

SUSTAINABLE THURSTON

Task Force Draft

Preferred Land Use Scenario and Key Indicators

June 25, 2013

THURSTON REGIONAL PLANNING COUNCIL (TRPC) is a 22-member intergovernmental board made up of local governmental jurisdictions within Thurston County, plus the Confederated Tribes of the Chehalis Reservation and the Nisqually Indian Tribe. The Council was established in 1967 under RCW 36.70.060, which authorized creation of regional planning councils.

TRPC's mission is to **“Provide Visionary Leadership on Regional Plans, Policies, and Issues.”**

To Support this Mission:

- A. Support **regional transportation** planning consistent with state and federal funding requirements.
- B. Address **growth management, environmental quality**, and other topics determined by the Council.
- C. **Assemble and analyze data** that support local and regional decision making
- D. Act as a **“convener”**, build regional **consensus** on issues through information and citizen involvement.
- E. Build **intergovernmental consensus** on regional plans, policies, and issues, and advocate local implementation.

This report was prepared as part of the Thurston Regional Planning Council's 2013 regional work program.

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Preferred Land Use Vision

In one generation Thurston Region's built environment will transition to distinct, recognizable places and neighborhoods, fostering a sense of community, supporting a robust economy, and protecting farmlands and natural areas. City and town centers in Bucoda, Lacey, Olympia, Tumwater, Rainier, Tenino, Yelm, and Grand Mound will be developed or enhanced into thriving business districts, all with a walkable, well-designed urban form that encourages a mix of housing, goods, services, and places to recreate. Close-in neighborhoods will have greater access to goods and services, and increased opportunities for housing choices to fit the needs of the changing population. Greater attention will be paid to design, walkability, accessibility, and affordability, all essential to both meet the needs of an aging population and to attract and retain innovators and creative people in our community. Suburban single-family neighborhoods will provide housing choices for families and others that value quiet neighborhoods with private spaces. The rural areas will remain a mixture of rural homes, farmlands, forest lands, and natural areas, with markedly lower densities of residential growth than the urban areas.

Priority Targets:

- By 2035, 72 percent of all (new and existing) households in our cities, towns, and unincorporated growth areas will be within a half mile (comparable to a 20 minute walk) of an urban center, corridor, or neighborhood center with access to goods and services to meet some of their daily needs.
- Between 2010 and 2035, 5 percent of new housing will locate in the rural areas. Rural areas are defined as outside of the cities, towns, unincorporated urban growth areas and tribal reservations.

Supporting Land Use Target:

- No net loss of farmlands, forest lands, prairie habitats (in addition to environmentally critical areas that are currently protected) while providing for a range of rural densities within rural Thurston County.

Relationship to the Remainder of the Sustainability Plan:

The Land Use Vision will support and be supported by the other elements that are essential to a sustainable community:

- Bold Leadership and Inclusive Participation.
- Robust and Innovate Economy.
- Diverse and Accessible Opportunities and Choices.
- Healthy Environment.
- Strategic and Long term Investment.

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Scenario Development

Phase One:

Initially three land use scenarios were developed to reflect strategies presented in the Places Vision and Strategy Briefs, and to move toward overall Sustainable Thurston Vision and Goals. Scenarios were compared against a Baseline.

Phase Two:

After reviewing the initial scenarios and gathering public input, The Sustainable Thurston Task Force determined that to achieve the community vision would require bolder steps with regard to land use. They articulated a bold Regional Vision and embarked on setting priority goals and targets. Two land use targets were discussed by the Task Force and evaluated by staff using the Land Use Model. A Preferred Land Use Scenario was developed that can achieve the following targets, and still maintain the foundations of the land use scenario development:

- By 2035, 72 percent of all (new and existing) households in our cities, towns, and unincorporated growth areas will be within a half mile (comparable to a 20 minute walk) of an urban center, corridor, or neighborhood center with access to goods and services to meet some of their daily needs.
- Between 2010 and 2035, 5 percent of new housing will locate in the rural areas. Rural areas are defined as outside of the cities, towns, unincorporated urban growth areas and tribal reservations.

The foundations of the land use scenarios were:

- Plan for our changing demographics, changing housing preferences, and anticipated growth.
- Ensure the scenarios were market based and realistic.¹
- Ensure scenarios took into account property rights, vesting, and reasonable use of property.
- Ensure the scenarios were consistent with public input.
- Ensure the scenarios are consistent with the goals of the State's Growth Management Act and the Foundational Principles and Policies articulated during Phase One of Sustainable Thurston.
- Base land use scenarios on the strategies outlined in the Places Vision and Strategy Briefs, the Land Use, Transportation, Climate Change brief, and additional measures as necessary to achieve priority targets.

¹ Source: The sources for this were several market studies developed for Sustainable Thurston and an associated projected called Urban Corridor Communities, as well as the Grand Mound Development Plan.

Scenario Development

Phase One scenarios were developed based on discussions of the Urban Corridors Task Force, Population and Employment Advisory Group, Sustainable Thurston Panels, and Sustainable Thurston Task Force. The details are consistent with available research, market studies, and discussions with jurisdictional planning staff.

Changing Demographics

Around 12 percent of our population is 65 or older today. By 2035, it is expected that 19 percent of our population will be age 65 or older. This will drive a shift in housing demand and delivery of services.

As people age, they tend to want to reduce their home maintenance (including yards) but often do not want to move out of their neighborhoods. Active seniors are expressing a desire for more housing choices in walkable urban communities where they do not need to rely on a car to meet their daily needs. As seniors become less active, they will need housing opportunities close to nearby goods and services.

The other demographic that is driving a change in housing choices is the Millennium Generation. The young people entering the work force are delaying marriage and parenthood, and are locating in increasing numbers in walkable urban city centers. They are also driving a new wave of entrepreneurs.



Land Use Baseline

The Baseline Scenario is the Region's adopted population and employment forecast. It represents the path we are currently on. It considers existing conditions, past trends, and existing plans and policies including Growth Management Act Local Comprehensive Plans, zoning and environmental regulations. The Baseline Scenario was developed under guidance of the Forecast Advisory Group over the course of the last year. The final phase of the Forecast was adopted by TRPC on February 1, 2013.

Some key features of the Baseline Scenario:

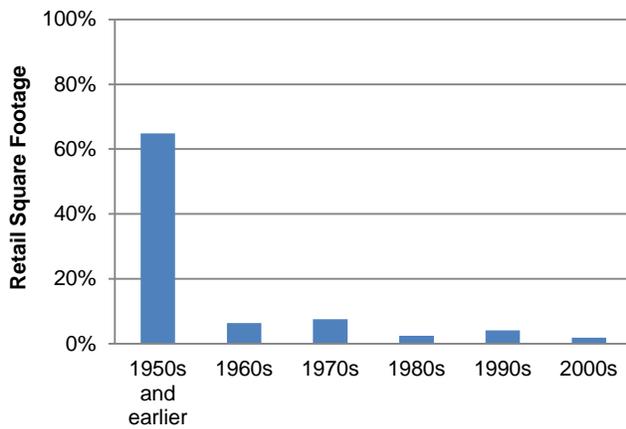
- There is approximately 10 to 12 years' worth of single-family subdivision projects that are permitted, vested or planned in Thurston County. Many of these are planned for the suburban areas of the cities and unincorporated growth area in what is currently greenfield or partially vacant lands.
- There is also an approximate 10 to 12 years of supply of permitted, vested, or planned multifamily projects. Most of the multifamily activity that is permitted or planned is occurring outside of central city cores and in the form of garden style apartments.
- Demand for walkable urban residential housing choices (housing of all pricing ranges) is higher than existing supply. This is expected to continue in the future.
- Central areas (including south county cities and towns) will continue to struggle to retain essential goods and services, (keep storefronts full) and compete successfully against big box stores and internet shopping.
- Redevelopment along urban transit corridors is expected to continue in a suburban, auto-oriented form.
- Very few accessory dwelling units have been permitted in infill areas in the last ten years. This is not expected to increase much in the future unless financing, concerns over design, and education on how to build these types of homes are addressed.
- Neighborhood centers (small hubs of retail/services) within neighborhoods will continue to be difficult to create – due to 1) not enough customers – rooftops – within walking distance to support the business or 2) community opposition for new businesses/community clubs in existing neighborhoods, 3) community concerns about new mixed-use neighborhoods adjacent to their neighborhoods.
- There has been a sharp decrease in the percent of new homes going into the rural areas, likely due to the rural rezone in 2007 as well as the attractiveness of some master planned communities in the cities. The Baseline assumes that around 13 percent of new growth will go into rural areas, a slight decrease from the last five years.
- Home based employment will continue to be at the levels of today.
- The number of county to county (and city to city) commuters will continue to grow at the same rate as the last few decades.

Movement Away from City Centers

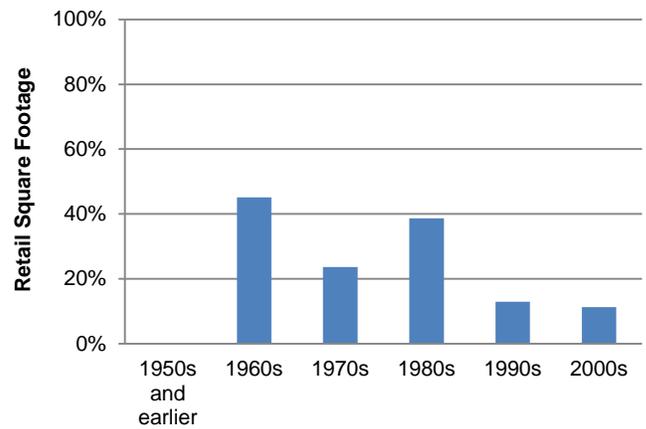
The movement from city centers to the suburbs occurred for both residential and commercial development over the last 50 years. Thurston County's development patterns are typical of those seen throughout the United States. The series of graphs below show trends in location of retail buildings in Thurston County over the last half century. Some highlights:

- In the 50s and prior, most retail located in city/town centers or on the corridors (mainly state highways) that linked them. The city and town centers were developed in a walkable urban form.
- The 60s saw the first regional shopping centers or malls. One of the first malls was South Sound Center in Lacey. Capital Mall followed a decade or so later.
- The corridors began as state highways, but today are major city streets linking the centers in Tumwater, Olympia, and Lacey. The type of development that typically occurs along the corridors is auto-oriented.
- Freeway interchange shopping areas emerged shortly after Interstate 5 in the late 50s and 60s. Retail development at the interchanges has continued to grow, capturing a larger and larger share of retail growth. Much of that is in the form of auto-oriented, larger scale retail stores.

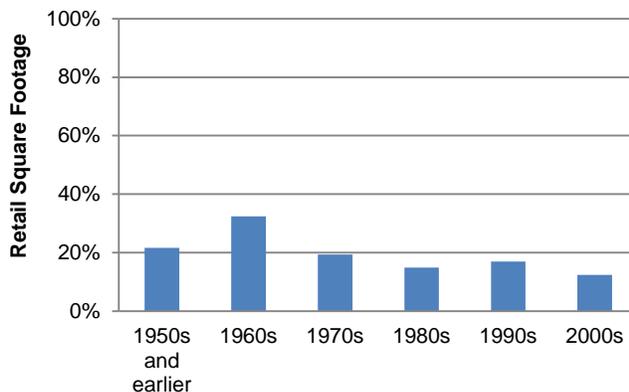
City/Town Centers



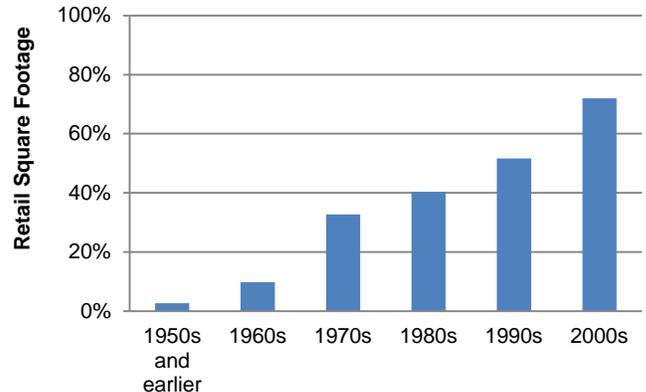
Regional Shopping Centers



Urban Corridors



Freeway Interchange Shopping Areas



Preferred Land Use Scenario

Actively create vibrant centers, corridors, and neighborhood centers while protecting rural residential lands, farmlands, prairies, and forest lands.

What if we reinvest in our existing job centers and transit corridors? What if we take an active role in looking for opportunities for infill and redevelopment, and public private partnerships? What if we work with neighborhoods to create livelier, livable “village” style neighborhoods, use our remaining urban land supply strategically, and take stronger measures to protect our rural residential and resource lands?

This Scenario imagines that we focus our investment, energy, and attention in creating vibrant urban centers, lively neighborhoods, protecting rural lands. It imagines we better understand the changing needs of our community, and take proactive steps to ensure that we are creating the types of places that will support our residents, both today and in the future, by giving urban residents greater access to a full range of housing and transportation options, and protecting rural lifestyle choices and resource lands. Key to this is gaining an understanding of what is appropriate for each of our communities, based on local visions and assets – both physical and community assets. This can only happen by involving the nearby community, both businesses and residents, each step of the way.

Compared to the Baseline, by 2035 the Preferred Scenario will result in the following measurable benefits:

Greater Efficiency in the Delivery of Services and Provision of Infrastructure

- 95 percent of growth locating in areas designated for urban growth – or the cities, towns, designated urban growth areas and Tribal Reservations,
- An increase in activity density (people plus jobs) in higher-frequency transit corridors approaching a level that may support a higher level of transit service.
- 1.6 billion dollars in savings in road, water, sewer, and other related infrastructure to support residential development.



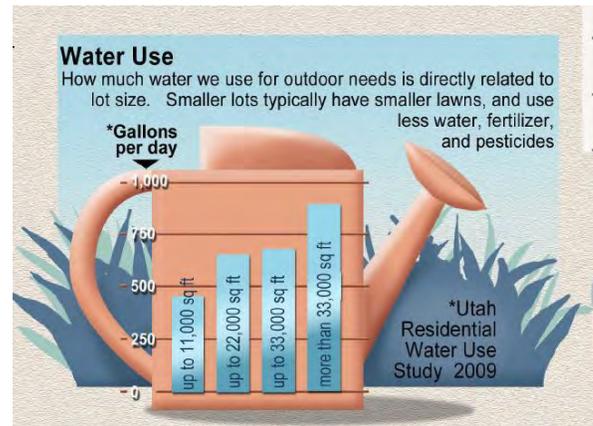
Greater Access to Jobs, Shopping, Food, and Services

- A better mix of jobs and housing in the county as a whole will lead to a 16 percent reduction of 1990 levels of vehicle miles traveled based on land use changes alone.
- 43 percent of the population living within a quarter mile of transit service.
- 72 percent of urban households living within a half mile of goods and services.



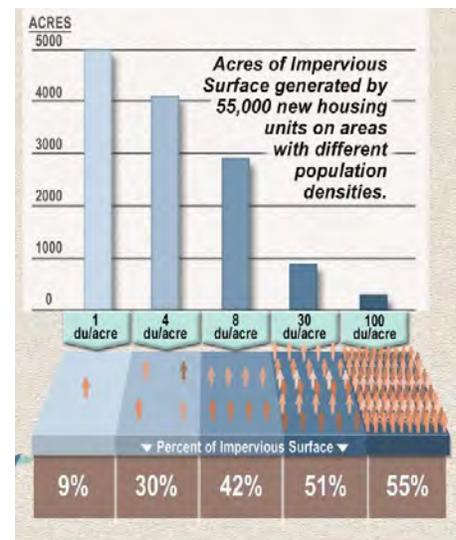
More Efficient Use of Resources

- 33 percent reduction in land consumption compared to the Baseline.
- 11 percent reduction of 2010 levels in per household water use through land use changes alone; and a 45 percent reduction when conservation measures are included, leading to a 21 percent decrease in total residential water consumption while accommodating growth.
- 28 percent reduction of 2010 levels in per household energy consumption through land use changes alone; and a 39 percent reduction when conservation measures are included, leading to an 11 percent decrease in total energy consumed by households while accommodating growth.
- No net loss of forest lands.
- No net loss of rural farmlands.



Greater Protection of Environmental Quality

- 34 percent reduction in new impervious area compared to Baseline in protected stream basins; 31 percent reduction in new impervious area compared to Baseline in sensitive stream basins.
- 38 percent reduction in residential carbon dioxide emissions per household; leading to a 10 percent reduction in total carbon dioxide emissions from residential uses compared to 2010.



Some Benefits of the Preferred Scenario Are Less Quantifiable:

- Creating vital urban places will foster an innovative and entrepreneurial economy. By integrating land uses, increasing transportation options, increasing housing density and employment intensity, our urban areas will become more economically productive. This will reduce unemployment, increase wages, and make our economy more resilient. One study showed that doubling population density led to a 6 percent increase in labor productivity and a 15 percent increase in economic productivity².



- Focusing on walkable urban places and economic and social factors such as employment, community safety, income, and education, will have positive outcomes on personal health. According to the County Health Rankings Model, 50 percent of health outcomes are related to: 1) the physical environment (environmental quality and built environment – 10%), and 2) social and economic factors (education, employment, income, family and social support, and community safety – 40%). The other factors are health behaviors (30%) and clinical care (20%).
- Reducing cost burden. Twenty-four percent of Thurston County households spend more on housing than they can afford – or are cost burdened. Of our low to moderate income households (or those earning less than eighty percent of median income) sixty-four percent spend more than 30 percent of their income on housing. One-third pays more than 50 percent, are considered severely cost burdened, and are at risk of becoming homeless. The Preferred Scenario focuses on measures to reduce transportation and energy costs, increase economic opportunities, and increase access to food. These measures will lead to households being better able to meet their basic needs.
- Fostering a sense of community. In a recent survey for the Sustainable Thurston project, 85 percent of responders felt like working together as a region to plan for the future will lead to an improved quality of life. Sixty-six percent felt that their actions and participation as an individual can affect the planning and future of the region.



² Bettencourt, L.M.A., J. Lobo, D. Delbing, C. Kuhnert, G.G. West (2007). Growth, innovation, scaling, and the pace of life in cities. Proceedings of the National Academy of Sciences 104 (17): 7301-7306.

Some elements of the Preferred Scenario:

- Focus on creating or enhancing walkable urban city and town centers in Bucoda, Grand Mound, Lacey, Olympia, Rainier, Tenino, Tumwater and Yelm. These sorts of places create the hearts of our community, foster economic development and an innovative culture, and offer places to live, work, shop, and play. The essential elements of a walkable urban center – at any scale – from neighborhood to city center – are the following:

Walkable Urban Housing- Why is This So Difficult to Achieve?

Thurston County has a pent-up demand for walkable urban housing. That means people would like to move or live in walkable urban areas, but cannot find housing that meets their needs (either price or location, or size of unit) so they locate in another part of the county instead.

Walkable Urban is the type of neighborhood or place that has easy access to jobs, goods, and services, as well as buildings and streets that invite walking. The result is that people are not dependent on their cars for every errand, get more exercise, and find community outside their doors.

The reason it is difficult to locate new housing in these areas is that until the region has some successful housing projects penciled out and get built in our city centers, it will be difficult for others to get financing. All of the right elements must come into alignment to have a quality project built. Many factors have to come into alignment including: land prices, interest rates, construction costs, rents and/or home sale prices that will support quality construction, financing, suitable site with close by amenities (i.e. views, parks, trails, shops or services), a willing developer, and community and political support.

People: People living, working, shopping, and recreating in the centers brings vibrancy, safety through “eyes on the street”, customers for local businesses, and opportunities for increased transportation options such as transit and walking.

Places: Interesting and essential places, such as grocery stores and pharmacies, specialty retail and services, allow people to meet their daily needs without having to travel long distances. In larger centers a broader range of job opportunities near to housing and services reduces the need for long daily commutes. Other amenities such as parks, small pockets of open space and cultural activities – depending on the size of the center – enhance walkability.

Physical Form: The physical form or design of buildings, streets, parking, and open space, can either invite or inhibit walkability. Lower floors of buildings should be architecturally interesting, and designed to enhance the pedestrian realm. Transition zones should be created between higher density areas and existing neighborhoods. Parking should be underground, under buildings, or set behind the building to minimize seas of asphalt. Green infrastructure such as trees can be used to enhance attractiveness and walkability.

Paths: Small block sizes and well-connected streets provide direct routes that invite walkability. Streets must be safe and accommodate vehicles, transit, cyclists and pedestrians. Pedestrian and bicycle pathways should be designed into walkable urban communities.

Public Investments: Public investments in transit, street design, parks and public buildings, is an essential component to creating a walkable urban center.

Attracting Retail Growth to Existing City Centers and Corridors

Residents of Thurston County have expressed a desire for more walkable urban environments – areas where they can live, work, play, and shop, and that have a range of transportation choices including frequent transit service. The best opportunities for these places are existing centers and corridors. To create these live, work, play, shop areas will require enough housing units close by to support additional retail and services within walking distance of places where people live — a full range of retail and services including drug stores and grocery stores. Yet much of the growth in the retail and services continues to be located in suburban shopping centers predominately accessible by car.

What Could Reverse This Trend?

- 1) Locating more housing near existing retail areas
- 2) Transitioning existing retail areas in centers and corridors to a more walkable urban form
- 3) Focusing growth in existing commercial areas
- 4) Strategic investments in amenities in city centers and corridors

Households Support Neighborhood Retail

National research suggests that a typical household supports approximately 70 square feet of retail space - 15 square feet of which could reasonably be neighborhood retail or services (such as the type of retail found along Capitol Boulevard in Tumwater or Martin Way in Olympia and Lacey) within walking distance. Neighborhood retail and services are generally things such as drug stores, small grocery stores, specialty stores such as bike stores, convenience stores, coffee shops and restaurants and personal services such as nail and beauty salons.

A medium-sized neighborhood retail center – say 30,000 square feet or around the size of Southgate Center in Tumwater — could be supported by around 1,000 homes within a convenient walking distance of a quarter-mile, and another thousand households nearby. This is an overall residential density of 8 units per acre assuming the retail centers are distinct and separated. The keys are focusing the commercial areas into a walkable urban environment, making convenient connections to adjacent neighborhoods, paying attention to safety, attractiveness, and a sense of place, and providing amenities such as small parks. Larger mixed-use centers, such as those envisioned for “downtowns” would require more people to support them – both workers and residents.

Strategies

Local governments can help achieve a more walkable urban environment by investing in these areas focusing on safety, transportation improvements for walkability, cyclists, transit, and traffic flow, aesthetics including urban design and street improvements, and amenities such as parks and plazas. These investments will support neighborhood-scale businesses, and create an attractive and safe urban environment that will attract housing.

It will take a large range of strategies, from financing, incentives, investments, and public-private partnerships to reverse the trends of locating neighborhood-type retail and services in auto-oriented shopping areas. Our region is hard at work looking at solutions. For more information on this, please visit the Sustainable Thurston and Creating Corridor Communities webpages at www.trpc.org.

