	$562	$0	$214,891	$0	**$214,891**
Witch Hazel	$6,862	$0	$9,275	$8,575	$10,236	$4,612	$39,559	$0	**$39,559**
Shute Road	$6,350	$0	$967	$619	$1,200	$0	$9,136	$0	**$9,136**
Rock Creek	$33,576	$0	$1,076	$3,185	$4,664	$6,295	$48,796	$0	**$48,796**
Pleasant Valley	$103,823	$0	$22,686	$21,172	$32,213	$70,186	$250,080	$53,993	**$304,073**
North Bethany	$157,723	$0	$13,500	$13,800	$13,800	$38,800	$237,623	$146,000	**$383,623**
Beaver Creek	$66,300	$0	$8,500	$15,900	$25,200	$0	$115,900	$0	**$115,900**
Park Place	$58,400	$0	$5,520	$3,800	$820	$3,220	$71,760	$0	**$71,760**
South Hillsboro	$203,057	$0	$7,550	$11,316	$0	$56,894	$278,817	$16,700	**$295,517**
South Waterfront	$148,445	$29,900	$0	$0	$710	$92,553	$271,607	$51,850	**$323,457**
Lake Oswego Village Cntr	$797	$0	$0	$0	$0	$0	$797	$4,319	**$5,116**
Brewery Blocks	$0	$0	$0	$0	$0	$0	$0	$40,647	**$40,647**
Civic Neighborhood	$3,413	$6,194	$366	$266	$1,365	$0	$11,606	$0	**$11,606**
North Main	$811	$0	$0	$0	$0	$0	$811	$108	**$919**

[8] Escalation assumed to equal 1st Q. 2008 dollars. Change between year of planning estimate and this year, based on 4% annual escalation rate. Costs do not reflect state facilities. SW Tualatin project assumes 50% of 242nd Ave. improvement is allocated to project area.