

Guiding Growth – Healthy Watersheds: **Black Lake Basin** Water Resource Protection Study



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1. Introduction

Overview: Guiding Growth – Healthy Watersheds

Black Lake and the land that drains into it was one of three Thurston County basins identified for a focused study as part of the *Guiding Growth – Healthy Watersheds* program. Thurston County is located at the southern end of Puget Sound, and boasts a wealth of natural resources, including large forested areas and many streams and water bodies. In part, we owe our relatively good water quality to the fact that the county is less developed than other urbanized areas in the Puget Sound region. Thurston County is also home to the state capitol and the metropolitan area surrounding the cities of Olympia, Lacey, and Tumwater. It is one of the fastest growing counties in Washington State. According to the 2013 population forecast developed by Thurston Regional Planning Council (TRPC), we can expect an additional 110,000 people to move into our region over the next 20 years.

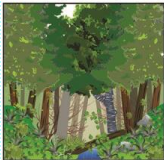

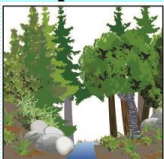
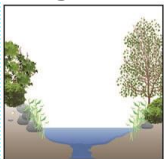

This growth will bring many benefits to the economy and residents of Thurston County, yet there are downsides to such a rapid increase in population and the demand for new homes, roads, and services that it entails. Development in sensitive areas can damage or disrupt important ecosystem services provided by our watersheds, including the filtering and purification of water, regulation of water flows, protection from floods, and creation of habitat for plants and animals. Careless development in these areas could lead to lakes, streams, and beaches that are unhealthy and unusable for both people and wildlife. One response is to plan for this growth by identifying ecologically important areas at a landscape scale, and considering how development can occur in a way that preserves the ecosystem services that are important within specific watersheds.

Project Background

Thurston County teamed with TRPC and the cities of Olympia, Tumwater, and Lacey to integrate watershed science into local policies. The aim of the study was to investigate ways to accommodate projected population growth while preserving water resources in areas impacted by that growth. This collaborative effort is funded by a grant from the U.S. Environmental Protection Agency, as part of that agency's efforts to protect and restore water quality in Puget Sound. The project initially focused on areas within the Totten, Eld, Budd/Deschutes, Henderson, and Nisqually Reach watersheds (Map 1). The watershed planning process began in 2010 and includes the following stages, several of which are detailed in accompanying documents:

Evaluating Current Basin Conditions

In Phase One of this project, stream basins within the Totten, Eld, Budd/Deschutes, Henderson, and Nisqually Reach watersheds were categorized by their current conditions:

<p>Intact</p> 	<p><i>Intact basins have little to no impervious surfaces (<2% basin-wide), a nearly complete forest canopy (>80% basin-wide), and vegetated riparian corridors (>90%). Water bodies are in excellent condition, with no water quality violations and a high B-IBI score (>41).</i></p>
<p>Sensitive</p> 	<p><i>Sensitive basins have minimal impervious area (2-10% basin-wide), considerable forest cover (65-80% basin-wide), and riparian corridors with few breaks in protective buffers (75-90% vegetated). Water bodies are in good condition, meeting most water quality standards, and have a high B-IBI score (36-41).</i></p>
<p>Impacted</p> 	<p><i>Impacted basins are moderately urbanized (10-25% total impervious area), with some remaining forest cover (45-65%). Riparian corridors are cleared in many places (only 60-75% vegetated) and water quality is fair, with some impairments and lower B-IBI scores (28-35).</i></p>
<p>Degraded</p> 	<p><i>Degraded basins are urbanized (25-40% total impervious area) with limited remaining forest canopy (30-45%) or vegetated riparian areas (30-60%). Water quality is poor, with multiple impairments and very low B-IBI scores (28-35).</i></p>
<p>Highly Degraded</p> 	<p><i>Highly degraded stream basins generally have poor water quality and support a low diversity of aquatic species. Impervious cover is generally over 40% and forest cover is generally less than 30%. No Thurston County stream basins fall into this category.</i></p>

Project Stages

1. Evaluate basins based on current conditions and impacts from future growth. The results of this evaluation are detailed in a separate report, *BASIN EVALUATION AND MANAGEMENT STRATEGIES FOR THURSTON COUNTY* (TRPC 2013). This report reviews recent research about the impacts of urbanization on water quality and watershed health and provides an assessment of the current condition of 69 basins within Thurston County that drain to Puget Sound, classifying each as intact, sensitive, impacted, or degraded (see sidebar). This assessment was based on monitoring and land cover data as well as a characterization of watershed processes. It also details the potential impacts of future growth on each of those basins, using projections of impervious surfaces and loss of forest lands.
2. Select three at-risk basins for detailed study. Based on the results of the basin evaluation and the availability of sufficient data for hydrologic modeling, the project team recommended three key basins for further attention: McLane Creek basin, Black Lake basin, and Woodard Creek basin. Section 2 of this report includes a narrative depiction of the current conditions, threats, and management goals for Black Lake basin.
3. Analyze future land-use scenarios. Section 3 of this report includes a description of the scenarios developed and a summary of the results of the hydrologic modeling. A more detailed account of the modeling methodology and results is included in a separate report, *HYDROLOGIC MODELING IN SUPPORT OF WATERSHED BASED LAND USE PLANNING IN THURSTON COUNTY* (NHC 2014).

4. Develop recommended changes to management policies. Section 4 of this report includes a set of recommended policy changes for the Black Lake basin, based on the results of the modeling work and land use analysis.
5. Adopt and implement changes to land use practices. Although this report recommends a preferred management approach and Section 5 includes suggested next steps for making the identified policy changes, each local jurisdiction will determine how best to apply the results in their communities using their own public process. The long-term success of this effort depends on continued regional coordination as well as public outreach and support.
6. Monitoring/Adaptive management. The effectiveness of the policies developed and implemented through this project will be evaluated in future phases of this study.


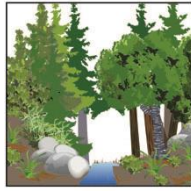
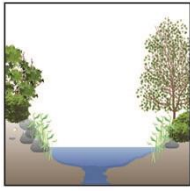
Project Goals

The *Guiding Growth – Healthy Watersheds* project was begun with the understanding that preventing damage to our watersheds is less expensive and often more effective than paying to restore natural forest cover and stream flow conditions after they have been extensively altered. Rather than focus on restoring the most degraded areas, the focus of this project is to prevent basins that are categorized as “intact” or “sensitive” from becoming “impacted,” and to prevent basins that are categorized as “impacted” from becoming “degraded.” The approach taken by the project team has been to look at landscape patterns from a basin-scale and determine the goals and policies that make sense based on the current conditions and future potential of that basin (Table 1).

The strategies identified for achieving these goals include:

- Focusing new development in existing urban areas
- Guiding growth away from identified sensitive or critical habitats
- Reducing the impacts of growth through low impact development and stormwater regulations

TABLE 1: SUMMARY OF MANAGEMENT GOALS BASED ON EXISTING BASIN CONDITIONS.

Basin and In-Stream Current Conditions			
	Sensitive	Impacted	Degraded
Management Goals:			
Basin-wide Conditions to support properly functioning Water Flow and Water Quality			
Protect basin-wide conditions ¹	Yes	Functions already impacted	Functions already degraded
Restore basin-wide conditions	Yes	Possibly	Probably not achievable
Maintain existing basin-wide conditions	Yes	Yes	Yes
Critical Habitats Functions (Shorelines, Wetlands, Riparian Corridors)			
Protect critical habitats:	Yes	Yes	Yes
Restore critical habitats:	Yes	Possibly	Less likely although it is dependent on the size / uniformity of basin conditions ²
Water Quality			
Minimize downstream pollutants from new growth:	Yes	Yes	Yes
Improve water quality – lower existing pollutant levels:	Yes	Yes	Yes
Water Flow (Flooding)			
Minimize increase in peak flows	Yes	Yes	Yes
Improve water flow conditions where degraded	Yes	Yes	Yes

¹ Basin conditions – mainly related to land use and land cover characteristics such as urbanization and impervious area, forest cover, and other land uses that effect in-stream conditions.

² Some basins may have large patches of intact or sensitive areas where restoration will be successful. Each basin must be evaluated for local conditions.

Planning Process

This basin study was conducted by a project team that included staff from Thurston County's Planning and Water Resources departments, Thurston Regional Planning Council (TRPC), U.S. Environmental Protection Agency, and Northwest Hydraulic Consultants. The basin scenarios and management recommendations were developed with the input and assistance of planning and public works staff from the cities of Olympia, Tumwater, and Lacey, and the Squaxin Island Tribe, as well as members of the Municipal Stormwater Technical Advisory Committee for Thurston County (StormTAC), and the WRIA 13 Salmon Habitat Workgroup.

A Scientific Advisory Team (SAT) was convened to review technical decisions and products at key points during the project, including the data used for the project, the basins selected, and the modeling results. The SAT included technical experts from Cambria Science and Communication, Washington State Department of Ecology, King County, and the Squaxin Island Tribe.

Public Engagement

Thurston County solicited input from basin residents and other interested parties throughout the course of the project. In August and September of 2013, Thurston County and TRPC distributed a survey to property owners and residents in the three basins to assess the community's awareness and interest in water resource issues, and their preferences in developing management policies that affect the future of the basins. The results of the survey for Black Lake basin are detailed below, in Section 2.

On April 9, 2014, the County hosted a Water Resource Community Workshop for residents of the Black Lake basin at the Black Lake Grange Hall. Those who attended were given a presentation with background on water resource issues in the McLane Creek and Black Lake basins and the watershed planning work. Participants provided feedback on what management goals should be prioritized for the basin, and on specific places that they considered worthy of attention.

On October 30, 2014, the County hosted a second workshop for residents and interested parties at Kenneydell Park Lodge. The workshop included a presentation describing the alternative future scenarios developed for the project, an overview of the preliminary modeling results, and a discussion about the draft management options discussed in Section 3 of this report.

Additional opportunities for public feedback on the project and recommendations will be provided as this report is reviewed by the Thurston County Planning Commission and Board of County Commissioners in the spring and summer of 2015.

Relationship to Regional Goals

While the results included in this basin study apply specifically to the Black Lake basin, this watershed planning project also supports the goals and strategies outlined in several ongoing regional efforts, as detailed below:

Puget Sound Partnership Indicators and Targets

The Puget Sound Partnership is the state agency charged with coordinating the recovery of Puget Sound. The agency has identified a set of 21 key ecosystem indicators to track progress toward their recovery goals, and the Partnership's Leadership Council has adopted specific targets for many of these indicators. This basin study and the management policies recommended support several of these indicators and targets.

Indicator: Freshwater Quality

- By 2020, at least 50% of all monitoring stations with suitable data have Freshwater Water Quality Index scores of 80 or higher.
- By 2020, achieve a decrease in the number of impaired waters (303(d) list) in Puget Sound freshwaters.
- By 2020, 100% of Puget Sound lowland stream drainage areas monitored with baseline B-IBI scores of 42-46 or better retain these "excellent" scores and mean B-IBI scores of 30 Puget Sound lowland drainage areas improve from "fair" to "good."

Indicator: Land Cover & Land Development

- By 2020, average annual loss of forested land cover to developed land cover in non-federal lands does not exceed 1,000 acres per year and 268 miles of riparian vegetation are restored or restoration projects are underway.
- By 2020, the proportion of basin-wide growth occurring within urban growth areas is at least 86.5% (equivalent to all counties exceeding goal by 3%) and all counties show an increase over their 2000-2010 percentage.
- Basin-wide, by 2020, loss of vegetation cover on indicator land base over a 5-year period does not exceed 0.15% of the 2011 baseline land area.

Sustainable Thurston

Thurston Regional Planning Council's Sustainable Thurston plan, *CREATING PLACES—PRESERVING SPACES: A SUSTAINABLE DEVELOPMENT PLAN FOR THE THURSTON REGION*, adapts the Puget Sound Partnership's 2020 freshwater quality target and sets the following target for the Thurston County region in 2035:

- Protect small stream basins that are currently ranked as "intact" or "sensitive," and improve and restore as many as possible "impacted" stream basins.

What are Urban Growth Areas?

Local cities and counties in Washington State plan under the Growth Management Act (GMA). In Thurston County, jurisdictions have worked together to designate urban growth areas (UGAs). These are the areas that already have, or are planned to receive, urban services such as sewer, in the future.

Thurston County's first urban growth boundary agreement was established in 1983 for the north county areas, and later revised in 1988. In the early 1990s growth boundaries were established county-wide. Since that time the urban growth boundaries have been adjusted slightly. Overall, the area designated for urban growth has been reduced by over 1,000 acres, or around 1.7% in the last 20 years.

Thurston County's urban growth areas include the incorporated areas (cities and towns), the unincorporated urban growth areas within and around the cities and towns, and the unincorporated Grand Mound area.

The Sustainable Thurston plan also sets two land-use priority targets, which will help the region protect water quality, as well as reduce vehicle miles traveled and related greenhouse gas emissions:

- By 2035, 72% 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, no more than 5% of new housing will locate in the rural areas, and 95% will be within cities, towns, unincorporated growth areas, and tribal reservations. Rural areas include land outside of the cities, towns, unincorporated urban growth areas and tribal reservations.
 - Supporting 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 densities within rural Thurston County.

2. Basin Description

Overview

The Black Lake basin (Figure 1; Map 2) includes around 5,000 acres that drain to one of the largest lakes in Thurston County. The basin is located in northwestern Thurston County, east of the Black Hills and McLane Creek basin, and contains a western portion of the city of Tumwater.

Historically, Black Lake was the headwaters of the Black River system, which flows southwest into the Chehalis River, and drains to Grays Harbor on the Pacific coast; however, since the excavation of the Black Lake Ditch in 1922, the lake has been hydrologically linked to Percival Creek and drains to Budd Inlet and Puget Sound. The lake is large - roughly 570 acres - but relatively shallow, with a mean depth of 19 feet. The historic lake outlet is now mostly obstructed by beaver dams and vegetation.

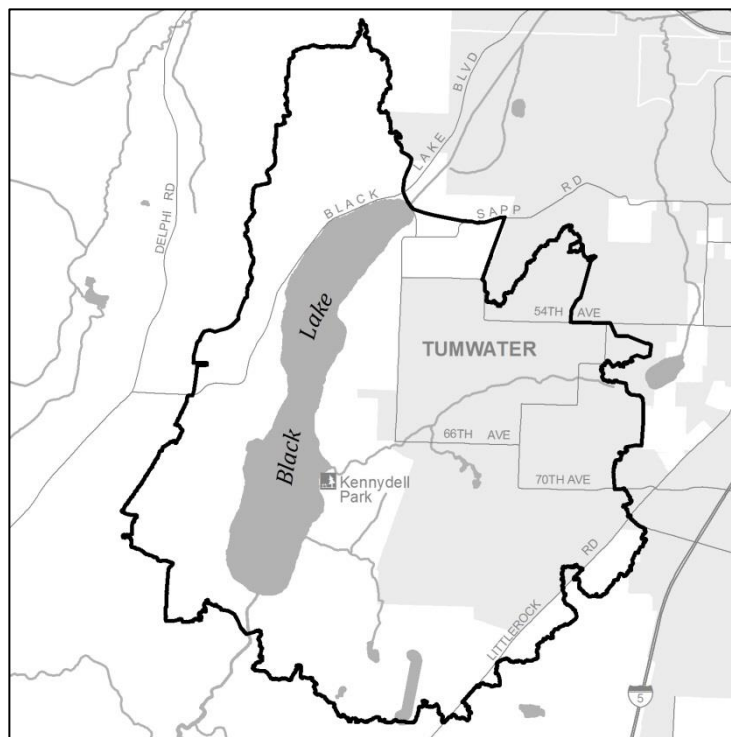


FIGURE 1: BLACK LAKE BASIN

The hydrology of the basin is complicated – there is shallow groundwater in much of the area, and Black Lake is bordered by extensive wetlands, particularly at its northern and southern ends. Several small creeks flow into the lake – the largest of these is Fish Pond Creek, which flows through the city of Tumwater and drains into Black Lake at Kenneydell Park. There is an additional, unnamed tributary on the east side of the lake, one larger tributary on the west side that drains to the lake at the county-owned Guerin Park property, as well as several intermittent streams. At certain times of year, a portion of the flow from Dempsey Creek flows into the lake via the large wetland complex at its southern end rather than south into the Black River. Black Lake basin likely also receives some groundwater inputs from the Salmon Creek basin (NHC 2014) (Map 3).

In 2010, almost 5,500 people lived within the Black Lake basin boundaries. The population of the area is expected to grow by 12,300 people by 2035, an increase of 123%, with most of the growth forecast for the urban areas (city and urban growth area).

Jurisdiction

Black Lake basin is divided between Thurston County (42%) and Tumwater (36%) – the remaining 22% of the basin is in the Tumwater urban growth area (UGA), which is managed under Joint Planning agreements between the County and City (Map 3). Under current plans, land within the UGA eventually

will be annexed into the city of Tumwater; in preparation for this, zoning and development regulations within the UGA match those of the city of Tumwater. Emergency services in the UGA are provided by the County.

Soils

The basin is underlain by a mix of outwash and till soils, with almost a quarter identified as saturated soils (NHC 2014)³. Outwash soils include glacial deposits of permeable sands and gravels; these include large areas on the east side of the lake within the city of Tumwater. Till soils include areas where glacial activity left a compacted and relatively impermeable layer of clay, silt, loam, and/or gravels; they generally allow limited drainage and have higher surface runoff. Within Black Lake basin, till soils are located mostly on the west side of the lake, and within the Tumwater UGA. Kitsap soils include those formed by lacustrine sediment, and generally have greater moisture storage and drainage than till soils, but less than outwash – only a very small area on the northwest side of Black Lake has Kitsap soils. Saturated soils are poorly drained and include wetland areas – these occur with wetland areas on the northern and southern ends of the lake, and surrounding the tributaries to the lake, as well as wetland areas associated with those streams, particularly within the city of Tumwater.

Thurston County sets some standards for development and stormwater management according to hydrologic soil group classifications. Hydrologic soil groups are defined by the Natural Resource Conservation Service and are based on estimates of surface water runoff potential determined by how fast water can be expected to infiltrate – these groups are related but do not correspond exactly to the soil classes described above. Group A soils have the highest infiltration rates (low runoff potential) even when thoroughly wetted (greater than 0.30 in/hr); Group B soils have more moderate infiltration rates (0.15-0.3 in/hr); Group C soils have slow infiltration rates (0.05-0.15 in/hr) and include fine textured soils and those with a layer that impedes downward draining of water; Group D soils have very low infiltration rates (0-0.05 in/hr) and include clay soils as well as areas with high groundwater that nears the surface (Thurston County DDEM 2009). In Black Lake basin, most of the soils have moderately high to high runoff potential (Groups C and D), with some areas with more moderate infiltration within the city of Tumwater and in the area around Fish Pond Creek (see Table 2; Map 4).

TABLE 2: SOIL TYPES IN BLACK LAKE BASIN

USGS Soil Class	Outwash	Till	Kitsap	Saturated
	36%	37%	1%	26%
Hydrologic Soil Group (NRCS)	Group A	Group B	Group C	Group D
	15%	27%	29%	29%

³ These four soil classifications were defined using NRCS soils inventory data by the US Geological Survey and were used in the HSPF modeling study for this project.

Species and Habitat

The Black Lake basin supports a variety of wildlife, including several endangered and threatened species. The lake is a popular fishing destination with resident populations of Coastal Cutthroat Trout, Largemouth and Smallmouth Bass, Yellow Perch, Black Crappie, and Brown Bullhead, and is stocked annually with Rainbow Trout by the Washington Department of Fish and Wildlife (WDFW). Black Lake Drainage Ditch at the north end of the lake is mapped as habitat for coho salmon, as well as cutthroat. The wetlands at the southern end of the lake support large concentrations of ducks and other waterfowl, including mallards, wigeons, pintail, shoveler, goldeneye, greenwing and cinnamon teal, and green heron. Though much of the area is wet, the southeastern portion of the basin has soils conducive to prairie habitat.

The Black Lake basin includes habitat for several species protected under the federal Endangered Species Act. The Mazama pocket gopher was listed as a threatened species in April 2014. Soils associated with gopher activity are found east of Black Lake, particularly within the city of Tumwater and UGA along Littlerock Road.⁴ These soils are used as a screening tool for identifying gopher habitat during land use proposals. The Oregon spotted frog was listed as a threatened species in September 2014; potential habitat for the frog includes areas around the lake shoreline, tributaries to the lake, and wetland areas. Within Thurston County and the UGA, these and other prairie species will be managed under a Habitat Conservation Plan that is under development.⁵

WDFW maintains a list of Priority Habitats and Species (PHS) that identify state priorities for conservation and management. Priority species include state listings of Endangered, Threatened, Sensitive, or Candidate species, as well as wildlife that are vulnerable to habitat alteration and disturbance, or that are of economic or tribal importance. The PHS catalog and map data identify the following important species and habitats within the Black Lake basin:

TABLE 3: PRIORITY HABITATS AND SPECIES IN BLACK LAKE BASIN

	Common Name	Black Lake Basin Location
Species		
	Cutthroat trout	Black Lake
	Olympic mudminnow	Unnamed tributary on west side of lake connecting wetland to McLane basin

⁴ Based on historic data and recent field work, U.S. Fish and Wildlife Service has indicated that they do not expect to find gophers west of the Black River. If there is no existing evidence to suggest a given parcel west of the Black River has gopher occupancy, the County does not presently screen in these areas. This includes all areas west or northwest of the Black River, Black Lake, Black Lake Drainage Ditch, and Percival Creek. Prairie habitat does exist west of the Black River.

⁵ <http://www.co.thurston.wa.us/planning/hcp/hcp-home.htm>

	Wood duck	Breeding areas south of Black Lake and in wetlands east of the lake
	Oregon spotted frog	Breeding areas noted near Belmore, Fish Pond Creek
	Big brown bat, Townsend's big-eared bat, Little brown myotis, Yuma myotis	Throughout basin
	Oregon vesper sparrow	Southern Tumwater, near the Olympia airport
	Bald eagle	Nesting areas west of Black Lake Boulevard
	Mazama (Western) pocket gopher	East of Littlerock Road and near 70 th Avenue in Tumwater
Habitats		
	Palustrine wetlands	Extensive wetlands throughout basin, especially associated with Fish Pond Creek and other tributaries, as well as Black Lake
	Lacustrine littoral	Associated with Black Lake

Critical Areas

Thurston County's Critical Areas Ordinance (TCC 24) was updated in 2012; it includes protective policies for five types of critical areas: important fish and wildlife habitat areas (including prairie and riparian corridors), wetlands, critical aquifer recharge areas, frequently flooded areas, and geologically hazardous areas (including steep slopes and bluffs). A variety of critical areas are located within Black Lake basin.