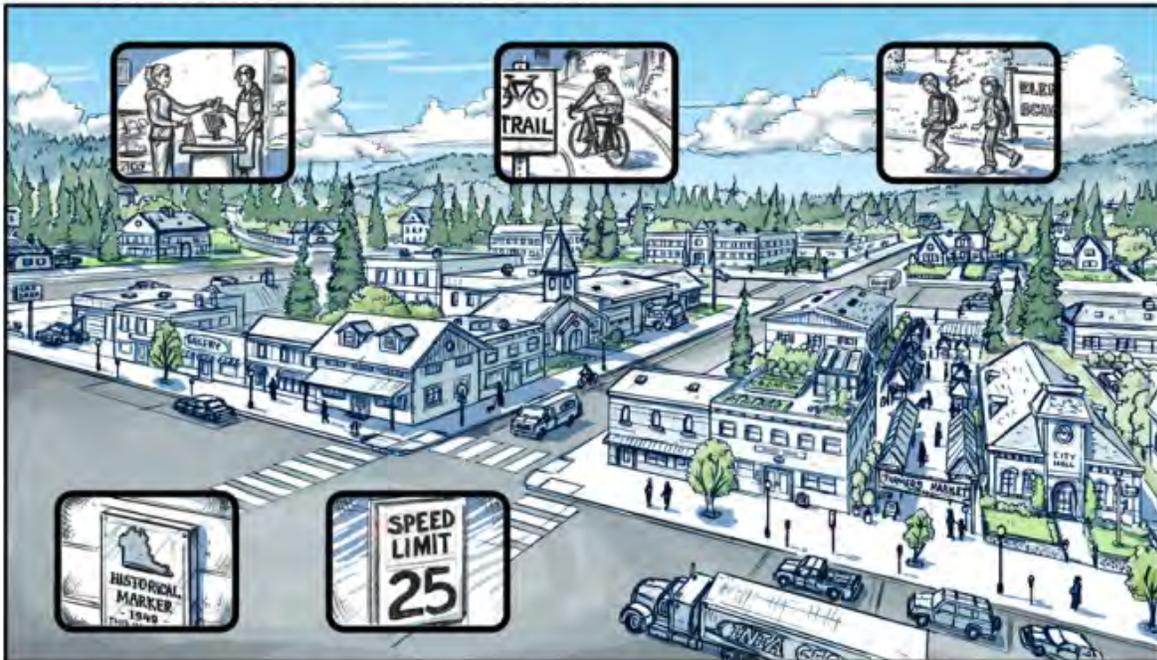
CITY CENTERS - NORTH COUNTY



A place to live, work, shop and play • Housing choices for a full range of ages and incomes • Multistory buildings with a mix of shops, offices and services • Early & safe opportunities supporting walking, biking and riding transit • Well-designed buildings along beautiful streets or surrounding parks and plazas



CITY/TOWN CENTERS - SOUTH COUNTY

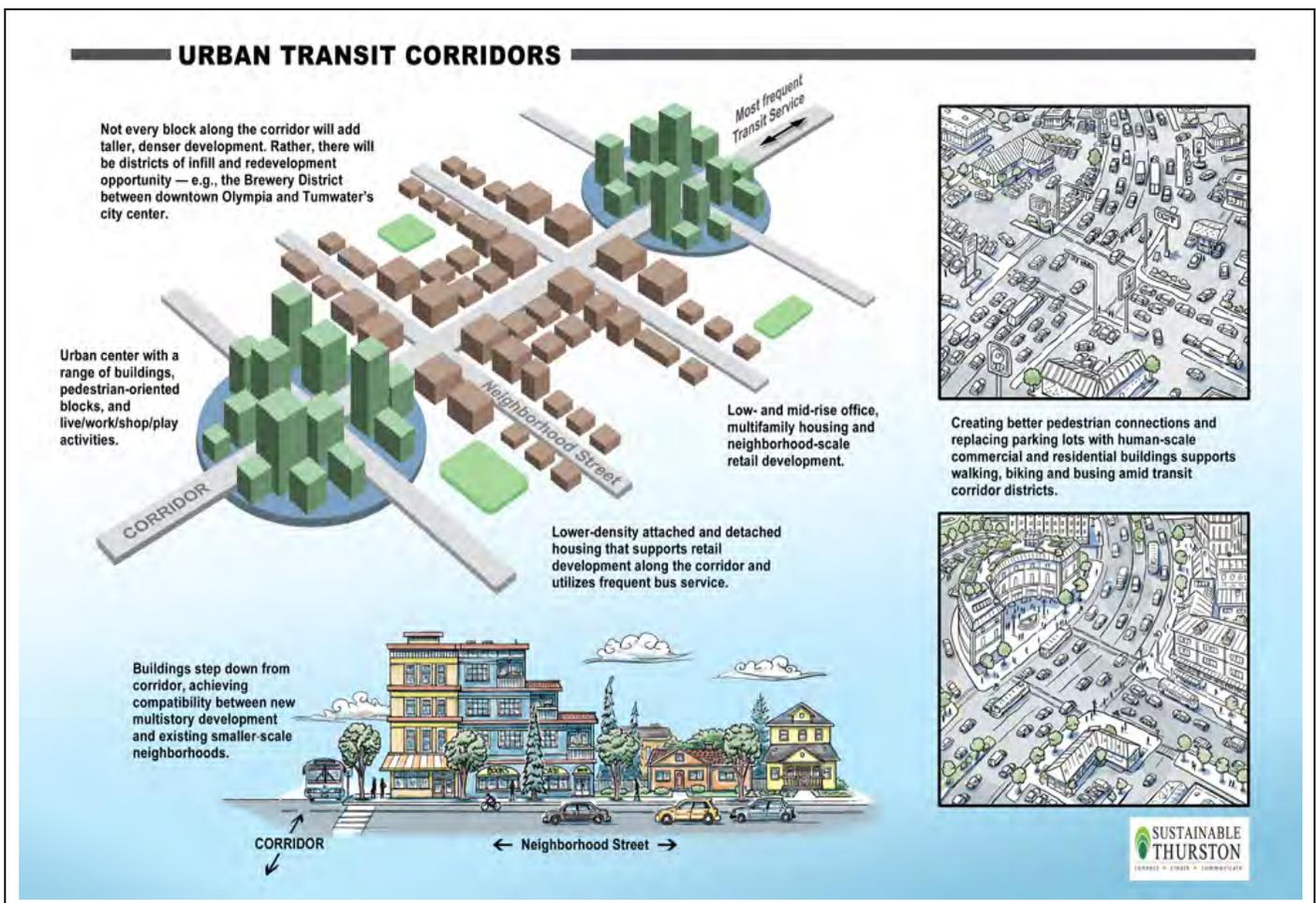


A healthy mix of homes, shops and services • Safe sidewalks and street crossings • Housing choices for all ages and incomes • Slower vehicles speeds • New buildings that blend with historic structures • Local residents who support shops • Green buildings that conserve energy and water • Centrally located schools



- Transition auto-oriented corridors into a more walkable urban form and seek opportunities for housing and a mix of services and amenities. The “nodes” along the corridor can be the city centers or smaller clusters of activity at fairly regular intervals. The rule of thumb is that a small neighborhood-scale commercial center can be supported by 500 households within a quarter mile, and another 500 households within a half mile. Neighborhood commercial centers typically support smaller businesses with goods or services that are not found in larger retail stores or purchased on-line.

The type of residential density likely to be supported by the market in Lacey, Olympia, and Tumwater along the corridors or corridor nodes is no more than 5 or 6 stories with some surface parking. This scale of development will only be feasible in areas with amenities such as parks, supporting transportation infrastructure such as sidewalks and bicycle lanes, views, and nearby activities. This is because areas with amenities and buildings with quality construction will get high enough rents to make development profitable. Additional incentives to developers such as reductions of impact fees, reductions in parking requirements, and tax credits will also help ease the difference between financing and construction costs and rents or sale prices.



- Increasing neighborhood vitality, access to goods and services, neighborhood businesses, opportunities to work from home – where appropriate.

NEIGHBORHOODS

Same Lane-Miles

A connected network of smaller streets offers alternative routes and decreases travel distances for cyclists, pedestrians and drivers.

Small shops patronized by nearby residents • Connected streets • Sidewalks • Bike lanes • Well-designed multifamily housing • Pocket parks • Street-level activity • Opportunities for neighborhood interaction

SUSTAINABLE THURSTON
COURAGE • CLARITY • COOPERATION

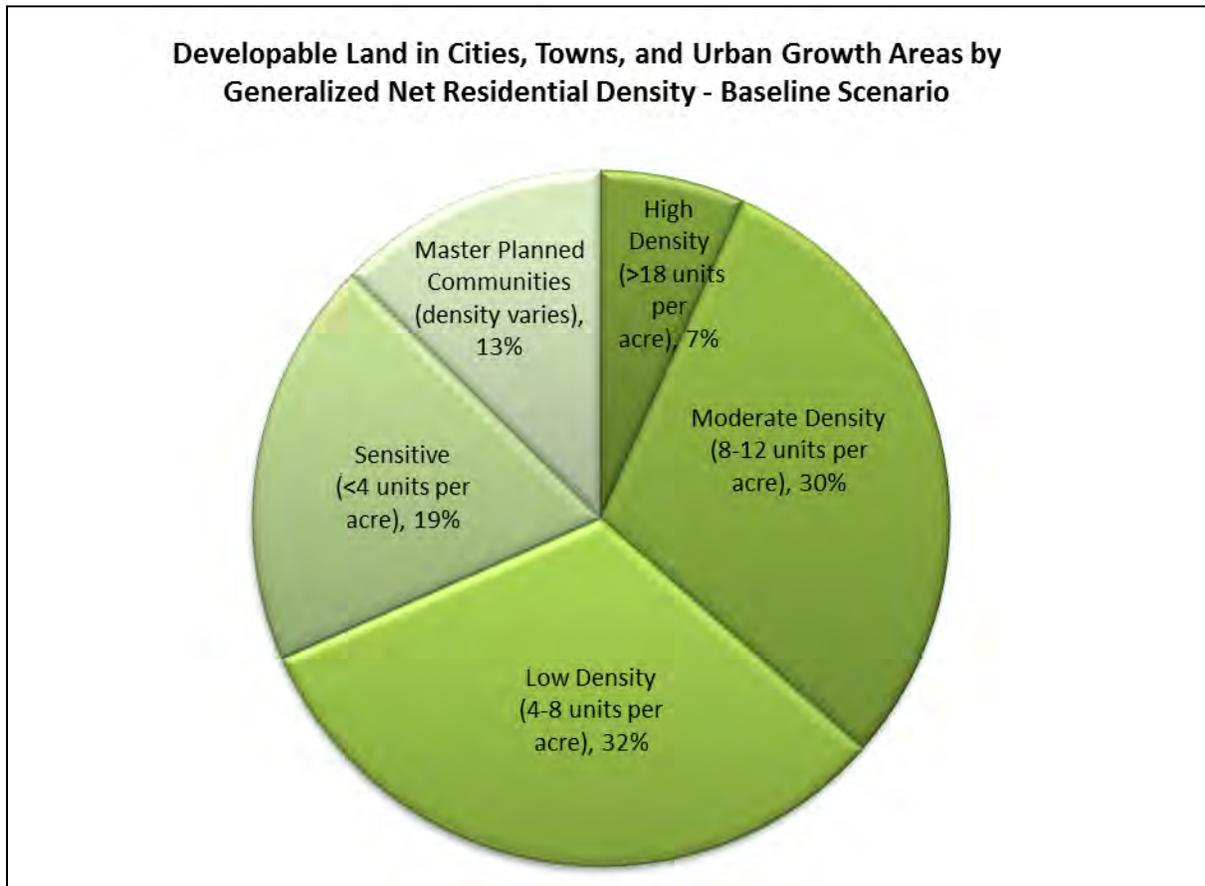
In urban neighborhoods (example above) seek opportunities to increase housing density to support neighborhood businesses, and improve the urban form and design.

In suburban neighborhoods (example to the right) seek opportunities for small pockets of activity.

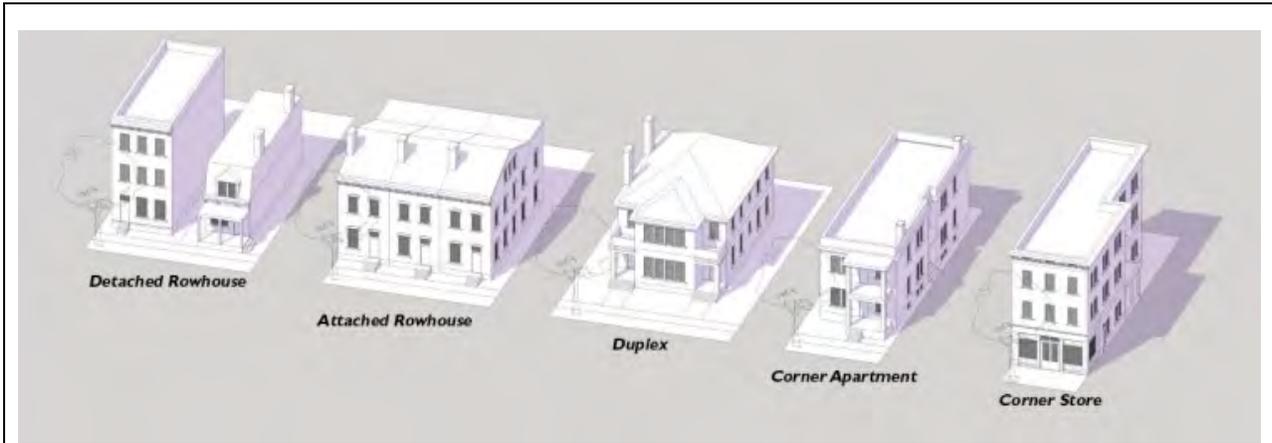
- Increase the range and choice of housing, especially in areas with access to goods and services such as transit. Focus on “moderate density” and accessible housing choices for neighborhoods to meet the needs of our changing demographics. The proportion of people aged 65 and older in Thurston County is expected to increase from 12 to 19 percent by 2035. People like to age in place, which means within their own home or neighborhood. As they age their needs change. Homes with large lawns require maintenance. Homes with stairs can be difficult to navigate. By providing a range of housing opportunities within neighborhoods, people will have options.

Some strategies to increase the range and choice of housing in neighborhoods include: conducting neighborhood planning to work with neighborhoods to resolve issues relating to fear of density. Residents generally fear that increased housing density will bring poorly designed homes into their neighborhoods. Working with neighborhoods on design and scale issues often resolves these issues. Templates for small housing, accessory dwelling units, and other types of infill housing can improve predictability and reduce costs.

- Rethink low density residential-only zoning districts in the urban areas. These zoning districts encourage development to occur at densities too low to be serviced by transit, creating large neighborhoods that have very few transportation options, and often are far away from jobs, goods, and services.



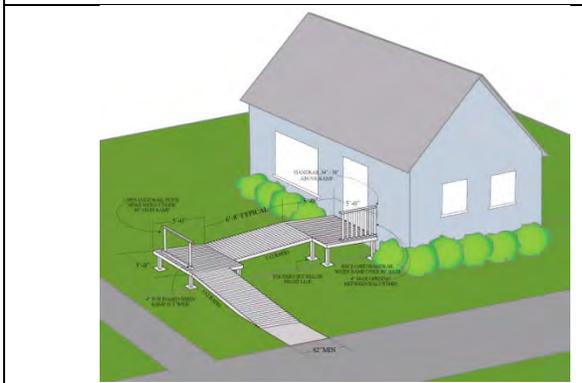
Some examples of “middle” density housing choices that may be more acceptable to neighborhoods are shown below.



Fourplex



Mansion Apartments
(examples from Opticosdesign.com)



Accessibility will be essential (lowes.com)



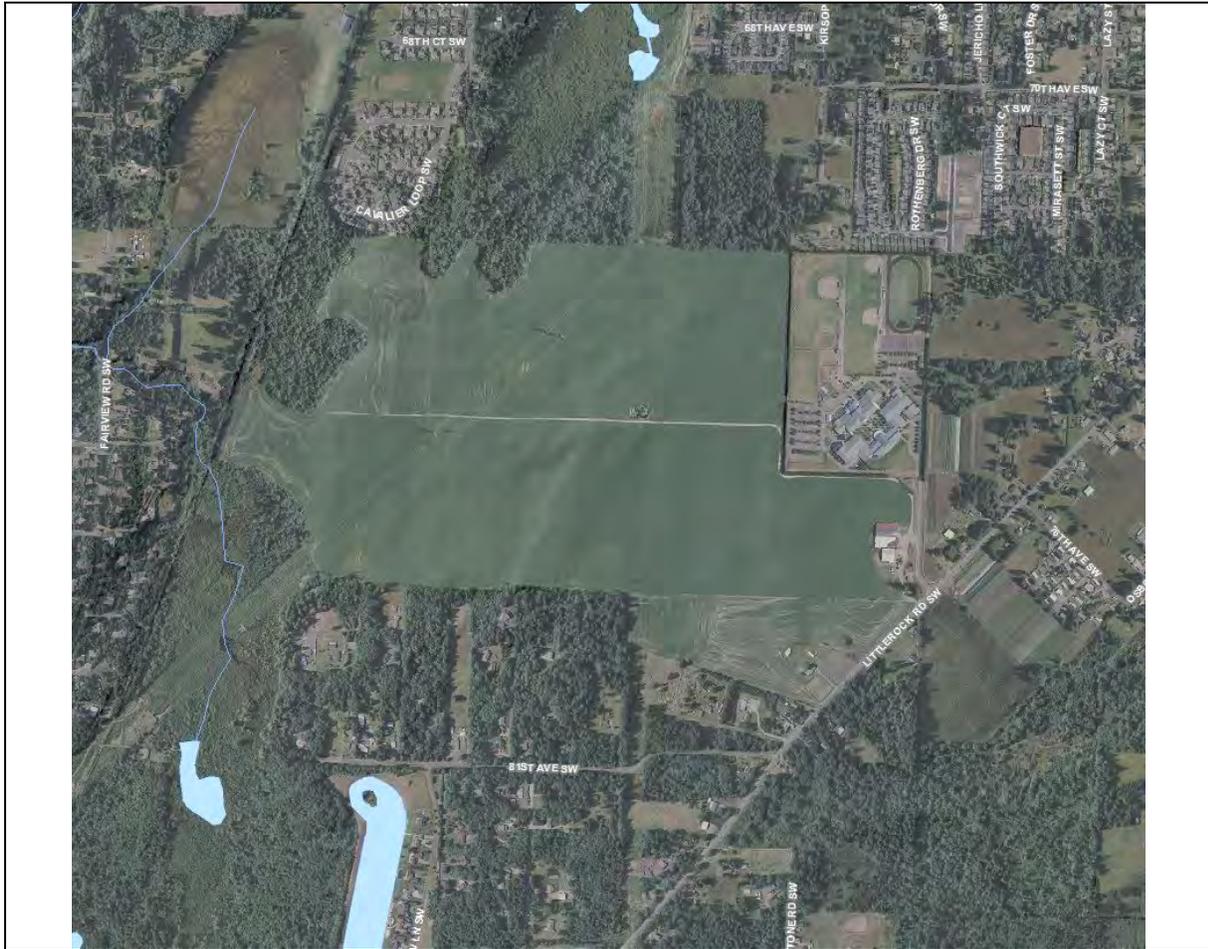
Accessory dwelling unit

- Use remaining urban land supply more efficiently.
- Take a comprehensive look at the vacant land supply, especially in the unincorporated area, and remove any areas that are not suitable for urban development for environmental reasons such as high groundwater, large amounts of wetlands, or steep slopes.
- Assess the cost of extending infrastructure to the remainder of the urban growth areas, and consider the full costs of maintenance when determining appropriate areas for urban growth. Place areas of the unincorporated growth area that do not currently have urban infrastructure (sewer or water lines) or where there are no specific plans to extend infrastructure, into longer term holding zones or lower density development.



This area along Woodland Creek is within the unincorporated urban growth area of Lacey. Much of the area was purchased by the City in recent years. In the center of the image was the site of a proposed 317 unit single-family subdivision. The urban growth areas have many areas that are environmentally sensitive, and not suitable for dense urban growth.

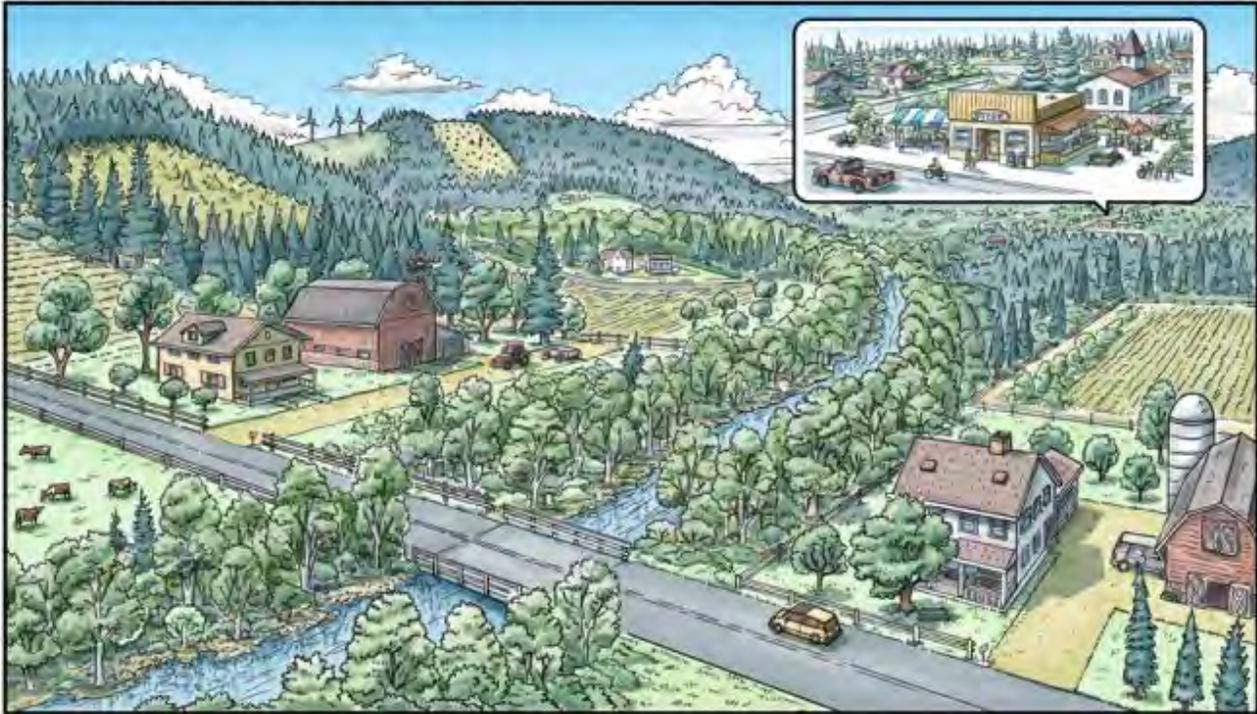
- Increase opportunities for urban agriculture while accommodating growth. Much of the developable land with existing city limits is also suitable for agriculture. Techniques such as clustering homes can help preserve as much of that land as possible, while accommodating growth. Other prime farmlands can be set-aside for urban agriculture, if compatible with nearby residential development.



The Doelman Farm in the City of Tumwater is zoned for a mixed-use development. Clustering commercial and residential development near Little Rock Road and the high school will help preserve farmland.

- Take into account property rights, vesting, and reasonable use of property. With around a 10 to 12 year supply of residential lots and multifamily projects either permitted, vested, or proposed, work with property owners to ensure new development supports the preferred land use vision when possible.
- Inventory and assess farmlands, forest lands, prairies, and other rural lands, and take steps such as re-examining rural zoning, transferring or purchasing development rights, or providing economic incentives to protect the rural character of Thurston County.