Habitat Areas

Fish Pond Creek is listed as Type-F, or fish-bearing, streams under the Washington Department of Natural Resources (DNR) classification system, as is an unnamed tributary that drains to the west side of the lake near 60th Lane SW. Other tributaries are listed as Type-N or unknown. Thurston County's Critical Areas Ordinance assigns Type-F streams a riparian habitat area ranging from 150 to 250 feet, depending on the width of the stream. Other streams would have a standard riparian habitat area of 100 feet.

Prairie habitat is protected by the Critical Areas Ordinance. Soil types are the screening tool used to detect the presence of prairie, and the soil groups that support Mazama pocket gophers and prairies have a lot of overlap. Prairie habitat does exist in some areas of the basin west of Black Lake, while gopher habitat is limited to east of Black Lake and Black River.

Wetlands

There are extensive wetlands in the basin, including those associated with the various tributaries to Black Lake, and at the north and south ends of the lake itself. These areas qualify for protections under the Critical Areas Ordinance, with wetland buffers ranging from 50 to 300 feet, depending on the condition of the habitat.

Critical Aquifer Recharge Areas

Critical Aquifer Recharge Areas (CARAs) are locations that overlie significant groundwater resources and, based on geology and soils, are particularly susceptible to groundwater contamination. Category I CARAs are considered extremely sensitive, and include Wellhead Protection Areas, or the distance around a well through which contaminants are likely to travel within one, five, or ten years. There are 16 wellhead protection areas within or overlapping the Black Lake basin, including those surrounding the water systems for Black Lake Bible Camp and Conference Center, Evergreen Shores, Timberland Mobile Estates, Lakeside, Lakeland Manor Black Lake Estates, Black Lake Acres, Laurel Park Community, Israel Place San Angelo Park, Lazy Acres, Holiday Acres, Andersen, Summerhill, Ski View Estates neighborhoods. There are Category I CARAs mapped within most of the basin. Activities that use hazardous materials or that could pose a risk to groundwater are restricted and regulated within these areas.

Frequently Flooded Areas

The large number of wetland and high groundwater areas within Black Lake basin contributed to flooding concerns in the basin. High groundwater areas are most concentrated within the city of Tumwater. FEMA has designated one-hundred-year floodplain along parts of Fish Pond Creek and the unnamed tributary to the southeast end of the lake. Development must be set back and above the base flood elevation of these areas. New onsite septic systems must be located outside of the one-hundred-year floodplain, floodway, and high groundwater hazard areas.

Geologically Hazardous Areas

The northeast corner of Black Lake basin includes slopes that are greater than 40% and that may pose a risk if cleared. Removal of vegetation is restricted within these hazard areas, and tree harvesting is subject to review in addition to that required under Forest Practice Permits.

Land Use

Most of the lake shoreline is developed for residential use at moderate densities, and there are two mobile home parks on the east shore, along with several recreational resorts and a bible camp. The County owns one developed park property on the east shore, Kenneydell Park, and one undeveloped property on the west, Guerin Park. In the southern part of the basin is an artificially created waterski pond and residential development.

Zoning

Most of the County portion of the basin is zoned Rural Residential Resource 1/5 (35% of basin), with some smaller areas zoned as Limited Areas of More Intensive Rural Development (LAMIRD) 1/1, 1/2,

2/1, Rural 1/20, or Public Parks Trails and Preserves (1%). The major zoning designations in the Tumwater areas of the basin are Single Family Low Density Residential (19% of basin), Residential Sensitive Resource (5%), Single Family Medium Density (4%), and Light Industrial (2%). The Tumwater urban growth area is mostly zoned Single Family Low Density (16%), with smaller areas in Single Family Medium Density (2%), Open Space (1%), or other (Map 5).

Rural Residential Resource 1/5. The purpose of this zone is to balance human uses with the natural environment, maintain rural character, and buffer environmentally sensitive areas and resource management areas from incompatible activities. Primary land uses permitted in this zone include agriculture, forestry, open space, and low-density residential. The zone allows one dwelling unit for every five acres of land. Land in this zone may have critical areas or limited groundwater, and should not require the provision of urban services. This zone is not permitted to be upland to an aquaculture management district or a “natural” shoreline designated in the Shoreline Master Program.

Within this zone, maximum impervious surface coverage is 60%, except lots that are primarily on soils with minimal infiltration capacity (hydrologic soil groups C and D) are limited to 10% impervious coverage. Maximum building coverage on a lot is 6,000 square feet for parcels between five to ten acres, and 20,000 square feet for parcels over ten acres. Within Black Lake basin, there are no vegetation retention requirements for this zone.

Residential LAMIRD 1/1, 1/2, 2/1. These zones recognize residential development in rural areas that was developed at a higher density prior to July 1990. Within the Black Lake basin, this zoning includes the Cougar Ridge (1988) and Camelot (1970) subdivisions off Delphi Road, and the Alpine Hills neighborhood (1971). New development in these areas is limited to infill and to a density that is consistent with existing development (one unit per acre, one unit per two acres, or two units per acre, respectively). The maximum impervious coverage limit within these zones is 60%, and there are no vegetation retention requirements.

Rural 1/20. The purpose of this zone is to protect public health and safety by minimizing development in environmentally sensitive and hazardous areas, and to protect critical areas and create open space corridors. Within this zone, maximum impervious surface coverage is 60%, except lots that are primarily on soils with minimal infiltration capacity (hydrologic soil groups C and D) are limited to 10% impervious coverage.

Shorelines

The shoreline of Black Lake has been highly modified and much of it armored with hard structures. Thurston County’s Shoreline Master Program regulates land use and development along marine shorelines, rivers with flows greater than 20 cubic feet per second, lakes larger than 20 acres, associated floodplains and wetlands, as well as areas within 200 feet of these shorelines. Most of the lake shoreline is designated as Rural; the east side of the lake south of 66th Avenue (including Kenneydell Park) is

designated Conservancy, as is a short reach on the west side of the lake beside Lakeside Street. The lakeshore and wetlands at the southern end of the lake are designated Natural. The County is currently working on an update to the Shoreline Master Program.

Rural Designation. The Rural Environment designation applies to areas along the shoreline with low-intensity land uses, including residential development less than two dwelling units per acre. Permitted uses include agriculture, aquaculture, forest management, and low- to medium-intensity recreational access. Boat ramps, docks, buoys, and piers are allowed within this designation, subject to general regulations, as are shoreline protective measures, such as bulkheads, dikes, riprap, and berms. Mining is allowed with a conditional use permit, and industrial uses are prohibited.

Within the Rural Environment designation, total impervious surface coverage is limited to 30% coverage of a lot. Commercial and residential structures must be set back 50 feet from the ordinary high water mark, and a minimum 20-foot buffer of existing ground cover must be maintained.

Conservancy Designation. The Conservancy Environment designation applies to areas along the shoreline with low-intensity land uses, and is intended to protect and manage existing natural resources, as well as valuable historic and cultural areas, to ensure sustainable utilization of renewable forest and aquatic resources as well as limited recreational use. Permitted uses include agriculture, aquaculture, and low-intensity recreational access. Residential development of up to one unit per acre is allowed, as is clustering of development – for non-clustered developments, 100 feet is the minimum lot width. Forest Management is permitted with regulations to provide additional protections for wildlife habitat. Boat ramps, docks, buoys, and piers are allowed within this designation, subject to general regulations, as are shoreline protective measures, such as bulkheads, dikes, riprap, and berms. Mining is allowed with a conditional use permit, and industrial uses are prohibited. Utility distribution and transmission lines are permitted, but facilities such as sewage treatment plants and substations are prohibited.

Within the Conservancy Environment designation, total impervious surface coverage is limited to 30% coverage of a lot. Commercial recreation and residential structures must be set back 100 feet from the ordinary high water mark. A minimum 20-foot buffer of existing ground cover must be maintained, but there are no additional regulations related to the removal of trees and vegetation for views or other reasons.

Aquatic Habitat Conditions

Black Lake basin is a moderately impacted basin, but still has many areas with good habitat conditions. The lake shoreline and hydrology have been extensively modified, and many historic wetland areas have been filled or altered, but many good quality wetland areas remain. The basin has just above 8% total impervious surfaces and 37% tree canopy, and streams within the basin remain vegetated along their shores in most places, although vegetation has been cleared along much of the lakeshore.

TABLE 4: CURRENT AQUATIC HABITAT CONDITIONS FOR BLACK LAKE BASIN

Level of Urbanization	Hydrology	Riparian Corridor	In-stream and Wetland Physical Conditions
<ul style="list-style-type: none"> • Total Impervious Area Estimate 1991: 5.1% 2006: 8% 2011:8% 	<ul style="list-style-type: none"> • Effective Impervious Area Estimate, 2006: 5.9% • Forest Cover, 2011: 37% • Unmodified Wetlands: 20.6% • Miles of Streams: 9.2 • Areas of high groundwater flooding: 1.2% of basin 	<ul style="list-style-type: none"> • Coniferous forest cover in 250 foot stream riparian corridor, 2006: 9.6% • Forest, scrub/shrub vegetation and wetlands in stream riparian corridor: 150 ft: 88.4% 250 ft: 79.9% 1,000 ft: 57.1% • Number of road crossings per mile of creek: 1.9 	<ul style="list-style-type: none"> • Black Lake Ditch lowered lake level, establishing a barrier to historic runs of Black River Chinook, coho, and chum salmon • Many wetland areas have been filled or modified • Beaver activity in lake outlet results in high lake levels and flooding

SOURCE: TRPC 2013

Overall water quality for Black Lake is ranked *Fair* by Thurston County Environmental Health. The lake has moderate-to-high nutrient concentrations which result in nuisance blue-green algae growth in late summer and fall. The lake is thermally stratified in the summer, and the lower layer of cooler water can be very low in oxygen. This results in a slow release of phosphorus from the sediments into the water near the lake bottom. When the lake mixes in early fall, the phosphorus released from the sediments stimulates algae growth in the lake (TCEH 2012).

Residential Development Potential

The eastern portion of the Black Lake basin is within Tumwater's city limits and urban growth area, and is largely undeveloped and designated for urban growth. There are several planned residential projects in the area, and one master-planned community. The rural portions of the basin are largely developed at rural densities, although there are some subdividable rural lots (Map 6).

Threats and Concerns

- The Basin Evaluation report (TRPC, 2013) identified Black Lake basin as at high risk from development pressure. Impervious area in the basin is projected to increase by 6.5% between 2010 and buildout under current plans.
- Algal blooms have been a recurring and increasing problem in the lake, particularly blooms of blue-green algae in the fall, which can close the lake to recreational uses: 1992, 1994, 2000, 2004, 2006, 2007, 2010, 2011, and 2012 were all bad years for algae blooms.
- Black Lake is listed on the 303(d) list for Phosphorus, since 1996, and for PCBs in rainbow trout tissue samples since 2008.
- Adjacent wetlands, shallow groundwater, and the many septic systems along the lake shore likely influence water quality in Black Lake. Residential homes along the lake are not hooked up to sewer.

- The Black Lake Grocery property on the northwest shore of Black Lake has groundwater and soil contaminated with petroleum hydrocarbons from leaking underground storage tanks. Cleanup efforts in 1995 and 2004 removed the tanks and installed a treatment wall of sphagnum peat moss to remediate the contaminated groundwater that flows into the lake, but cleanup is not considered complete.
- Fish Pond (Fishtrap) Creek has consistently failed to meet either part of the fecal coliform bacteria standard. This creek flows through Tumwater and the urban growth area before discharging into the lake near the swimming area at Kenneydell County Park.
- Beaver activity in the Black Lake Ditch can cause the lake level to rise and lead to flooding of yards and docks.
- Black Lake Ditch, which drains the lake at its northern end, violates fecal coliform standards and dissolved oxygen standards, and may violate temperature standard in the summer.
- Eurasian milfoil was discovered in the lake in 2004, and has been actively managed by Thurston County. Yellow iris, fragrant water lily, and native submersed water nymph are all nuisance species in Black Lake.

Threats and concerns in the Black Lake basin include (clockwise) pollution from stormwater runoff, agriculture, and residential septic systems.

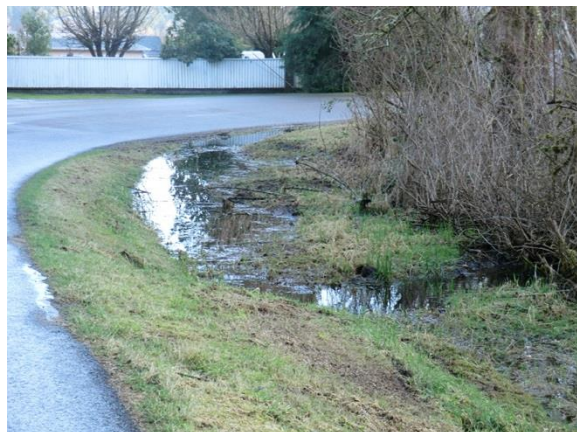


FIGURE 2: BLACK LAKE BASIN – THREATS AND CONCERNS.

Public Views

In response to a survey⁶ sent in August 2013, residents and property owners indicated that the things they value most about living in the Black Lake basin are its natural environment and scenery, the opportunities it provides for a rural lifestyle while being close to stores and businesses, and its wildlife. Clean drinking water, swimmable lakes and streams, Puget Sound water quality are all issues that are very important to the majority of respondents. More than half of those who responded (69%) indicated that they are somewhat or very concerned about water quality in the basin. The greatest risks to water quality they see are urban development, as well as pollution from stormwater runoff and septic systems. When it comes to planning for the future of the basin, residents felt that the most important issues to address were:

- Protecting water quality (58%),
- Protecting wildlife and fish habitat (44%),
- Preserving farmland and agriculture (28%),
- Improving water quality (27%), and
- Low-impact development (27%).

When asked how they would like to describe Black Lake basin in the future, many residents expressed hope that water quality will be much improved, and that they and their children or grandchildren would be able to safely swim and fish in the lake. Several residents expressed a desire that there be greater monitoring and oversight of septic tanks. There is a desire to maintain the semi-rural, quiet aspect of the area while enhancing recreational opportunities around Black Lake.

These views were emphasized at a community workshop held on April 9, 2014, at the Black Lake Grange. Participants expressed curiosity about the potential impacts of planning and growth on the watershed, as well as concerns about water quality in Black Lake, the use of chemicals used for lawn care, flooding issues, and how zoning might impact wells and overall quality of life. Map 7 shows a summary of comments noted on an aerial map of the basin. Participants were asked to identify areas they thought should be identified for protection, or that were of special concern to them. These notes included references to several areas that folks would like to see maintained at lower zoning, as open space or developed for recreation, areas that currently have issues with beavers and flooding, as well as areas that historically or currently support wildlife species, such as salmon or Oregon spotted frog.

Management Goals for Black Lake Basin

Black Lake basin was categorized as “impacted” in the Basin Evaluation report. The report identifies the following management goals for “impacted” basins:

- Maintain, and where possible restore, basin-wide conditions
- Protect, and where possible restore, critical habitats
- Minimize downstream pollutants from new growth
- Improve water quality by lowering existing pollutant levels

⁶ The survey was sent to 2,293 homes and had a response rate of 15 %.

- Minimize increase in peak flows
- Improve water flow conditions where degraded

Watershed Characterization

The project team considered the results of the Washington Department of Ecology's Puget Sound Watershed Characterization Project (Stanley et al., 2010) in the course of this study. Watershed characterizations are landscape-scale analyses that integrate data sources to describe and relate ecological processes at a basin and watershed scale, rather than at a site scale. These analyses can provide an early filter to help identify priority areas for protection, restoration, and development.

The Puget Sound Characterization includes assessments for water flow processes (delivery, surface storage, recharge, and discharge), water quality (sediment, nutrients, pathogens, metals), and fish and wildlife habitat (terrestrial, freshwater, marine shorelines). In its regional analysis, the project assessed the Black Lake basin as part of the greater Deschutes watershed (WRIA 13), although Black Lake has traditionally been included in the Upper Chehalis watershed (WRIA 23). The basin was not included in the habitat assessment. The west side of Black Lake basin was identified as a priority area for a mix of conservation and restoration, particularly for protection of surface storage and delivery of water. The east side of Black Lake basin, which includes areas within the city of Tumwater was identified as a high priority area for restoration of surface storage as well as important areas for recharge of groundwater, due to the loss of historic wetlands and increase in impervious surfaces. In its water quality evaluation, Black Lake basin was identified as having high potential for exporting phosphorus, sediment, and pathogens into surface water if source areas in the upland is disturbed. Suggested management actions include:

- Restore storage in urban areas by retrofitting development to increase retention and infiltration of surface waters
- Restore depressional wetland areas and increase storage on agricultural lands and open space
- Cluster new development, minimize impervious cover, and increase forest cover, especially along riparian corridors
- Prevent activities that remove vegetation
- Restore natural cover and control existing sources of phosphorus
- Limit new sources of pathogens (west side of lake)

The project team worked with Ecology to further refine its water flow analysis within the Black Lake basin; that analysis identified the following priorities:

- ***Northwest of Black Lake:*** the sub-area west of the lake and north of 62nd Avenue SW is identified as a priority area for protection, particularly for delivery of water to lake. This includes the steep, forested area in the northwest corner of the basin.
- ***East of Black Lake:*** this sub-area is identified as a priority for restoration, particularly the lands within the City of Tumwater that drain to Fish Pond Creek and the unnamed tributary to the

south end of the lake. Many historic wetlands in this area have been drained, ditched, or otherwise modified, which has affected surface storage and the recharge of groundwater sources.

3. Analysis of Basin Alternatives

How Scenarios Were Developed

Black Lake basin was classified as “impacted” in the Basin Evaluation report (TRPC, 2013), although total impervious area was below 10%, which placed it on the better-functioning range of the “impacted” basins. A large portion of the study area is within Tumwater’s city limits and unincorporated urban growth area, but is fairly undeveloped. For this reason it was felt that both protection and restoration management strategies would be effective in this basin.

Scenarios of historic, current, and future alternatives were developed to better understand stream water quantity and quality dynamics under a variety of conditions. All scenarios were developed for a hydrologic model that gave outputs on various stream flow and water quality factors.

The basic premise is that as land cover (forest, grass, impervious areas, etc.) and hydrology (stream network and infrastructure that modifies water flow such as ditches, pipes, and stormwater ponds) change it will have an impact on both the stream water quantity and quality. In general, as urbanization increases, so does the amount of impervious surfaces. This means less rainwater can infiltrate into the ground, and there is a greater amount of stormwater runoff (Figure 3). The runoff can scour stream beds and carry pollutants to the water. Stormwater infrastructure, such as ponds that capture runoff and release it slowly, can help mitigate some of the effects of runoff.

Using a hydrologic model, land cover and hydrologic conditions can be tied to stream flow and water quality where stream monitoring data are available. For this reason, the scenarios start with a Current Condition scenario to help ensure that the model is working (calibrated) correctly. The Historic Condition scenario gives an idea of how the stream flowed and functioned before the land cover and hydrology was altered. The three future scenarios were developed to evaluate potential management strategies. All future scenarios were designed to be realistic and achievable.

Scenarios were conceptualized and developed by a project team of land use, storm water, and hydrology specialists with experience in Thurston County. The scenarios were designed to answer some specific questions such as:

- Will stream health degrade with additional development under current zoning regulations, and would changing the zoning density make a difference?

What are Impervious Surfaces?

Impervious surfaces are materials that prevent the infiltration of water into the soil. The most common impervious surfaces in the built environment are roads, rooftops, sidewalks, and patios. While these structures are almost 100% impervious; other features such as gravel roads, compacted soils, and even lawns are impervious to varying degrees, as they allow for less infiltration than natural ground cover such as forests.

- Will it make a significant difference in stream health if some areas are removed from the urban growth areas, where growth was likely to occur on sewer systems, and rezoned to rural densities, where less growth is likely to occur, but it would be on septic systems?
- Will stream health degrade under current stormwater regulations, and will updating stormwater regulations to include low impact development techniques make a difference?
- Will stream corridor or wetland restoration lead to an improvement in stream health?
- Will retrofits of stormwater infrastructure in areas of existing development lead to an improvement in stream health?

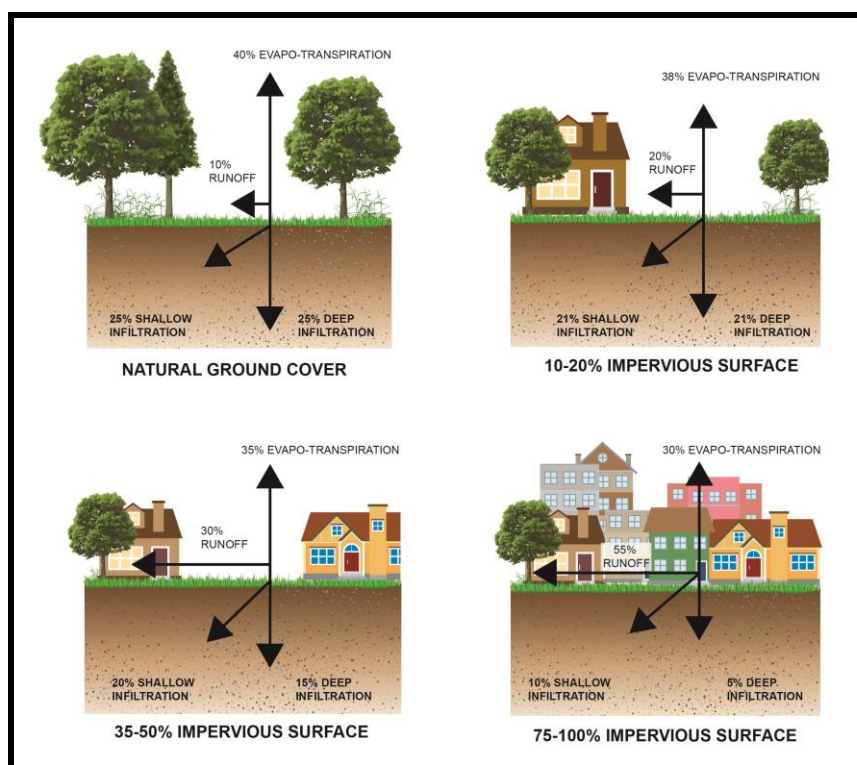


FIGURE 3: WATER CYCLE CHANGES ASSOCIATED WITH URBANIZATION.

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

Current Condition

The Current Condition scenario was developed to approximate 2010-12 conditions for land cover and land use, hydrology, and stormwater treatment facilities. Sources included existing land cover and land use data, basin reports, infrastructure mapping, and air photo mapping. Each land cover was assigned a value for water infiltration and runoff, as well as the amount of pollutants it was likely to generate. The current condition data layers were used to calibrate the hydrologic model to stream flow and water quality data.

Historic Condition

The Historic Condition scenario was developed by assuming land cover was a combination of forest, wetlands and prairie throughout the basin. A variety of sources were used to develop the land cover data, including maps of historic wetlands and prairies.

Planned Trend

The Planned Trend scenario was developed to approximate future development under adopted zoning and development regulations. Planned trend was consistent with the assumptions developed for the region's population and employment forecast and buildable lands analysis (www.trpc.org). Assumptions for future impervious area were made depending on the type or density of expected development. (see *TRPC 2013A and TRPC 2015*).

Specific assumptions for the Planned Trend scenario included:

- Current zoning and development regulations would remain in place
- Current stormwater regulations would remain in place
- Future development occurs in similar style / density as recent trends
- As development occurs, land cover would convert from existing cover to a mixture of impervious surfaces (homes, driveways, roads) and other urban land cover (lawns and cleared areas)

Alternative Future A

The Future A scenario examined changes to regulations as a way to protect stream health from the effects of development. The following changes were evaluated:

- Remove the portion of the unincorporated growth area surrounding the lake edge where water and sewer infrastructure is not yet available and rezone to rural densities (Figure 4). The area north of Kenneydell Park already has sewer infrastructure (Map 8) along Black Lake Belmore Road to 60th Avenue SW, and was retaining inside the urban growth area for all scenarios.
- Assume that new development in both the city and rural area would meet low impact development requirements for stormwater control, if feasible (Figure 5)
- Implement mandatory clustering in large undeveloped parcels within the city to minimize new impervious area
- Rezone portions of the rural area around the lake periphery to lower densities (up to 10-acre lots) (Map 9)
- Place large undeveloped and forested parcels in long term forestry zoning designation (in area adjacent to McLane Creek Basin) and make adjustment to urban growth area
- Set tree cover and impervious surface limits for new rural development

What are the New Low Impact Development (LID) Requirements for Stormwater Control?

The current stormwater flow control standard only requires controlled release for infrequent, large storms (50% of 2-year peak flow = 1.4 inches in 24-hrs at Olympia Airport) and is intended to only protect against stream bank erosion and control downstream flooding impacts. Smaller storm events are routed through stormwater facilities with little to no restrictions. This flow control standard can be met by detention ponds only, with little or no infiltration.

The new LID flow control standard (required by 2016 in parts of Thurston County) will provide control for much smaller storms (8% of 2-year peak flow = 0.22 inches in 24-hrs at Olympia Airport). It is intended reduce the volume of stormwater runoff and limit low flows to pre-development (forested) conditions. Based on recent research, changes to these low flows can have impacts to stream quality and the increased volume of runoff increases pollutant loadings. In general to meet this standard requires extensive infiltration of stormwater into the ground through bioretention, porous pavement, infiltration ponds/trenches, etc. A detention pond in the majority of cases cannot be the only stormwater control method, mainly because they would be prohibitively large to meet the standard.

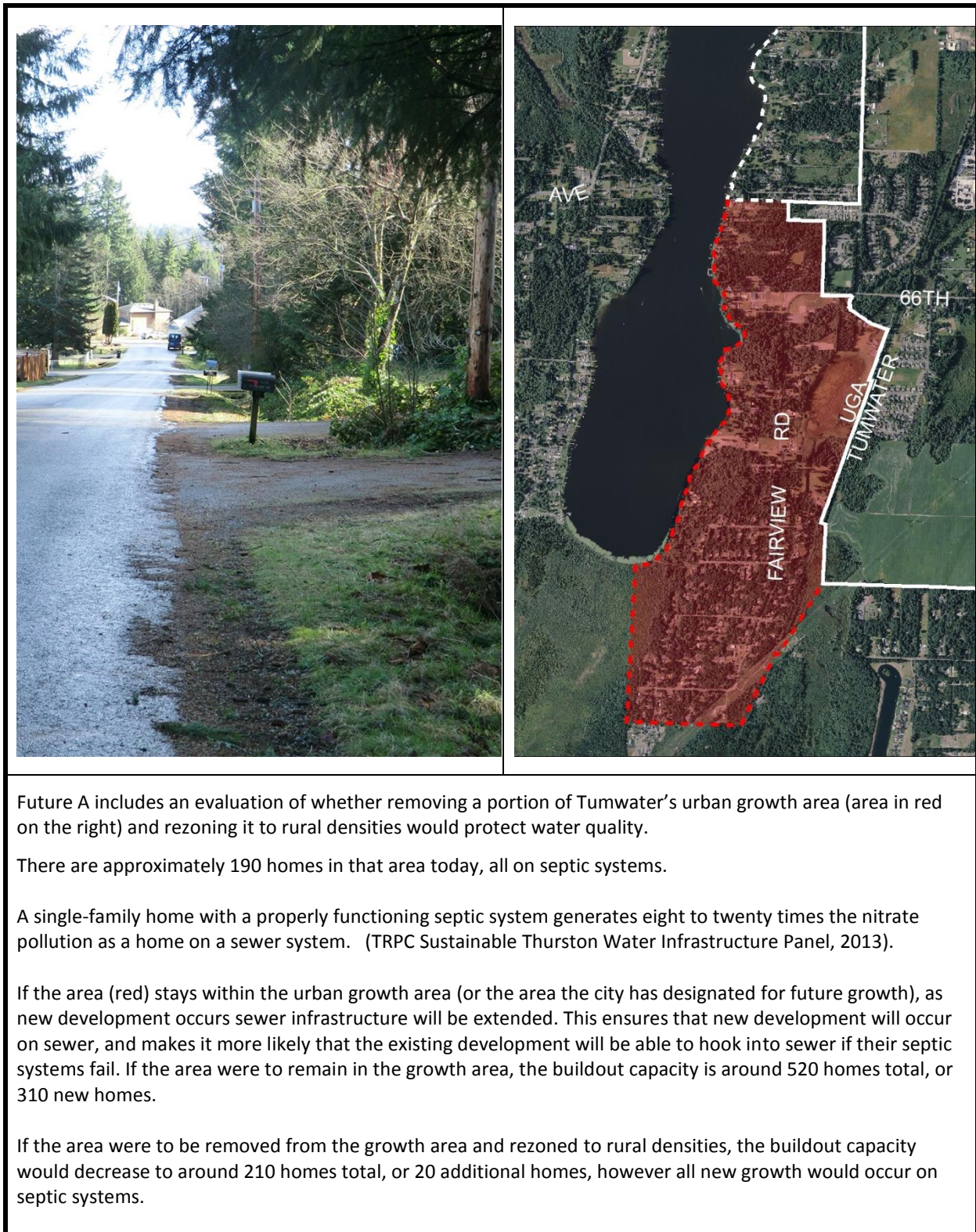


FIGURE 4: FUTURE A SCENARIO URBAN GROWTH AREA ADJUSTMENT.

What is Low Impact Development?

Low impact development (LID) is an approach to land development that works with nature to manage stormwater as close to its source as possible.

Some of the principles of low impact development are:

- Preserving and re-creating natural landscape features,
- Minimizing impervious areas and create functional and appealing site drainage that treat stormwater as a resource rather than a waste product.

By implementing low impact principles and practices, stormwater can be managed in a way that promotes the natural movement of water within an ecosystem.

At the site-level, low impact development techniques include:

- Reducing impervious area by requiring narrower streets than conventional development, Requiring smaller lots and clustering development to reduce miles of street,
- Using porous materials such as pervious sidewalks rather than impervious materials
- Maintaining native vegetation
- Using bioswales and bioretention areas to infiltrate runoff, rather than trying to capture the runoff and move it off of the site as quickly as possible



FIGURE 5: CONVENTIONAL DEVELOPMENT (LEFT) VERSUS LOW IMPACT DEVELOPMENT (RIGHT).

SOURCE: AHBL, 2012.

Compact Growth as a Form of Low Impact Development

Compact growth is also a form of low impact development. Given the same amount of homes, directing growth to city centers and urban residential neighborhoods as compared to rural areas can significantly reduce the amount of impervious area within a basin. In the example below, at rural densities (A) 1,000 homes would cover the entire rural area – or 5,000 acres – resulting in 200 acres of impervious surfaces. At typical urban residential neighborhood densities, the same amount of homes would require around 125 acres (B) and result in around 55 acres of impervious surfaces. At city center densities, 1,000 apartments or condominiums would require around 10 acres (C) and result in around 6 acres of impervious surfaces. Of course actual growth will be accommodated in all three areas, but guiding growth to urban areas has less impact overall on a basin.

Type of Area	Density	Units of New Growth	Percent Impervious Area	Total Acres	Impervious Acres
City Center	100 dwellings per acre	1,000	55%	10	6
Urban Residential Neighborhood	8 dwellings per acre	1,000	44%	125	55
Rural 5 acre lots	1 dwelling per five acres	1,000	4%	5,000	200

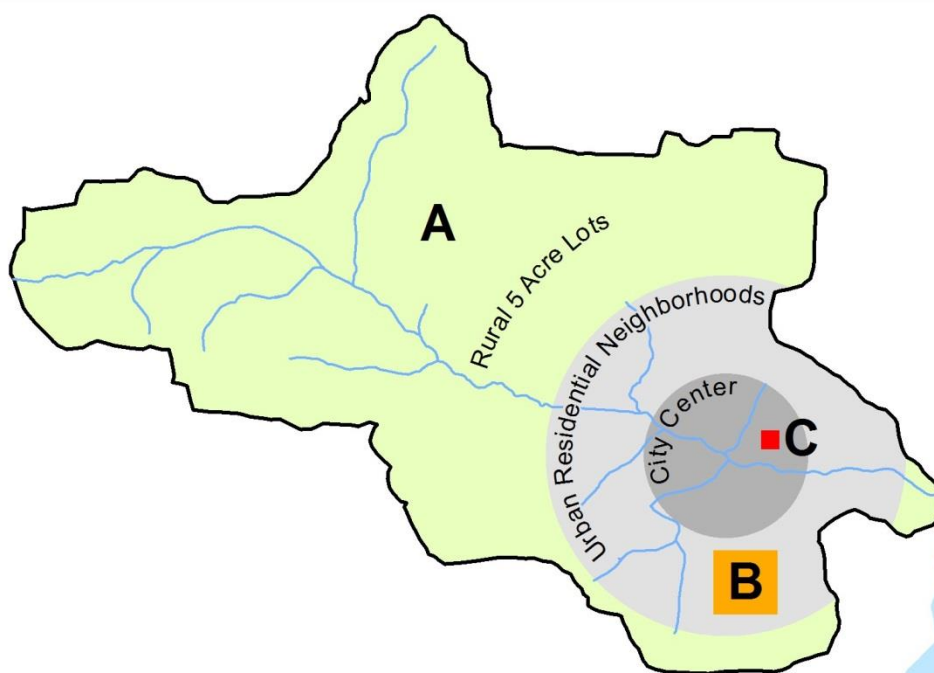


FIGURE 6: COMPACT GROWTH AS A FORM OF LOW IMPACT DEVELOPMENT.

Alternative Future B

The Future B scenario built on the Future A scenario and added the following (Map 10):

- Restore forest cover (where altered) along the major stream corridor that drains into Black Lake near Kenneydell Park and the stream near Black Lake Grocery (Figure 7)
- Restore wetland hydrology (where degraded) along the major stream corridor that drains into Black Lake near Kenneydell Park (Figure 8).
- Implement stormwater retrofit projects for older residential rural subdivisions (Figure 9)

The stream corridor (A) along the creek that drains into Black Lake is an example where planting trees in the riparian area could help shade the stream and filter contaminants from stormwater. Restoration sites for Future B were identified by examining stream corridors around major creeks through aerial photography. Many restoration opportunities are on private property, and will require working with the landowner.



FIGURE 7: EXAMPLE OF A POTENTIAL RESTORATION SITE.



FIGURE 8: EXAMPLE OF A POTENTIAL WETLAND RESTORATION AREA.



Stormwater retrofit is a term used when stormwater treatment is added to areas of existing development. Under current regulations, all new developments must be built with stormwater treatment facilities, but there are many existing development where stormwater can flow untreated into natural water bodies. These are areas where retrofits would be beneficial to water quality.

The project team asked public works and water resources professionals to identify areas where stormwater retrofits may be beneficial for the purposes of developing the Future B scenario.

FIGURE 9: EXAMPLE OF A STORMWATER RETROFIT PROJECT.

Comparison of Results

Land Use and Dwelling Units

Black Lake basin is a moderately developed area and has around 2,330 homes in it under current conditions. Under the Planned Trend, at buildout it would have around 5,970 homes, or an increase of 171%. Under the Future A and B Alternatives, buildout within the city would remain the same, but the unincorporated areas (rural and unincorporated growth areas combined) would see a significant reduction in potential buildout. This would be a result of rezoning a portion of the unincorporated growth area to rural densities (and removing it from the growth area), and rezoning rural areas along the stream corridor to lower densities.

TABLE 5: NUMBER OF DWELLING UNITS FOR CURRENT AND FUTURE SCENARIOS.

Dwelling Units (homes)	Current Condition 2010	Planned Trend Buildout	Future A & B Buildout
City	1,100	4,030	4,030
Unincorporated	1,230	2,280	1,940
Total	2,330	6,310	5,970
Percent Increase from Current Condition			
City		266%	266%
Unincorporated		85%	58%
Total		171%	156%

What is Buildout?

Buildout is a theoretical maximum number of homes that can be built in a specific area based on current land use, ownership, and zoning. It is unlikely that all of the possible homes that could be built will be built, as many land owners will choose to keep their properties undeveloped. Properties that are designated for parks, open space, and long term forestry are not considered to be buildable.

SOURCE: THURSTON REGIONAL PLANNING COUNCIL.

NOTE: DOES NOT INCLUDE REDEVELOPMENT, FAMILY MEMBER UNITS OR ACCESSORY DWELLING UNITS.

Land Cover

Compared with historic conditions, Black Lake basin has lost a considerable amount of forest cover, as well as some wetlands, but has only moderate coverage of impervious surfaces. Under the Planned Trend scenario, more forested and open areas would be converted to hard surfaces (roofs, roads, driveways) and other uses, and total impervious surfaces in the basin could increase to 10%. Land use changes in Alternative A would mitigate this result somewhat, but do not restore tree cover or ecological processes such as storage of water. By restoring vegetation, particularly along streams, Future Alternative B leads to the recovery of some forest cover, as well as a total reduction in polluting surfaces (Map 11, Map 12).

TABLE 6: COMPARISON OF HISTORIC, CURRENT, AND FUTURE LAND COVERS.

	Historic Condition	Current Condition 2010	Planned Trend Buildout	Future A	Future B
Forest	72%	56%	55%	55%	56%
Pasture/Prairie	6%	14%	11%	12%	11%
Grass	0%	6%	9%	8%	8%
Wetland	17%	16%	15%	15%	15%
Water	5%	5%	5%	5%	5%
High-polluting Total Impervious Area	0%	3%	4%	4%	3%
Low-polluting Total Impervious Area	0%	3%	6%	5%	5%

SOURCE: NHC 2014⁷

Water Flow & Water Quality

The hydrologic model tested the effects of each of the five scenarios on surface water flow in the basin to the lake (hydrology), both for the basin as a whole and for the area draining into Fish Pond Creek and entering Black Lake at Kenneydell Park. This allowed the study to partially isolate the impacts associated with the area that is likely to become the most developed in the future. The study focused on surface water flows to the lake, and did not consider processes within the lake itself, nor did it consider effects associated with groundwater.

Overall, when compared with historic conditions, minimum water flow into the lake has not changed substantially; however, streams on the east side of the lake are flashier, with sharply higher flows after storms and lower low flows in dry weather. These streams have a greater number of high pulse events when the amount of water in the stream doubles from its average flow. These high pulse events also last longer than they would have historically, and both these factors affect the ecological communities of macroinvertebrates that are sentinels for stream health, and that are vulnerable to changes in flow brought by urbanization. Looking at the basin as a whole, the flashiness of inflows to the lake is dampened by the lake's storage capacity, and flows are smoothed out for the outflow to Black Lake Ditch. None of the future scenarios led to significant degradation from existing conditions, and none made changes sufficient to restore flow patterns into the lake to historic conditions.

The model also considered several water quality parameters, including temperature, bacteria (fecal coliform), and nitrates. Water quality has degraded, with substantial increases in the number of days that stream temperatures are too warm, as well as increased nutrient and bacteria loads. Under existing

⁷ Percentages in this table look at the Black Lake basin, plus the additional contributing area around the Dempsey and Fish Trap Creek tributaries to the Black River, which contribute a portion of their runoff to Black Lake – a total area of 19.2 square miles. Much of this additional area is forested and in a natural condition, which the more developed areas are within the core Black Lake basin, including within the city of Tumwater.

conditions, phosphorus loading for the basin is estimated to have approximately doubled relative to historic conditions. The differences between the Planned Trend and Alternative Future scenarios were much smaller when compared with the changes from Historic to Current conditions. In general, the Planned Trend scenario did not lead to additional degradation in the basin; however, fecal coliform concentrations in Fish Pond Creek at Kenneydell Park will increase slightly, though they decrease slightly for the basin as a whole. This outcome was seen in the modeling despite the assumption that all units on septic systems within the city and UGA boundaries will be converted to sewer.

With the land use changes proposed in Future Scenario A, water quality would improve in some local stretches of streams, including in Fish Pond Creek. Nitrate loads would be reduced in this tributary thanks to increased water quality treatment for sites developed to a low-impact standard. The greatest improvements were seen in Alternative Future Scenario B, which includes restoration of riparian and wetland areas, retrofits of older development to provide improved stormwater flow control and treatment in addition to land use changes. Under Future Scenario B, temperature in tributaries to the lake would be restored to closely resemble conditions prior to any development in the region and nutrient levels would be substantially reduced. This scenario would provide the greatest benefit to aquatic health for the basin, although it would not address nutrient issues associated with internal lake processes.

A summary that compares the results from the alternative futures modeling is shown in Table 7. For a complete discussion of the model results, see NHC 2014.

TABLE 7: BLACK LAKE BASIN MODELING RESULTS SUMMARY

	Planned Trend	Future Alternative A	Future Alternative B
Hydrology	No change	No change	No change
Temperature	No change (frequent violations)	No change (frequent violations)	Large improvement
Fecal Coliform (Bacteria)	Small local increase; small reduction basin-wide	Small reduction	Small reduction
Nitrate	No significant change	Moderate reduction	Moderate reduction
Overall Benefit to Aquatic Health	Mixed	Moderate	Moderate

SOURCE: NHC 2014

Septic Systems & Water Quality

One question raised at the start of the modeling was whether the Planned Trend scenario would result in less nutrient pollution than in the alternative future scenarios. Because traditional septic systems do not remove nutrients, a single home using a septic system can contribute between 8 to 20 times as much nitrate to groundwater and shallow sub-surface flows as one that is hooked up to a sewer system, which will treat waste at a central facility. When many homes are concentrated in a sensitive area, this can cause a substantial impact to water quality. Alternative Future A and B scenarios include an adjustment to the growth area boundary (Figure 4). This will affect how many homes are likely to have

access to sewer infrastructure versus septic systems. Under the Growth Management Act, sewer infrastructure should only be extended to development within the urban growth area (UGA) and city limits, so homes that remain outside that boundary are likely to be permanently on septic systems⁸.

One hypothesis was that the Planned Trend scenario would result in less nitrate and bacteria pollution than current conditions and Future A and B, because although the Planned Trend would result in more new homes overall, there would be fewer homes on septic systems. In practice, this assumption was complicated by the fact that some homes on septic systems pose a higher risk to water quality because of factors such as their proximity to water or the soil type used for drainage. The project team identified areas that would be considered higher risk for contributing pollution loads, and noted those septic systems as being higher contributors in the model (see Table 8). Many of these higher-risk areas are along the lake shore, and a portion of them are in the area that would be removed from the Tumwater UGA in Alternative Future scenarios A and B. As discussed above, the Planned Trend showed mixed results, with a small decrease in bacteria loading for the basin, but a local increase for some of the area slated to be removed from the UGA, no significant change in nitrate loading and a moderate reduction in phosphorus loading. The land use changes and low impact development of Alternative Future A seem to offset the benefit of sewerage additional homes in Planned Trend, resulting in greater reductions of bacteria and nutrient loads, while the restoration actions of Alternative Future B bring the greatest benefit of all the scenarios.

TABLE 8: ESTIMATES OF NITRATE POLLUTION UNDER CURRENT CONDITIONS, PLANNED TREND, AND FUTURE A & B.

	Current Condition 2010	Planned Trend Buildout	Future A & B Buildout
Number of homes in area that is designated in Future A & B Scenarios for removal from UGA	190	520	210
Type of wastewater treatment	septic	sewer	septic
Number of homes on septic systems in a high-risk zone for fecal coliform, total basin⁹	668	355	458
Number of homes on septic systems in a high-risk zone for nitrates, total basin⁷	1,177	561	755

Interpretation and Limits of Results

In summary, the model results indicate that:

⁸ Under RCW 36.70A.110(4), exceptions to extending urban services, such as a sewer line, into rural areas may only be justified, “in those limited circumstances shown to be necessary to protect basic public health and safety and the environment and when such services are financially supportable at rural densities and do not permit urban development.”

⁹ Source: NHC 2014.

- Existing land uses in the basin have impacted both water flow patterns and water quality, when compared to conditions that would have prevailed prior to Euro-American settlement in the 1850s. The tributaries draining areas that have developed, such as land within the city of Tumwater, are flashier with higher flows after storm events, due to the higher percentage of impervious area in upland areas that channel runoff into streams instead of into the ground. Bacteria and nutrient loads to the lake are much higher than they would have been prior to development.
- Although the analysis shows that there has been significant degradation of water quality when compared with historic conditions, this trajectory seems to have slowed, and conditions are not seen to get dramatically worse under the Planned Trend scenario. This result indicates that current regulations – including zoning and critical area protections – when properly implemented, can be effective at minimizing the impact of new development.
- Lowering the dwelling unit densities through downzoning, as presented in Alternative Future A, by itself is unlikely to have a substantial impact on water flow or water quality basin-wide, although there may be localized improvements in some smaller areas.
- Removing the proposed area from the Tumwater UGA, as proposed in Alternatives A and B, would not degrade water quality in Black Lake, and may lead to potential water quality improvements when compared to development that could occur under the Planned Trend. The potential water quality improvements of converting homes in this area from on-site septic systems to sewer under the Planned Trend scenario could be offset by other actions included in the Alternative Future scenarios, such as having all new homes in the basin built to a low impact development standard.
- The policies identified for Future Alternative B, which pairs land use changes with a substantial restoration effort, will have the greatest benefit to water quality in Black Lake basin. In particular, revegetating shorelines where they have been cleared will help to shade and cool streams. Such restored riparian areas will also reduce the amount of fecal coliform bacteria and nitrogen loading into streams. Restoration of degraded wetland areas would provide additional storage and treatment in some areas.
- Retrofitting older stormwater infrastructure to provide more flow control and water quality treatment can bring substantial improvements to stream conditions.
- No scenarios approach the simulated Historic condition. This is in part due to a lack of forest restoration in any scenarios – all non-pervious land covers will contribute nutrients and bacteria through runoff at more than twice the rate of a forested area. To restore water quality to be closer to historic, pre-development condition, existing pasture areas would need to be treated for nutrient removal, or returned to a non-agricultural, forested use.