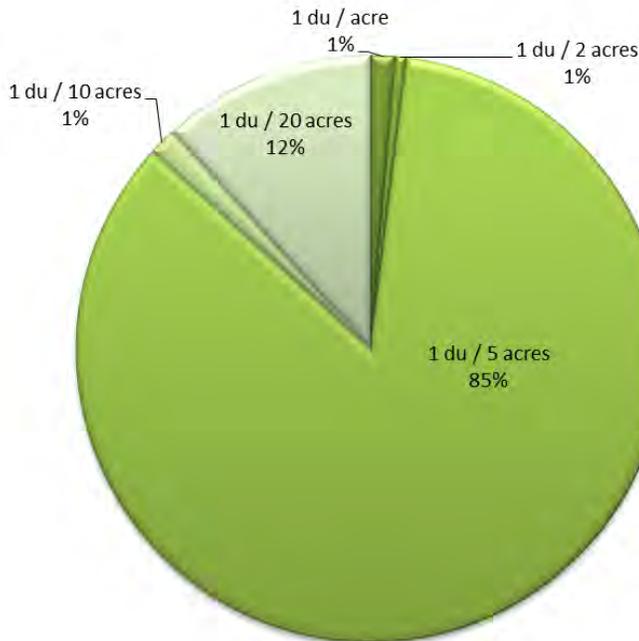
RURAL & RESOURCE LANDS



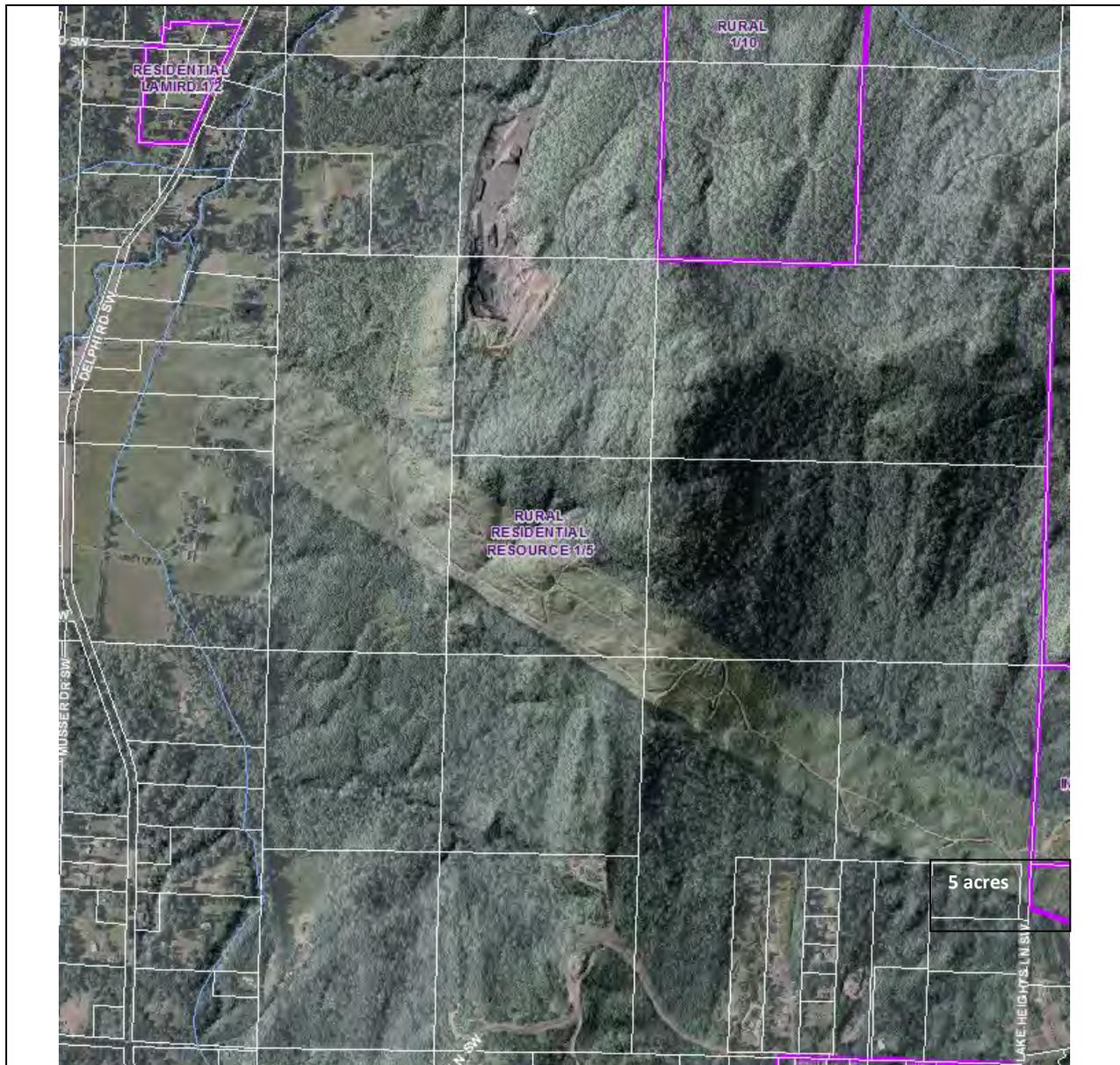
Mix of farms, forests, rural households and small-scale businesses at commercial crossroads •
Protects region's natural resources • Preserves opportunities for rural living



Developable Land in Rural Areas by Generalized Net Residential Density - Baseline Scenario



85 percent of developable rural lands are in one home per five acre zoning. One strategy to reduce rural sprawl is to re-examine rural zoning to provide a broader balance of rural densities.



The majority of Thurston County’s private rural lands are zoned for one unit per five acres. This scale of zoning encourages single-family homes where people drive into the nearby city for jobs, goods, and services. It also puts increasing pressure on our emergency services.

This example in the McLane Creek Watershed shows one unit per five acre zoning for 50 to 100 acre sized forested, rural tax parcels in areas inaccessible by roads. Rethinking rural zoning to provide for better protection of forest and farm lands.

Summary: It will take a wide range of actions on the part of the public and private sector to achieve the Preferred Scenario. These actions are outlined in the Community Chapter of the Regional Plan for Sustainable Development.

Scenario Outcome – Indicators Overview

The Scenario Outcome is described through Indicators, or quantitative measures derived from the Land Use and Indicator Models.

“Not everything important can be measured, and not everything that can be measured is important.” (Einstein).

| Outcome/Change between today and 2035, for current trends based on: | Change from current trends (Baseline): |
|---|--|
| Baseline Adopted Population and Employment Forecast (updated in 2012). | Preferred Scenario Actively create vibrant centers, corridors, and neighborhood centers while protecting rural residential lands, farmlands, prairies, and forest lands. |
| Efficient Delivery of Services and Provision of Infrastructure | |
| 1. Urban Population Sixty-eight percent of the population lives in the urban areas in 2010. This is projected to increase to 73 percent by 2035. | By setting a target of 5 percent of housing growth in the rural areas between now and 2035 instead of the 14 percent expected under the forecast, the percentage of population in the urban areas will increase to 75 percent. |
| Fourteen percent of new dwelling units located in rural County. | Five percent of new dwelling units locate in rural County mainly in areas of existing, platted lots in rural communities; protection of forest lands, farmlands, prairies, and other sensitive areas is prioritized through incentives, purchase/transfer of development rights, and establishing a better balance of rural densities. |
| 2. Activity Density in Transit Corridors | |
| Activity density in 15-minute transit service areas is around 11.6 people plus jobs per acre. This is expected to increase to 13.5 by 2035. | Under the Preferred Scenario the activity density in 15-minute transit corridors will increase to 14.2 people plus jobs per acre, making transit operate in a much more efficient manner, and setting the stage for a higher capacity form of transit (such as more frequent bus service, bus-rapid transit or other fixed-route service) in the near future. |
| Activity density in 30-minute transit service areas is around 4.0 people plus jobs per acre. This is expected to increase to 4.9 by 2035. | Under the Preferred Scenario there would be slightly less activity density in the areas with 30-minute transit service, mainly due to a decrease in projected activity in the rural areas between Lacey and Yelm. |
| 3. Subdivision Road Construction Estimate that over 500 miles of new subdivision roads will be built to support new residential development. | The Preferred Scenario relies on a much more compact form of development to accommodate growth. It is estimated that it will result in a 23 percent reduction in the amount of new subdivision roads built to support residential development. This will result in cost savings of over 1.6 billion dollars in road, water, and other related infrastructure over the next twenty-five years, and save around 35 million dollars in road maintenance every 10 to 15 years. Increasing infill and redevelopment will allow for public-private partnerships to fund upgrades to existing and often sub-standard infrastructure in existing areas. |

| Outcome/Change between today and 2035, for current trends based on: | Change from current trends (Baseline): |
|--|--|
| Baseline Adopted Population and Employment Forecast (updated in 2012). | Preferred Scenario Actively create vibrant centers, corridors, and neighborhood centers while protecting rural residential lands, farmlands, prairies, and forest lands. |
| Access to Jobs, Shopping, Food, and Services | |
| 4. Mix of Population and Employment Improves over 2010 conditions. | The Preferred Scenario does two things to increase the mix of jobs and housing compared to the Baseline: <ol style="list-style-type: none"> 1) County-wide there will likely be a decrease in commuters traveling outside of the County for work. The compact development pattern will encourage innovation and new job opportunities, increasing job opportunities. 2) Within the urban areas housing will be increased near to existing employment sites within city/town centers, urban corridors, and commercial business districts, and neighborhood commercial areas will be developed near or within urban residential neighborhoods. |
| 5. Vehicle Miles Traveled per Capita | |
| In 1990 the average vehicle miles traveled per capita in Thurston County was 10,775. This is expected to decrease by 15 percent by 2035 based on land use changes alone. The target adopted in the Regional Transportation Plan is for a decrease of 30 percent by 2035. | The Preferred Land Use Scenario will set the stage for a further reduction in vehicle miles traveled, however it requires large differences in density and mix of uses to affect vehicle miles traveled. Thurston County has a suburban form that will take time to transition to a more urban form, and a large component of population living in rural areas. Other strategies such as increased opportunities to work from home, home businesses, encouragement of commute alternatives, parking and congestion pricing, etc. will be necessary to meet adopted goals. |
| 6. Population with Access to Basic Transit Service | |
| Approximately 14 percent of Thurston County's population is located within a quarter mile of a 15-minute or better transit route. This is expected to increase to 15 percent by 2035. | The Preferred Scenario represents an improvement over the Baseline by providing greater opportunities to locate housing in areas already served by frequent transit service, or expected to be served by frequent transit service in the future. By 2035 the percent of population within a quarter mile of frequent transit service would increase to 17 percent. |
| Approximately 41% of Thurston County's population is located within a quarter mile of a 30-minute or better transit route. This is expected to decrease to 40% by 2035. | The percentage of population with access to 30-minute transit service would increase to 43 percent. These percentages would be significantly higher if fixed-route transit service was provided in the west Yelm, Rainier, Tenino, and Grand Mound in the future. |
| 7. Urban Households with Access to some Goods and Services within a Half Mile | |
| Approximately 47 percent of Thurston County's urban households (households in the cities/towns and designated growth areas) have access to some goods and services within a half mile today. This is expected to increase to 50 percent in the future. | Under the Preferred Scenario 72 percent of Thurston County's urban households will have access to some goods and services within a half mile. Nearer to city center and major corridors, the vision is for complete districts or centers with a strong commercial core. Further from existing commercial areas, the vision is for smaller-scale neighborhood commercial centers to develop, enhancing existing neighborhoods. |

| Outcome/Change between today and 2035, for current trends based on: | Scenario change from current trends (Baseline): |
|---|---|
| <p>Baseline Adopted Population and Employment Forecast (updated in 2012).</p> | <p>Preferred Scenario Actively create vibrant centers, corridors, and neighborhood centers while protecting rural residential lands, farmlands, prairies, and forest lands.</p> |
| Efficient use of Resources | |
| <p>8. Residential Land Consumption It is estimated that approximately 21,100 acres of land will be developed for residential uses in Thurston County by 2035.</p> | <p>The Preferred Scenario shows a 33 percent reduction in land consumption for residential uses compared to the Baseline. Most of the greenfield development in the Preferred Land Use Scenario is projected to occur in residential projects that are already in the development pipeline. The main difference between the Baseline and Preferred Scenario is the amount of development in the rural areas and outer areas of the unincorporated growth area. The Preferred Scenario anticipated that those areas will not develop as rapidly in the forecast horizon as infill and redevelopment opportunities increase.</p> |
| <p>9. Household Water Consumption Residential water consumption per Thurston County household is expected to decrease 7 percent by 2035. Total residential water consumption is expected to increase by 38 percent without additional conservation measure.</p> | <p>The Preferred Land Use Scenario results in an 11 percent reduction of residential water use per household compared to 2010. Adding conservation measures, the decrease could be as much as 45 percent, leading to a 21 percent decrease in total residential water consumption while accommodating growth.</p> |
| <p>10. Residential Energy Consumption Total annual residential energy use is expected to increase by 9 percent by 2035. Energy use per household is expected to decrease by 27 percent.</p> | <p>The Preferred Land Use Scenario shows a slight decrease in energy usage per household compared to the Baseline, mainly as a result of difference in vehicle miles traveled and an increase in multifamily homes relative to single-family.</p> <p>With implementation of energy conservation actions, a 39 percent reduction in per household energy use is forecast. This translates to an 11 percent reduction in total energy usage county-wide while accommodating growth.</p> |
| <p>11. Forest Land Preservation Thurston County has approximately 188,900 acres of Forest Lands. It is estimated that approximately 19,300 acres will likely convert to residential uses (both urban and rural) by 2035.</p> | <p>The Preferred Scenario was designed to protect forest lands in the rural areas by implementing a range of strategies including a science-based approach to protecting forest lands, especially in areas where they are essential to watershed protection. Strategies include placing rural forest lands in long-term forestry zoning, funding a purchase of development rights program, and providing economic incentives. If all of these measures were implemented no net loss of forest lands could be achievable.</p> |
| <p>12. Farmland Preservation Thurston County has approximately 48,200 acres of farmlands today. It is estimated that approximately 15,500 acres will likely convert to residential uses (both urban and rural) by 2035.</p> | <p>The Preferred Scenario was designed to protect farm lands in the rural areas and unincorporated urban growth areas. The assumptions were that the County would take steps to identify and prioritize farm lands for protection. In the rural areas strategies could include establishing a larger range of rural densities including additional areas placed in long-term agriculture zoning, funding a purchase of development rights program, and a set of economic incentives to lead to no net loss of farm lands in the rural county. It is anticipated that no more than 5 percent of remaining farmlands in Thurston County (mainly located within city limits) will be lost to urbanization.</p> |

| Outcome/Change between today and 2035, for current trends based on: | Change from current trends (Baseline): |
|---|---|
| <p>Baseline Adopted Population and Employment Forecast (updated in 2012).</p> | <p>Preferred Scenario Actively create vibrant centers, corridors, and neighborhood centers while protecting rural residential lands, farmlands, prairies, and forest lands.</p> |
| Environmental Quality | |
| <p>13. Impervious Area It is estimated that over 2,800 acres of new impervious surfaces will be added to sensitive stream basins by 2035; and an additional 1,200 acres added to impacted basins that have not yet been degraded.</p> | <p>The Preferred Scenario results in a</p> <ul style="list-style-type: none"> • 34 percent reduction in new impervious area compared to Baseline in protected stream basins and a • 31 percent reduction in new impervious area compared to Baseline in sensitive stream basins <p>It is important to minimize the amount of impervious surface cover in well-functioning stream basins as it is easier to protect a properly functioning stream basin than to restore it once it has been degraded. In addition, storm water treatment facilities, necessary to treat runoff from impervious surfaces, are costly. Minimizing new impervious surfaces saves both private and public funds.</p> <p>The Preferred Scenario offers increased opportunities for infill and redevelop, and will help facilitate storm water retrofits in core urban areas where urban runoff is an issue.</p> |
| <p>14. Residential Carbon Dioxide (CO₂) Emissions Total annual residential carbon dioxide emissions are expected increase by 12 percent by 2035 without conservation measures. Emissions per household are expected to decrease by 24 percent overall.</p> | <p>The Preferred Scenario shows a slight decrease in carbon dioxide emissions per household compared to the Baseline through land use changes alone, mainly as a result of difference in vehicle miles traveled and an increase in multifamily homes relative to single-family.</p> <p>With implementation of energy conservation actions, a 38 percent reduction in per household emissions is forecast. This translates to a 10 percent reduction county-wide when growth is considered.</p> |

Indicators

What are Indicators?

Indicators are numbers that predict how our region, Thurston County, will look, function and feel in 2035. While not all attributes of our community can be quantified, indicators can help us gauge how different growth patterns will affect our region.

How Indicators will be used in the Planning Process?

Indicators are used to evaluate the Land Use Scenarios developed in Phase Two of the Sustainable Thurston project, and provide data support for the development of Performance Measures.

What we are measuring?

Thurston Regional Planning Council developed a set of indicators relating to land use and transportation policy. Indicators were developed to measure:

Efficient Delivery of Services and Provision of Infrastructure

1. Urban Population.
2. Activity Density in Transit Corridors.
3. Subdivision Road Construction.

Access to Jobs, Shopping, Food, and Services

4. Mix of Population and Employment.
5. Vehicle Miles Traveled per Capita.
6. Population and Employment with Access to Transit Service.
7. Urban Households with Access to some Goods and Services within a Half Mile.

Efficient use of Resources

8. Residential Land Consumption.
9. Household Water Consumption.
10. Energy Consumption.
11. Forest Land Preservation.
12. Farmland Preservation.

Environmental Quality

13. Impervious Area.
14. Residential Carbon Dioxide (CO₂) Emissions.

How Indicators Were Developed:

Indicators were chosen to provide meaningful feedback. Not everything is measurable. While a broad range of indicators were considered, only indicators that met both of the following criteria were included in the final list:

- Indicator provides meaningful feedback to the public.
- Indicator is based on a statistically sound relationship or can be directly measured from the Land Use Models.

A general description of each indicator and its results are shown in this section. Further details can be found in the Appendix.

1. Urban Population

What is this?

This indicator measures the percent of the regions' population that resides in higher-density (urban)³ areas versus low-density (rural) areas.

Why is it meaningful?

The Region's plans call for a greater share of growth to be located in urban areas, or areas where urban services, such as city water and sewer, are already available or nearby. Concentrating urban growth in urban areas helps protect rural and resource lands. It also allows for more efficient delivery of municipal and county services – since the cost of many services is related to the miles of pipes necessary to deliver the water to or remove the waste from dwelling units.

Areas of the County have been designated for urban growth. They include all of the incorporated areas or cities and towns, as well as unincorporated growth areas that are designated around the incorporated areas.

How is it measured?

Population is estimated in the Population and Employment Forecast model.

Indicator Results:

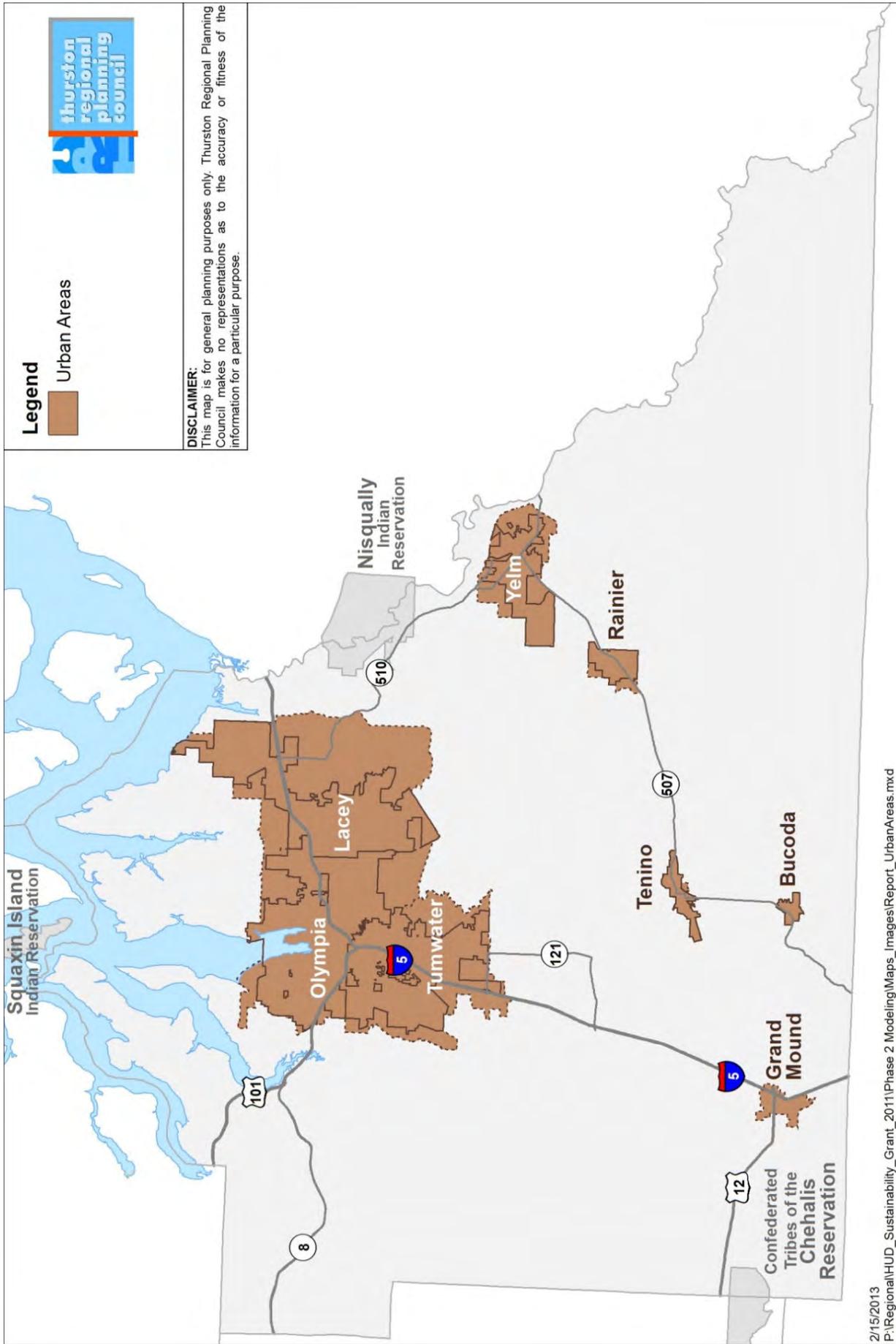
| | Current 2010 | Baseline 2035 | Preferred Scenario 2035 |
|--|-----------------|------------------|-------------------------------|
| Total Population | 252,260 | 370,590 | 361,600 |
| Total Population in Urban Areas | 170,900 | 270,600 | 271,800 |
| Percent of Population in Urban Areas | 68% | 73% | 75% |
| Percent of New Dwelling Units (2010-2035) in rural areas | | 13% | 5% |

³ Designated urban growth areas.

Discussion:

The Baseline Forecast projects an increase in the percent of population living in the urban areas by 2035. This reflects efforts of Thurston County to rezone large portions of the rural areas to a range of rural densities, and represents approximately 13 percent of new housing growth locating in the rural areas (or outside of cities, towns, designated unincorporated growth areas, and Tribal Reservations).

The Preferred Scenario sets a target of approximately 5 percent of new dwelling units locating in the rural areas – a significant decrease from the Baseline Forecast. This will still allow for homes to be built in the rural areas but at a broader range of rural densities. It takes into account reasonable use exemptions on existing (and often smaller) lots, farm homes, family member units, and other forms of rural housing.



2/15/2013
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FIGURE 1: THURSTON COUNTY URBAN AREAS.

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2. Activity Density in Transit Corridors

What is this?

Activity density refers to the number of people per acre. People are measured by household population (residents) plus jobs (employees).

Transit corridors in Thurston County are defined as areas with:

- Basic transit service with 30-minute service.
- Higher-frequency bus service (15-minutes or less) along a corridor with one route or a combination of one or more routes.

Why is it meaningful?