A number of assumptions were made in the development and application of the model that should be considered when interpreting these results. The future scenarios assumed that new development would only clear and cover a minimal amount of each parcel with impervious surfaces, rather than the total amount allowed under current regulations (for example, up to 60% in areas zoned RRR 1/5). More extensive clearing and conversion could lead to additional impacts in the watershed. The model also assumed that all pasture areas have some livestock or agricultural use, and that this use would contribute a certain amount of bacteria and nutrient loads – these contributions could be lessened or mitigated through a variety of best practices. The model analysis assumed that existing regulations would effectively protect critical areas, and that stormwater facilities, including those required under the new low impact development standard, would be mostly effective at reducing and treating stormwater to mimic a pre-developed, forested condition. This assumption underlines the need for tools to ensure these facilities are properly built and maintained over time.

The model results provide a window into the potential effects of different policies, but they are limited to considering only impacts to water flow and water quality – they do not take into account many other important environmental factors that should be considered as part of the planning effort. For example, the model does not account for the many habitat benefits that would come from preserving tree cover in the basin. For this reason, the recommendations listed in Section 4 of this study are based on the full spectrum of information included in this report, rather than solely on the model results.

Public Views on Future Scenarios

On October 30, 2014, Thurston County and Thurston Regional Planning Council (TRPC) hosted a second community workshop for residents of Black Lake basin and other interested parties. Attendees had the opportunity to view maps that showed the different future scenarios and outlined different outcomes associated with each, including the results of the modeling work. They were provided with colored dots that they could place to indicate items they liked (green dot) or disliked (red dot) about a certain scenario, and could also write comments on notes attached to the maps.

Overall, participants showed support for policies that go beyond maintaining current conditions in the basin to actions that restore ecological functions and improve water quality. Of the three future scenarios, participants generally disliked the Planned Trend scenario, which had the greatest increase in projected number of new dwelling units and showed the most area to be annexed into the city of Tumwater. Some residents in the area identified for potentially being removed from the Tumwater UGA in the Alternative Future A scenario indicated they preferred the area remain rural. Participants liked the restoration actions of Future Alternative B, but were concerned about the cost associated with such activities. Some participants suggested that their preference was for a combination of actions in Alternative Future scenarios A and B – actions that would simultaneously limit growth in existing rural area, concentrate that growth in the urban areas of Tumwater, take a low impact development approach, and restore degraded areas.

4. Management Recommendations

This watershed study provided an opportunity to consider current conditions in the Black Lake basin, how future growth and development may impact those conditions, and how alternative management approaches might affect that future. The following recommendations for management actions in the Black Lake basin are based on the basin alternatives analysis outlined above in Section 3, as well as public input and other information described in this report. This section outlines four overarching **goals** for the basin – these are high-level statements that outline the desired aim of any actions taken. The basin goals are grounded in the watershed-scale assessments completed in the Baseline Conditions report and Puget Sound Watershed Characterization project, which both emphasized the need for protection and restoration of ecological functions in this basin, as well as in the feedback received during public outreach. Associated with each goal are a mix of **strategies** intended to set the guiding direction for achieving that goal, as well as specific **actions** that address each strategy. Some actions have priority areas for implementation, as identified in the analyses or other planning efforts. These actions can be taken on by Thurston County, as well as other local jurisdictions, state and federal agencies, or community organizations.

GOAL B.1 Maintain and restore basin-wide ecological functions, particularly surface storage of water and recharge to groundwater

Black Lake basin was identified as a priority area for protection and restoration of water flow processes. The basin historically has a high percentage of wetlands, and while some of these remain, many wetlands were drained or modified, resulting in a loss of storage capacity. Development in the basin has resulted in an overall loss of forest cover, as well as more areas covered with impervious surfaces or converted to lawns. As a result, less precipitation is stored on site or allowed to infiltrate to groundwater, and more is directed as runoff into tributaries to Black Lake. This disruption of hydrology, combined with high groundwater in some areas, also has likely contributed to flooding issues in the basin. The basin is likely to see a significant amount of growth in the future, and while the modeling results show that existing regulations do a good job of reducing some impacts, it is important that new development not exacerbate these issues. Construction should be designed to minimize discharge and retain existing tree cover and vegetation, and mitigate any impacts to remaining wetlands.

Strategies

- ◆ Minimize the installation of new impervious surfaces
 - Thurston County areas*
 - Require clustering of new development (See Memo, Appendix A)
 - Consider ways to minimize new impervious surfaces from detached family member units (see Memo, Appendix B)
 - Establish impervious surface limits through zoning for this basin (See Memo, Appendix C)

- Consider implementing an impervious surface trading program that would shift the placement of new surfaces out of sensitive areas
- Tumwater areas*
 - Allow grouped units such as duplexes, townhouses, fourplexes as part of new development. (see Memo, Appendix E)
 - Require narrower streets as part of development near wetlands and in high groundwater areas. (see Memo, Appendix E)
- ◆ Maintain existing tree cover and native vegetation, particularly along riparian corridors
 - Thurston County areas*
 - Establish tree retention standards for the rural portions of the basin to ensure canopy cover remains at current levels or better
 - Review open space standards, and consider increasing incentives to landowners who set aside and maintain open space
 - Tumwater areas*
 - Base the number of permitted units on density rather than minimum lot size (see Memo, Appendix E)
 - Make the storm system and natural areas a key part of the development's open space and an extension of people's yards (see Memo, Appendix E)
 - Designate sensitive area tracts as areas separate from individual lots (see Memo, Appendix E)
- ◆ Implement low impact development approaches for areas that develop
 - *County and Tumwater:* Update stormwater regulations to encourage low impact development, where feasible, in accordance with state guidelines
- ◆ Encourage and support the restoration and enhancement of degraded wetland and riparian areas
 - County*
 - Identify potential mitigation sites for use in the pilot in lieu fee mitigation program
 - Develop guidance and improved outreach for landowners interested in conducting voluntary restoration on their own properties
 - Provide priority ranking for funding of projects in this basin, including through Conservation Futures
 - ❖ Priority areas: Fish Pond Creek, Goldsby Creek (next to Black Lake Grocery), unnamed creek near Guerin Park property
 - Work with Bonneville Power Administration to consider options for appropriate vegetation and wetland restoration under power lines
 - Tumwater*
 - Fund and construct retrofit projects in Black Lake basin already identified in Capital Facilities Plan
 - ❖ *Priority areas:* undersized culverts and drainage ditches that contribute to flooding along Kirsop Road

- ◆ Monitor key indicators – such as impervious surfaces, water quality, and acres of forested land – to assess long-term condition of basin
 - Continue annual monitoring through TRPC’s benchmark program
- ◆ Consider how climate change may affect ecological functions
 - Develop a watershed-based climate resilience plan

GOAL B.2 Protect and improve water quality in sources to Black Lake

Past development and current activities have substantially degraded water quality in tributaries to Black Lake, resulting in higher levels of bacteria and nutrients when compared with historic conditions. These current conditions are likely contributing to water quality concerns in Black Lake, including the frequency of harmful algal blooms that result in lake closures. Residents in the basin are very concerned about water quality in the lake and would like more actions taken to improve current conditions to ensure the lake is in better condition in the future. The modeling study found that land use changes could help hold the line against further degradation and improve some parameters, while actions that address existing impairments could result in a substantial improvement to water quality. More information is needed to understand how ecological processes within the lake itself contribute to an ongoing cycle of excess nutrients and low oxygen conditions, and how these processes compare with potential contributions from sources to the lake.

Strategies

- ◆ Limit dense development in sensitive areas
 - County*
 - Consider removing area from the Tumwater UGA along the shore of Black Lake and rezone to a lower density, such as Residential 1/10
 - ❖ *Priority area:* Area within the UGA south of 66th Street and between Black Lake-Belmore and the lake shore. Boundary to be refined after additional analysis to consider factors such as neighborhoods with higher septic densities
 - Consider lowering zoning densities in sensitive areas
 - Support protective shoreline regulations through update of Thurston County Shoreline Management Program
 - Consider expanding the county’s Transfer of Development Rights Program to include priority forested lands within Black Lake basin as applicable sending areas (See Memo, Appendix D)
 - Tumwater*
 - Base the number of permitted units on density rather than minimum lot size (see Memo, Appendix E)
 - Make the storm system and natural areas a key part of the development’s open space and an extension of people’s yards (see Memo, Appendix E)
- ◆ Minimize and reduce pollution from septic systems
 - County*

- Expand septic risk assessment to identify high-risk areas for septs in the rural areas of the County
- Institute focused operation and maintenance program for Black Lake basin, similar to existing program for Henderson Inlet
- *County and Tumwater:* Implement a focused program to convert high- and moderate-risk septic systems in the urban portion of basin to sewer systems
 - ❖ *Priority Areas:* Neighborhoods identified in 2015 Urban Septic Risk Assessment
- ◆ Minimize and reduce pollution from stormwater runoff
 - *County and Tumwater:* Update stormwater regulations to encourage low impact development, where feasible, in accordance with state guidelines
 - *County:* Investigate and prioritize additional stormwater retrofit opportunities within this basin in Thurston County's Capital Facilities Plan
 - *Tumwater:* Fund and construct retrofit projects in Black Lake basin already identified in Capital Facilities Plan
 - ❖ *Priority areas:* undersized culverts and drainage ditches, wetland mitigation and water quality treatment along Kirsop Road adjacent to Fish Pond Creek and wetland areas
- ◆ Minimize and reduce nutrient pollution from agricultural and residential use
 - Work with landowners to educate and encourage best management practices for agriculture
 - Develop homeowner education and outreach program to discourage use of fertilizer near lake and tributaries and encourage natural shoreline enhancement

GOAL B.3 Protect open space and critical habitat for wildlife and fish

Black Lake basin includes habitat for a number of priority species, including the Oregon Spotted Frog, which is a federally listed threatened species. Residents value opportunities they have to view wildlife in the area, and the more open feel of the northern reaches of the basin. The County should work to ensure that current regulations continue to protect critical habitat, and look for innovative ways to encourage preservation of open space areas.

Strategies

- ◆ Provide options for preserving habitat through land use regulations
 - Ensure development occurs in compliance with the Critical Areas Ordinance (TCC 24)
 - Encourage clustered development that preserves more open space and habitat (See Memo, Appendix A)
 - Consider expanding the county's Transfer of Development Rights Program to include priority wetlands and riparian areas within Black Lake basin as applicable sending areas, and developable areas within the city of Tumwater and its UGA as applicable receiving areas (see Memo, Appendix D)
 - Develop a regional approach to track and plan for open space
- ◆ Protect and enhance habitat for endangered and threatened species

- Provide guidance for enhancement of Oregon Spotted Frog habitat in residential and agricultural areas
- Develop guidance for maintenance of Oregon Spotted Frog habitat in county public right-of-way areas and stormwater facilities

GOAL B.4 Support and increase recreational opportunities

Residents in Black Lake basin value access to recreational opportunities in the basin, including existing boat ramps and Kenneydell County Park. Some additional areas within the basin were identified as places used informally by residents and visitors for low-impact recreation. In its planning efforts, the County and other entities should consider ways to expand existing recreational opportunities to provide additional low-impact recreation in this basin.

Strategies

- ◆ Ensure land use regulations support recreation use in appropriate areas
 - Adjust zoning around Kenneydell Park to Public Parks, Trails & Preserves to better reflect use in this area
- ◆ Develop recreational facilities
 - Consider areas for purchase and development of low-impact recreation facilities, including hiking trails, and interpretive displays
 - ❖ Priority areas: Black Hills area in northwest portion of basin; southern wetlands complex

5. Implementation and Next Steps

This study identified a number of recommended strategies and actions to protect and improve water quality and aquatic resources in the Black Lake basin. Accomplishing the goals set out in the previous section will require leadership and continued support from project partners as well as funding for many of the individual actions. Because this study was directed by Thurston County, most of the actions noted are ones that should be led by one or another county department, except where noted otherwise. Additional actions could be taken up by other organizations interested in supporting these strategies.

The actions identified in this study can be grouped into a number of different categories; some may potentially be addressed by work that is currently underway.

Land use. These actions concern changes to zoning, development regulations, or plans that guide land use in the County, such as the Shoreline Master Program (SMP) or Comprehensive Plan (CP). Actions in this category would likely be led by Thurston County's Long-Range Planning Division.

- *Code review:* The County is currently reviewing many of its development codes for as required under its NPDES stormwater permit to make low impact development the preferred option for development. This code review is being led by an interdepartmental LID Work Group and is covering topics like tree and vegetation retention, cluster and open space standards, and impervious surface limits.

Programs. These actions would involve the modification of current programs run by the county, or the development of entirely new programs.

- *Outreach and education:* This study identified a need for additional outreach to landowners in a number of categories, and a way to provide centralized information and support for those who may be interested in either preserving large open areas or doing restoration in degraded areas.

Table 9 lays out an implementation plan that identifies the potential lead and timeline for each action.

TABLE 9: IMPLEMENTATION OF BASIN-SPECIFIC ACTIONS

Goals, Strategies, Actions			Category	Lead	Partners
B.1 Maintain and restore basin-wide ecological functions, particularly surface storage of water and recharge to groundwater					
	<i>Minimize the installation of new impervious surfaces</i>				
		Require clustering of new development	Land use; code review	County, Tumwater	LID Work Group
		Consider ways to minimize new impervious surfaces from detached family member units	Land use; code review	County	LID Work Group
		Establish impervious surface limits through zoning for this basin	Land use; code review	County	LID Work Group

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Goals, Strategies, Actions			Category	Lead	Partners
		Consider implementing an impervious surface trading program that would shift the placement of new surfaces out of sensitive areas	Programs	County	
		Allow grouped units such as duplexes, townhouses, fourplexes as part of new development.	Land use; code review	Tumwater	
		Require narrower streets as part of development near wetlands and in high groundwater areas.	Code review	Tumwater	
<i>Maintain existing tree cover and native vegetation, particularly along riparian corridors</i>					
		Establish tree retention standards for the rural portions of the basin to ensure canopy cover remains at current levels or better	Land use; code review	County	LID Work Group
		Review open space standards, and consider increasing incentives to landowners who set aside and maintain open space	Land use; code review	County	LID Work Group
		Base the number of permitted units on density rather than minimum lot size	Land use; code review	Tumwater	
		Make the storm system and natural areas a key part of the development's open space and an extension of people's yards	Code review	Tumwater	
		Designate sensitive area tracts as areas separate from individual lots	Land use; code review	Tumwater	
<i>Implement low impact development approaches for areas that develop</i>					
		Update stormwater regulations to encourage low impact development, where feasible, in accordance with state guidelines	Land use; code review	County, Tumwater	LID Work Group
<i>Encourage and support the restoration and enhancement of degraded wetland and riparian areas</i>					
		Identify opportunities for use in the pilot in lieu fee mitigation program	Programs	County	
		Develop guidance and improved outreach for landowners interested in conducting restoration on their own properties	Programs; outreach	County	
		Provide priority ranking for funding of projects in this basin	Programs	County	
		Work with Bonneville Power Administration to consider options for appropriate vegetation and wetland restoration under power lines	Programs; research		
		Fund and construct retrofit projects in Black Lake basin already identified in Capital Facilities Plan	Programs; CFP	County, Tumwater	
<i>Monitor key indicators to assess long-term condition of basin</i>					

Black Lake Basin Water Resource Protection Study

Goals, Strategies, Actions			Category	Lead	Partners
		Continue annual monitoring through benchmark program	Programs	TRPC	
	<i>Consider how climate change may affect ecological functions</i>				
		Develop a watershed-based climate resilience plan	Land use	TRPC	County
B.2 Protect and improve water quality in sources to Black Lake					
	<i>Limit dense development in sensitive areas</i>				
		Consider removing area from the Tumwater UGA along the shore of Black Lake and rezone to a lower density, such as Residential 1/10	Land use	County	Tumwater
		Consider lowering zoning densities in sensitive areas	Land use	County	
		Support protective shoreline regulations through update of Thurston County Shoreline Management Program	Land use	County	
		Consider expanding the county's Transfer of Development Rights Program to include priority forested lands within Black Lake basin as applicable sending areas	Programs	County	
		Base the number of permitted units on density rather than minimum lot size	Land use; code review	Tumwater	
		Make the storm system and natural areas a key part of the development's open space and an extension of people's yards	Code review	Tumwater	
	<i>Minimize and reduce pollution from septic systems</i>				
		Expand septic risk assessment to identify high-risk areas for septic systems in the rural areas of the County	Research	County	
		Institute focused operation and maintenance program for Black Lake basin, similar to existing program for Henderson Inlet	Programs	County	
		Implement a focused program to convert high- and moderate-risk septic systems in the urban portion of basin to sewer systems	Programs	County; Tumwater	
	<i>Minimize and reduce pollution from stormwater runoff</i>				
		Update stormwater regulations to encourage low impact development, where feasible, in accordance with state guidelines	Code review	County; Tumwater	
		Investigate and prioritize additional stormwater retrofit opportunities within this basin in Thurston County's Capital Facilities Plan	Programs	County	
		Fund and construct retrofit projects in Black Lake basin already identified in Capital Facilities Plan	Programs	Tumwater	

Black Lake Basin Water Resource Protection Study

Goals, Strategies, Actions			Category	Lead	Partners
	<i>Minimize and reduce nutrient pollution from agricultural and residential use</i>				
		Work with landowners to educate and encourage best management practices for agriculture	Programs	County	
		Develop homeowner education and outreach program to discourage use of fertilizer near lake and tributaries and encourage natural shoreline enhancement	Programs	County	
B.3 Protect open space and critical habitat for wildlife and fish					
	<i>Provide options for preserving habitat through land use regulations</i>				
		Ensure development occurs in compliance with the Critical Areas Ordinance	Land use; ongoing	County	
		Encourage clustered development that preserves more open space and habitat	Land use; code review	County	LID Work Group
		Consider expanding the county's Transfer of Development Rights Program	Programs	County	
		Develop a regional open space plan	Land use	TRPC	County
	<i>Protect and enhance habitat for endangered and threatened species</i>				
		Provide guidance for enhancement of Oregon Spotted Frog habitat in residential and agricultural areas	Research		USFWS
		Develop guidance for maintenance of Oregon Spotted Frog habitat in county public right-of-way areas and stormwater facilities	Research		USFWS
B.4 Support and increase recreational opportunities					
	<i>Ensure land use regulations support recreation use in appropriate areas</i>				
		Adjust zoning around Kenneydell Park to Public Parks, Trails & Preserves to better reflect use in this area	Land use	County	
	<i>Develop recreational facilities</i>				
		Consider areas for purchase and development of low-impact recreation facilities	Programs	County	

This study did not include an analysis of the costs associated with the different scenarios, but an initial next step could include a prioritization of actions that includes such an analysis. Collaboration among the different groups and partners with interest in the watershed will be essential to carrying out these recommendations, as will continued monitoring to track the condition of the basin over the long term.

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Appendixes

Appendix A. Thurston County Cluster Developments

Appendix B. Family Member Units in Rural Thurston County

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Appendix D. Transfer of Development Rights and Purchase of Development Rights

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Appendix A.

Thurston County Cluster Developments

Issue:

Cluster development is considered a low-impact development technique because it reduces the amount of impervious surface in a subdivision. Thurston County's zoning code allows for cluster developments in certain zoning districts; however, more code work could be done to encourage rural cluster type development over conventional developments and incorporate additional low-impact development techniques.

Recommendations:

1. Amend Thurston County's Development code to removed inconsistencies and clarify open space requirements:
 - Establish an open space requirement for PRRD's in zoning districts where resource parcels are not required - R 1/20; R 1/10; UR 1/5; LAMIRD 1/2
 - Determine whether or not PRRDs are possible in the LAMIRD 1/2 zone (it appears as if no developable parcels are over 20 acres in size in this zoning district).
 - Reconcile inconsistencies in density bonus language in zoning and PRRD code for the Nisqually sub-area
 - Remove reference to cluster lots sizes in LAMIRD zones that are not eligible for PRDs and PRRDs.
2. Consider the recommendation from Thurston County's 2011 *Low-Impact Development Barriers Analysis* that additional considerations related to stormwater and water quality be incorporated into cluster development code, including:
 - Encourage cluster subdivisions where sensitive areas exist such as streams, wetlands, shorelines, etc.
 - Require or provide incentives to locate the open space areas and/or resource parcel downslope from the developed portions of a site to create water quality benefits.
 - Require or provide incentives to locate the open space area and/or resource parcel contiguous to parks, critical areas/buffers, or open space on adjacent lands to increase connectivity of habitat areas.
 - Require or provide incentives for the retention (or restoration) of native vegetation and tree canopy on the proposed resource parcel/open space area.

Background:

Thurston County allows for cluster development in all of the rural residential zoning districts with the exception of two LAMIRD zones: RL 2/1 and RL 1/1. In the Grand Mound urban growth area cluster development and cottage housing (a form of clustering) is also allowed.

In the Lacey, Olympia, and Tumwater UGAs, cluster developments are permitted through the Planned Residential Development (Lacey and Olympia) or Planned Unit Development (Tumwater) planning processes, and all three jurisdictions allow for cottage housing.

Clustering is considered a best management practice for low-impact development as it allows for a large resource or environmentally sensitive parcel to be set aside, and the residential units to be clustered in a smaller part of the property, resulting in fewer miles of roads.

The benefits of clustering in subdivision design include¹:

- Reduced impervious surface and land disturbance per dwelling unit
- Protection of resource lands provides habitat, particularly if resource land is located contiguous to other resource lands, parks, or open space.
- Area of resource land and/or open space may be suitable for low-impact development best management practices such as dispersion
- If the resource land/open space is located between development and critical areas, or at least “down slope” from the developed area it can provide additional water quality benefits and mitigation.



Conventional Development versus Low Impact Development Cluster Design

Source: Integrating LID into Local Codes: A Guidebook for Local Governments. July 2012.

Since the Growth Management Act Comprehensive Plan and Zoning was adopted in Thurston County in the mid-1990s, Thurston County has approved 47 rural cluster subdivision developments, resulting in 990 residential lots and more than 2,600 acres of open space or resource lands placed into protection. The amount of open space and resource land protection varied by zoning district, and averaged 77 percent of the total area.