Density is one of several important factors in supporting a wider range of transportation options – such as transit and walkable neighborhoods. Other factors include:

- Diversity – the mix of uses.
- Distance – the distance from other activity centers.
- Design – neighborhood walkability and design features.
- Destination – or the distance to regional centers.

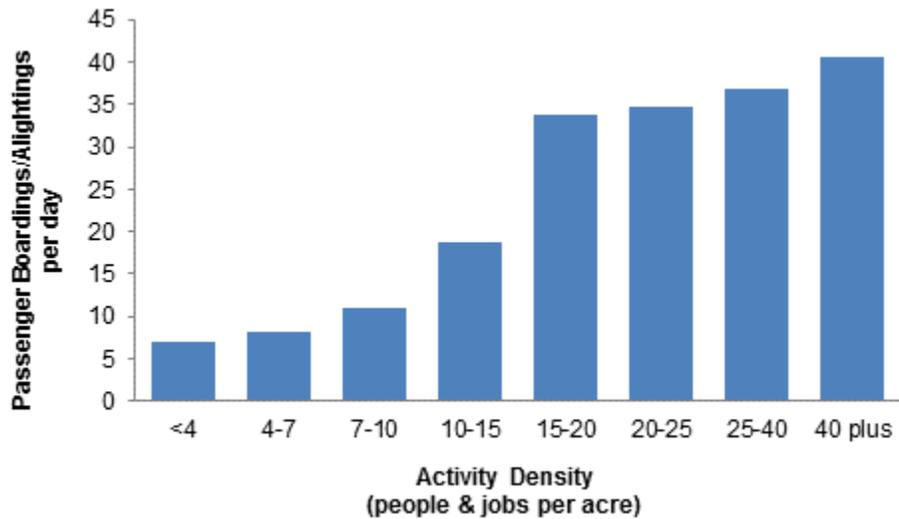
The rule of thumb is that:

- Basic 30-minute bus service needs at least seven dwelling units per acre to work efficiently.
- Higher-frequency urban transit service of 15-minutes or better needs at least ten units per acre and/or 25 employees per acre to be viable.

The key to effective urban transit service is having a rich mix of residential, employment, and other activities in the same area.

In our local transit service area, Intercity Transit data for fixed route service shows that as activity density (people plus jobs per acre) increase, so does transit usage. There appears to be a fairly strong jump in transit usage as densities approach 15 people plus jobs per acre.

Relationship Between Activity Density & Transit Usage



SOURCE: THURSTON REGIONAL PLANNING COUNCIL DATA PROGRAM; INTERCITY TRANSIT.

How is it measured?

Transit corridors are measured from the street to one quarter mile in all directions. This is because the rule of thumb is that people will walk around a quarter mile for transit service. They will walk slightly longer distances for premium transit service such as subways and metros, trams and trolleys, or light rail.

Activity is measured as people (population) and jobs (employment).

Activity density is measured as the activity per acre.

Indicator Results:

| | Current 2010 | Baseline 2035* | Preferred Scenario 2035* |
|---|-------------------------|---------------------------|---|
| Activity density in 15-minute transit service areas | 11.6 | 13.5 | 14.2 |
| Activity density in 30-minute transit service areas | 4.0 | 4.9 | 4.9 |

Activity density is Population plus Employment per acre.

Note: *Includes an increase in both 15-minute and 30-minute transit service areas.

Discussion:

The Baseline and Preferred Scenario will increase activity density within the basic and higher-frequency transit service areas. The Preferred Scenario improves densities within the 15-minute service areas, and both will lead the region closer to their goals of increasing transit service in the urban core. There is little difference in the 30 minute transit service area between the scenarios. In part this is because both the Baseline Forecast and Preferred Scenario include development projects that are proposed along existing and planned 30 minute transit routes.

[Additional Information – See Page 83](#)

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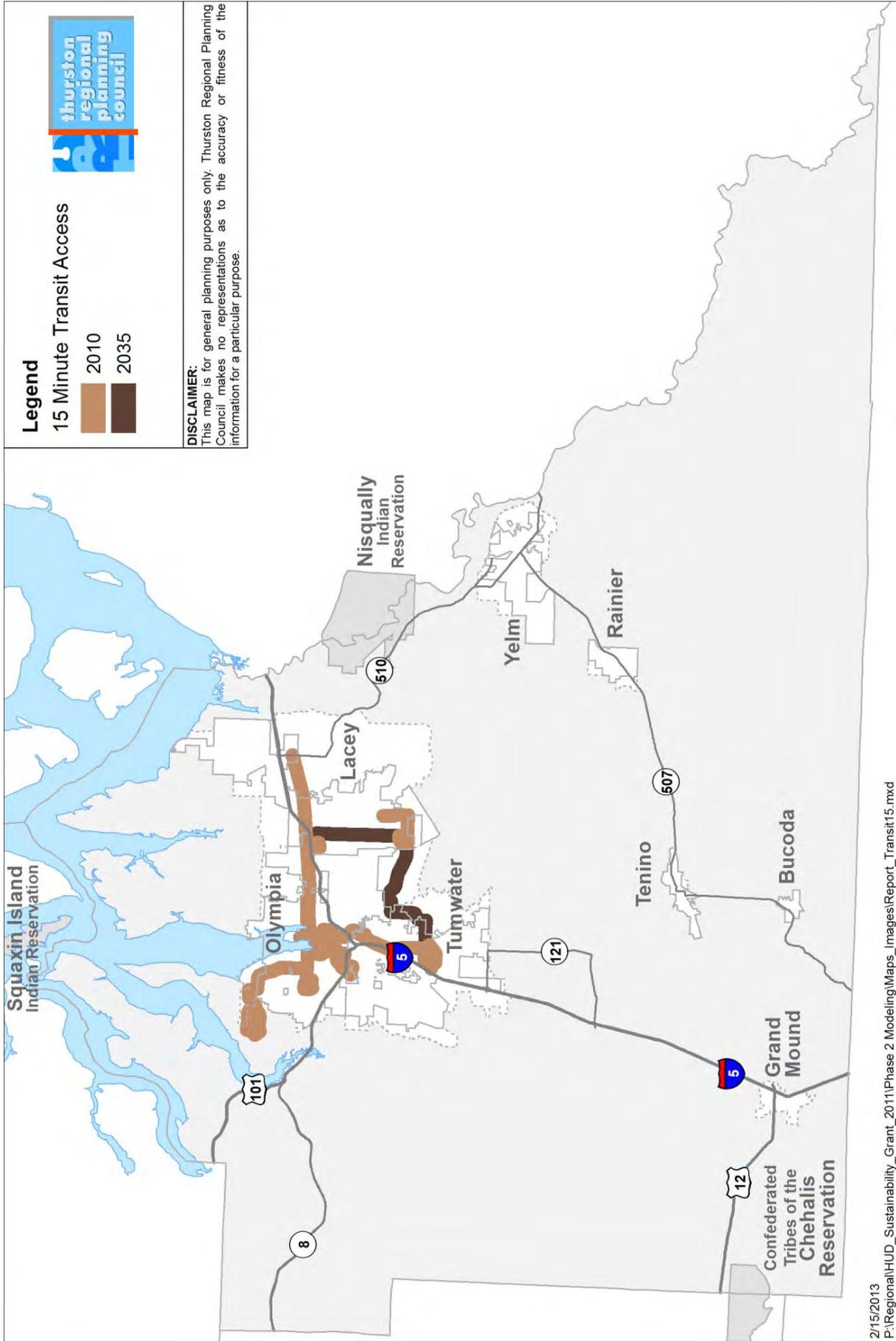


FIGURE 2: THURSTON COUNTY INTERCITY TRANSIT FIXED-ROUTE 15-MINUTE OR BETTER TRANSIT SERVICE AREAS.

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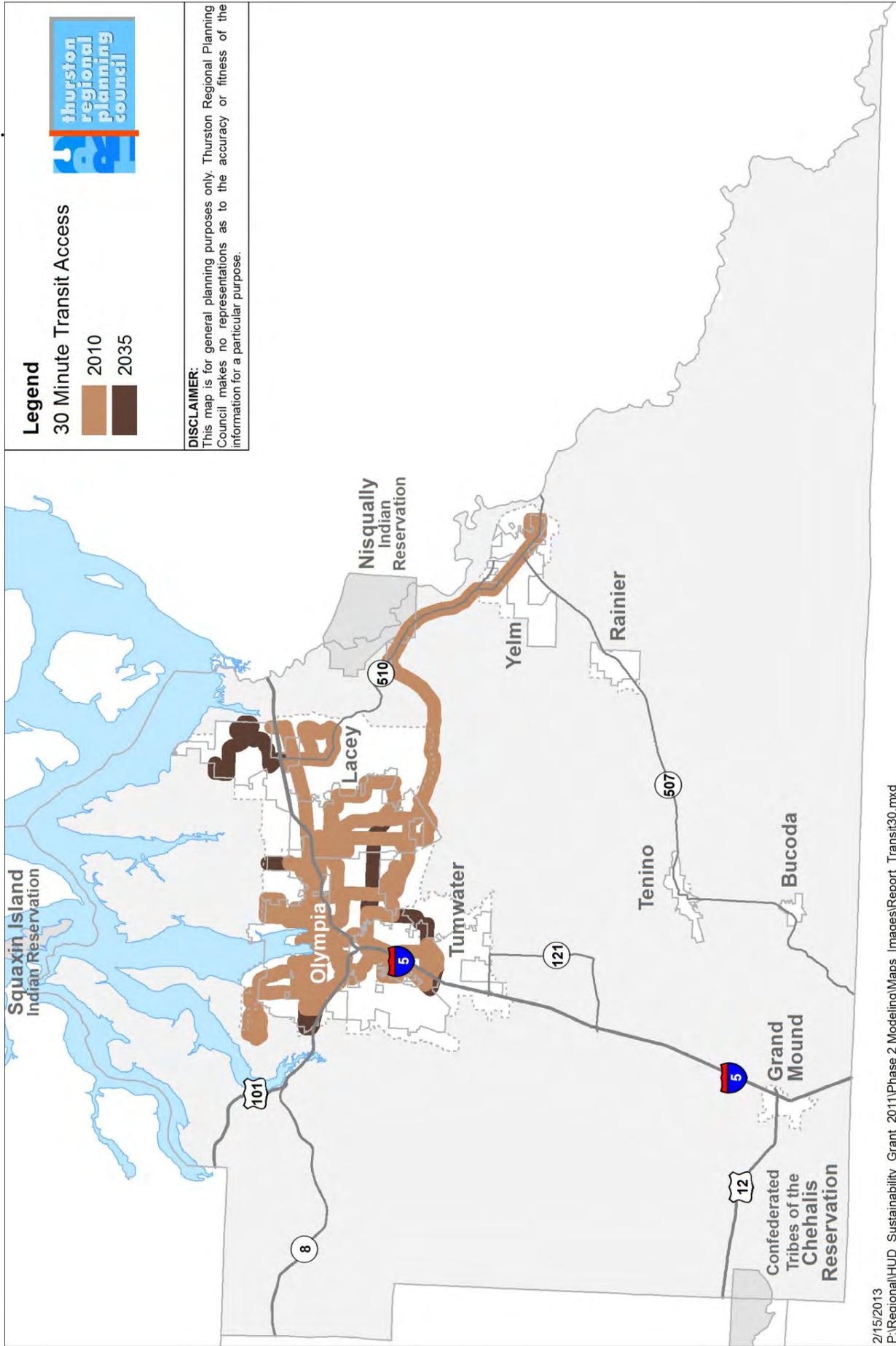


FIGURE 3: THURSTON COUNTY INTERCITY TRANSIT FIXED-ROUTE 30-MINUTE OR BETTER TRANSIT SERVICE AREAS.

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3. Subdivision Road Construction

What is this?

This indicator estimates the length of roadways that must be built to connect each new home in residential subdivisions to the existing road network. It is measured in feet of roads per unit.

Why is it meaningful?

Road construction represents a cost to developers that is passed on to homebuyers; municipalities also bear the cost of road maintenance. It costs:

- \$16 million to build a mile of road.
- \$250,000-\$500,000 to resurface a 1 mile single lane of roadway (every 10-15 years).

Road length is also related to other costs borne by developers, utility providers, and homeowners, including the costs of installing and maintaining the water, sewer, electrical and telecommunication lines servicing residences. As the length of roads increases, so do costs.

How is it measured?

Residential density was compared to the length of roadways for Thurston County subdivisions built between 1970 and 2010. Length of roads is measured in units of length like feet and miles.

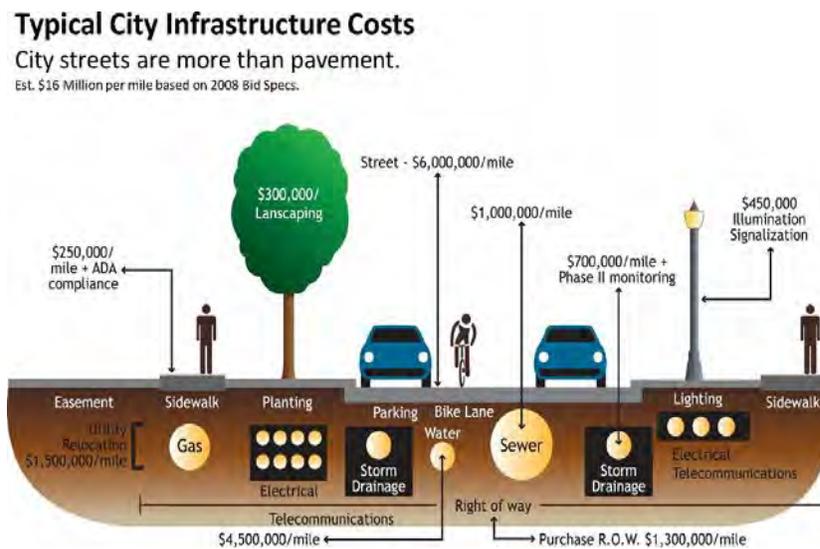


FIGURE 4: COMPONENTS OF ROAD CONSTRUCTION COSTS.

SOURCE: ASSOCIATION OF WASHINGTON CITIES, AS PRINTED IN WS DEPT. OF COMMERCE'S "LEARNING TO LEAD: A PRIMER ON ECONOMIC DEVELOPMENT STRATEGIES, 2009.

Indicator Results:

| | Baseline 2010-2035 | Preferred Scenario 2010-2035 |
|--|-----------------------|------------------------------------|
| Miles of New Roads in Residential Subdivisions | 516 | 397 |
| <i>Percent Increase/Decrease from Baseline Scenario</i> | | -23% |
| <i>Estimated cost savings for subdivision roads and related infrastructure</i> | | <i>1.6 billion dollars</i> |

Discussion:

The Preferred Scenario relies on a much more compact form of development to accommodate growth. It is estimated that it will result in at least a twenty percent reduction in the amount of new subdivision roads built to support residential development. This will result in cost savings of over **1.6 billion dollars** in road, water, and other related infrastructure over the next twenty-five years, and save around **35 million dollars** in road maintenance every 10 to 15 years.

By increasing infill and redevelopment will allow for public-private partnerships to fund upgrades to existing and often sub-standard infrastructure in existing areas.

[Additional Information – See Page 84](#)

4. Mix of Population and Employment

What is this?

This indicator compares the number of people (population) to jobs (employment) within a square mile area.

Why is this Indicator Meaningful?

The mix of people and jobs is an indication of how many opportunities there are for people to access shopping, food, and jobs near to where they live. In general, the greater the mixes of jobs and housing, the less distance people need to travel to meet their daily needs.

How is it measured?

The number of jobs to residents in each square mile is compared to the county-wide average. This results in a diversity index. The index ranges from:

- 1 - Which would be a uniform mix of jobs and people.
- 0 - Where there is no mixture of jobs and residents in the square mile.

Indicator Results:

| | Current 2010 | Baseline 2035 | Preferred Scenario 2035 |
|-----------------|-----------------|------------------|-------------------------------|
| Diversity Index | 0.50 | 0.51 | 0.54 |

Discussion:

The Preferred Scenario does two things to increase the mix of jobs and housing compared to the Baseline.

- 1) County-wide there will likely be a decrease in commuters traveling outside of the County for work. The compact development pattern will encourage innovation and new job opportunities, increasing job opportunities.
- 2) Within the urban areas housing will be increased near to existing employment sites within city/town centers, urban corridors, and commercial business districts, and neighborhood commercial areas will be developed near or within urban residential neighborhoods.

[Additional Information – See Page 85](#)

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5. Vehicle Miles Traveled

What is this?

Vehicle miles traveled (VMT) is a standard measure of total vehicular travel on streets and highways. Per capita VMT translates that total travel into total vehicle miles traveled per person.

Why is it meaningful?

Planners use VMT to understand travel patterns on individual streets and on the larger transportation network in order to make policy and investment decisions. VMT is an important input to fuel forecasts and associated future transportation revenue projections. VMT levels are also recognized as a surrogate for transportation's contributions to greenhouse gas emissions and other pollutants; reducing VMT is an effective way of reducing transportation emissions. Increasingly planners look at VMT to understand how changes in land use and growth patterns increase or decrease the need for people to drive.

Governor Gregoire issued two Executive Orders on climate change that underscore this relationship between VMT and greenhouse gas emissions generated by transportation. Executive Order 07-02, signed in 1997, establishes greenhouse gas emissions goals of:

- Returning to 1990 levels by 2020.
- Achieving a 25 percent reduction of 1990 levels by 2035.
- Achieving a 50 percent reduction of 1990 levels by 2050.

As part of that Executive Order, the State Department of Transportation adopted the following goals (RCW 47.01.440):

- Decrease the annual per capita vehicle miles traveled by eighteen percent by 2020.
- Decrease the annual per capita vehicle miles traveled by thirty percent by 2035.
- Decrease the annual per capita vehicle miles traveled by fifty percent by 2050.

These goals were amended into the Thurston Region's long-range Regional Transportation Plan in 2010:

- Decrease annual per capita vehicle miles traveled in the Thurston region to 1990 levels by 2020, to 30 percent below 1990 levels by 2035, and to 50 percent below 1990 levels by 2050. Monitor and report on progress towards these goals in five-year increments.

How was it measured?

Vehicle miles traveled is strongly influenced by land use patterns. Numerous research studies have shown that in compact urban neighborhoods with nearby services and job opportunities and a range of convenient travel options, VMT can be 20-40 percent lower than conventional suburban neighborhoods. The **change** in VMT between 2010 and 2035 was estimated based on the **change** in three land use characteristics over time:

- Density - the number of people and jobs per square mile.
- Diversity - the mix of land use categories within a specific area.
- Distance - population within a walkable distance of transit services.

This resulted in an estimate of average VMT per capita.

Indicator Results:

| | 1990* | 2010 | Baseline 2035 | Preferred Land Use Scenario 2035 | Land Use plus Additional Strategies 2035 Target |
|--|--------|-------|------------------|---|--|
| Estimated average annual vehicle miles traveled per capita | 10,775 | 9,290 | 9,120 | 9,020 | 7,520 |
| <i>Percent Increase/Decrease from 2010</i> | | | -2.8% | -4.1% | |
| <i>Percent Increase/Decrease from 1990</i> | | | -15% | -16% | -30% |

Note: 1990 estimates are from Highway Performance Monitoring System (HPMS), as required by the Federal Highway Administration (FHWA). This data will be used to monitor annual state-level vehicle miles traveled relating to the adopted Washington State Vehicle Miles Traveled reduction benchmarks. 2010 and 2035 forecasts are developed through the Sustainable Thurston modeling efforts.

Discussion:

Our VMT goals cannot be achieved through land use changes alone. The Thurston Region has a predominately suburban and rural land use pattern. It takes fairly large increases in density mix of jobs and employment to affect VMT patterns (see additional information.) The Preferred Scenario starts to lay the groundwork for a major shift in land use patterns that will better support a range of transportation options and opportunities to reduce vehicle miles traveled, however changes take time. There is an approximate 10 to 12 years of residential lot supply that is permitted, vested, or planned, and not highly likely to change under any land use scenario. However, by taking steps now, our region will be in a better position to reach our VMT goals.

To reach our 2035 goals, it will take a combination of land use changes and other strategies. The other strategies include things such as:

- Manage parking supply and cost.
- Pricing mechanisms such as tolling and congestion pricing.
- Increasing access to transit.
- Connecting streets to provide multiple travel routes.
- Encouraging carpools, vanpools, transit and other commute alternatives.
- Increasing opportunities to work from home.
- Increasing opportunities for home businesses.

[Additional Information – See Page 86](#)

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6. Population and Employment with Access to Transit Service

What is this?

Residents of Thurston County have expressed a desire for greater access to higher frequency transit service. This indicator measures the percentage of the population expected to live within walking distance of basic (30 minute or better) and higher frequency (15 minutes or better) transit service in 2035.

Why is it meaningful?

Not only are these types of areas desired by Thurston County residents, they will also be essential to retain the Millennium Generation before they start families and desire single-family homes, and provide additional choices for seniors as they transition out of their existing homes. Increasing the share of households living in these areas will indicate that we are meeting the market demand for walkable urban communities, and providing a full range of housing choices for our residents.

How is it measured?

This indicator is measured directly from the Population and Employment Forecast model. Future transit service routes were developed working with Intercity Transit staff for the purpose of this indicator.

Indicator Results:

| | 2010 | Baseline 2035* | Preferred Scenario 2035* |
|---|----------------|-------------------|--------------------------------|
| Total Population | 252,264 | 370,600 | 361,600 |
| Access to 15-minute or better transit service | | | |
| Population | 34,800 | 54,900 | 62,500 |
| <i>Percent of Total Population</i> | 13% | 15% | 17% |
| <i>Percent Increase/Decrease from Baseline Scenario</i> | | | 15% |
| Access to 30-minute or better transit service | | | |
| Population | 103,100 | 147,300 | 154,100 |
| <i>Percent of Total Population</i> | 41% | 40% | 43% |
| <i>Percent Increase/Decrease from Baseline Scenario</i> | | | 5% |

Note: *Includes an increase in both 15-minute and 30-minute transit service areas. Access is defined as within a quarter mile of a transit route.

Discussion:

The Preferred Scenario represents an improvement over the Baseline by providing greater opportunities to locate housing in areas already served by frequent transit service, or expected to be served by frequent transit service in the future. By 2035 the percent of population within a quarter mile of frequent transit service would increase to 17 percent.

The percentage of population with access to 30-minute transit service would increase to 43 percent. These percentages would be significantly higher if fixed-route transit service was provided in the west Yelm, Rainier, Tenino, and Grand Mound in the future.

[Additional Information – See Page 83](#)

7. Urban Households with Access to some Goods and Services within a Half Mile

What is this?

Residents of Thurston County have expressed a desire for more live, work, play, shop, walkable urban communities. The best chance to create these places is in our existing centers and corridors.

Residents have also expressed a desire for more gathering places and destinations within or nearby their neighborhoods. This can happen several ways.

- Existing neighborhood centers can add additional housing units (accessory dwellings, granny flats, and townhomes) on infill lots or on existing lots.
- Small neighborhood commercial centers can be added where there are enough households to support businesses.
- New neighborhood centers – villages – can be created with a mix of commercial and residential development.

This indicator measures the percentage of households expected to live in these types of neighborhoods by 2035.

Why is it meaningful?

Not only are these types of areas desired by Thurston County residents, they will also be essential to retain the Millennial Generation before they start families and desire single-family homes, and provide additional choices for seniors as they transition out of their existing homes. Increasing the share of households living in these areas will indicate that we are meeting the community desire for walkable urban communities, and providing a full range of housing choices for our residents.

These neighborhoods will provide opportunities for people to meet some of their daily needs without having to travel to the urban centers and corridors.

How is it measured?

This indicator is measured directly from the Population and Employment Forecast model.