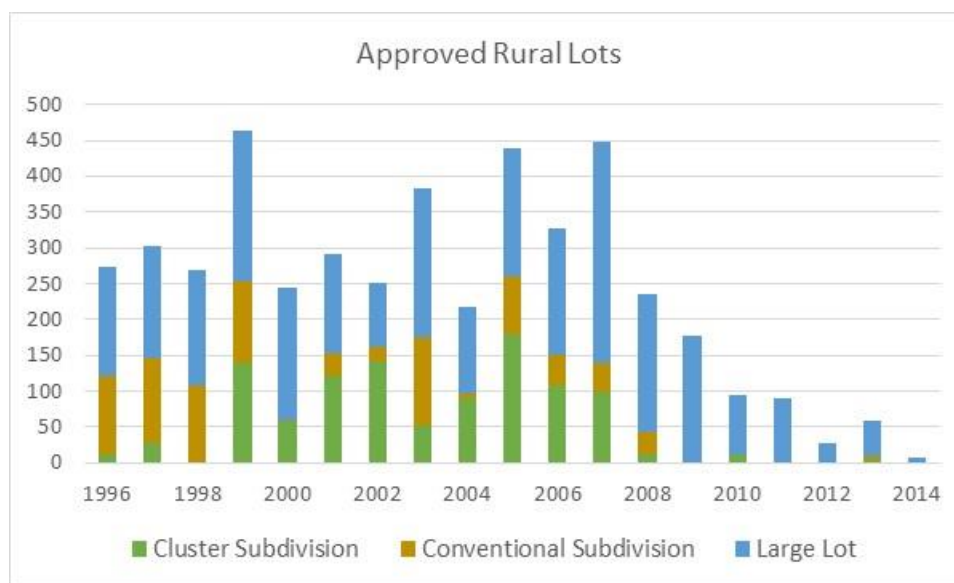
¹ Low Impact Development Barriers Analysis – Thurston County, Washington. March, 2011.

Zoning District	Number of Residential Lots	Residential (acres)	Resource or Open Space (acres)	Rights-of-Way (acres)	Total (acres)	Percent Open Space	Units per Acre	Acres per Unit
LTA	7	14	147	1	162	90%	0.04	23.21
MGSA	129	63	528	12	602	88%	0.21	4.67
RR1/2	211	94	234	22	350	67%	0.60	1.66
RRR1/5	644	491	1,703	64	2,258	75%	0.29	3.51
Total	991	662	2,612	99	3,372	77%	0.29	3.40

Thurston County placed a moratorium on cluster developments in the late 2000's. The moratorium was lifted in June 2011 when new regulations were adopted. One of the main differences between the earlier regulations and current regulations was the removal of most of the density bonuses given for clustering.

The main issue with the density bonuses was that they allowed for an increase in rural densities of between 35 and 65 percent based on how much open space/resource lands were put aside. Overall, the regulations resulted in about a 50 percent increase in density in clustered subdivisions in the RRR1/5 zone compared to conventional development.

The number of new rural lots being approved slowed considerably starting in the late 2000s. There were many factors at play: the recession and drop in the housing market; changing demographic preferences of a walkable urban lifestyle; and a rural rezone in 2007.



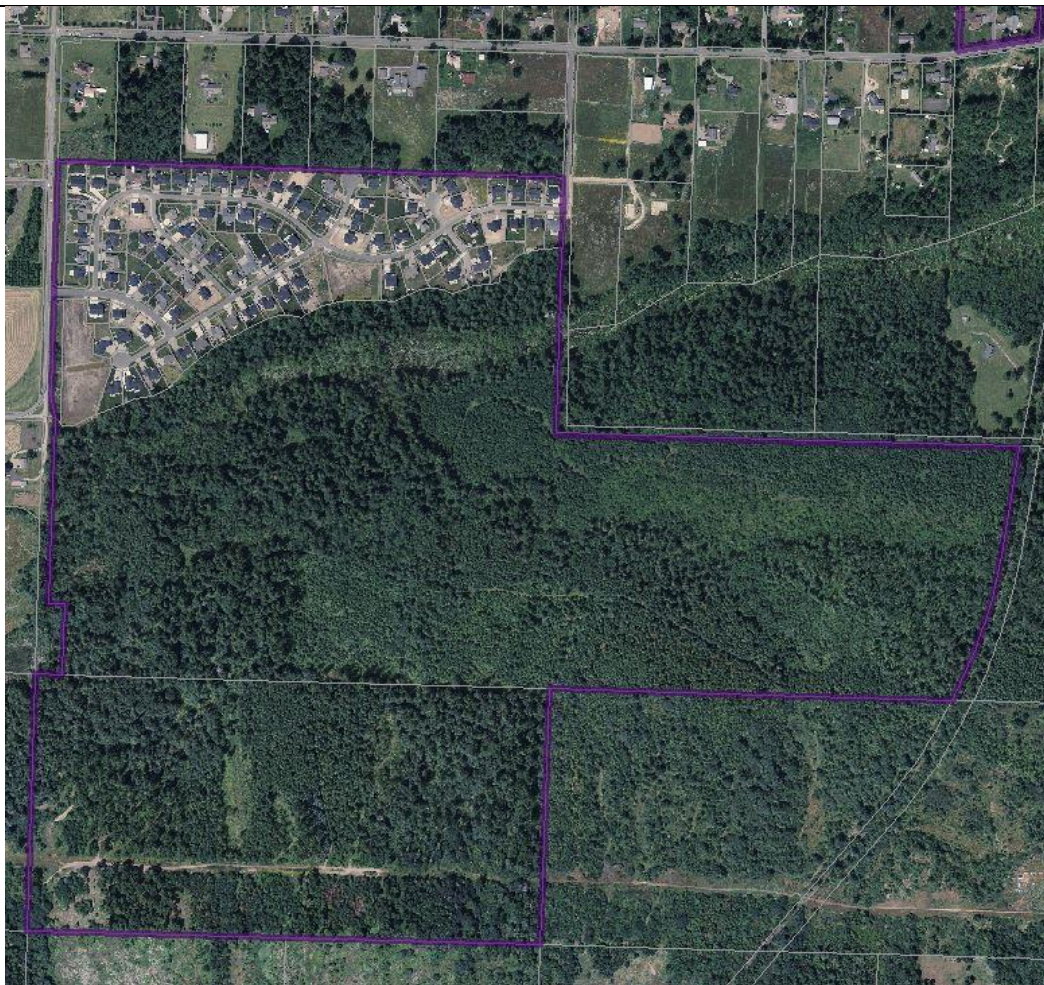
Today density bonuses are allowed in the Grand Mound UGA², and density increases are allowed amid the Nisqually Agriculture zoning district and the RRR 1/5 and RR1/5 if there are certain critical areas present.

² Although density bonuses are listed in the zoning code for the Nisqually sub-area (in RR1/5) they are not allowed in Chapter 20.30.050 (PRD section of code.)

Since Thurston County lifted the moratorium on clusters put into place new regulations, the County has approved just two small subdivisions — one a cluster subdivision and the other a conventional one.

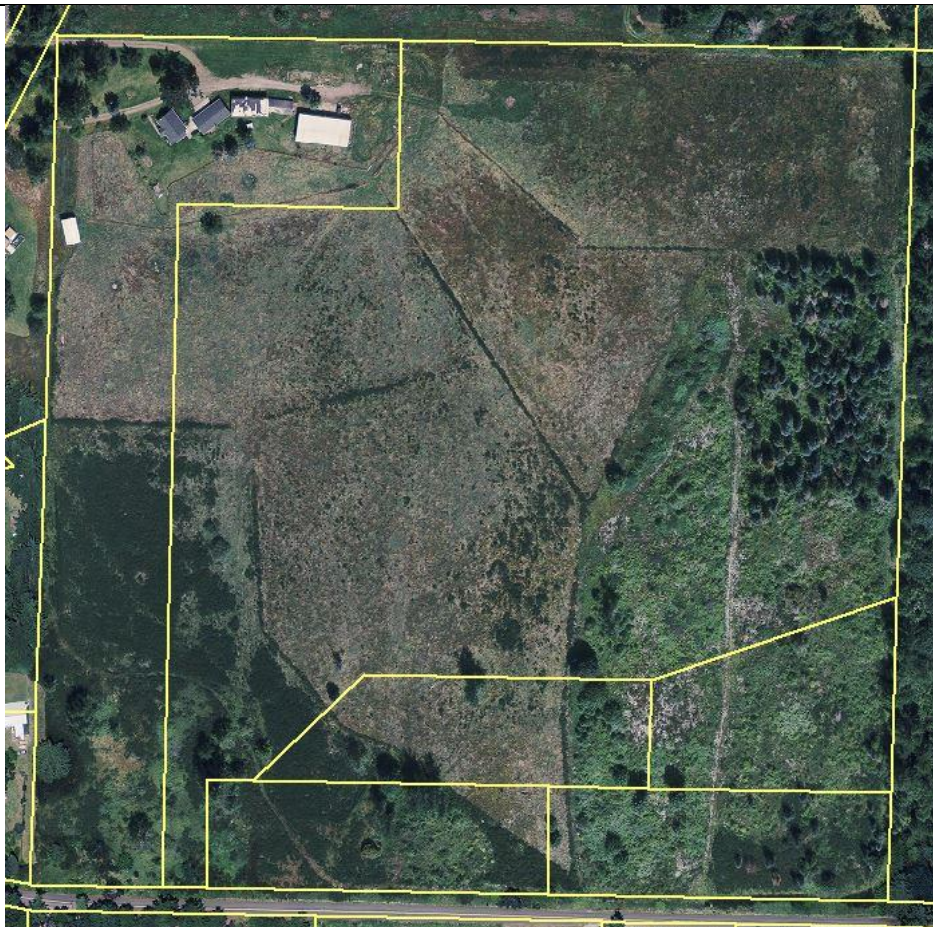
There are more than 1,300 rural properties over 20 acres in size — almost 64,000 undeveloped acres — that could either develop in a conventional or cluster form at an average density of around one unit per five acres.

Cluster Subdivision Approved under pre-2011 Regulations



The Riverwood subdivision was approved in 2007. The open space parcel contains Spurgeon Creek. Ninety homes were permitted on a 305-acre property. The average residential lot size is 0.37 acres in size, for an average density of 0.3 units per acre, or 3.3 acres per unit. Compare that to the lots just north of the subdivision that represent the typical 5 acres per unit lot size in this zoning district (RRR1/5). Eighty-six percent of the land was preserved in open space. Without the density bonus, around 61 lots would have been allowed (without removing critical areas from the density calculation per rules in 2007).

Cluster Subdivision Approved under updated Regulations



Merryman Estates is the only subdivision to be approved under the updated PRRD regulations. This 39-acre parcel has been subdivided into five residential lots and a 23-acre resource parcel (60 percent of the total plat area). The original farm home is now on a 7.7-acre lot, and the new residential lots are around 2 acres in size. The overall density is around 7.7 units per acre.

Guiding Growth – Healthy Watersheds: Science to Local Policy

Zoning Code	Underlying Zoning District Density	Cluster Development Allowed	Density Bonus or Incentive to Cluster	Resource Parcel / Open Space
Chapter 20.08A Long-Term Agriculture District (LTA)	One unit per 20 acres	Yes – PRRD (consistent with 20.30A – when in conflict more restrictive standards apply)	No	85 percent of proposed subdivision – resource parcel Chapter 20.32 for open space – no specific set-aside
Chapter 20.08C Nisqually Agricultural District (NA)	One unit per 40 acres	Yes - PRRD	Yes – density calculated at one unit per five acres for cluster development	90 percent of proposed subdivision – resource parcel Chapter 20.32 for open space – no specific set-aside
Chapter 20.08D Long-Term Forestry District (LTF)	One unit per 80 acres unless lots are smaller than 640 acres then 1 unit per 20 acres	Yes – PRRD	Required for subdivisions in this zoning district (on lots smaller than 640 acres) Density is one unit per 20 acres	75 percent of proposed subdivision – resource parcel Chapter 20.32 for open space – no specific set-aside
Chapter 20.09 Rural Residential—One Dwelling Unit per Five Acres (RR 1/5)	One unit per 5 acres ¹	Yes - PRD	Yes if wetlands are present - wetlands not subtracted if it is a cluster development	30 percent or more – greenbelt, active recreation, environmentally sensitive lands
Nisqually Sub-area	Same as above	Yes – PRD	Required for lots 20 acres or larger Density bonus of 20 percent listed in 20.09.045 but conflicts with other section 20.30.050 Number 4 that says “no density bonus shall be awarded for PRDs in the RR 1/5 and MGSA area.	Title 20.09.045 75 percent of parcel shall be open space Does this conflict with 20.30.060: 30 percent or more – greenbelt, active recreation, environmentally sensitive lands
Chapter 20.09A Rural Residential/Resource—One Dwelling Unit per Five Acres (RRR 1/5)	One unit per 5 acres ¹	Yes – PRRD Wetlands not subtracted if it is a cluster development	Yes if wetlands are present - wetlands not subtracted if it is a cluster development Resource parcel may be converted after annexation to city	60 percent of proposed subdivision – resource parcel If annexed into adjacent city, limitations on the use of the resource parcel will be removed Chapter 20.32 for open space – no specific set-aside
Chapter 20.09B Rural—One Dwelling Unit per Twenty Acres (R 1/20)	One unit per 20 acres	Yes – PRRD	No	No resource parcel required; Chapter 20.32 for open space – no specific set-aside
Chapter 20.09C Rural—One Dwelling Unit per Ten Acres (R 1/10)	One unit per 10 acres	Yes – PRRD	No	No resource parcel required Chapter 20.32 for open space – no specific set-aside

Guiding Growth – Healthy Watersheds: Science to Local Policy

Zoning Code	Underlying Zoning District Density	Cluster Development Allowed	Density Bonus or Incentive to Cluster	Resource Parcel / Open Space
Chapter 20.09D Urban Reserve—One Dwelling Unit per Five Acres (UR 1/5)	One unit per 5 acres	Yes – PRRD	Resource parcel may be converted after annexation to city	No resource parcel required Chapter 20.32 for open space – no specific set-aside
Chapter 20.10A Residential LAMIRD—One Dwelling Unit per Two Acres (RL 1/2)	One unit per 2 acres	Yes – PRRD Minimum lot size: Cluster subdivision lot—one acre for single-family, two acres for duplexes	No	No resource parcel required Chapter 20.32 for open space – no specific set-aside
Chapter 20.11A Residential LAMIRD—One Dwelling Unit per Acre (RL 1/1)	One unit per acre	No (but cluster lot size mentioned in zoning) Minimum lot size: Cluster subdivision lot—one-half acre for single-family, one acre for duplexes	N/A	
Chapter 20.13A Residential LAMIRD — Two Dwelling Units per Acre (RL 2/1)	Two dwelling units per acre	No (but cluster lot size mentioned in zoning) Minimum lot size: Cluster subdivision lot—seven thousand two hundred square feet for single-family, fifteen thousand square feet for duplexes	N/A	
Chapter 20.15 Residential—Three To Six Dwelling Units per Acre (R 3—6/1) ²	Three to six units per acre	Yes – PRD Minimum lot size: Cluster subdivision lot—four thousand square feet	Yes – up to 20 percent if open space requirements are met	30 percent or more – greenbelt, active recreation, environmentally sensitive lands
Chapter 20.21A Residential—Four To Sixteen Dwelling Units per Acre (R 4—16/1) ²	Four to sixteen units per acre	Yes – PRD No minimum lot size for cluster	Yes – up to 20 percent if open space requirements are met	30 percent or more – greenbelt, active recreation, environmentally sensitive lands
Chapter 20.23 McAllister Geologically Sensitive Area District (MGSA)	One unit per 5 acres	Yes – PRD Minimum lot size: Cluster subdivision lot: twelve thousand five hundred square feet	No	30 percent or more – greenbelt, active recreation, environmentally sensitive lands

Notes:

Project size for PRD in the RR1/5 and MGSA zones and PRRDs in all zones is 20 to 100 acres

¹ Subtract critical areas (but not critical area buffers) for traditional development. No deductions for cluster development.

² Grand Mound Urban Growth Area

Appendix B.

Family Member Units in Rural Thurston County

Issue:

Several chapters of Title 20 of Thurston County’s code (Zoning) permit the following: In addition to the maximum number of dwelling units permitted on a lot, “one temporary mobile/manufactured home or modular home may be located upon a lot for the purposes of housing a person or persons who are family members to a person residing in a structure existing on the lot when application for family unit approval is requested.” Such Family Member Units (FMUs) must be removed: 1) when a family member no longer occupies the units; 2) or prior to sale of the property – unless the purchaser provides the County a letter stating that a family member will occupy the FMU.

Approximately 190 FMUs were built in the rural county between 2000 and 2011, according to a Thurston Regional Planning Council analysis.

Thurston County and Lewis County are the only two counties in Washington that allow FMUs; however, Lewis County will terminate its FMU code provisions as of July 1, 2015. Other counties allow Accessory Dwelling Units (ADUs) instead. The difference is that FMUs are detached structures, usually mobile homes, while ADUs are attached to the main residence or garage. This is important, as the Western Washington Growth Management Hearings Board (No. 03-2-0003c) held that detached units must be counted as dwelling units for the purpose of determining residential density.

Current rules in Thurston County allow FMUs to be permanently placed modular homes, thus making removal difficult when the family member moves out, according to Thurston County staff. The result is a permanent increase in rural density — density inconsistent with the Comprehensive Plan and Growth Management Act.

A secondary, but related issue, is that family member units are often placed on the property in a way that greatly increases the amount of impervious surfaces via driveways and the new residence — infrastructure that increases stormwater runoff. Even if the FMU were to be removed, the driveway would remain (See aerial photo examples of added FMUs and related impervious surface area, beginning on pg. 13). This is an important point, as the state Department of Ecology’s revised municipal stormwater permit directs Thurston County and other jurisdictions to integrate low-impact development (LID) practices into their codes and standards so as to reduce stormwater runoff into waterbodies.

Recommendation:

Eliminate all references to Family Member Units throughout the Thurston County Code and amend Chapter 20.34 (Accessory Uses and Structures) to allow accessory dwelling units in all rural residential areas, as well as the unincorporated urban growth areas. This measure (Option 1, below) would not only eliminate arcane FMU references from the code but mitigate the issue of de facto urban sprawl as a result of detached accessory housing and associated impervious surfaces. Option 2 (also below), would leave Thurston County as the only municipality in the state with “Family Member Unit” provisions still in

its code. Further, Option 2 would not mitigate the issue of impervious surfaces, which also has a major impact on basin water quality.


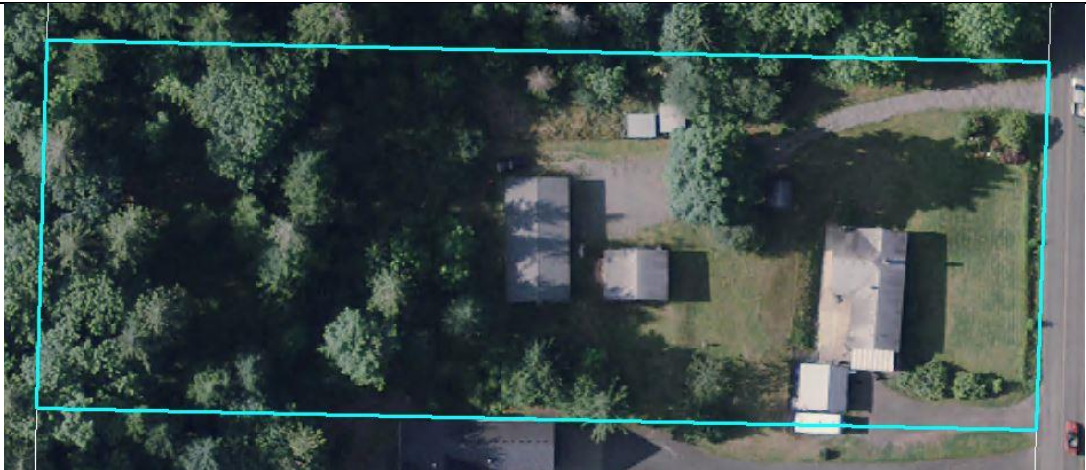
Analysis:

Family Member Units and Accessory Dwelling Units are allowed in various chapters of Title 20, Thurston County's zoning code.

Zoning District	Additional Units
Chapter 20.08A Long-Term Agriculture District (LTA)	FMUs and Farm Housing
Chapter 20.08C Nisqually Agricultural District (NA)	No
Chapter 20.08D Long-Term Forestry District (LTF)	FMUs
Chapter 20.08E Public Parks, Trails, And Preserves District (PP)	N/A
Chapter 20.08F Military Reservation District (MR)	N/A
Chapter 20.08G Agritourism Overlay District (AOD)	N/A
Chapter 20.09 Rural Residential—One Dwelling Unit per Five Acres (RR 1/5)	FMUs
Nisqually Sub-area	As above
Chapter 20.09A Rural Residential/Resource—One Dwelling Unit per Five Acres (RRR 1/5)	FMUs and Farm Housing
Chapter 20.09B Rural—One Dwelling Unit per Twenty Acres (R 1/20)	FMUs and Farm Housing
Chapter 20.09C Rural—One Dwelling Unit per Ten Acres (R 1/10)	FMUs and Farm Housing
Chapter 20.09D Urban Reserve—One Dwelling Unit per Five Acres (UR 1/5)	FMUs
Chapter 20.10A Residential LAMIRD—One Dwelling Unit per Two Acres (RL 1/2)	FMUs
Chapter 20.11A Residential LAMIRD—One Dwelling Unit per Acre (RL 1/1)	FMUs
Chapter 20.13A Residential LAMIRD —Two Dwelling Units per Acre (RL 2/1)	No
Chapter 20.15 Residential—Three To Six Dwelling Units per Acre (R 3—6/1)	ADUs
Chapter 20.21A Residential—Four To Sixteen Dwelling Units per Acre (R 4—16/1)	ADUs
Chapter 20.22 Neighborhood Convenience District (NC)	N/A
Chapter 20.23 McAllister Geologically Sensitive Area District (MGSA)	FMUs
Chapter 20.24 Rural Commercial Center District (RCC)	No
Chapter 20.25 Arterial Commercial District (AC)	No
Chapter 20.26 Highway Commercial District (HC)	N/A
Chapter 20.27 Planned Industrial Park District (PI)	N/A
Chapter 20.28 Light Industrial District (LI)	N/A
Chapter 20.29 Rural Resource Industrial District (RRI)	Caretaker unit



Examples of Additional Family Member Units and Impervious Surfaces

2000 Aerial Photograph	2012 Aerial Photograph
	
<p>Location: Black Lake Basin</p> <p>Change: The family member unit was added in 2002. Impervious area increased from 10% to 14.5% on this 3 acre property.</p>	

2000 Aerial Photograph	
2012 Aerial Photograph	
<p>Location: Black Lake Basin</p> <p>Change: The family member unit on this property was permitted in 2008. Impervious area increased from 7% to 13% on this 2 acre property.</p>	

2000 Aerial Photograph	2012 Aerial Photograph
	
<p data-bbox="203 1312 487 1339">Location: McLane Basin</p> <p data-bbox="203 1375 1445 1491">Change: The manufactured home on this property (partially covered by trees) was converted to a family member unit when the single family home was constructed in 2008. Impervious area increased from 3 percent to 17 percent on this 5 acre property.</p>	

2000 Aerial Photograph	
2012 Aerial Photograph	
<p>Location: Woodard Basin</p> <p>Change: The family member unit on this property was permitted in 2005. Impervious area increased from 9% to 14% on this 3 acre property.</p>	

2000 Aerial Photograph	
2012 Aerial Photograph	
<p>Location: Woodard Basin</p> <p>Change: The family member unit on this property was permitted in 2008. Impervious area increased from 3% to 20% on this 2.5 acre property.</p>	

Option 1: Eliminate all references to Family Member Units throughout the Thurston County Code and amend Chapter 20.34 (Accessory Uses and Structures) with language modeled after that in Chapter 17.102 of the Lewis County Code. In other TCC Title 20 chapters that currently allow FMUs, replace the FMU language with ADU language and cross-reference Chapter 20.34.

In Washington, only Thurston and Lewis counties use the term “Family Member Unit” in their code in this context. Currently, Thurston County allows FMUs only in residential zones within rural unincorporated areas (See Option 2 below); Accessory Dwelling Units (ADUs), rather, are allowed only within the Grand Mound (Chapter 20.15 and 20.21A), Lacey, Tumwater and Olympia unincorporated urban growth areas (Titles 21-23). Instead, Thurston County could allow attached ADUs in all rural residential areas, as well as the unincorporated urban growth areas (See suggested edits below).

For the time being, Lewis County Code allows ADUs as well as “Separate Residential Units” (also known as Family Member Units) in rural residential areas outside of Local Areas of More Intense Rural Development (LAMIRD). Separate Residential Units are allowed in RRD 1-10 and 1-20 (areas eligible for a

density bonus) and must be occupied by “family members.” ADUs, rather, are allowed where no subdivision of the land may occur; such units must be attached to or within the land’s primary dwelling unit [See Lewis County Code Chapters 17.102.040 and .050 (implementation) and 17.102.060 (enforcement)]. Lewis County will terminate the FMU provisions of the code as of July 1, 2015 (the FMU language was put in as a stopgap in 2002 to allow people caught in the middle of zoning to break up land, if needed, to continue farming practices), according to Lewis County Senior Planner Karen Witherspoon. The ADU provisions will remain in place.

Benton County has similar code language (below):

Benton County Code 11.52.082 *(Does not allow detached ADUs and sets size limit)*

ACCESSORY DWELLING UNITS--PURPOSE AND AUTHORIZATION. An accessory dwelling unit shall be allowed on any real property located within unincorporated Benton County that is zoned for single family residences, except for those properties with an Industrial or Commercial zoning designation, thereby meeting the requirements of the Washington State Housing Policy Act of 1993 to incorporate provisions for accessory apartments in the County's zoning ordinance (Title 11 BCC).

11.52.084 ACCESSORY DWELLING UNITS--CRITERIA.

Accessory Dwelling Units authorized herein shall meet the following minimum criteria:

- (a) Existing residence. The single family dwelling in which the accessory dwelling unit is to be located must meet Benton-Franklin District Health Department requirements for the additional unit.
- (b) The accessory dwelling unit must be located within or attached to the single family dwelling unit with a common wall. In no case shall an accessory dwelling be permitted in a detached structure such as a guest house or garage.
- (c) The appearance and character of the single family residence shall be maintained when viewed from the surrounding neighborhood. Whenever possible, any new entrance shall be placed at the side or rear of the building.
- (d) Only one accessory dwelling unit shall be approved for each primary single family dwelling. If the parcel has an approved Temporary Dwelling Permit as allowed in BCC 11.52.091, no accessory dwelling unit shall be allowed.
- (e) The occupant of the accessory dwelling unit must be related to the occupant or be providing or receiving continuous care and assistance necessitated by advanced age, illness, or other infirmity.
- (f) Rent or other remuneration will not be required as a condition for occupancy of the accessory dwelling unit.
- (g) The accessory dwelling unit shall not exceed a maximum of 800 square feet.

TCC Chapters 20.15 and 20.21A, which pertain to residential development amid the Grand Mound Urban Growth Area, currently permit ADUs and contain the following language:

Accessory uses. 

Accessory dwelling unit, in accordance with the provisions of Chapter 20.34.

In Title 20 chapters that currently allow FMUs (20.08A and 20.08D; 20.09; 20.09A-D; 20.10A; 20.11A; and, 20.23), the FMU language could be replaced with the ADU language above. An example of how such chapters could be amended is below:

20.09.010 Purpose.

The intent of this district is to assist in maintaining the commercial timber industry and to protect the public health in areas with severe soil limitation for septic system, severely limited water supply, aquifer recharge and floodplains, and the Nisqually subarea.

(Ord. 11398 § 3 (part), 1997; Ord. 11025 § 5, 1995; Ord. 6708 § 3 (part), 1980)

20.09.020 Primary uses.

Subject to the provisions of this title, the following uses are permitted in this district;

1. Agriculture, including forest practices;
2. Single-family and two-family residential (within urban growth management areas, limited to four residential dwelling units per lot; otherwise, limited to one primary residential structure per lot);

(Ord. 11804 § 47, 1998; Ord. 11398 § 3 (part), 1997; Ord. 11025 § 4, 1995; Ord. 10398 § 6, 1993; Ord. 8216 § 14, 1985; Ord. 6708 § 3 (part), 1980)

(Ord. No. 14773, § 7(Att. F), 7-24-2012)

20.09.025 Special uses.

See [Chapter 20.54](#) for special uses permitted in this district.

(Ord. 11398 § 3 (part), 1997; Ord. 8216 § 15, 1985)

20.09.030 Family member unit.

~~1. In addition to the maximum number of dwelling units permitted on a lot, one temporary mobile/manufactured home or modular home may be located upon a lot for the purposes of housing a person or persons who are family members to a person residing in a structure existing on the lot when application for family unit approval is requested. A person is a family member when related by blood, marriage or adoption.~~

~~2. Persons wishing to establish a family member unit shall furnish proof of family member status and shall receive written approval to establish such unit from the department before locating or constructing the unit.~~

~~3. Dwelling units which are located or constructed pursuant to this section shall be removed when the family member no longer occupies the family member unit.~~

~~4. Dwelling units which are pursuant to this section shall be removed prior to sale of the property, unless the purchaser provides a letter to the county stating the family member unit will be occupied by a family member.~~

~~5. A family member unit must have an approved sewage disposal system, adequate water source, and all other applicable permits.~~

~~(Ord. 11804 § 48, 1998; Ord. 11398 § 3 (part), 1997; Ord. 10595 § 12, 1994; Ord. 6708 § 3 (part), 1980)
(Ord. No. 14773, § 10(Att. I), 7-24-2012)~~

20.09.030 Accessory uses.

Accessory dwelling unit, in accordance with the provisions of Chapter 20.34.

20.09.040 Design standards.

The following standards are established as the minimum necessary to insure that the purpose of this rural residential, one unit per five acre district is achieved and maintained as new lots are created and new buildings are constructed:

1. Minimum Lot Size:
 - a. Conventional subdivision lot (net)—four acres for single-family, eight acres for duplexes;
 - b. Nonresidential use—five acres;
2. Maximum Building Height—thirty-five feet;
3. Minimum Yard Requirements:
 - a. Single-family and two-family residential:
 - i. Front yard—twenty feet from right-of-way easement or property line and thirty feet from right-of-way easement or property line on arterials, except ten feet from right-of-way of a flanking street;
 - ii. Side yard—six feet;
 - iii. Rear yard—ten feet;
 - b. All other structures: See [Section 20.07.030](#) (required minimum yards);
4. Maximum Coverage by Structures—sixty percent.

(Ord. 12761 § 10, 2002; Ord. 11398 § 3 (part), 1997; Ord. 10595 § 14, 1994; Ord. 6708 § 3 (part), 1980)

20.09.045 Subdivisions within the Nisqually subarea.

The subdivision of parcels twenty acres and larger which are located within the Nisqually subarea shall meet the following standards:

1. At least seventy-five percent of the parcel shall be open space;
2. The open space portion of the lot shall only be used for agriculture, forestry, or passive recreation with no more than twenty-five percent of this area used for stormwater facilities or sewage system drainfields;

3. Subdivisions created under these standards shall have a twenty percent density bonus but no fractional units may be created;
4. Lots may be as small as one-half acre provided that the sewage disposal and water supply systems are approved by the environmental health department;
5. Lots shall also have a minimum width to length ratio of not less than one unit per four units of length (1 to 4);
6. The minimum setback from the exterior boundary of the site shall be the same as the underlying zone; however, other setback requirements may be waived to provide design flexibility, provided individual buildings shall maintain a ten-foot separation; and
7. The design of the subdivision shall minimize its impacts upon critical areas and resource lands.

(Ord. 11398 § 3 (part), 1997: Ord. 10595 § 15, 1994: Ord. 10199 § 6, 1992)

20.09.050 Density.

1. The base density for this district is a maximum of one unit per five acres, or one unit per one-one hundred twenty-eighth of a section of land; and
2. The maximum number of dwelling units allowed shall be determined by:
 - a. Subtracting from the parcel area: documented high groundwater hazard areas, wetlands twenty-two thousand square feet or more and two thousand five hundred square feet or more if adjacent to a stream or within its one-hundred-year floodplain, marine bluff hazard areas to the top of the bluff and landslide hazard areas; one-hundred-year floodplains; and submerged lands as defined in the Shoreline Master Program for the Thurston Region, as amended;
 - b. Critical area buffers shall not be subtracted from the parcel for purposes of making the density calculation; and
 - c. The zoning density shall be applied to the remainder of the parcel.
 - d. For the purposes of calculating density, the documented area of a wetland shall not be subtracted from the parcel area if a property owner opts to develop a planned residential development as specified in [Chapter 20.30](#) TCC.

(Ord. No. 14773, § 7(Att. F), 7-24-2012)

20.09.070 Additional regulations.

Refer to the following chapters for provisions which may qualify or supplement the regulations presented above:

1. [Chapter 20.32](#), Open Space;
2. [Chapter 20.34](#), Accessory Uses and Structures;
3. [Chapter 20.40](#), Signs and Lighting;
4. [Chapter 20.44](#), Parking and Loading;
5. [Chapter 20.45](#), Landscaping and Screening.

(Ord. 11398 § 3 (part), 1997: Ord. 11025 § 6, 1995: Ord. 8216 § 18, 1985; Ord. 6708 § 3 (part), 1980)

Suggested edits to Chapter 20.34 of the Thurston County Code are below:

20.34.010 Authorization.

Accessory uses are permitted in any zoning district, ~~accept~~ **except** as prohibited or limited in this chapter.

20.34.020 Limitations on accessory uses.

1. Location of accessory uses. Accessory uses shall be on the same lot of record as the principal use or building, unless a provision of this title allows otherwise.
2. Antenna structures and satellite dishes shall not be located within twenty feet of any property line. This requirement does not apply to satellite dishes eighteen inches or less in diameter.
3. Buildings shall not be located in required front or side yards.
4. Corner lot structures and planting shall comply with Section 20.07.070 (Use limitations on corner lots).
5. Barbed wire fences are prohibited in the RL 2/1, R 3-6/1, and R 4-16/1 districts, except as accessory uses to agricultural operations of one acre or more. On industrial and commercial uses, the strands shall be restricted to the uppermost portion of the fence and shall not extend lower than a height of six feet from the nearest ground level.
6. **Accessory dwelling units may be permitted in the following zoning districts:**

Chapter 20.08A Long-Term Agriculture District (LTA)
Chapter 20.08D Long-Term Forestry District (LTF)
Chapter 20.09 Rural Residential—One Dwelling Unit per Five Acres (RR 1/5)
Chapter 20.09A Rural Residential/Resource—One Dwelling Unit per Five Acres (RRR 1/5)
Chapter 20.09B Rural—One Dwelling Unit per Twenty Acres (R 1/20)
Chapter 20.09C Rural—One Dwelling Unit per Ten Acres (R 1/10)
Chapter 20.09D Urban Reserve—One Dwelling Unit per Five Acres (UR 1/5)
Chapter 20.10A Residential LAMIRD—One Dwelling Unit per Two Acres (RL 1/2)
Chapter 20.11A Residential LAMIRD—One Dwelling Unit per Acre (RL 1/1)
Chapter 20.13A Residential LAMIRD —Two Dwelling Units per Acre (RL 2/1)
Chapter 20.15 Residential—Three To Six Dwelling Units per Acre (R 3—6/1)
Chapter 20.21A Residential—Four To Sixteen Dwelling Units per Acre (R 4—16/1)
Chapter 20.23 McAllister Geologically Sensitive Area District (MGSA)
Chapter 20.24 Rural Commercial Center District (RCC)
Chapter 20.25 Arterial Commercial District (AC)

~~Within the residential three—six units per acre and residential four—sixteen units per acre districts located within the Grand Mound urban growth area~~ accessory dwelling units are permitted as follows:

- a. There shall be no more than one accessory dwelling unit per lot in conjunction with a single-family structure.
- ~~b. An accessory dwelling unit may be attached to, created within, or detached from a new or existing primary single-family dwelling unit.~~
- b. An accessory dwelling unit must be attached to or created within a new or existing primary single-family structure or associated accessory building, and may not be a separate, stand-alone unit.¹**

¹ Lewis County amended its code with this language to clarify that ADUs cannot be detached, standalone units and thus not increase the density of structures on a parcel or property (See Western Washington Growth Management

- c. The accessory dwelling unit will require one parking space, which is in addition to any off-street spaces required for the primary single-family dwelling unit.
- d. The primary entrance to an accessory dwelling unit shall not be visible from the yard on the same side of the lot on which the primary entrance to the primary single-family dwelling unit is located.
- e. To ensure that the accessory dwelling unit is clearly secondary to the primary dwelling unit, the floor area for the accessory dwelling unit shall in no case exceed eight hundred square feet, nor be less than three hundred square feet, and the accessory dwelling unit shall contain no more than two bedrooms.
- f. No more than one family, as defined in Chapter 20.03, shall be allowed to occupy an accessory dwelling unit.
- g. An accessory dwelling unit, together with the primary single-family dwelling unit with which it is associated, shall conform to all other provisions of this chapter.
- h. All accessory dwelling units shall conform to the Uniform Building Code and all other applicable codes and ordinances.
- i. Prior to final approval of any structure for an accessory dwelling unit, the property owner shall file a covenant to run with the land that stipulates the accessory dwelling unit shall not be cause for subdivision unless such subdivision is in compliance with all subdivision, zoning and other development regulations in effect at the date of application for subdivision approval.²
- j. The restriction referenced above shall be recorded on the face of the plat of any lot created by the density bonus granted herein, including the date of the implementation and termination of the restriction.
- k. Property may be transferred to other qualifying family members without invoking the covenant.
- l. Any property transferred in violation of the covenant shall be liable for an assessment of a fee equal to 10 percent of the sale price or assessed value of the property, whichever is higher. The fee shall be assessed to the seller of the property.

Hearings Board, Yanich v. Lewis County, Case No. 02-2-007c. ... In a separate case, No. 03-2-0003c, the Board held that detached ADUs must be counted as dwelling units for the purpose of determining residential density.)

² This implementation and enforcement language below was adapted from the Lewis County Code (17.102)

Option 2: Amend Title 20 of the Thurston County Code by limiting the size and type of FMU allowed. This could be achieved by removing the reference to a modular home as an allowable FMU type. A modular home is not a mobile/manufactured home; it is simply a home that is built in pieces off site and then assembled on site. According to HUD:

“Manufactured (also known as mobile) homes are constructed according to a code administered by the U.S. Department of Housing and Urban Development (HUD Code). The HUD Code, unlike conventional building codes, requires manufactured homes to be constructed on a permanent chassis. Modular homes are constructed to the same state, local or regional building codes as site-built homes. Other types of systems-built homes include panelized wall systems, log homes, structural insulated panels, and insulating concrete forms.”

Family Member Units are permitted in the following sections of Title 20: 20.08A and 20.08D; 20.09; 20.09A-D; 20.10A; 20.11A; and, 20.23.

The suggested edits to 20.09 (below) could be made to all applicable sections of Title 20 so as to ensure consistency.

20.09.010 Purpose.

The intent of this district is to assist in maintaining the commercial timber industry and to protect the public health in areas with severe soil limitation for septic system, severely limited water supply, aquifer recharge and floodplains, and the Nisqually subarea.

(Ord. 11398 § 3 (part), 1997; Ord. 11025 § 5, 1995; Ord. 6708 § 3 (part), 1980)

20.09.020 Primary uses.

Subject to the provisions of this title, the following uses are permitted in this district;

1. Agriculture, including forest practices;
2. Single-family and two-family residential (within urban growth management areas, limited to four residential dwelling units per lot; otherwise, limited to one primary residential structure per lot);

(Ord. 11804 § 47, 1998; Ord. 11398 § 3 (part), 1997; Ord. 11025 § 4, 1995; Ord. 10398 § 6, 1993; Ord. 8216 § 14, 1985; Ord. 6708 § 3 (part), 1980)

(Ord. No. 14773, § 7(Att. F), 7-24-2012)

20.09.025 Special uses.

See [Chapter 20.54](#) for special uses permitted in this district.

(Ord. 11398 § 3 (part), 1997; Ord. 8216 § 15, 1985)

20.09.030 Family member unit.

1. In addition to the maximum number of dwelling units permitted on a lot, one temporary mobile/manufactured home ~~or modular home~~ may be located upon a lot for the purposes of housing a person or persons who are family members to a person residing in a structure existing on the lot when

application for family unit approval is requested. A person is a family member when related by blood, marriage or adoption.

2. Persons wishing to establish a family member unit shall furnish proof of family member status and shall receive written approval to establish such unit from the department before locating or constructing the unit.

3. Dwelling units which are located or constructed pursuant to this section shall be removed when the family member no longer occupies the family member unit.

4. Dwelling units which are pursuant to this section shall be removed prior to sale of the property, unless the purchaser provides a letter to the county stating the family member unit will be occupied by a family member.

5. A family member unit must have an approved sewage disposal system, adequate water source, and all other applicable permits.

6. To ensure that the family member unit is clearly secondary to the property's primary dwelling unit, the habitable floor area of the family member unit shall in no case exceed 800 square feet, nor be less than 300 square feet. Further, the family member unit shall contain no more than two bedrooms.

(Ord. 11804 § 48, 1998; Ord. 11398 § 3 (part), 1997; Ord. 10595 § 12, 1994; Ord. 6708 § 3 (part), 1980)

(Ord. No. 14773, § 10(Att. I), 7-24-2012)

20.09.040 Design standards.

The following standards are established as the minimum necessary to ~~insure~~ensure that the purpose of this rural residential, one unit per five acre district is achieved and maintained as new lots are created and new buildings are constructed:

1. Minimum Lot Size:

- a. Conventional subdivision lot (net)—four acres for single-family, eight acres for duplexes;
- b. Nonresidential use—five acres;

2. Maximum Building Height—thirty-five feet;

3. Minimum Yard Requirements:

a.

Single-family and two-family residential:

- i. Front yard—twenty feet from right-of-way easement or property line and thirty feet from right-of-way easement or property line on arterials, except ten feet from right-of-way of a flanking street;
- ii. Side yard—six feet;
- iii. Rear yard—ten feet;

b. All other structures: See [Section 20.07.030](#) (required minimum yards);

4. Maximum Coverage by Structures—sixty percent.

(Ord. 12761 § 10, 2002; Ord. 11398 § 3 (part), 1997; Ord. 10595 § 14, 1994; Ord. 6708 § 3 (part), 1980)

20.09.045 Subdivisions within the Nisqually subarea.

The subdivision of parcels twenty acres and larger which are located within the Nisqually subarea shall meet the following standards:

1. At least seventy-five percent of the parcel shall be open space;
2. The open space portion of the lot shall only be used for agriculture, forestry, or passive recreation with no more than twenty-five percent of this area used for stormwater facilities or sewage system drainfields;
3. Subdivisions created under these standards shall have a twenty percent density bonus but no fractional units may be created;
4. Lots may be as small as one-half acre provided that the sewage disposal and water supply systems are approved by the environmental health department;
5. Lots shall also have a minimum width to length ratio of not less than one unit per four units of length (1 to 4);
6. The minimum setback from the exterior boundary of the site shall be the same as the underlying zone; however, other setback requirements may be waived to provide design flexibility, provided individual buildings shall maintain a ten-foot separation; and
7. The design of the subdivision shall minimize its impacts upon critical areas and resource lands.

(Ord. 11398 § 3 (part), 1997: Ord. 10595 § 15, 1994: Ord. 10199 § 6, 1992)

20.09.050 Density.

1. The base density for this district is a maximum of one unit per five acres, or one unit per one-one hundred twenty-eighth of a section of land; and
2. The maximum number of dwelling units allowed shall be determined by:
 - a. Subtracting from the parcel area: documented high groundwater hazard areas, wetlands twenty-two thousand square feet or more and two thousand five hundred square feet or more if adjacent to a stream or within its one-hundred-year floodplain, marine bluff hazard areas to the top of the bluff and landslide hazard areas; one-hundred-year floodplains; and submerged lands as defined in the Shoreline Master Program for the Thurston Region, as amended;
 - b. Critical area buffers shall not be subtracted from the parcel for purposes of making the density calculation; and
 - c. The zoning density shall be applied to the remainder of the parcel.
 - d. For the purposes of calculating density, the documented area of a wetland shall not be subtracted from the parcel area if a property owner opts to develop a planned residential development as specified in [Chapter 20.30](#) TCC.

(Ord. No. 14773, § 7(Att. F), 7-24-2012)

20.09.070 Additional regulations.

Refer to the following chapters for provisions which may qualify or supplement the regulations presented above:

1. [Chapter 20.32](#), Open Space;

2. [Chapter 20.34](#), Accessory Uses and Structures;
3. [Chapter 20.40](#), Signs and Lighting;
4. [Chapter 20.44](#), Parking and Loading;
5. [Chapter 20.45](#), Landscaping and Screening.

Carol Tobin, a planning analyst with MRSC, said it shouldn't be problematic for Thurston County to remove the explicit reference to "modular home." Such an approach would be consistent with several other counties' codes, which omit references to modular homes. Instead, the codes allow structures generally referred to as "temporary dwellings." Examples below:

Clark County Code 40.260.210 Temporary Dwellings (*allows standalone temporary dwelling units, so long as they're small enough to be deemed "accessory"*)

B1c. The temporary dwelling shall be a temporary structure such as a mobile home designed, constructed and maintained in a manner which will facilitate its removal at such time as the justifying hardship or need no longer exists; provided, that the additional dwelling authorized by Section [40.260.210](#)(A)(4)(b) need not be a temporary structure if the declaration required by Section [40.260.210](#)(C)(1)(e) includes a covenant obligating the purchaser or successors to remove the existing dwelling upon the death or permanent change in residency of the seller retaining a life estate.