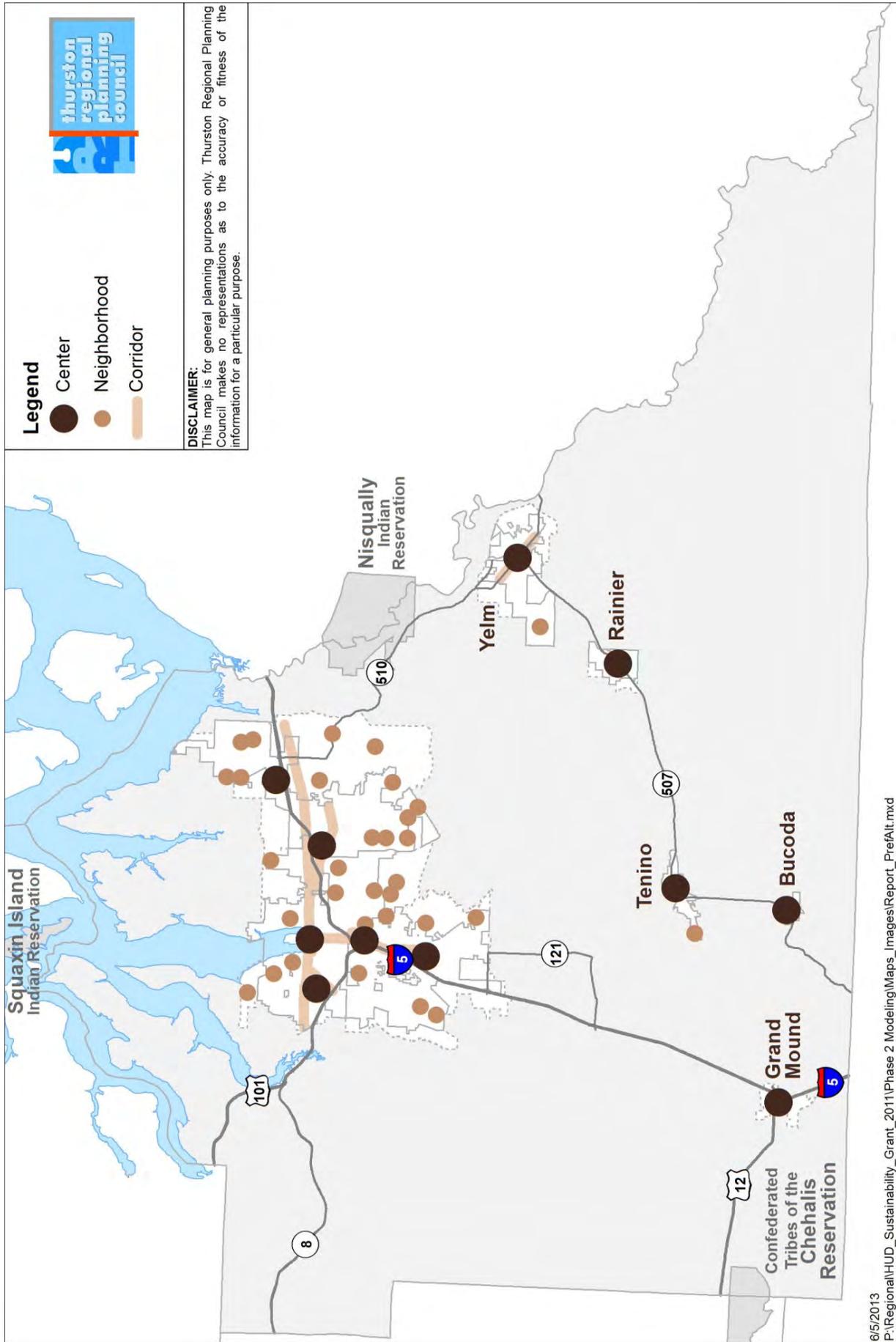
Indicator Results:

| | 2010 | Baseline 2035 | Preferred Scenario 2035 |
|--|--------|------------------|-------------------------------|
| Number of Households in Urban Areas (cities/towns and designated unincorporated urban growth areas) | 77,400 | 119,400 | 120,300 |
| Number of Households in Urban Areas with Access to some Goods and Services within a half mile (comparable to a 20-minute walk) | 34,900 | 59,100 | 86,800 |
| <i>Percent of Households in Urban Areas with Access to some Goods and Services within a half mile (comparable to a 20-minute walk)</i> | 47% | 50% | 72% |
| <i>Percent Increase/Decrease from Baseline</i> | | | 47% |

Note: Baseline assumes half of the future neighborhood centers designated in local plans will be built by 2035.

Discussion:

The Preferred Scenario represents a large increase in the number of urban households with access to some goods and services within a quarter mile – 72 percent compared to the Baseline of 50 percent. This is an aggressive target and will require a strong commitment to neighborhood planning by local jurisdictions. Thurston County’s urban areas have a predominately suburban character of single-family homes on fairly large lots. In many neighborhoods, the density of development does not have enough activity to support a neighborhood center, and there are very few opportunities for infill and redevelopment. These neighborhoods are unlikely to change much in the future. Other neighborhoods have the potential for some infill and redevelopment to support a small neighborhood center. A rule of thumb is that a small neighborhood center requires around 500 households within a quarter mile, and another 500 with a half mile to thrive. Under the Preferred Scenario, all new centers will be developed in a walkable urban form with a mix of opportunities for commercial and housing.



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FIGURE 5: THURSTON COUNTY CURRENT AND FUTURE CENTERS, CORRIDORS AND NEIGHBORHOOD CENTERS.

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8. Residential Land Consumption

What is this?

Residential land consumption is the term for how much land is consumed by the residential built environment – homes, yards, driveways. It is measured in units of area – such as square miles or acres. At higher densities, less land is consumed per housing unit. Stacked condos or apartments consume less land per dwelling unit than single-family homes, for instance. In areas where urban services such as sewer and water are not available, homes require larger yards for their wells and septic fields.

Why is this Indicator Meaningful?

Land consumption is one measure of how efficient a community is at using land to accommodate population growth.

Given the same amount of growth:

Urban development

- Less land consumption.

Suburban dispersed development patterns

- Higher amounts of land consumption.

Using land efficiently in centers and close-in communities protects rural resources and character.

How is it measured?

Land consumption increases as residential density decreases:

- Density is a measure of dwelling units per acre.
- Urban Land consumption is a measure of acres per dwelling unit.
- For rural lands, each dwelling unit is assumed to take up no more than one acre (home, yard, and driveway) – with the remainder of the rural property likely to remain in agricultural or natural uses.

Indicator Results:

| | Baseline 2010-2035 | Preferred Scenario 2010-2035 |
|---|-----------------------|---------------------------------|
| Acres of Land Developed for Residential Uses | 21,100 | 14,200 |
| <i>Percent Increase/Decrease from Baseline Scenario</i> | | -33% |

Discussion:

The Preferred Scenario shows a 33 percent reduction in land consumption for residential uses compared to the Baseline. Most of the greenfield development in the Preferred Land Use Scenario is projected to occur in residential projects that are already in the development pipeline, such as the Gateway project in Lacey, the Tahoma Terra planned community in Yelm, or a large variety of other smaller residential projects. The main difference between the Baseline and Preferred Scenario is the amount of development in the rural areas and outer areas of the unincorporated growth area. The Preferred Scenario anticipated that those areas will not develop as rapidly in the forecast horizon as infill and redevelopment opportunities increase.

[Additional Information – See Page 88](#)

9. Household Water Consumption

What is this?

Water is consumed for residential purposes for both indoor and outdoor uses. This indicator looks at the total water used for residential uses by all households in Thurston County, including those on Class A systems, Class B systems or exempt wells.

Why is it meaningful?

There is a limited amount of water to sustain people in perpetuity while protecting the environment.

How is it measured?

Rates of water usage were estimated from data provided by 18 water systems across Thurston County and local jurisdictions. Rates vary based on location, water source and type of residence:

- Class A Water Systems have 15 or more connections. In general, their customers live in urban areas or rural subdivisions and usage is metered.
- Class B Systems serve 2 to 14 customers and are rarely metered.
- Exempt Wells serve single-family residences using less than 5,000 gallons per day.

Based on a variety of strategies outlined by the Water Panel, estimates of water conservation through conservation were developed. The assumptions applied in the model were as follows:

| By 2035: | Assumption |
|-----------------------|--|
| Baseline | Assume all households maintain 2010 water use rates |
| Conservation Measures | All Class A water systems reduce their per household water consumption 25% from 2010, and All new units on Class B systems or exempt wells are metered and will consume at the same rate as 2010 Class A Rural systems. |

The conservation assumptions for Class A systems are based on observed trends. In 2011, Olympia reduced its water use by 20 percent for single-family and 11 percent for multifamily units from the 2004-2007 4-year average. While the reduction was likely due to both aggressive demand- and supply-side conservation measures by the city and a cooler, wetter spring in 2011, it shows that the 25 percent reductions are within the range of what is achievable by jurisdictions over the next 25 years.

Indicator Results:

| Water Conservation Scenario | 2010 | Baseline 2035 | Preferred Scenario 2035 | Conservation Measures 2035 |
|--|------|------------------|-------------------------------|----------------------------------|
| Total Residential Water Use (million gpd) | 31.9 | 44.0 | 41.3 | 25.3 |
| <i>Percent Increase/Decrease from 2010</i> | | 38% | 29% | -21% |
| Residential Water Use per Household (gpd) | 295 | 274 | 263 | 162 |
| <i>Percent Increase/Decrease from 2010</i> | | -7% | -11% | -45% |

Detailed Results:

| | 2010 | Baseline 2035 | Preferred Scenario 2035 | Conservation Measures 2035 |
|--------------------------------------|-------------|------------------|-------------------------------|----------------------------------|
| Total Water Use (million gpd) | | | | |
| Water System Type | | | | |
| Class A Municipal | 12.8 | 21.0 | 21.2 | 16.2 |
| Class A Rural | 3.9 | 4.8 | 4.6 | 3.5 |
| Class B & Exempt | 15.2 | 18.1 | 15.5 | 5.7 |
| Jurisdiction | | | | |
| City | 10.4 | 15.4 | 16.5 | 12.6 |
| Reservation | 0.1 | 0.2 | 0.2 | 0.1 |
| Rural | 16.5 | 20.5 | 17.8 | 7.6 |
| Unincorporated urban growth area | 4.9 | 7.8 | 6.7 | 5.0 |
| Total | 31.9 | 44.0 | 41.3 | 25.3 |
| Water Use per Household (gpd) | | | | |
| Water System Type | | | | |
| Class A Municipal | 190 | 190 | 189 | 144 |
| Class A Rural | 232 | 232 | 233 | 177 |
| Class B & Exempt | 630 | 630 | 630 | 230 |
| Jurisdiction | | | | |
| City | 197 | 187 | 187 | 142 |
| Reservation | 527 | 559 | 565 | 221 |
| Rural | 492 | 507 | 494 | 211 |
| Unincorporated urban growth area | 226 | 211 | 212 | 158 |
| Total | 295 | 274 | 263 | 162 |

Discussion:

Figure 7 shows the current water service boundaries in Thurston County. Changes are expected by 2035. Some areas within Urban Growth Boundaries are not currently served by a water system. In these areas, new growth between now and 2035 is assumed to be connected to a municipal water system. Outside of the Urban Growth Boundary, no new water systems are expected.

The Preferred Land Use Scenario would result in an 11 percent reduction of residential water use per household, compared to a 7 percent reduction forecast under the Baseline. These reductions are based on two factors:

- A greater proportion of multifamily homes compared to 2010.
- A greater proportion of growth going into the urban areas, where households tend to consume less water per household.

Additional reductions can be used by undertaking the conservation measures outlined by the water panel, including:

- Institute or continue with aggressive water-conservation measures that stretch existing drinking water supplies, which may include incentives such as rebates or free fixtures for the following: single-family and multifamily housing high-efficiency toilets; water-efficient washing machines; commercial high-efficiency toilets; weather-based irrigation controllers; commercial/residential irrigation system assessments; and, commercial and institutional WaterSmart retrofits. Public outreach may include banners, events and water conservation displays, as well as school education programs. Education efforts may include showing customer use patterns and pricing information for the different tiers.
- Identify a local entity to provide technical assistance to private well owners regarding water conservation and leakage detection.
- Change state water law to limit groundwater withdrawals from exempt wells. This could entail the following: working with local legislators, affected state departments, and partners to change state water law; crafting legislation that allows local governments to adopt development regulations that restrict or limit groundwater withdrawals by exempt wells within a specific basin; developing water-restriction areas, which could include total or partially closed basins, locations with an imminent closure (either total or partial), or basins where an aquifer recharge study shows that an area has insufficient water supply to support a greater level of withdrawals; and, considering the unintended consequences to residential food production, agriculture, and stock watering.
- Change state water law, or adopt common local land use regulations that prohibit individual exempt wells within UGAs when municipalities or private suppliers can provide drinking water.

[Additional Information – See Page 89](#)

[Water Efficiency Case Studies – See Page 98](#)

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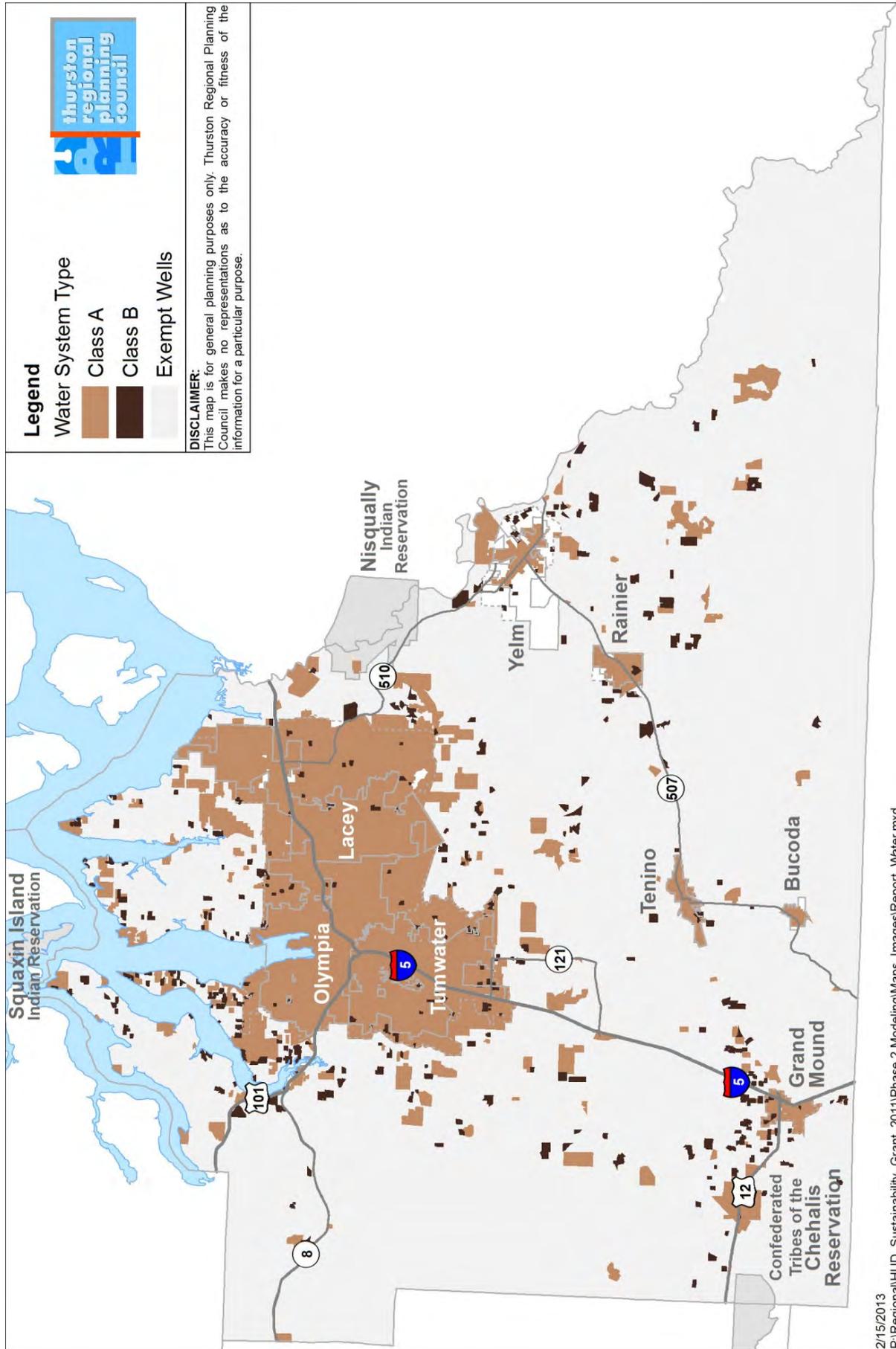


FIGURE 6: WATER SYSTEM TYPES IN THURSTON COUNTY.

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10. Residential Energy Consumption

What is this?

Residents of Thurston County use energy to meet their daily needs including:

- Heating their homes.
- Electricity within their home.
- Vehicle travel.

This indicator provides an estimate of the amount of energy each household in Thurston County uses per year.

Why is it meaningful?

Energy from fossil fuels is a limited resource, and the extraction and use of fossil fuels has environmental implication, including contributing to climate change. Energy from other sources such as hydroelectric dams, solar panels, etc., also has environmental and other costs associated with it. In addition, a portion of a household's budget goes towards their energy bills and to pay for fuel for their vehicles. Reducing our energy consumption will help reduce household costs, costs for energy providers, and environmental costs.

How is it measured?

Energy usage was measured for both home and residential vehicle consumption, and then added together. Home consumption was estimated based on building type (single-family, multifamily or mobile home) and number of residential units. Residential vehicle energy consumption was estimated by converting vehicle miles traveled to energy usage.

Energy is measured in different units. All units were converted to British Thermal Units (Btus).

The Sustainable Thurston Energy Workgroup estimated that a 30 percent reduction in energy usage (applied to existing and new households) is achievable by 2035 if the following actions were taken:

- Explore "on bill" financing of distributed generation installations (spread over time).
- Recognize and support clean-energy jobs. Link to education system — provide training opportunity.
- Explore incentives for the installation of distributed generation equipment, such as rooftop solar panels.
- Build large-scale renewable energy projects (e.g., large-scale solar arrays).
- Investigate a legislative solution to permit Property Assessed Clean Energy (PACE) in Washington State. Advocate if solution is identified.
- Explore the viability of energy generation at solid waste facilities.

- Adopt uniform building codes and permitting practices in jurisdictions to make the installation of solar panels, or other distributed generation technologies, easier and faster.
- Monitor system, or grid-scale, energy storage innovations, and learn from the experiences of communities that begin to deploy them.
- Support energy suppliers' equipment upgrades, new programs, and service offerings related to adding information technology to the system or grid.
- Partner with energy providers to test innovative system-scale, grid-scale, and energy storage solutions in isolated, controlled conditions. If, and when, technological progress is proven, partner with energy providers for deployment of such storage solutions.
- Support voluntary programs for adding vehicle chargers to homes, businesses, and public parking infrastructure.
- Promote integration of electric vehicle infrastructure into residential building codes and public and private facilities, including allowances in zoning regulations for charging stations in locations where they are needed.
- Create local projects to increase the existing electric vehicle fleet.
- Require energy providers make incremental improvements in the energy system using information technology to increase reliability to bring back systems online after power outages and to decrease transmission losses.
- Explore variable electric and natural gas rates: Reward lower-volume usage with lower rates. Some jurisdictions already do this with water rates.
- Require that commercial and residential landlords pay for utilities to encourage energy retrofits.
- Develop new incentives for green buildings (e.g., Leadership in Energy & Environmental Design), both commercial and residential.
- Jurisdictions adopt complementary ordinances that require solar orientation for all new construction.
- Continue to work with businesses to increase the energy efficiency of processes and facilities.
- Offer incentives for the use of heat pumps.
- Offer incentives for the use of roof-mounted solar water heaters.
- Increase the energy efficiency of the region's water infrastructure. This includes replacing pumps and other systems that consume plentiful energy.
- Work regionally to adopt uniform energy-efficiency building standards and engage in continuous improvement.

Vehicle Fuel Efficiency Assumption

- Average vehicle fuel economy would increase from 20.4 to 34.5 miles per gallon by 2035⁴ due to increased Corporate Average Fuel Economy (CAFÉ) standards and a larger proportion of electric and hybrid-electric vehicles.

⁴ U.S. Energy Information Administration (2012) "Annual Energy Outlook"
http://www.eia.gov/forecasts/aeo/sector_transportation_all.cfm#energyimpact

Note: This indicator assumes no changes in the carbon intensity of electricity consumption or in the fuels used by households (i.e., natural gas, or electricity alone).

Indicator Results:

| | 2010 | Baseline 2035 | Preferred Land Use Scenario 2035 | Preferred Land Use Scenario plus Modest and Mighty Conservation Actions 2035 |
|---|------------|---------------|----------------------------------|--|
| Total Dwelling Units | 108,182 | 160,200 | 156,800 | 156,800 |
| Total Annual Residential Energy Use (million Btus) | 20,700,000 | 22,500,000 | 21,600,000 | 18,400,000 |
| <i>Percent Increase/Decrease from Baseline</i> | | | -4% | -18% |
| <i>Percent Increase/Decrease from 2010</i> | | 9% | 4% | -11% |
| Annual Residential Energy Use per Household (million Btus / household) | 192 | 140 | 138 | 117 |
| <i>Percent Increase/Decrease from Baseline</i> | | | -2% | -16% |
| <i>Percent Increase/Decrease from 2010</i> | | -27% | -28% | -39% |

Note: Includes fuel efficiency factor for vehicles (related to Corporate Average Fuel Economy (CAFÉ) standards for 2035 scenarios. Please see Scenario Description.

Discussion:

It is forecast that there will be a decrease in residential energy use per household between 2010 and 2035 under the Baseline Scenario for two primary reasons:

- An increase in the percentage of multifamily units within the county, that tends to use less energy per household.
- An increase in fuel efficiency.

The Preferred Land Use Scenario shows a slight decrease in energy usage per household compared to the Baseline, mainly as a result of difference in vehicle miles traveled and an increase in multifamily homes relative to single-family. With implementation of mighty energy conservation actions outlined above, a 39 percent reduction in per household energy use is forecast. This translates to an 11 percent reduction in total energy usage county-wide when growth is considered.

[Additional Information – See Page 92](#)

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11. Forest Land Preservation

What is this?

Forest Lands are our working forest lands. They include:

- Public Forests such as Capitol Forest.
- Private Forest Lands enrolled in the Open Space Forest Tax Program. This program provides landowners the option of having their land valued at “current use” rather than “highest and best use.” As a result, their taxes are lowered if their properties are accepted into the program. This program is an incentive for conservation, but is not designed to protect farmlands in perpetuity.

This should not be confused with forest cover. Forest lands are an ownership and use designation, while forest cover is usually a direct measure (through air photos or satellite data) of tree canopy.

This indicator provides an estimate of how vulnerable forest lands are to conversion to residential uses.

Why is it meaningful?

Private forest lands are vulnerable to conversion to urban uses. A TRPC report⁵ indicated that approximately 18,600 acres of forested lands were converted to urban uses between 1985 and 2000, a rate of approximately 1,200 acre per year.

In addition to their economic benefits, forest lands provide many environmental benefits. For instance, intact forest cover is one of the components of a healthy watershed, and trees are important for carbon sequestration.

How is it measured?

This indicator is measured through Population and Employment Forecast model. We identified forest lands, and then calculated land consumption. It should be considered a sketch planning tool, as many other factors will influence forest land conversion other than urban growth.

⁵ The Rate of Urbanization and Forest Harvest in Thurston County, 1985-2000. Thurston Regional Planning Council, 2002.