Grays Harbor County Code 17.24.030(F) (*allows standalone temporary dwelling units, so long as they're small enough to be deemed "accessory"*)

On any legal parcel which is less than ten acres, a second temporary dwelling unit may be authorized provided that the following conditions are met:

- (1) The accessory unit is for use by a member of the family of the occupants of the principal residence on the property. For the purposes of this section, "member of the family" means related by blood, marriage or law;
- (2) No division of the property is authorized;
- (3) The unit shall be removed or converted to a conforming use when the use authorized by the permit is discontinued;
- (4) The parcel shall comply with the minimum lot requirements of the health department for each unit;
- (5) The board of adjustment shall establish either a final expiration date or annual renewal by the administrator upon showing by the applicant that the approved use is continuing;

###

Appendix C.

Transfer of Development Rights and Purchase of Development Rights Programs

Issue:

Thurston County’s Transfer of Development Rights and Purchase of Development Rights programs are programmatic tools that may be used to protect environmentally sensitive, open space, forest, and farm lands. The two programs, however, are open only to owners of specific agricultural lands. Modifications to these programs’ *sending areas* will increase their usefulness to protect forest and farm lands and preserve open space in rural watersheds.

Recommendation:

1. Amend existing Transfer of Development Rights and Purchase of Development programs in Thurston County so a greater range of environmentally sensitive, open space, forest, and farm lands are eligible as sending areas.
2. Prioritize potential sending areas.
3. Consider new sending areas.

Background:

Transfer of Development Rights

Thurston County established a Transfer of Development Rights (TDR) program in 1995 so as to preserve farmland while allowing owners to realize the economic value of their property’s development potential. The program allows owners of property in a designated ***sending area*** to gain credit for unused development rights that can be sold and transferred to another property in designated ***receiving area***.

Sending Area

The current area for the TDR program is composed of parcels within the Long-Term Agriculture (LTA) Zoning District. Thurston County credits one transferable development right per five acres in the LTA zoning district — subtracting one development right for each residence or commercial structure on the parcel, unless the structure qualifies as farm housing or a Family Member Unit (FMU). Zoning density for the LTA zoning district is one unit per 40 acres (unless, of course, the residential units are farm housing or FMUs.)

Receiving Area

The cities of Olympia, Lacey, Tumwater, and Thurston County have identified areas within their zoning codes where TDRs may be used to achieve specific urban densities. These receiving areas exist both within city boundaries and unincorporated urban growth areas (UGAs).

Location	Receiving Area Zoning	What may a TDR be used for?	Code Reference
Grand Mound UGA	Residential 3-6	One additional unit of density above 5 dwelling units/acre	TCC 20.15
	Residential 4-16	One additional unit of density above 15 dwelling units/acre	TCC 20.21A
Olympia City & UGA	Residential 4-8	One additional unit of density above 7 dwelling units/acre; OR one less unit of density below 5 dwelling units/acre	OMC 18.04.080 TCC 23.04.080
Lacey City & UGA	Mixed Use Moderate Density Corridor (MMDC)	Density bonus above 12 residential units/acre (standard density is 8-12 du/acre)	LMC 16.22 TCC 21.22
	Mixed Use High Density Corridor (MHDC)	Density bonus above 20 residential units/acre (standard density is 12-20 du/acre)	LMC 16.22 TCC 21.23
	Moderate Density Residential Zone (MD)	Density bonus above 12 dwelling units/acre (standard density is 6-12 du/acre)	LMC 16.15 TCC 21.15
	High Density Residential Zone (HD)	Density bonus above 20 dwelling units/acre (standard density is 6-20 du/acre)	LMC 16.18 TCC 21.18
Tumwater City & UGA	Single Family Low Density 4-7	One additional unit of density above 6 dwelling units/acre	TMC 18.10.050 TCC 22.10.050
	Single Family Medium Density 6-9	One additional unit of density above 8 dwelling units/acre	TMC 18.12.050 TCC 22.12.050
	Multifamily Medium Density 9-15	One additional unit of density above 14 dwelling units/acre	TMC 18.14.050 TCC 22.14.050
	Multifamily High Density 14-29	Up to 4 additional units of density above 25 dwelling units/acre	TMC 18.16.050 TCC 22.14.050

Purchase of Development Rights Program

Thurston County established a Purchase of Development Rights (PDR) program to buy and retire development rights amid the Nisqually Agriculture District. Through this program in the 1990s, private land owners sold 168 development rights for \$2,241,122. In 2011, Thurston County amended the program to align it better with land-preservation funding sources, as well as to authorize Thurston County and qualified conservation organizations to purchase development rights to preserve farmland throughout the county. The program works in the following ways:

- The County or qualified conservation organizations will compensate agricultural land owners for agreeing to conserve their land.
- Generally, the property owner would retain ownership of the land and continue to reside on and farm the property.
- County Conservation Futures funds may be used as matching funds in partnership with non-profit land trusts so as to maximize and leverage public funds.

In essence, instead of transferring the development right to a receiving area (such as in a TDR program), the PDR program retires the development right after purchasing it through grant or conservation futures funds.

Sending Area:

The sending area for the PDR program is open to all lands that meet the definition of agricultural lands, as defined in the Open Space Tax Program — RCW 84.34.020.

Options for Modifying Receiving Areas for TDR Program:

Current Program

In the zoning districts where the TDR program is currently applied, only two transfers have occurred.

One was a Habitat for Humanity project off of Henderson Boulevard, just south of Yelm Highway. The TDR program enabled the project to provide one additional dwelling unit and exceed the 6 du/acre maximum for a project in the SFL 4-7 zone district.

In 2014, two development rights were transferred from farmland in the rural County to allow for additional density at the Woodard Lane Cohousing development in west Olympia, a 2.34 acre parcel zoned Residential 4-8.

Infill and Redevelopment

The TDR program has been successful in larger cities where there is a strong infill and redevelopment market, and the development community is willing to “pay extra” for increased density. This is unlikely to be the case in Thurston County’s urban areas. Recent market studies have shown that at current land values and rents, higher-density developments in our city centers and corridors are on the edge of financial feasibility. Cities are implementing such tools as multifamily tax exemptions, lowering parking standards, or funding infrastructure to tip the balance. This means that adding additional financial burdens to achieving higher densities, such as buying development rights from a TDR bank, will likely result in financially infeasible projects.

Options for Receiving Areas for TDR Program

Option A - Keep the receiving areas as they are today

Option B - Increase receiving eligibility to add Accessory Dwelling Units (ADUs) in the rural County

Option C - Increase receiving eligibility to add density bonuses for cluster development in the rural County

Option D - Increase receiving eligibility to allow for impervious surfaces transfer

Option A – Keep the receiving areas as they are today

There have been two development rights purchased for transfer to urban projects. This lack of participation in the program could be due to the lack of market in receiving areas, or lack of outreach about the program. The existing receiving areas of the program could be a barrier to successful program implementation.

Option B - Increase receiving eligibility to add Accessory Dwelling Units (ADUs) in the rural county

Thurston County currently allows for Family Member Units in the rural county. Essentially, one additional residential unit may be built on a rural lot for the purpose of housing people related to those residing in the structure existing on the lot when the additional unit is requested. Between 2000 and 2011, about 190 Family Member Units were built in rural Thurston County (TRPC data program).

Family Member Units are meant to be temporary. They are often permanently placed modular homes, however, making removal difficult when the family member moves out. One option is to eliminate FMUs and allow for Accessory Dwelling Units (ADUs) in the rural county instead. ADUs are attached to the main structure and are typically restricted in size. While permanent, an ADU has less of an environmental footprint than an additional detached dwelling unit.

If the County were to proceed with that change, it could require that a development right be purchased as a requirement of building an Accessory Dwelling Unit in the rural county. ADUs are not considered to add density (per the Western Washington Growth Management Hearings Board); therefore, transferring development rights from one traditional housing unit to an ADU would result in a decrease in rural density.

Option C - Increase receiving eligibility to add density bonuses for cluster development in the rural county

Cluster developments are allowed in several zoning districts in the rural county as Planned Residential Developments (PRDs) and Planned Rural Residential Developments (PRRDs). There are currently only two types of density bonuses allowed:

- Nisqually Sub-Area – 20 percent density bonus

- RR1/5 and RRR1/5 – density is calculated on total acreage for cluster developments, rather than total acreage minus critical areas (not including critical area buffers). This allows for a density bonus on property with critical areas.

This option would allow for a third type of density bonus for cluster developments through the use of the PDR program.

Option D - Increase receiving eligibility to allow for impervious surfaces transfer

This option allows for increases in impervious surfaces in rural zoning districts (where limits have been set) through the use of a development right transfer. It would require a conversion of one development right to a set square footage of impervious area.

Options for Sending Areas for Both Programs:

Option A - Keep the sending areas of the programs as they are today

Option B - Expand the eligible sending areas for both programs to a broader range of criteria

Option C - Expand the eligibility of the sending areas of the TDR program to the entire Rural County

Option A - Keep the sending areas of the programs as they are today

There is one land owner who has gone through the program to certify her development rights with Thurston County for the TDR program. This lack of participation in the program could be due to the limited area of eligible sending areas, lack of market in receiving areas, or lack of outreach about the program itself to eligible land owners. Keeping only the existing sending areas of the programs (especially the TDR) could be a barrier to successful program implementation.

Option B - Expand the eligible sending areas for both programs to a broader range of criteria

For the goal of watershed protection, expand the criteria to include:

- Land defined as “Open Space land” pursuant to RCW 84.34.020 and is used for agricultural or forestry operations;
- Lands defined as “Farm and agricultural land” pursuant to RCW 84.34.020;
- Lands defined as “Timber land” pursuant to RCW 84.34.020.
- Areas rezoned to 1/10 or 1/20 or lower densities as part of basin planning efforts (development credits could be calculated at 1/5 units per acre as per the Nisqually Agriculture zoning district.
- Other areas identified as priority preservation areas identified in basin planning efforts.

Additional Criteria

Thurston County may consider adding other environmentally sensitive lands to the PDR/TDR sending area criteria. For instance, Pierce County includes a variety of other lands, such as:

- A site containing habitat for a federally listed endangered or threatened species;
- A site identified in the Pierce County Comprehensive Plan, including community plans or the Pierce County Park, Recreation, and Open Space Plan, as a regional trail or associated public purpose.

A prioritization of lands eligible for the program will likely have to occur, as changing the criteria will open up a large amount of area for program eligibility. In the prioritization process, the goals of watershed protection would need to be balanced with habitat preservation and other goals.

Why include lands from the Open Space Tax Program in the TDR/PDR Program if they are already eligible for tax breaks?

The Open Space Tax Program works to protect forest and farm lands by allowing those lands to be taxed at their current use rather than their “highest and best use,” as would be required otherwise under state law. The program provides a voluntary incentive for property owners to “. . . *maintain, preserve, conserve, and otherwise continue in existence adequate open space lands for the production of food, fiber, and forest crops, and to assure the use and enjoyment of natural resources and scenic beauty for the economic and social well-being of the state and its citizens.*” Market value for land used for timber, agriculture, or open space is often lower than the “higher” use of residences or businesses.

The Open Space Tax Program does not provide permanent protection from open space lands converting to other uses. Land can be withdrawn from the program at any time. However, the property owner must pay back taxes — and in some cases, penalties — unless he or she had the land in the program for eight years and gives two years notice of intent to withdraw from the program.

In 2000, there were about 177,400 acres of land enrolled in the various open space tax programs. By 2015, 8.5 percent — or more than 15,100 acres — was taken out of the program; 11,800 acres of land was added to the program, resulting in a net loss of 1.9 percent. Not all of the land removed from the program was converted to residential or commercial uses.

Type of Open Space Tax Program	2000	2000-2015					
	Acres	Acres removed	% removed	Acres added	% added	Net Rem./Added	Net % Rem./Added
Current Use Open Space	3,922	-179	-4.6%	1,891	48.2%	1,712	43.6%
Current Use Agriculture	38,274	-6,144	-16.1%	2,686	7.0%	-3,458	-9.0%
Current Use Timber or Designated Forest	135,207	-8,816	-6.5%	7,217	5.3%	-1,600	-1.2%
Overall	177,403	-15,139	-8.5%	11,794	6.6%	-3,346	-1.9%

Source: Thurston County Assessor’s database; Thurston Regional Planning Council analysis.

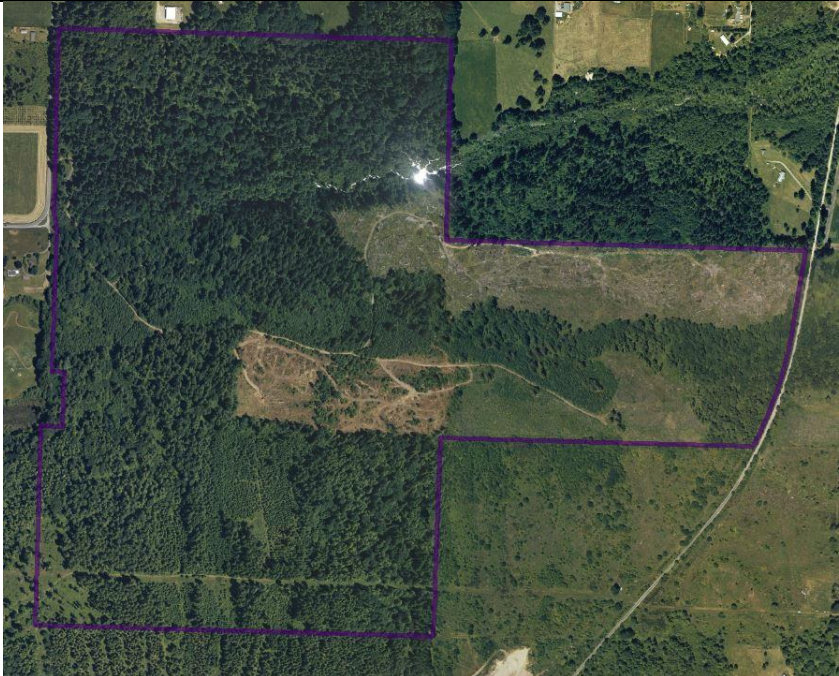
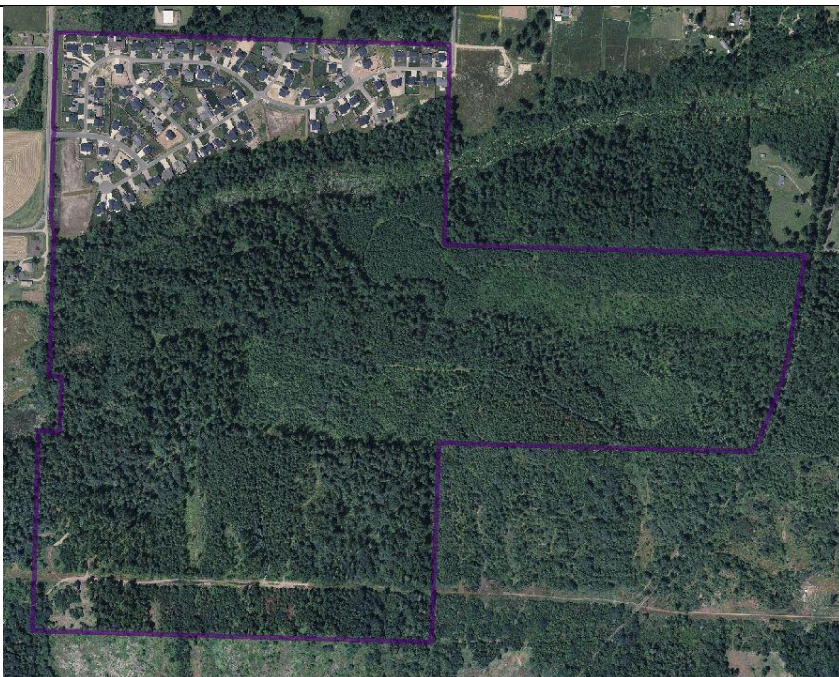
While the Open Space Tax Program does provide an incentive to keep lands in agriculture or forestry uses, it does not provide permanent protection in the way a Transfer of Development Rights or Purchase of Development Rights program would.

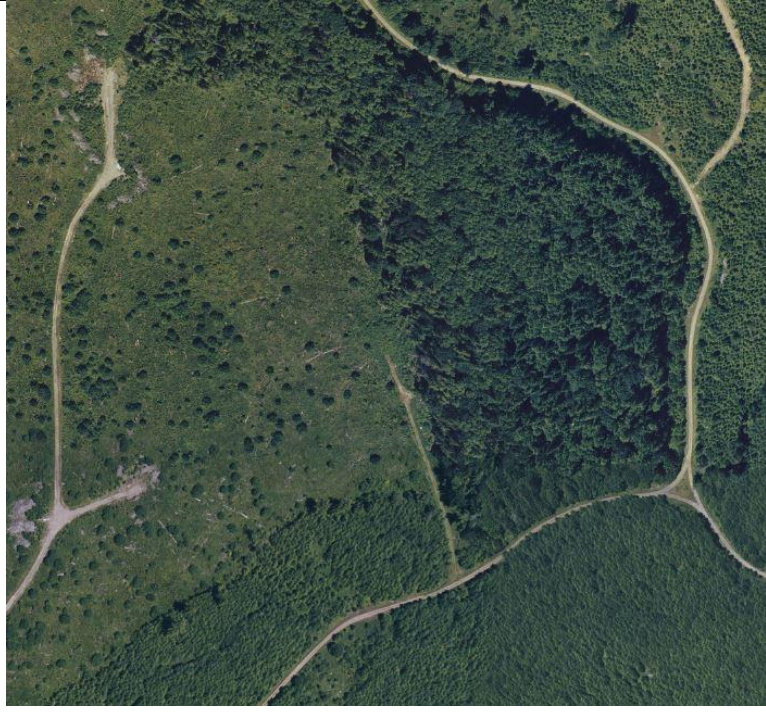

Examples of properties removed from the Open Space Tax Program

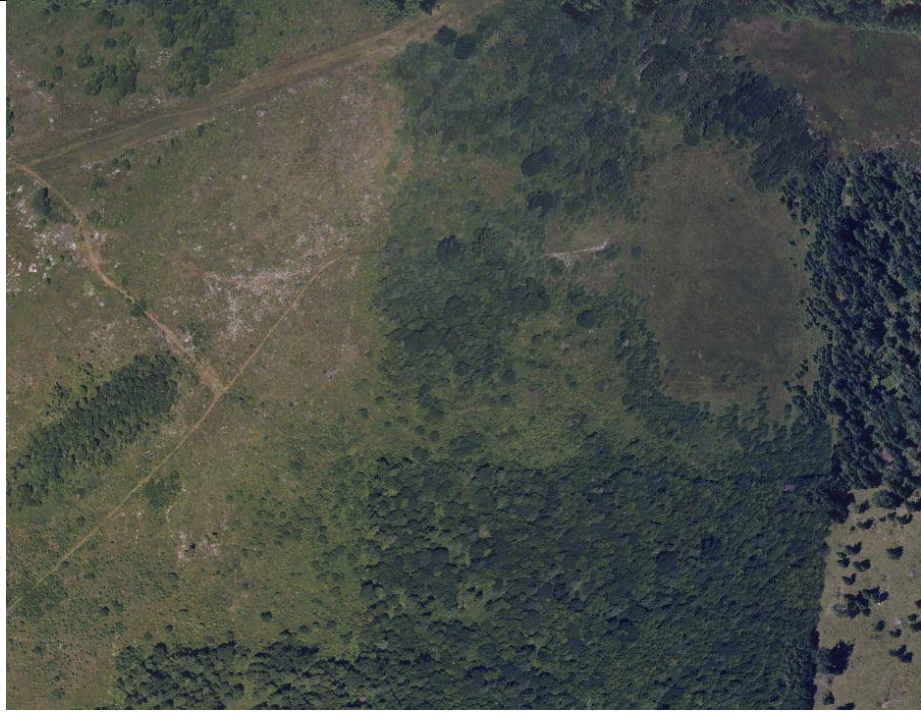
2000 Aerial Photos	 An aerial photograph from 2000 showing a large, rectangular, light-brown agricultural field in the upper left. To its right is a dense, dark green forest. Further right, a road and some small buildings are visible. The overall landscape is rural and undeveloped.
2012 Aerial Photos	 An aerial photograph from 2012 of the same area. The large agricultural field has been replaced by a large, irregularly shaped, light-brown area, likely a cleared field or a new development. The forest remains, but there is more visible clearing and some new structures or roads in the upper right. The landscape appears more developed than in 2000.
<p>Location: McLane Basin</p> <p>Change: The 22-acre farm at the top and left was enrolled in the open space agriculture program in 2000 but not enrolled by 2015. It did not convert to residential uses. The zoning is RRR 1/5.</p>	

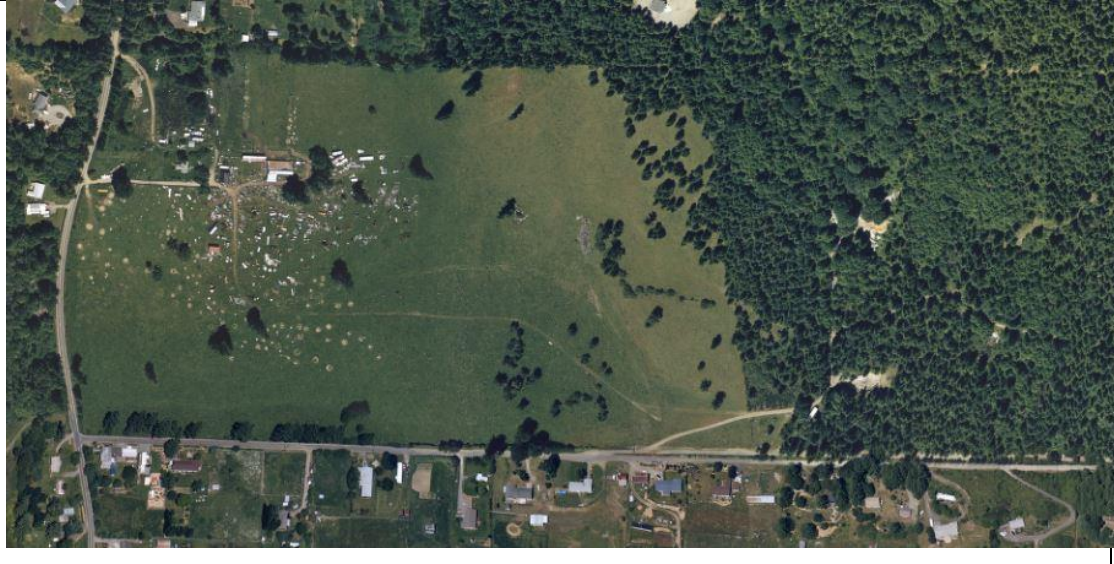

2000 Aerial Photos	2012 Aerial Photos
 An aerial photograph from 2000 showing a rural landscape. A large, dark, irregularly shaped pond is in the upper left. To its right is a cluster of farm buildings, including a large white barn and several smaller houses. The surrounding area is mostly green fields with some dirt roads and patches of trees.	 An aerial photograph from 2012 of the same area. The pond remains in the upper left. The farm buildings are still present but the land around them has been subdivided into smaller, more rectangular lots. There is more developed land, including what appears to be a parking lot or paved area near the buildings, and more trees planted in rows, suggesting landscaping or reforestation efforts.
<p>Location: Woodard Basin</p> <p>Change: The farm (top right) was enrolled in the Open Space Tax Program in 2000. By 2012, about half of the farm had been divided into five-acre lots that were developed subsequently. The zoning is RRR 1/5.</p>	