Indicator Results:

| | Total Forest Lands 2010 | Baseline 2035 | Preferred Scenario 2035 |
|---|----------------------------|------------------|-------------------------------|
| Acres of Forest Lands | 188,900 | 169,500 | 188,400 |
| Loss of Forest Lands (2010-2035) | | -19,300 | -460 |
| <i>Percent Decrease in Forest Lands (2010-2035)</i> | | -10% | 0% |

Discussion:

The Preferred Scenario was designed to protect forest lands in the rural areas by implementing a range of strategies including a science-based approach to protecting forest lands, especially in areas where they are essential to watershed protection. Strategies include placing rural forest lands in long-term forestry zoning, funding a purchase of development rights program, and providing economic incentives. If all of these measures were implemented no net loss of forest lands could be achievable.

[Additional Information – See Page 94](#)

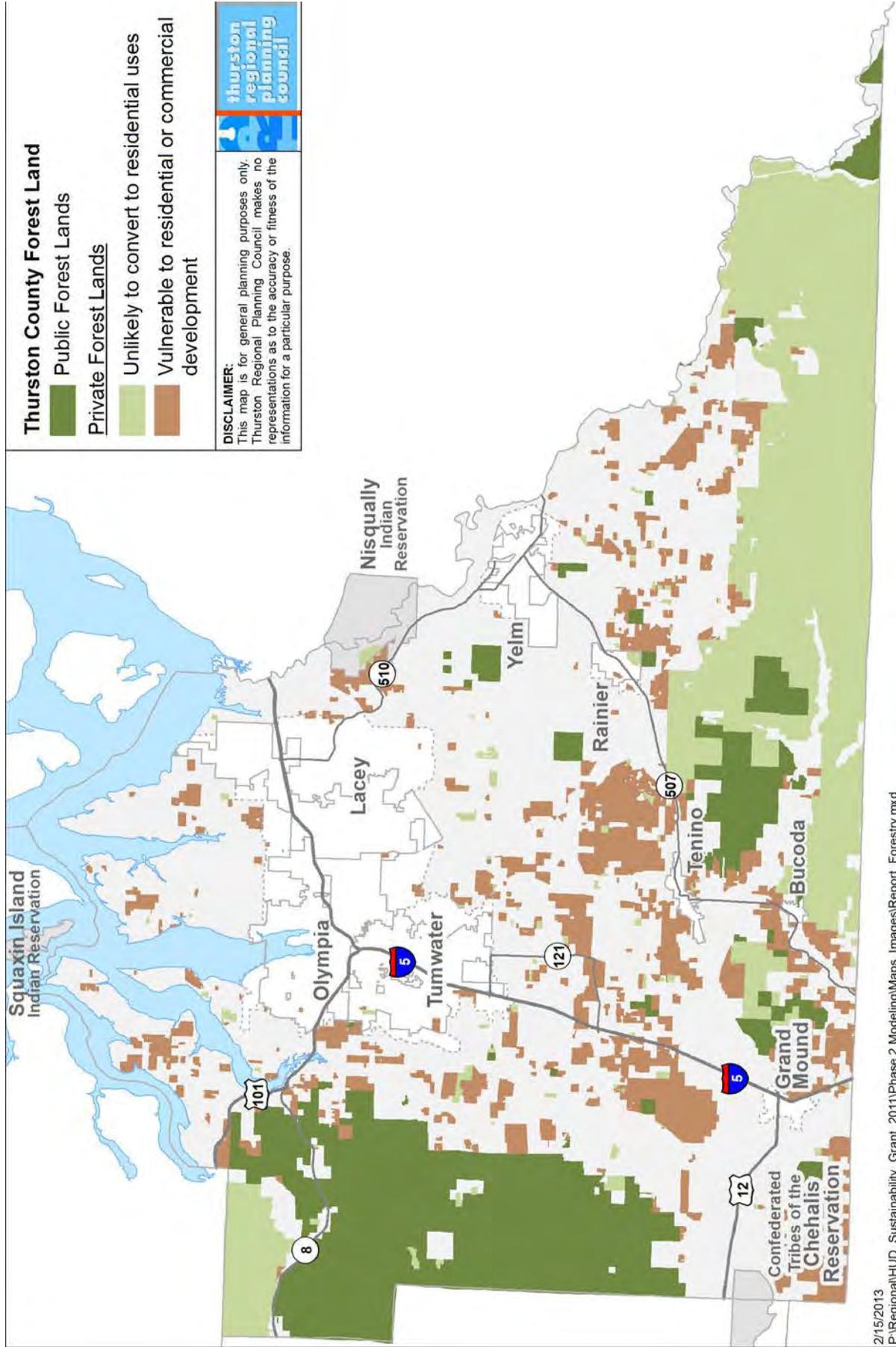


FIGURE 7: THURSTON COUNTY FOREST LANDS.

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12. Farmland Preservation

What is this?

Farmlands are lands suitable for farming. For the purposes of this indicator, farmlands are defined as parcels:

- Zoned in Agricultural Zoning. Agricultural zoning is designed to protect farmlands in perpetuity.
- Enrolled in the Open Space Agriculture Tax Program. This program provides landowners the option of having their land valued at “current use” rather than “highest and best use.” As a result, their taxes are lowered if their properties are accepted into the program. This program is an incentive for conservation, but is not designed to protect farmlands in perpetuity.
- Containing Tier 1 Prime Farmland Soils.³

Note: Parcels in the open space Forestry Tax Program containing Tier 1 soils are excluded from this indicator.

This indicator provides an estimate of how vulnerable farmlands are to conversion to residential uses.

Why is it meaningful?

Farmlands are vulnerable to conversion to urban uses. A recent Farmland Inventory estimated that some 90,000 acres of farmlands have been converted to other uses (including urbanization, open space, and forestry) since 1950, and that approximately 2,000 acres of working agricultural lands are converted to urban uses per year in Thurston County.⁶

How is it measured?

This indicator is measured through the Population and Employment Forecast model. We identified farmlands, and then calculated land consumption. It should be considered a sketch planning tool, as many other factors will influence farmland conversion other than urban growth.

⁶ Thurston County Farmland Inventory, Summary Report to the Bullitt Foundation by Jeff Fisher and Lea Mitchell for South of the Sound Community Farm Land Trust. March, 2009.

Indicator Results:

| | Total Farmlands 2010 | Baseline 2035 | Preferred Scenario 2035 |
|--|----------------------------|------------------|-------------------------------|
| Acres of Farmland | 48,200 | 32,600 | 46,000 |
| Loss of Farmlands (2010-2035) | | -15,600 | -2,200 |
| <i>Percent Decrease in Farmlands (2010-2035)</i> | | -32% | -5% |

Note: The Thurston County Farmland Inventory defined approximately 68,250 acres of farmlands in 2009. The estimate in this report does not include forest lands with Tier 1 soil types as they were included in the forest land inventory. It is likely that this accounts for the majority of the difference between the two estimates.

Discussion:

The Preferred Scenario was designed to protect farm lands in the rural areas and unincorporated urban growth areas. The assumptions were that the County would take steps to identify and prioritize farm lands for protection. In the rural areas strategies could include establishing a range of rural densities including additional areas placed in long-term agriculture zoning, funding a purchase of development rights program, and a set of economic incentives. With these steps, it is forecast that no more than 5 percent of remaining farmlands in the cities, unincorporated growth areas, and rural areas will be lost to urbanization.

Some further loss of farmland is anticipated, including:

- Residential lots that have already been issued a building permit (as the forecast horizon begins in 2010).
- Rural residential lots in Limited Areas of More Intensive Rural Development that are in prime farmlands, but unlikely to be rezoned as they were rezoned in 2007.
- Vested subdivisions in the cities and unincorporated growth areas that are in the open space agriculture program.
- Large master planned communities or areas designated for master planned communities that are in the open space agriculture program or contain prime farmlands, such as the Doelman Farm in Tumwater.

[Additional Information – See Page 95](#)

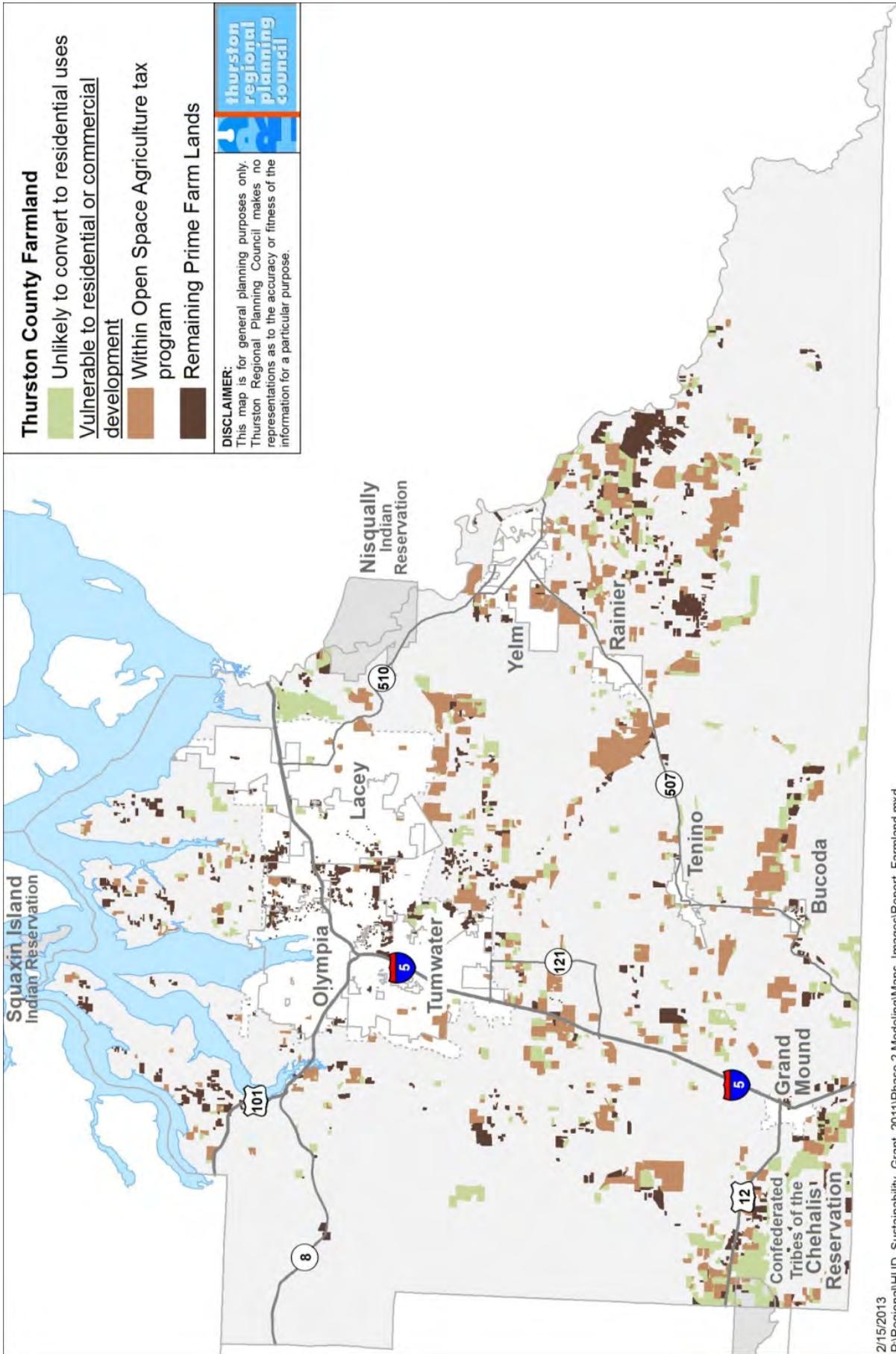


FIGURE 8: THURSTON COUNTY FARMLANDS.

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13. Impervious Area

What is this?

Impervious surfaces are materials that slow or stop the infiltration of water into the ground. Parking lots, roof tops and roads are all impervious surfaces. The area covered by impervious surfaces is called impervious area. It is measured in units of area – such as square miles or acres.

Why is it meaningful?

Among other variables, studies have shown a strong relationship between impervious area in a basin or watershed and the health of streams and other water resources. Impervious area is directly related to zoning density. As lot sizes decrease, the percentage of the lot covered in impervious area increases.

As impervious area increases, less water is absorbed into the ground. Instead of being filtered naturally, water rapidly flows to stream systems as runoff. Increased surface runoff leads to more pollution in streams and inlets, to higher and increased numbers of flood events, and to degradation of streams and stream beds. Managing storm water runoff is a requirement for local governments to help protect stream and watershed health.

Research shows that as development increases (measured as changes in impervious area), impacts to streams tend to increase. Natural resource managers can use the percent of a stream’s basin that is impervious to reflect its general health: healthy streams tend to have basins less than 10 percent impervious while a degraded stream’s basin cover is likely to be more than 30 percent impervious.

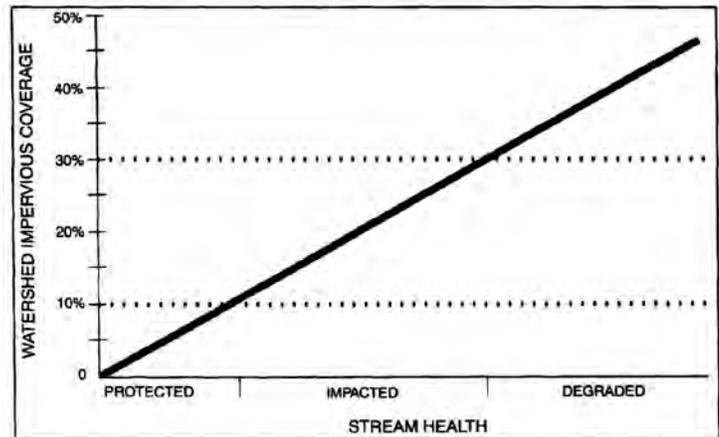


FIGURE 9: STYLIZED RELATIONSHIP OF WATERSHED IMPERVIOUS COVERAGE AND STREAM HEALTH

SOURCE: ARNOLD, C. L., JR., AND GIBBONS, C.J. (1996). IMPERVIOUS SURFACE COVERAGE - THE EMERGENCE OF A KEY ENVIRONMENTAL INDICATOR. *JOURNAL OF THE AMERICAN PLANNING ASSOCIATION*, 62(2), 243-258.

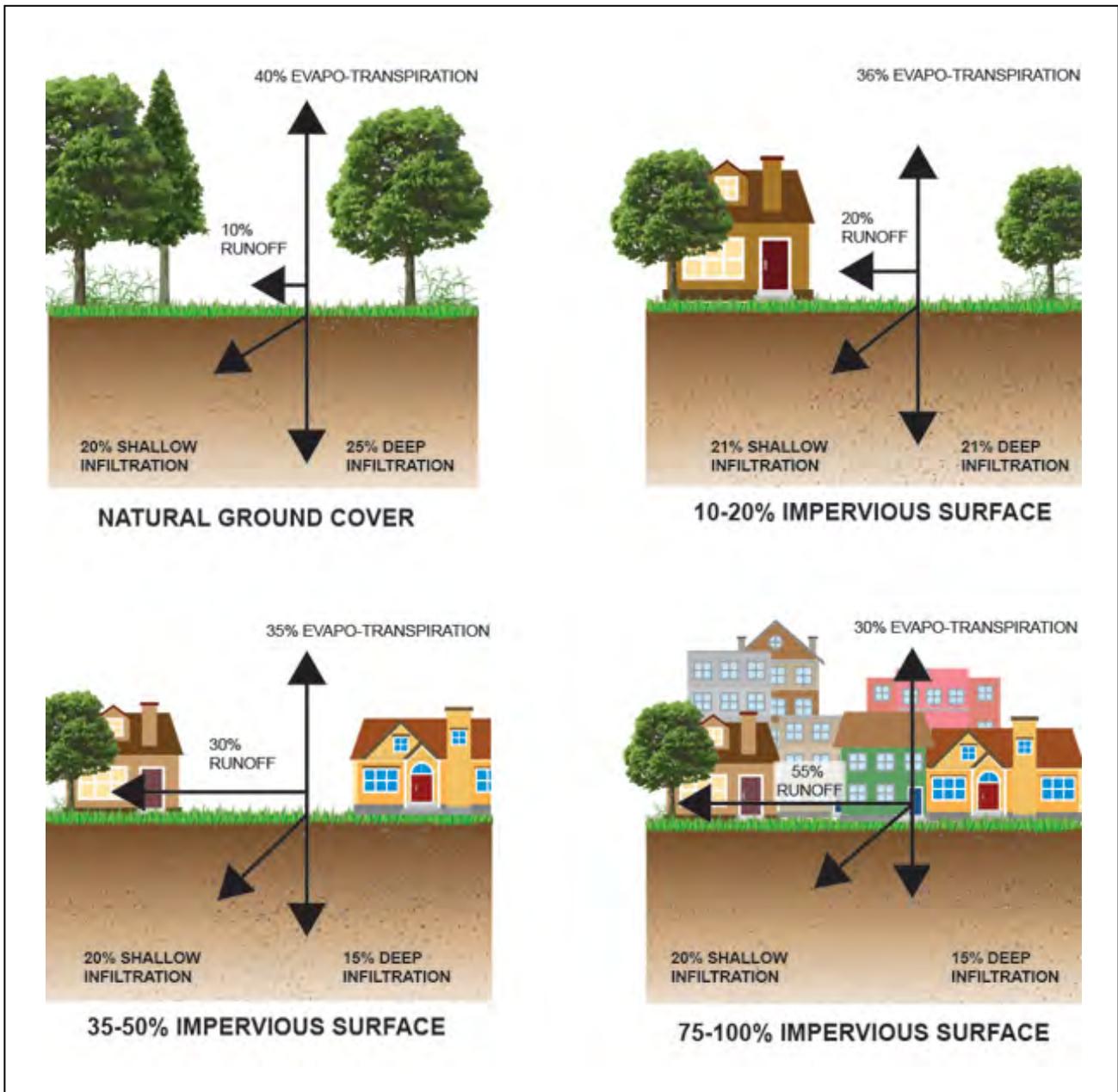


FIGURE 10: WATER CYCLE CHANGES ASSOCIATED WITH URBANIZATION.

SOURCE: (GUIDANCE SPECIFYING MANAGEMENT MEASURES FOR SOURCES OF NONPOINT SOURCE POLLUTION IN COASTAL WATERS, 1993) AS SHOWN IN (ARNOLD & GIBBONS, 1996).

How is it measured?

Impervious area is either estimated from land use patterns, or measured directly from aerial photographs or satellite imagery. It can be estimated from land use patterns because as activity density increases, so does impervious area. At low activity levels such as on farmlands or rural lands, percent impervious area tends to be low.

Indicator Results:

| | Baseline 2010-2035 | Preferred Scenario 2010-2035 |
|---|-----------------------|---------------------------------|
| Acres of Impervious Surfaces in Basins with currently less than 10% impervious cover in 2010 | 2,860 | 1,890 |
| <i>Percent Increase/Decrease from Baseline Scenario</i> | | -34% |
| Acres of Impervious Surfaces in Basins with currently greater than 10% and less than 30% impervious cover in 2010 | 1,190 | 818 |
| <i>Percent Increase/Decrease from Baseline Scenario</i> | | -31% |

Discussion:

The Preferred Scenario represents a large improvement from the Baseline Scenario for stream basins that have an impervious surface cover of fewer than 10 percent or between 10 and 30 percent – or streams that are sensitive or impacted today. It is important to minimize the amount of impervious surface cover in well-functioning stream basins as it is easier to protect a properly functioning stream basin than to restore it once it has been degraded. In addition, storm water treatment facilities, necessary to treat runoff from impervious surfaces, are costly. Minimizing new impervious surfaces saves both private and public funds.

The Preferred Scenario offers increased opportunities for infill and redevelop, and will help facilitate opportunities for storm water retrofits in core urban areas where urban runoff is an issue.

Additional Information:

TRPC estimates future impervious area using the Population and Employment Forecast Model. More information on TRPC's methodology can be found in [this document](#).⁷

⁷ Estimate of Current and Future Impervious Area for Watershed Based Land Use Planning – Thurston County, 2013. http://www.trpc.org/regionalplanning/environment/Documents/Healthy%20Watersheds/Update-MapsandReport04-13/EstimatesofFutureImpervious2013_w_maps.pdf

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14. Residential Carbon Dioxide Emissions

What is this?

Gases that trap heat in the atmosphere are called greenhouse gases. The principal gases that enter the atmosphere because of human activities are:

- Carbon Dioxide (CO₂).
- Methane (CH₄).
- Nitrous Oxide (N₂O).
- Fluorinated Gases.

Why is it meaningful?

“Energy from the sun drives the earth's weather and climate. The earth absorbs energy from the sun, and also radiates energy back into space. However, much of this energy going back to space is absorbed by “greenhouse” gases in the atmosphere. Because the atmosphere then radiates most of this energy back to the Earth’s surface, our planet is warmer than it would be if the atmosphere did not contain these gases. Without this natural “greenhouse effect,” temperatures would be about 60°F lower than they are now, and life as we know it today would not be possible.

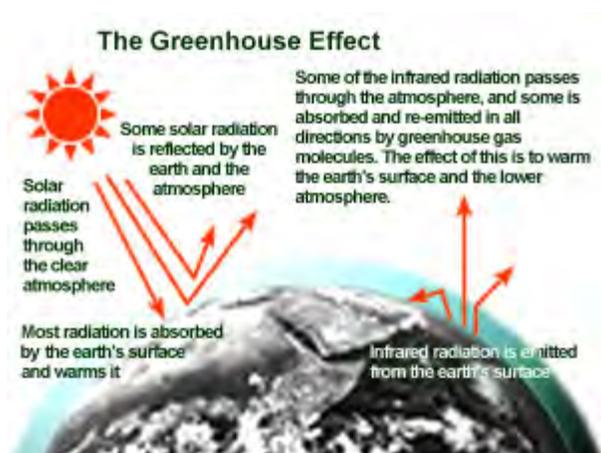


FIGURE 11: THE GREENHOUSE EFFECT.

During the past century humans have substantially added to the amount of greenhouse gases in the atmosphere by burning fossil fuels such as coal, natural gas, oil and gasoline to power cars, factories, utilities and appliances. The added gases — primarily carbon dioxide and methane — are enhancing the natural greenhouse effect, and likely contributing to an increase in global average temperature and related climate changes.”⁸

In the state of Washington the Governor issued a Climate Change Executive Order in 2007, setting greenhouse gas emission limits of:

- Returning to 1990 levels by 2020.
- Achieve a 25 percent reduction below 1990 by 2035.
- Achieve a 50 percent reduction below 1990 by 2050.

⁸ US Environmental Protection Agency <http://epa.gov/climatechange/science/index.html>

How is it measured?

Carbon dioxide emissions (CO₂) were measured for both home and residential vehicle consumption, and then added together. CO₂ emissions are related to both energy efficiency (Indicator 10) and vehicle miles traveled (Indicator 5). Home consumption was estimated based on building type (single-family, multifamily or mobile home) and number of residential units. Residential vehicle energy consumption was estimated by converting vehicle miles traveled to energy usage. Carbon dioxide emissions are measured in short tons.

Note: This indicator assumes no changes in the carbon intensity of electricity consumption or in the fuels used by households (i.e., natural gas, or electricity alone).

Indicator Results:

| | 2010 | Baseline 2035 | Preferred Land Use Scenario 2035 | Preferred Land Use Scenario plus Modest and Mighty Conservation Actions 2035 |
|---|-----------|------------------|---|---|
| Total Dwelling Units | 108,182 | 160,200 | 156,800 | 156,800 |
| Total Annual Residential Carbon Dioxide Emissions (tons CO₂) | 2,020,000 | 2,260,000 | 2,180,000 | 1,810,000 |
| <i>Percent Increase/Decrease from Baseline</i> | | | -3% | -20% |
| <i>Percent Increase/Decrease from 2010</i> | | 12% | 8% | -10% |
| Annual Residential Carbon Dioxide Emissions per Household (tons CO₂ /household) | 18.6 | 14.1 | 13.9 | 11.5 |
| <i>Percent Increase/Decrease from Baseline</i> | | | -1% | -18% |
| <i>Percent Increase/Decrease from 2010</i> | | -24% | -25% | -38% |

Discussion:

The Preferred Land Use Scenario shows a slight decrease in carbon dioxide emissions per household compared to the Baseline, mainly as a result of difference in vehicle miles traveled and an increase in multifamily homes relative to single-family.

With implementation of mighty energy conservation actions, a 38 percent reduction in per household emissions is forecast. This translates to a 10 percent reduction county-wide when growth is considered.

[Additional Information – See Page 96](#)

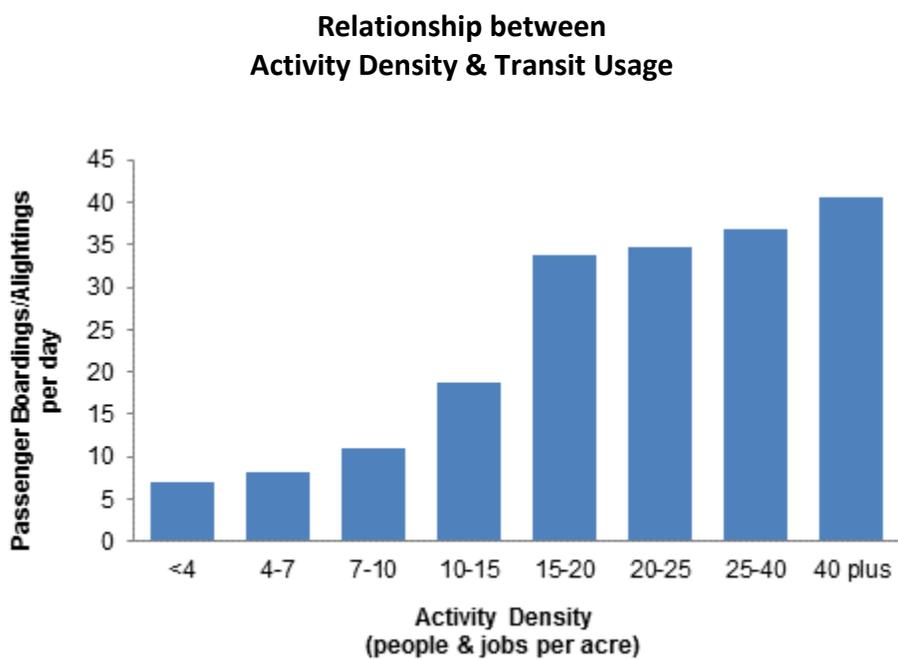
APPENDIX

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ADDITIONAL INFORMATION ON INDICATOR DEVELOPMENT

Activity Density and Transit Usage - Additional Information

For the Intercity Transit service area (the northern urban area of Thurston County) a relationship between bus boardings/alightings and activity density was developed by comparing local data sets. As activity density increases, so does ridership on transit. This analysis does not take into account frequency of routes, and other related factors. Transit transfer centers are removed from the data set. This data was not used in the analysis of indicators, but is shown as a local data set to help better understand the significance of indicator results.



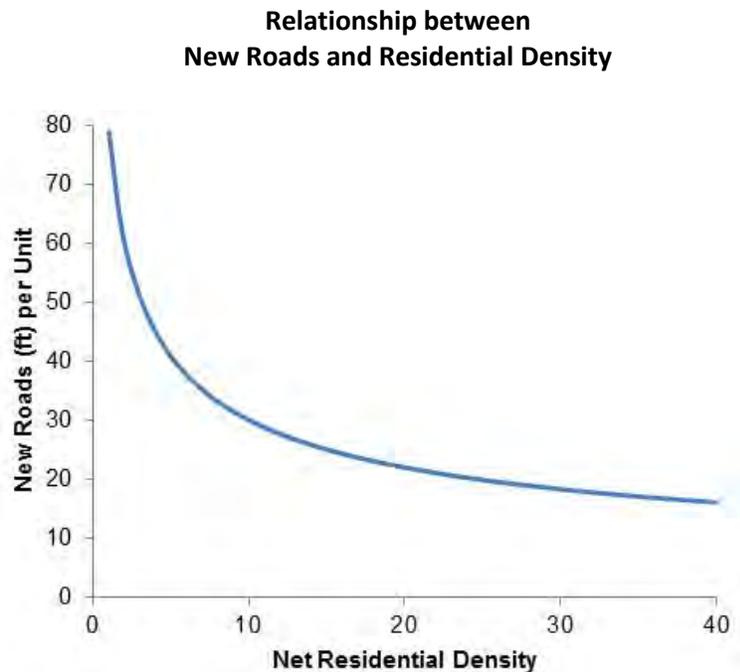
SOURCE: THURSTON REGIONAL PLANNING COUNCIL DATA PROGRAM; INTERCITY TRANSIT.

Subdivision Road Construction – Additional Information

TRPC maintains a database of subdivision boundaries of residential long plat subdivisions built in the urban and rural areas since 1970. This database does not capture large lot and short plat subdivisions, which are a fairly large component of rural growth.

Subdivision boundaries are maintained in TRPC's subdivision database and GIS system. Road length was compared to subdivision boundaries. Residential density was derived from the subdivision database.

Please see **Residential Land Consumption** for the relationship between Net Residential Density and Activity Density.



SOURCE: THURSTON REGIONAL PLANNING COUNCIL DATA PROGRAM.

Mix of Population and Employment –Additional Information

The mix, or diversity, of residents with jobs (Diversity) for each grid on the map was measure on a scale of 0 to 1 where:

1 = The ratio of jobs to residents in the grid equals the county-wide ratio.

0 = There are only residents or only jobs in a grid.

$$\text{Diversity} = 1 - \frac{\text{Abs} \left[\frac{\text{County Employment}}{\text{County Population}} - \frac{\text{Grid Employment}}{\text{Grid Population}} \right]}{\frac{\text{County Employment}}{\text{County Population}} + \frac{\text{Grid Employment}}{\text{Grid Population}}}$$

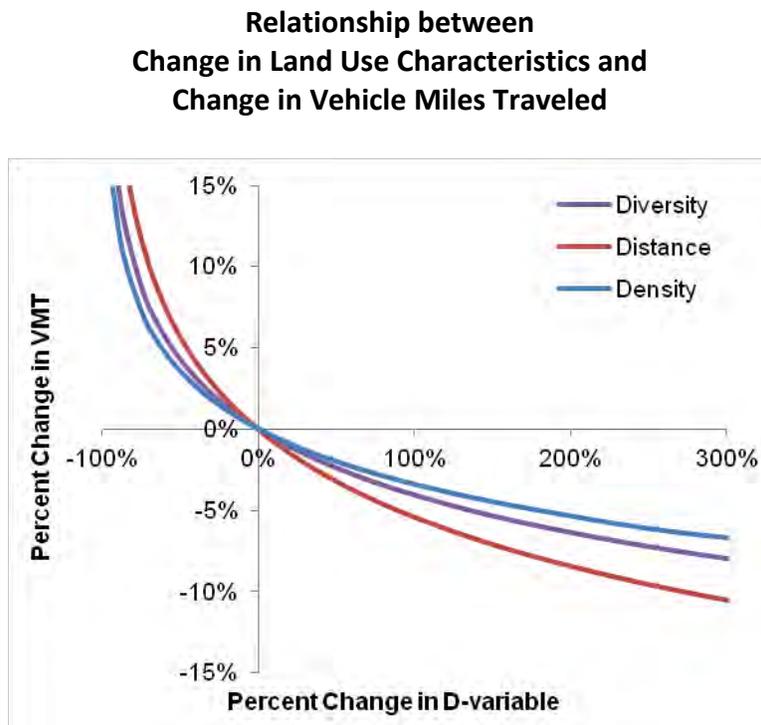
The final number reported is the average diversity for all grids in the county, weighted by population.

Vehicle Miles Traveled – Additional Information

The equations for this indicator are based on a study conducted by Sonoma Technology, Inc., in collaboration with the Washington State Department of Transportation, the Thurston Regional Planning Council, and the Washington State Department of Commerce. These organizations collaborated to develop a web-based modeling tool (Low-Carb Land) to evaluate how changes in land use and future growth affect travel activity and carbon dioxide (CO₂) emissions. More information on the equations and research studies that informed tool development can be found here:

<http://lowcarbland.sonomatechdata.com/About.aspx>.

The equations used to determine the effect of land use patterns on vehicle miles traveled assume that as diversity, distance, and density change, there is a corresponding change in vehicle miles traveled. The amount of change is based on that variable's elasticity. The relationship is shown in the graph below:



SOURCE: LOW-CARB LAND MODEL DOCUMENTATION, SONOMA TECHNOLOGY INC.

Equations:

Density

Density was measured as the Activity Density (number of Residents plus Jobs per square mile)

Diversity

Diversity (mix of housing and jobs) was measured as the balance of jobs plus residents. Values range from 0 to 1, where:

1 = The ratio of jobs to residents in the grid equals the county-wide ratio.

0 = There are only residents or only jobs in a grid.

$$\text{Diversity} = 1 - \frac{\text{Abs} \left[\frac{\text{County Employment}}{\text{County Population}} - \frac{\text{Grid Employment}}{\text{Grid Population}} \right]}{\frac{\text{County Employment}}{\text{County Population}} + \frac{\text{Grid Employment}}{\text{Grid Population}}}$$

Note – grid refers to each square mile map grid.

Distance

Distance was measured the number of people within 0.25 mile of a bus stops. This is the average distance people will walk to get to a transit stop.

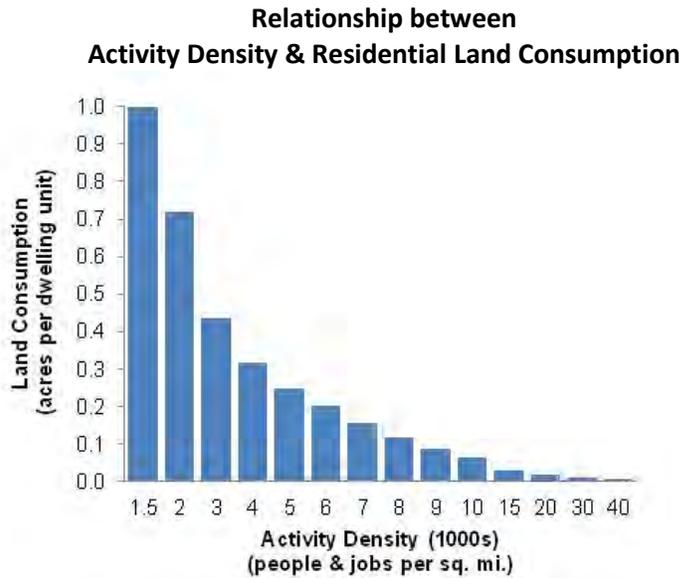
Vehicle Miles Traveled

The following equation was used to calculate VMT. The elasticities of VMT with respect to each variable (-0.05, -0.06, -0.08) are from Sonoma Technology's Low-Carb Land Model Documentation.

$$\begin{aligned} \log[\text{VMT 2035}] = & \log[\text{VMT 2009}] \\ & - 0.05 \times (\log[\text{Density 2035}] - \log[\text{Density 2010}]) \\ & - 0.06 \times (\log[\text{Diversity 2035}] - \log[\text{Diversity 2010}]) \\ & - 0.08 \times (\log[\text{Distance 2035}] - \log[\text{Distance 2010}]) \end{aligned}$$

Residential Land Consumption – Additional Information

The relationship between activity (people and jobs per square mile) and residential land consumption was generalized from assumptions used in the Buildable Lands Analysis for Thurston County. The relationship was as follows:



| Activity Density (people & jobs per sq. mi.) | Residential Land Consumption (acres/du) | Residential Density (du/acre) rounded | Percent of Growth as Infill and/or Redevelopment |
|--|---|---|--|
| 1,500 or less | 1.00 | 1 | - |
| 2,000 | 0.72 | 1.5 | - |
| 3,000 | 0.43 | 2 | - |
| 4,000 | 0.32 | 3 | - |
| 5,000 | 0.25 | 4 | 4% (infill) |
| 6,000 | 0.20 | 5 | 3% (infill) |
| 7,000 | 0.16 | 6 | 1% (infill) |
| 8,000 | 0.12 | 8 | - |
| 9,000 | 0.09 | 11 | 3% (redev.) |
| 10,000 | 0.07 | 15 | 40% (redev) |
| 15,000 | 0.03 | 34 | 60% (redev) |
| 20,000 | 0.02 | 55 | 60% (redev) |
| 30,000 | 0.01 | 102 | 60% (redev) |
| 40,000 or more | 0.01 | 136 | 60% (redev) |

TABLE 1: THE RELATIONSHIP BETWEEN ACTIVITY DENSITY AND RESIDENTIAL LAND CONSUMPTION.

SOURCE: THURSTON REGIONAL PLANNING COUNCIL DATA PROGRAM.

Household Water Consumption – Additional Information

A household’s water use was estimated based on its location (urban versus rural), its water source and the type of structure. Households in Washington have three primary sources for water:

- Class A systems, generally metered, serve 15 or more units.
- Class B systems serve 2 to 14 units.
- Private wells generally serve households in rural or low-density areas.

Two factors that affect water use are the type of dwelling unit and the location. Much of this is driven by outdoor water use. A single-family unit with a lawn is likely to use more water than a multifamily unit without one. Similarly, units in rural areas tend to have large lots requiring more water for irrigation. The following estimates were used for households in each group:

Estimated Residential Water Use Rates (Gallons Per Minute)

| Water System | 2010 | | Baseline 2035 | | Preferred Scenario 2035 | | Conservation Measures 2035 | |
|--------------------------------|------|-----|---------------|-----|-------------------------|-----|----------------------------|-----|
| | SF | MF | SF | MF | SF | MF | SF | MF |
| Class A: Municipal | 210 | 150 | 210 | 150 | 210 | 150 | 160 | 115 |
| Class A: Rochester/Grand Mound | 260 | 260 | 260 | 260 | 260 | 260 | 195 | 195 |
| Class A: Rural | 230 | 230 | 230 | 230 | 230 | 230 | 175 | 175 |
| Class B & Exempt Wells: | | | | | | | | |
| Existing Units (2010) | 630 | 630 | 630 | 630 | 630 | 630 | 630 | 630 |
| New Units (2010-35) | 630 | 630 | 630 | 630 | 630 | 630 | 230 | 230 |

Developing Estimates:

Class A Water Systems: Municipal

Estimates for households served by Class A municipal water systems were based on data reported by five Thurston county jurisdictions. Because of its particularly high rates of water use, the Rochester/Grand Mound rates were analyzed separately. In 2035, it was assumed that all new units within Urban Growth Areas will be served by a municipal water system.

Reported per Household Water Use Rates (Gallons Per Day) for Thurston County Jurisdictions.

| | Rainier 2012 | Olympia 2004-07 | Olympia 2011 | Lacey 2011 | Tumwater 2006-08 | Yelm 2006-07 | Grand Mound 2005-10 |
|---------------|-------------------------|----------------------------|-------------------------|-----------------------|-----------------------------|-------------------------|------------------------------------|
| Single-Family | 182 | 198 | 159 | 169 | * | 215 | 282 |
| Multifamily | n/a | 123 | 109 | n/a | * | n/a | n/a |

Note: *Tumwater data only reported by connection, not by household.

Class A Water Systems: Rural

Over 10,000 households are served by a Class A water system outside of the Urban Growth Boundary. Water use for these households was based on a sampling of 23 water systems servicing rural subdivisions. New units built within their service areas are assumed to be connected to the system.

Reported Per Household Water Use Rates for Class A Water Systems Serving Rural Subdivisions.

| Class A Water System | Gallons per Day | Owner |
|-----------------------------|------------------------|---------------------------------------|
| Black Lake Estates | 230 | Washington Water Service Co. |
| Boston Harbor | 166 | Thurston County |
| Cornerstone Estates | 282 | Thurston PUD |
| Covington | 265 | Thurston PUD |
| Creekside Meadows Div. 2 | 200 | Washington Water Service Co. |
| Crowder Rd | 244 | Thurston PUD |
| Foxhall | 270 | Washington Water Service Co. |
| Grandview | 204 | Rochester Water Association |
| Lake Lawrence | 160 | Washington Water Service Co. |
| Lazy Acres W1 | 229 | Thurston PUD |
| Lew's 81 st | 205 | Thurston PUD |
| Loma Vista | 311 | Thurston PUD |
| Nisqually Highlands | 561 | Thurston PUD |
| Pederson Place | 340 | Thurston PUD |
| Prairie Ridge | 565 | Thurston PUD |
| Prairie Villa | 274 | Thurston PUD |
| Prairie Vista | 201 | Rochester Water Association |
| Scott Lake | 180 | Washington Water Service Co. |
| Smith S Prairie | 327 | Thurston PUD |
| Sunwood Lakes | 190 | Washington Water Service Co. |
| Tamoshan | 204 | Thurston County |
| Tanglewilde | 244 | Thurston PUD |
| Tolmie Estates | 234 | Thurston PUD |
| Average | 231 | (Weighted by # of Connections) |

Class B & Exempt Wells

Water usage in households served by Class B water systems or private exempt well is not metered and little data on usage exists. Local planners estimate that water usage is two to three times that of rural subdivisions since units tend to have large lawns requiring more water for irrigation and there is no financial incentive to conserve water.

The conservation strategies assume that all new units served by Class B water systems or exempt wells will be metered, allowing households to monitor and reduce their water consumption.

Residential Energy Consumption – Additional Information

Total Residential Energy Use is the sum of energy used in both homes and cars.

Housing Type Energy Usage

Housing unit type is important because multifamily units tend to use less energy due to their smaller size and the insulation provided by adjoining units. The average multifamily residence in Thurston County uses 26 percent less energy than the average single-family residence:

Thurston County Annual Residential Energy Usage

| PSE Customer Type | Structure Type | # Units¹ | Electricity¹ (kWh) | Natural Gas² (therms) | Total (M Btu) |
|------------------------------|---------------------------|----------------------------|--|---|--------------------------|
| Electric Only | Single-Family | 33,347 | 17,058 | 0 | 58.2 |
| | Multifamily | 18,213 | 9,649 | 0 | 32.9 |
| | Mobile Home | 10,984 | 15,760 | 0 | 53.8 |
| | Other | 335 | 13,312 | 0 | 45.4 |
| Gas and Electric | Single-Family | 40,234 | 8,997 | 608 | 91.5 |
| | Multifamily | 1,798 | 6,415 | 300 | 51.9 |
| | Mobile Home | 573 | 8,153 | 599 | 87.7 |
| | Other | 957 | 8,040 | n/a | n/a |

SOURCE: 1. PUGET SOUND ENERGY, 2011; 2. U.S. ENERGY INFORMATION AGENCY: RESIDENTIAL ENERGY CONSUMPTION SURVEY, 2009.

NOTE: MULTIFAMILY REFERS TO DUPLEXES, TRIPLEXES AND OTHER MULTIFAMILY UNITS. 1000 KWH = 3.412 M-BTU; 1 THERM = 0.100 M-BTU.

Applying the 10 and 30 percent reduction assumed for the Modest and Mighty scenarios gives the following energy use rates for the average dwelling unit (by type).

| | Single-Family (M-Btu) | Multifamily (M-Btu) | Mobile Home (M-Btu) |
|----------|----------------------------------|--------------------------------|--------------------------------|
| Current | 85.2 | 35.1 | 56.8 |
| Baseline | 85.2 | 35.1 | 56.8 |
| Modest | 76.7 | 31.6 | 51.1 |
| Mighty | 59.6 | 24.6 | 39.8 |

Since fewer than 10 percent of households in Thurston County use an alternative to electricity or natural gas for home heating⁹, only these two energy sources were considered for modeling purposes.

Vehicle Miles Traveled (VMT) and Energy Use

All vehicles require a certain amount of energy to travel a mile in distance. Multiplying total VMT by this rate gives the total annual energy consumption for residential transportation. Vehicle fuel efficiency is the primary driver of energy consumption in the transportation sector. More stringent CAFE standards and an increasing share of hybrid-electric and electric vehicles will drive the increase in average vehicle fuel efficiency in 2035.

$$\text{Total Energy Consumption (Residential Transportation)} = \text{Total VMT} \times \text{Energy per Mile Traveled}$$

| | Energy per Mile Traveled (k-Btu per Mile) | = | Energy Intensity of Gasoline (k-Btu / Gallon) | ÷ | Vehicle Fuel Efficiency (Miles / Gallon) |
|----------|---|---|---|---|--|
| Current | 5.59 | = | 114 | ÷ | 20.4 |
| Baseline | 3.30 | = | 114 | ÷ | 34.5 |
| Modest | 3.30 | = | 114 | ÷ | 34.5 |
| Mighty | 3.30 | = | 114 | ÷ | 34.5 |

SOURCE: ENERGY INFORMATION ADMINISTRATION: 2012 ANNUAL ENERGY OUTLOOK.

⁹ U.S. Census Bureau, 2007-2011 American Community Survey

Forest Land Preservation – Additional Information

The table below shows an estimate of Forest Lands in Thurston County. The private forest lands in the Cities and unincorporated Urban Growth Area (UGA) are more vulnerable to development pressures than the forest lands in the rural areas.

| 2010 Forest Land Inventory | Cities | UGA | Rural | Total |
|---|---------------|------------|----------------|----------------|
| Total Forest Lands (acres) | 370 | 480 | 188,040 | 188,890 |
| Public Forest Lands | 30 | 30 | 63,760 | 63,820 |
| Private Forest Lands | 340 | 450 | 124,280 | 125,070 |
| Unlikely to convert to residential uses | 160 | - | 79,760 | 79,930 |
| Vulnerable to residential or commercial development | 170 | 450 | 44,520 | 45,140 |

Farmland Preservation – Additional Information

The table below shows an estimate of Farmlands in Thurston County. The Farmlands in the Cities and unincorporated UGA are more vulnerable to development pressures than the farmlands in the rural areas. This is not an assessment of lands currently in use for farming or food production. The lands within the Open Space Agriculture Tax program are in agricultural uses. The Remaining Prime Farmlands are lands that are undeveloped or underdeveloped lands with soils that are suitable for farming based on the Natural Resources Conservation Service Land Capability Analysis (Tier 1 Soils).

| 2010 Farmland Inventory | Cities | UGA | Rural | Total |
|---|--------|-------|--------|--------|
| Total Farmlands (acres) | 1,800 | 1,950 | 44,430 | 48,200 |
| Unlikely to convert to residential development | 90 | 330 | 14,330 | 14,700 |
| Vulnerable to residential or commercial development | 1,710 | 1,620 | 30,100 | 33,440 |
| <i>Within Open Space Agriculture tax program</i> | 660 | 830 | 21,020 | 22,500 |
| <i>Remaining Prime Farmlands</i> | 1,050 | 790 | 9,080 | 10,900 |

Note: The Thurston County Farmland Inventory defined approximately 68,250 acres of farmlands in 2009. The estimate in this report does not include forest lands with Tier 1 soil types as they were included in the forest land inventory. It is likely that this accounts for the majority of the difference between the two estimates.

Residential Carbon Dioxide Emissions – Additional Information

Within the Puget Sound Energy service area, approximately 1.08 pounds of CO₂ are emitted for every kilowatt-hour of electricity generated; statewide, the average is 0.36 pounds per kilowatt-hour.¹⁰ Differences in methods and fuels used in generation (i.e., hydroelectricity versus natural gas combustion) explain the range of carbon intensities. For every therm of natural gas burned, 11.0 pounds of CO₂ are emitted.

Thurston County Annual Residential CO₂ Emissions

| PSE Customer Type | Structure Type | # Units ¹ | Electricity ¹ (kWh) | Natural Gas ² (therms) | CO ₂ (tons) |
|-------------------|----------------|----------------------|--------------------------------|-----------------------------------|------------------------|
| Electric Only | Single-Family | 33,347 | 17,058 | 0 | 9.2 |
| | Multifamily | 18,213 | 9,649 | 0 | 5.2 |
| | Mobile Home | 10,984 | 15,760 | 0 | 8.5 |
| | Other | 335 | 13,312 | 0 | 7.2 |
| Gas and Electric | Single-Family | 40,234 | 8,997 | 608 | 8.2 |
| | Multifamily | 1,798 | 6,415 | 300 | 5.1 |
| | Mobile Home | 573 | 8,153 | 599 | 7.7 |
| | Other | 957 | 8,040 | n/a | n/a |

SOURCE: 1. PUGET SOUND ENERGY, 2011; 2. U.S. ENERGY INFORMATION AGENCY: RESIDENTIAL ENERGY CONSUMPTION SURVEY, 2009.

NOTE: MULTIFAMILY REFERS TO DUPLEXES, TRIPLEXES AND OTHER MULTIFAMILY UNITS. 1 kWh = 1.08 POUNDS CO₂; 1 THERM = 11.0 POUNDS CO₂.

Applying the 10 and 30 percent reductions in the Energy Resource Scenarios gives the following rates of CO₂ emissions per household used in modeling.

| | Single-Family (tons CO ₂) | Multifamily (tons CO ₂) | Mobile Home (tons CO ₂) |
|----------|---------------------------------------|-------------------------------------|-------------------------------------|
| Current | 9.1 | 5.2 | 8.5 |
| Baseline | 9.1 | 5.2 | 8.5 |
| Modest | 8.19 | 4.68 | 7.65 |
| Mighty | 6.37 | 3.64 | 5.95 |

¹⁰ Puget Sound Energy "Customer Handbook for Climate Change."
http://pse.com/aboutpse/Environment/Documents/4405_Climate_Change_Handbook.pdf

Vehicle Energy Use and CO₂ Emissions

To estimate CO₂ emissions, Vehicle Miles Traveled (VMT) is multiplied by the average amount of CO₂ emitted by driving a mile.

$$\begin{aligned} &\text{Total CO}_2 \text{ Emissions (Residential Transportation)} \\ &= \\ &\text{Total VMT} \times \text{CO}_2 \text{ Emissions per Mile Traveled} \end{aligned}$$

| | CO₂ per Mile Traveled (lbs. per Mile) | = | Energy Intensity of Gasoline (lbs. / Gallon) | ÷ | Vehicle Fuel Efficiency (Miles / Gallon) |
|----------|---|---|---|---|---|
| Current | 0.966 | = | 19.7 | ÷ | 20.4 |
| Baseline | 0.571 | = | 19.7 | ÷ | 34.5 |
| Modest | 0.571 | = | 19.7 | ÷ | 34.5 |
| Mighty | 0.571 | = | 19.7 | ÷ | 34.5 |

SOURCE: ENERGY INFORMATION ADMINISTRATION: 2012 ANNUAL ENERGY OUTLOOK.

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Case Studies of Water Efficiency in Thurston County

Thurston Regional Planning Council

December 2012

Summary

The Sustainable Thurston Task Force is considering strategies that could be implemented to sustain water resources as the region's population and climate changes in coming decades. State law requires water producers to adopt conservation practices to meet today's water needs without compromising the ability of future generations to meet their needs. This document analyzes water conservation and efficiency initiatives that Olympia, Lacey and Yelm have undertaken — including setting irrigation budgets, adjusting rates, installing meters and offering incentives to businesses and households.

State

The state Department of Health (DOH) adopted the Water Use Efficiency rule in 2007 in response to the state's municipal water law. The rule requires water suppliers to report publicly annual production, consumption and progress toward meeting measurable efficiency goals. At least one demand-side goal is required (e.g., cutting water consumption per capita). On the supply side, water suppliers must meet a standard of no more than 10 percent distribution system leakage on a rolling, three-year average. Leakage is water that cannot be accounted for (the gap between total production and authorized consumption). A 2012 survey shows that the top three measures Washington water suppliers use to promote efficiency with customers are public education, conservation rates and bills that show consumption history.¹¹ Eighty-eight percent of water suppliers have meters on all connections, and 74 percent have conservation rate structures.



Olympia

On July 11, 2007 the mercury rose to 99 degrees Fahrenheit and nary a drop of rain fell from the sky.¹² On this “peak” day, when folks used more water to beat the heat than any other day that year, Olympia's municipal utility produced 15.1 million gallons — enough to serve customers and fight a fire, if needed. Climate models project warmer winters with less snow and drier summers in the Pacific Northwest during the next century.¹³ A warming, growing city will presumably consume more water — especially during summers — but Olympia has an aggressive conservation strategy to achieve its vision of a water supply that “sustains people in perpetuity while protecting the environment.”

¹¹ Partnership for Water Conservation. *Cooperative Conservation: A Report on the Implementation of Washington's Water Use Efficiency Rule*. 6 November 2012. Print.

¹² United States. Department of Commerce. National Oceanic and Atmospheric Administration. National Climate Data Center. *LCD Daily Form: 11 July 2006, Olympia Airport*. Washington, D.C. Online. Accessed 1 December 2012.

¹³ Washington State. Department of Ecology. *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy*. April 2012. Online. Accessed 17 December 2012.

Olympia’s 2009-2014 Water System Plan projects that peak summer demand for water will more than double to 37.7 million gallons per day (mgd) by 2058. If the City succeeds in reducing its water consumption by 5 percent every six years, savings during the next 50 years would be about 2.1 million gallons per day.

To achieve the plan’s short-term goal of cutting water consumption by 5 percent by 2014, Olympia educates citizens about conservation, conducts water-loss accounting, repairs system leaks, and promotes the installation of efficient toilets that exceed code requirements. The City also offers households free water-saving kits and provides rebates for efficient washing machines and other technologies. If such initiatives are the carrot, then progressively hefty water bills are the stick.

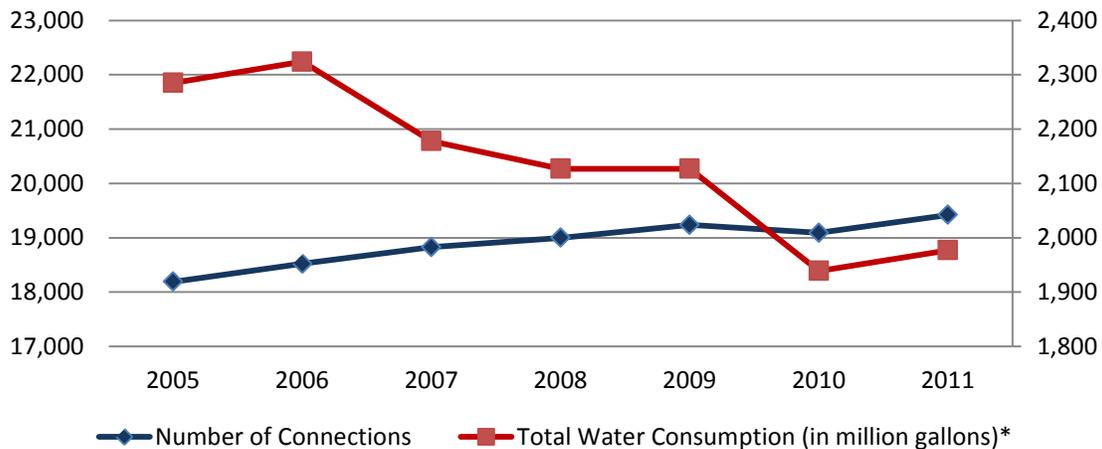
In 1997, Olympia introduced a three-tier rate structure for its single-family residential water customers, and the City added a fourth tier in 2005 to provide a stronger price signal. The “inclining block rate” structure means that the cost of water goes up along with usage (non-residential and multifamily customers are charged a seasonal water rate). Olympia is in the process of automating its system to enable officials to monitor meters remotely and fix leaks faster.

The conservation measures, along with recent summer weather patterns (people use less water during rainy summers), appear to be affecting consumer behavior, officials contend. The City is on pace to surpass its 2009-2014 conservation goal: Water consumption declined by more than 13 percent between the start of 2005 and end of 2011 as water connections increased almost 7 percent (Figure 1). Distribution system leakage in 2011 was 6.1 percent, down from 8.8 percent in 2007.¹⁴ During the 2009-2011 period, the leakage average was 7.2 percent; water consumption declined 7 percent.

“The Utility sees itself as a steward of the water resource and therefore takes a broad view of the entire hydrologic cycle, rather than focusing narrowly on system infrastructure.”

— City of Olympia, 2009-2014 Water System Plan

Figure 1: Olympia Conservation Versus Connections, 2005-2011



*Includes commercial and residential customers; does not include historical PUD consumption

Source: City of Olympia Public Works Department

¹⁴ Washington State. Department of Health. *Water Use Efficiency Performance Report (Olympia, 2007 & 2011)*. Online. Accessed 1 Dec. 2012.

Olympia’s water conservation efforts were highlighted in an article by the HarvestH2O.com, an online publication dedicated to sustainable water-management practices.¹⁵ The article noted several “lessons learned” from the efforts:

- Repeat rationale for conservation in as many venues as possible;
- Target different programs to different audiences;
- Partner with others in the community who share your conservation vision.

Lacey

In 2006, fast-growing Lacey adopted a resolution that prohibits new water connections within its urban growth area unless the property owner or developer has sufficient water rights and transfers them to the City. Six years later, Lacey is considering lifting the resolution’s restraints as part of changes to the City’s draft *Water Comprehensive Plan*. The move comes after the state Department of Ecology in July 2012 issued Lacey water permits for 6.6 million gallons a day to meet anticipated demand from building out its service area to planned densities that are required by the state Growth Management Act.

To help balance growth and consumption going forward, Lacey has the region’s broadest array of water-conservation measures. Lacey offers each residential customer an indoor water-saving kit that includes toilet leak-detection tablets, faucet aerators and a high-efficiency showerhead. Residential customers are also eligible for a free high-efficiency toilet and shower timer, as well as a cash rebate for buying a high-efficiency washing machine.

To save water outside, the City offers residential customers a free kit with hose screens, repair ends and an adjustable spray nozzle. Other giveaways to households include a soil moisture sensor and timer that shuts off hose sprinklers. Commercial customers are eligible for a free irrigation audit and rebates for implementing system upgrades recommended in the audit. Commercial customers that have received an audit — most of whom are homeowner associations (HOAs) — are saving about 25 percent more water, on average.

All Lacey water customers must follow an outdoor irrigation schedule to reduce summer peak demand. Addresses ending with an odd number may water yards on Saturdays, Mondays and Wednesdays; addresses ending with an even number may water outdoors on Sundays, Tuesdays and Thursdays. Exceptions include watering plants in pots and greenhouses, as well as washing vehicles.

Lacey implemented a four-tier rate structure for water customers in 2007. The City also adopted a 6.5 percent water rate increase annually through 2017 — part of the water plan’s strategy to reduce water use by 690,000 gallons a day by 2015. The strategy also includes reducing and maintaining the distribution system leakage to less than 10 percent, as well as reducing annual equivalent residential unit water demand for all accounts by 1 percent each year through 2014, to a value of 199 gallons a day.

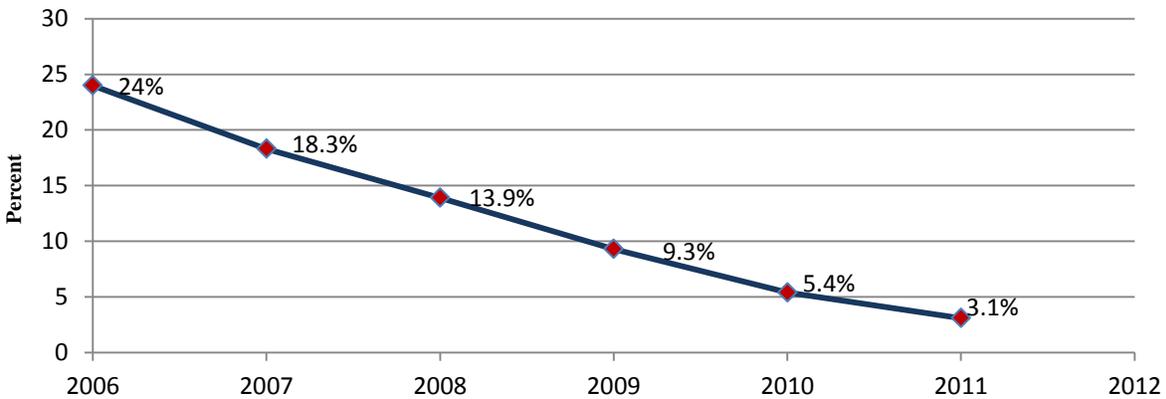


Lacey’s water use is forecast to grow from 9.2 mgd in 2015 to 11.6 mgd in 2029; peak demand would grow from 20.3 mgd in 2015 to 25.5 mgd in 2029.

¹⁵ Pushard, Doug. “Local Heros: City of Olympia Water Conservation Program Covers All Bases.” *HarvestH2O*. May 2005. Online. Accessed 1 Dec. 2012.

Lacey is already achieving the plan's goals. The City has slashed system leakage to about 3 percent by reducing water theft and automating meters, as well as by implementing state-of-the-art leak-detection and line-replacement programs (Figure 2). Officials read automated meters twice a day remotely and are able to detect and fix leaks faster. Officials have also placed roughly 300 locks on hydrants at schools, construction sites and spots hidden from public view; developers are now provided hydrant meters rather than charged a flat rate for water use at dusty construction sites.

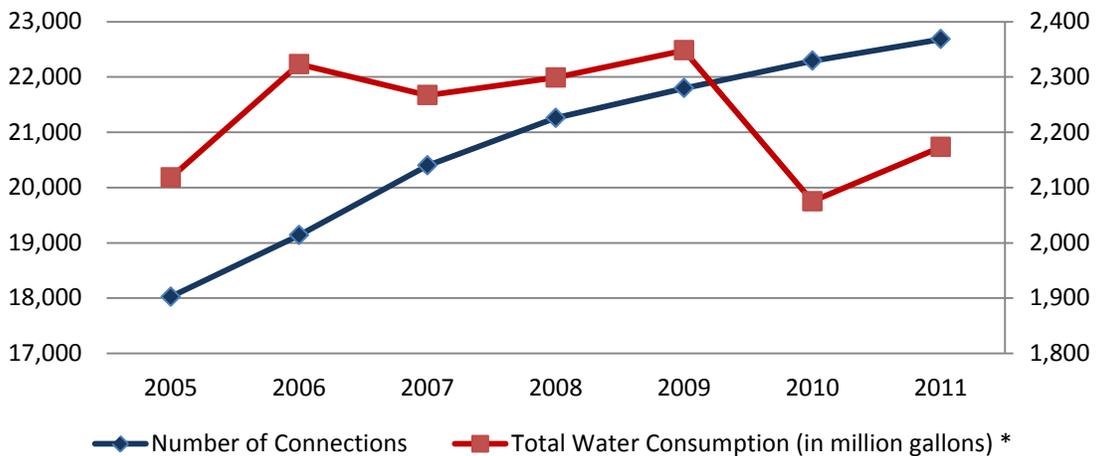
Figure 2: Lacey Distribution System Leakage (Unaccounted for Water), 2006-2011



Source: City of Lacey Public Works Department

In 2011, Lacey water customers consumed an average of 169 gallons a day, per equivalent residential unit (the City's new measuring stick for water consumption); this figure marked a 20 percent decrease from the baseline of 210 gpd.¹⁶ Water consumption rose roughly 3 percent between the start 2005 and end of 2011 as water connections increased 26 percent (Figure 3). Officials attributed the sharp decline between 2009 and 2010 to the implementation of a fourth tier of water rates, a very mild summer, and the purchase of calibration equipment at all of Lacey's 19 source meters; the new equipment indicated that the meters were over-reporting water use historically. Each meter is now calibrated on a regular basis, resulting in more accurate reporting.

Figure 3: Lacey Conservation Versus Connections, 2005-2011



*Includes total meter sales for commercial and residential customers; does not include distribution system leakage.

Source: City of Lacey Public Works Department

¹⁶ Washington State. Department of Health. *Water Use Efficiency Performance Report (Lacey, 2011)*. Online. Accessed 1 Dec. 2012.

Yelm

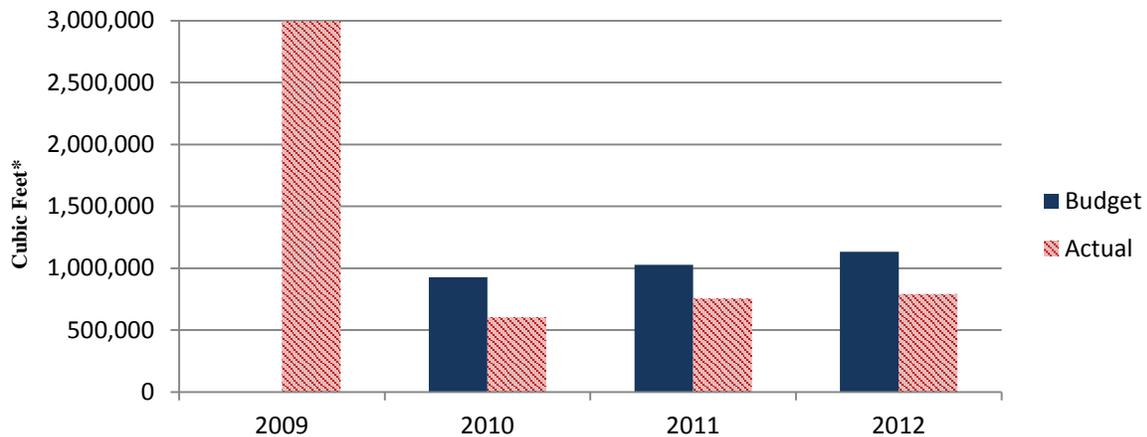
In April 2010, the Yelm City Council adopted a conservation program that established a water budget for businesses and homeowners associations with an irrigation meter. The 2010 irrigation budget was based on either the commercial customers' irrigation volume in 2009 or what the Washington Irrigation Guide (WIG) notes is needed for healthy and productive landscaping in Yelm (11.53 inches of irrigation water per season for trees/shrubs) — whichever was less. The goal was to cut in half the growing city's 2009 irrigation volume — nearly 3 million cubic feet (about 22.4 million gallons).

Here's how the irrigation budget worked for two of Yelm's biggest water consumers: WalMart and the Yelm Terra Homeowners Association, which represents the neighborhood immediately south of downtown. The WalMart Superstore near the intersection of State Routes 507 and 510 has about 52,300 square feet of landscaping and consumed about 204,600 cf of water for irrigation in 2009. Applying the WIG formula, Yelm calculated that the superstore's landscaping requires roughly 50,200 cf (390,000 gallons) of water — about a quarter of the water consumed in 2009 — to be healthy and productive. Thus, the 2010 budget slashed WalMart's consumption by about 154,600 cf (1.2 million gallons). The city saved another 47,000 cf (352,000 gallons) of water by applying the WIG formula to the Yelm Terra HOA.

Yelm has cut its irrigation volume by roughly a third while growing its population by a third since 2009.

Citywide, Yelm's water use for commercial irrigation — about 602,700 cf (4.5 million gallons) — was 35 percent below its 2010 budget of roughly about 926,700 cf (6.9 million gallons).¹⁷ Water use for commercial irrigation was 27 percent below budget in 2011 and 30 percent below budget in 2012 (Figure 4). The commercial landscape figures above do not include storm ponds and planter strips in the public right-of-way.

Figure 4: Yelm Commercial Irrigation Budget and Consumption, 2009-2012



* 1 cubic foot equals 7.5 gallons

Source: City of Yelm Community Development Department

City officials read commercial customers' meters weekly during the irrigation season (mid-April thru mid-October) and provide notice of usage. A customer's irrigation meter is locked when the annual water budget is reached. Planting strips in the public right-of-way are irrigated with reclaimed water. The water budgets have made businesses and HOAs more mindful that every drop counts — especially in Thurston County's fastest-growing city.

¹⁷ Beck, Grant. "Irrigation." Message to author. 4 Dec. 2012. E-mail.

Yelm and its urban growth area are projected to add roughly 18,000 people and 7,200 housing units between 2010 and 2035.¹⁸ In addition to issuing Lacey water permits last summer, the state Department of Ecology approved a permit that allows Yelm to receive rights to an additional 840,000 gallons of water a day. The permit is under appeal to the Washington State Pollution Control Hearings Board, which is anticipated to issue a decision in January 2013. If the permit is upheld, it would provide water sufficient for anticipated growth during the next two decades and avoid the need for a building moratorium.

Like the other communities, Yelm has achieved its goal of reducing residential water consumption — in the latter city’s case, to no more than 200 gallons a day. In 2011, the typical single-family home in Yelm used 170 gallons a day, down 3 percent from 2010.¹⁹ Demand-side conservation measures include public education and incentives — including providing tablets that detect toilet leaks.

As Yelm has raised commercial and residential water efficiency, the City’s distribution system leakage rate remains stubbornly high. Yelm has set a goal of limiting its leakage rate to 6 percent on a rolling, three-year average. Yelm’s average for the 2009-2011 period was 20.9 percent — more than twice the state standard. To identify and halt water losses, Yelm has expanded its leak-detection program, installed hydrant locks, performed annual meter calibration programs, conducted a system audit, and completed a water loss control action plan in accordance with state law.

Conclusion

Olympia, Lacey and Yelm have significantly increased their water use efficiency with a diverse portfolio of water rates, incentives and budgets. Some of the water-saving devices and rebates were made possible by the LOTT Clean Water Alliance, which has invested about \$7 million during the past 15 years to promote conservation in the communities of Lacey, Olympia, Tumwater and Thurston County.²⁰ LOTT’s investment has reduced pressure on water supplies and postponed the need to build additional sewer capacity. Lacey and Olympia’s tiered rate structures send powerful price signals to households and spur less consumption. Yelm’s irrigation budget enforces efficient water use and enables new development within the urban growth area. Such sustainability strategies are a critical and replicable form of climate change adaptation — which The World Bank defines as “a process by which measures and behaviors to prevent, moderate, cope with and take advantage of the consequences of climate events are planned, enhanced, developed and implemented.”²¹ Indeed, a recent state Department of Ecology report on climate change recommends that local governments improve water management by promoting integrated conservation and efficiency approaches that consider future water supply and address competing water demands.²²

Water use efficiency is an important hedge against climate change.

¹⁸ Thurston Regional Planning Council. *Population Forecast Allocations for Thurston County (draft)*. September 2012.

¹⁹ Washington State. Department of Ecology. *Water Use Efficiency Performance Report (Lacey, 2011)*. Online. Accessed 1 Dec. 2012.

²⁰ Dodge, John. “LOTT water conservation reduces pressure on Olympia drinking-water supplies.” *The Olympian*. 7 August 2012. Online. Accessed 4 Dec. 2012.

²¹ The World Bank. *Climate Change: Adaptation Guidance Notes — Key Words and Definitions*. Online. Accessed 4 Dec. 2012.

²² Washington State. Department of Ecology. *Preparing for a Changing Climate: Washington State’s Integrated Climate Response Strategy*. April 2012. Online. Accessed 17 December 2012.