2000 Aerial Photos	 An aerial photograph from 2000 showing a large, irregularly shaped area outlined in purple. The area is predominantly forested with dense green trees. There are some cleared patches and a few small buildings visible along the edges of the purple boundary.
2012 Aerial Photos	 An aerial photograph from 2012 showing the same area outlined in purple. The forest cover has been significantly reduced, particularly in the central and lower-left portions, where a large residential subdivision with many houses and roads has been developed. The purple boundary still encompasses the original area.
<p>Location: Spurgeon Creek Basin</p> <p>Change: The property outlined in purple was enrolled in the Open Space Tax Program in 2000. In 2006, the property was platted into the Fox Hill cluster subdivision. The resource parcels of the cluster subdivision left a large tract of forest cover that remained in the Open Space Tax Program. The zoning is MGSA.</p>	

<p>2000 Aerial Photos</p>	 An aerial photograph from 2000 showing a large, irregularly shaped parcel of land outlined in purple. The parcel is predominantly covered in dense, dark green forest. To the left of the parcel, there is a baseball field and some residential areas. To the right, there are more open fields and some buildings. The parcel is situated in a valley with a creek or stream visible on the right side.
<p>2012 Aerial Photos</p>	 An aerial photograph from 2012 showing the same parcel outlined in purple. The forest cover remains dense, but there is a noticeable change in the surrounding landscape. A large residential subdivision with many houses and roads is now visible to the left of the parcel. The parcel itself appears to be more isolated, with more forest and some cleared areas within its boundaries.
<p>Location: Spurgeon Creek Basin</p> <p>Change: The property outlined in purple was enrolled in the Open Space Tax Program as Forest in 2000. In 2007, the property was platted into the Riverwood cluster subdivision. The resource parcel of the cluster subdivision left a large tract of forest cover that remained in the Open Space Tax Program. The zoning is RRR1/5.</p>	

2000 Aerial Photos		
2012 Aerial Photos		
<p>Location: Deschutes Mainstem (middle basin)</p> <p>Change: The property in the middle of the photos was enrolled in the Open Space Tax Program as Forest in 2000. By 2012, the property had been removed and split into five-acre residential lots, most of which have been developed. The zoning is RRR1/5.</p>		

2000 Aerial Photos		
2012 Aerial Photos		
<p>Location: Deschutes Mainstem (middle basin)</p> <p>Change: The property in the middle of the photos was enrolled in the Open Space Tax Program as Forest in 2000. By 2012, the property had been removed and split into five-acre residential lots, most of which have been developed. The zoning is RRR1/5.</p>		

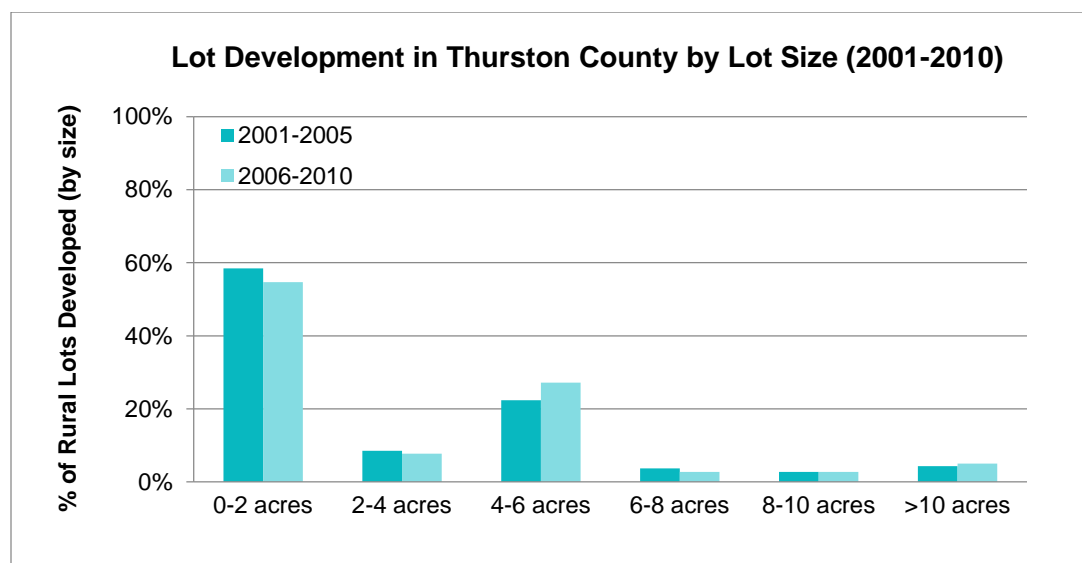
2000 Aerial Photos	
2012 Aerial Photos	
<p>Location: Spurgeon Basin</p> <p>Change: The property in the middle of the photos was enrolled in the Open Space Tax Program as Agriculture in 2000. By 2012, the property had been removed and split into five-acre residential lots, most of which have been developed. The zoning is MGSA.</p>	

Option C - Expand the eligibility of the sending areas of the TDR program to the entire Rural County

This option suggests expanding the sending area eligibility of the TDR program to all areas in the rural county. This would help with the issue of the large inventory of undeveloped lots in the County that are much smaller than would currently be allowed under current zoning. These lots are still developable under the reasonable use exemption as long as development can meet department of health requirement for sewer and well placement. Over 3,800 lots smaller than 4 acres were developed in rural Thurston County between 2001 and 2010. The average lot size was 1.26 acres. There are a further 2,600 developable lots, a seven year inventory if past development trends hold.

This is not an option for the PDR program, as the funding for the PDR program comes from Thurston County's conservation futures program and as such is targeted towards working farm lands and environmentally sensitive lands.

A prioritization of lands eligible for the program will likely have to occur, as changing the criteria will open up a large amount of area for program eligibility. In the prioritization process, the goals of watershed protection would need to be balanced with habitat preservation and other goals.



SINGLE-FAMILY RESIDENTIAL LOT DEVELOPMENT AND FUTURE SUPPLY IN THURSTON COUNTY BY LOT SIZE

Lot Size	Lots Developed (2001-2010)	Inventory of Vacant Lots ¹	Estimated Supply
0-4 acres	3,865	2,652	7 years
4-8 acres	1,624	1,898	12 years

Note:¹ Inventory of lots for single units.

Source: Thurston Regional Planning Council Buildable Lands Program.

Appendix D.

Impervious Surface Limits

Issue:

Thurston County's zoning code has an inconsistent approach to addressing impervious surfaces. Where limits have been set they are typically located within sensitive zoning districts, such as the R 1/10, R 1/20, sensitive basins such as McAllister Geologically Sensitive Area, and Green Cove Creek Basin, or on soil types with low infiltration rates. In other rural zoning districts there are sometimes building coverage limits and/or impervious surface limits that range as high as 60 percent in rural areas, or no mention of limits at all. Sixty percent is much higher than the actual impervious area on an average developed rural residential lot. Indeed, if all new residential development occurred with such a large amount of impervious area, it would likely lead to degradation of stream health and water quality.

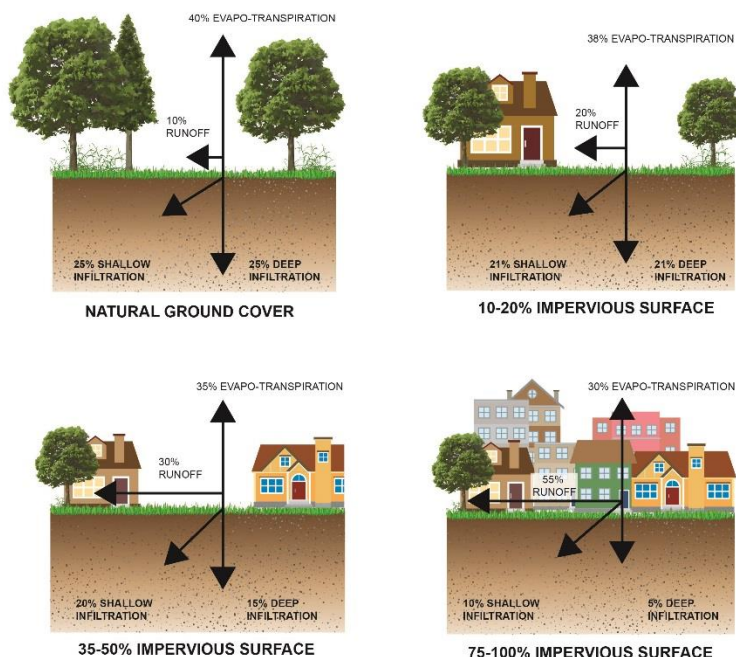
Recommendation:

1. Amend zoning code to place appropriate and consistently worded impervious surface coverage limits in a new chapter of zoning code, and reference the new chapter in each zoning district. The limits should be varied based on factors such as: 1) environmental sensitivity (by basin or soil group); and, 2) zoning density and lot size, including cluster versus traditional development, while allowing for a full range of rural development without adversely impacting water quality.
2. Use the low-impact development code-review process to recommend specific impervious surface thresholds.

Background:

Impervious surfaces, by definition, are materials that prevent the infiltration of water into the soil. The most common impervious surfaces in the built environment are roads, rooftops, sidewalks, and patios. While these structures are almost 100 percent impervious, other features such as gravel roads, compacted soils, and even lawns are impervious to varying degrees, as they allow for less infiltration than forests and other natural ground. As development increases, so does the amount of impervious surface, which leads to changes in the way water is transported and the hydrology of a drainage basin.



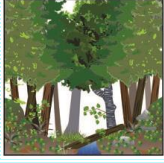
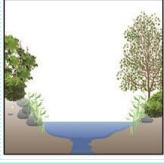
Stormwater runoff resulting from increased impervious surfaces affects both the quality and quantity of water entering natural water bodies in many ways. Stormwater runoff can lead to severe environmental impacts such as flooding, habitat loss, erosion, channel widening, and streambed alteration. Along with increased runoff comes decreased infiltration, which reduces groundwater supplies and may lead to a lowering of the water table. Ground water provides a consistent water supply to streams, wetlands, and lakes, and decreases in ground water supply may cause a stream or wetland to dry out during months when precipitation is low.



WATER CYCLE CHANGES ASSOCIATED WITH URBANIZATION.

As a general rule of thumb, when impervious surfaces exceed 10 percent of a basin (the entire area that drains into a stream) adverse environmental impacts can be measured in the stream — although impacts can occur in rural basins at impervious surface thresholds as low as 2 percent. Stream basins with above 25 percent impervious area generally have degraded water quality.

Basin Conditions

Intact 	<i>Intact basins have little to no impervious surfaces (<2% basin-wide), a nearly complete forest canopy (>80% basin-wide), and vegetated riparian corridors (>90%). Water bodies are in excellent condition, with no water quality violations and a high B-IBI score (>41).</i>	Impacted 	<i>Impacted basins are moderately urbanized (10-25% total impervious area), with some remaining forest cover (45-65%). Riparian corridors are cleared in many places (only 60-75% vegetated) and water quality is fair, with some impairments and lower B-IBI scores (28-35).</i>
Sensitive 	<i>Sensitive basins have minimal impervious area (2-10% basin-wide), considerable forest cover (65-80% basin-wide), and riparian corridors with few breaks in protective buffers (75-90% vegetated). Water bodies are in good condition, meeting most water quality standards, and have a high B-IBI score (36-41).</i>	Degraded 	<i>Degraded basins are urbanized (25-40% total impervious area) with limited remaining forest canopy (30-45%) or vegetated riparian areas (30-60%). Water quality is poor, with multiple impairments and very low B-IBI scores (28-35).</i>

Thurston County Zoning Code and Existing Impervious Limits

Impervious surface and lot coverage limits exist in various chapters of Thurston County’s zoning code, as shown in the table below. Where limits have been set, they are typically located within sensitive zoning districts such as the R 1/10, R 1/20, McAllister Geologically Sensitive Area, Green Cove Creek Basin, or on soil types with low infiltration rates. In other rural zoning districts there are sometimes building coverage limits and/or impervious surface limits that range as high as 60 percent in rural areas, or no mention of limits at all. The table below shows the range of impervious surface limits currently in Thurston County’s zoning (Chapter 20) code.

Zoning Code	Density	Impervious Surface Limit
Chapter 20.08A Long-Term Agriculture District (LTA)	One unit per 20 acres	None
Chapter 20.08C Nisqually Agricultural District (NA)	One unit per 40 acres	Maximum lot coverage: five percent Cluster: ten percent
Chapter 20.08D Long-Term Forestry District (LTF)	One unit per 80 acres unless lots are smaller than 640 acres then 1 unit per 20 acres	None
Chapter 20.08E Public Parks, Trails, And Preserves District (PP)	N/A	None
Chapter 20.08F Military Reservation District (MR)	N/A	None
Chapter 20.08G Agritourism Overlay District (AOD)	N/A	Same as underlying zoning district New buildings can be up to 20,000 sq ft
Chapter 20.09 Rural Residential—One Dwelling Unit per Five Acres (RR 1/5)	One unit per 5 acres ¹	Maximum Coverage by Structures—sixty percent.
Nisqually Sub-area	Same as above but with 20% density bonus for cluster development	As above
Chapter 20.09A Rural Residential/Resource—One Dwelling Unit per Five Acres (RRR 1/5)	One unit per 5 acres ¹	Maximum Building Coverage for non-special uses: 6,000 sf for parcels 5-10 acres in size; 20,000 sf for parcels over 10 acres Maximum impervious surface coverage for subdivisions, large lot subdivisions, short plats and new construction on lots: 5 acres or more on soils C & D: 10 percent less than 5 acres on soils C & D: 45 percent All other 60 percent Green Cove Creek Drainage Basin Lots up to but not including .23 acres (ten thousand nineteen square feet)—forty five percent Lots .23 acres to one acre—twenty-five percent Lots 1.01 acres or more—six percent

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Zoning Code	Density	Impervious Surface Limit
Chapter 20.09B Rural—One Dwelling Unit per Twenty Acres (R 1/20)	One unit per 20 acres	Maximum Building Coverage for non-special uses: 6,000 sf for parcels 5-10 acres in size; 20,000 sf for parcels over 10 acres Maximum impervious surface coverage for subdivisions, large lot subdivisions, short plats and new construction on lots: 5 acres or more predominately on soils C & D: 10 percent less than 5 acres predominately on soils C & D: 45 percent All other 60 percent
Chapter 20.09C Rural—One Dwelling Unit per Ten Acres (R 1/10)	One unit per 10 acres	Same as above
Chapter 20.09D Urban Reserve—One Dwelling Unit per Five Acres (UR 1/5)	One unit per 5 acres	Same as above
Chapter 20.10A Residential LAMIRD—One Dwelling Unit per Two Acres (RL 1/2)	One unit per 2 acres	Maximum impervious surface coverage 60 percent Green Cove Creek Drainage Basin Lots up to ten thousand square feet—forty-five percent Lots ten thousand one square feet to one acre—twenty-five percent Lots 1.01 acres or more—six percent
Chapter 20.11A Residential LAMIRD—One Dwelling Unit per Acre (RL 1/1)	One unit per acre	Same as above
Chapter 20.13A Residential LAMIRD —Two Dwelling Units per Acre (RL 2/1)	Two dwelling units per acre	Maximum coverage by structures—sixty percent
Chapter 20.15 Residential—Three To Six Dwelling Units per Acre (R 3—6/1) ²	Three to six units per acre	Maximum coverage by structures—sixty percent
Chapter 20.21A Residential—Four To Sixteen Dwelling Units per Acre (R 4—16/1) ²	Four to sixteen units per acre	Maximum coverage by structures—sixty percent
Chapter 20.22 Neighborhood Convenience District (NC)	N/A	Maximum coverage by impervious surfaces—eighty-five percent
Chapter 20.23 McAllister Geologically Sensitive Area District (MGSA)	One unit per 5 acres	Maximum Lot Coverage by Impervious Surfaces Five acres or larger: five percent For those uses allowed with a special use permit, the approval authority may grant additional lot coverage by impervious surfaces, of up to a maximum of ten percent Less than 5 acres: 60 percent or 10,000 sf – whichever is less
Chapter 20.24 Rural Commercial Center District (RCC)	Residential density must comply with RL 1/1 zone	Maximum coverage by impervious surfaces: seventy-five percent
Chapter 20.25 Arterial Commercial District (AC) ²	Residential density must comply with RL 4-16/1 zone	Maximum coverage by structures—sixty percent
Chapter 20.26 Highway Commercial District (HC)	N/A	Maximum coverage by structures—sixty percent
Chapter 20.27 Planned Industrial Park District (PI) ²	N/A	The total lot coverage of all structures and buildings shall not exceed sixty percent of such lot.
Chapter 20.28 Light Industrial District (LI) ²	N/A	The total lot coverage of all structures and buildings shall not exceed sixty percent of such lot.
Chapter 20.29 Rural Resource Industrial District (RRI)	N/A	Maximum lot coverage by impervious surfaces: sixty percent

¹ Subtract critical areas (but not critical area buffers) for traditional development. No deductions for cluster development.

² Grand Mound Urban Growth Area

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SUMMARY OF IMPERVIOUS SURFACE THRESHOLDS BY VARIOUS ZONING DISTRICTS

Lot Size		5%	6%	10%	25%	45%	60%	75%	85%	Other
Acres	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.
0.14	6,000	300	360	600	1,500	2,700	3,600	4,500	5,100	
0.23	10,000	500	600	1,000	2,500	4,500	6,000	7,500	8,500	
0.23	10,001	500	600	1,000	2,500	4,500	6,001	7,501	8,501	
0.38	16,667	833	1,000	1,667	4,167	7,500	10,000	12,500	14,167	
0.38	16,668	833	1,000	1,667	4,167	7,501	10,001	12,501	14,168	10,000
1.00	43,560	2,178	2,614	4,356	10,890	19,602	26,136	32,670	37,026	10,000
1.01	43,996	2,200	2,640	4,400	10,999	19,798	26,397	32,997	37,396	10,000
1.50	65,340	3,267	3,920	6,534	16,335	29,403	39,204	49,005	55,539	10,000
2.00	87,120	4,356	5,227	8,712	21,780	39,204	52,272	65,340	74,052	10,000
2.50	108,900	5,445	6,534	10,890	27,225	49,005	65,340	81,675	92,565	10,000
3.00	130,680	6,534	7,841	13,068	32,670	58,806	78,408	98,010	111,078	10,000
3.50	152,460	7,623	9,148	15,246	38,115	68,607	91,476	114,345	129,591	10,000
4.00	174,240	8,712	10,454	17,424	43,560	78,408	104,544	130,680	148,104	10,000
4.50	196,020	9,801	11,761	19,602	49,005	88,209	117,612	147,015	166,617	10,000
4.99	217,364	10,868	13,042	21,736	54,341	97,814	130,419	163,023	184,760	10,000
5.00	217,800	10,890	13,068	21,780	54,450	98,010	130,680	163,350	185,130	
5.50	239,580	11,979	14,375	23,958	59,895	107,811	143,748	179,685	203,643	
6.00	261,360	13,068	15,682	26,136	65,340	117,612	156,816	196,020	222,156	
6.50	283,140	14,157	16,988	28,314	70,785	127,413	169,884	212,355	240,669	
7.00	304,920	15,246	18,295	30,492	76,230	137,214	182,952	228,690	259,182	
7.50	326,700	16,335	19,602	32,670	81,675	147,015	196,020	245,025	277,695	
8.00	348,480	17,424	20,909	34,848	87,120	156,816	209,088	261,360	296,208	
8.50	370,260	18,513	22,216	37,026	92,565	166,617	222,156	277,695	314,721	
9.00	392,040	19,602	23,522	39,204	98,010	176,418	235,224	294,030	333,234	
9.50	413,820	20,691	24,829	41,382	103,455	186,219	248,292	310,365	351,747	
10.00	435,600	21,780	26,136	43,560	108,900	196,020	261,360	326,700	370,260	
Large Parcels		traditional		cluster						

	Green Cove Creek
	MGSA
	RRR1/5; R1/10; R 1/20 & UR 1/5 Soil types C & D
	RRR1/5; R1/10; R 1/20 & UR 1/5 Soil types A & B
	RR1/5*; RL 1/1; RL 2/1*; RL3-6/1*; RL 4-16/1*; AC*; HC*; PI*; LI*; RRI
	RCC
	NC
	NA
None	LTA; LTF; PP; MR

* lot coverage of structures

Actual Impervious Surface Coverage

Thurston Regional Planning Council staff digitized the impervious area for 92 properties that contained a single residential dwelling unit built after 1995 and was considered fully developed based on zoning density. Using this sample data set, the following relationship of rural lot sizes to impervious area were developed:

<u>Lot Size</u>		Typical Zoning Density	Average Percent Impervious	Average Square Feet Impervious	Number of Parcels in sample
Acres	Square Feet				
0.07 to 0.2	3,000-8,700	4 - 16 units per acre	52%	3,000	9
0.2 to 0.9	8,700-39,200	3 - 6 units per acre 2 units per acre	27%	3,900	10
0.9 to 1.8	39,200-78,400	One unit per acre	15%	8,600	16
1.8 to 4.6	78,400-200,400	One unit per 2 acres	9%	8,500	11
4.6 to 9.5	200,400-413,820	One unit per 5 acres	5%	13,000	24
9.5 to 19.5	413,820-849,400	One unit per 10 acres	3%	18,300	7
19.5 to 40	849,400-1,742,400	One unit per 20 acres	3%	37,200	6
40+ ac	1,742,400 plus	One unit per 40 acres	1%	36,100	9

The table above shows average percent impervious area. The range is quite high depending on how long driveways are and whether the garage is attached or detached. Below are some examples of specific properties from the sample set.

Examples were divided into three groups:

- Smaller rural lots – around one to one and a half acres in size
- Small to medium-sized rural lots – around two to less than five acres
- Medium-sized rural lots – around 5 acres in size
- Large resource and residential lots

Smaller Rural Lots – 0.9 to 1.8 acres

The average impervious area coverage on lots this size was 15 percent. The range was 7 percent to 28 percent. Photos are from 2012 unless otherwise indicated.



This 1 acre property contains a large home, detached garage, and driveway. The impervious area is 19 percent or 8,200 square feet.



This 1.2 acre property contains a large home, attached garage, and driveway. The impervious area is 16 percent or 8,700 square feet.



This 1.5 acre property contains a large home, detached garage, and driveway. The impervious area is 14.5 percent or 9,500 square feet.



This 1.7 acre property contains a large home, attached garage, and long driveway. The impervious area is 12 percent or 8,800 square feet.

Small to Medium Sized Rural Lots – 1.8 to 4.6 acres

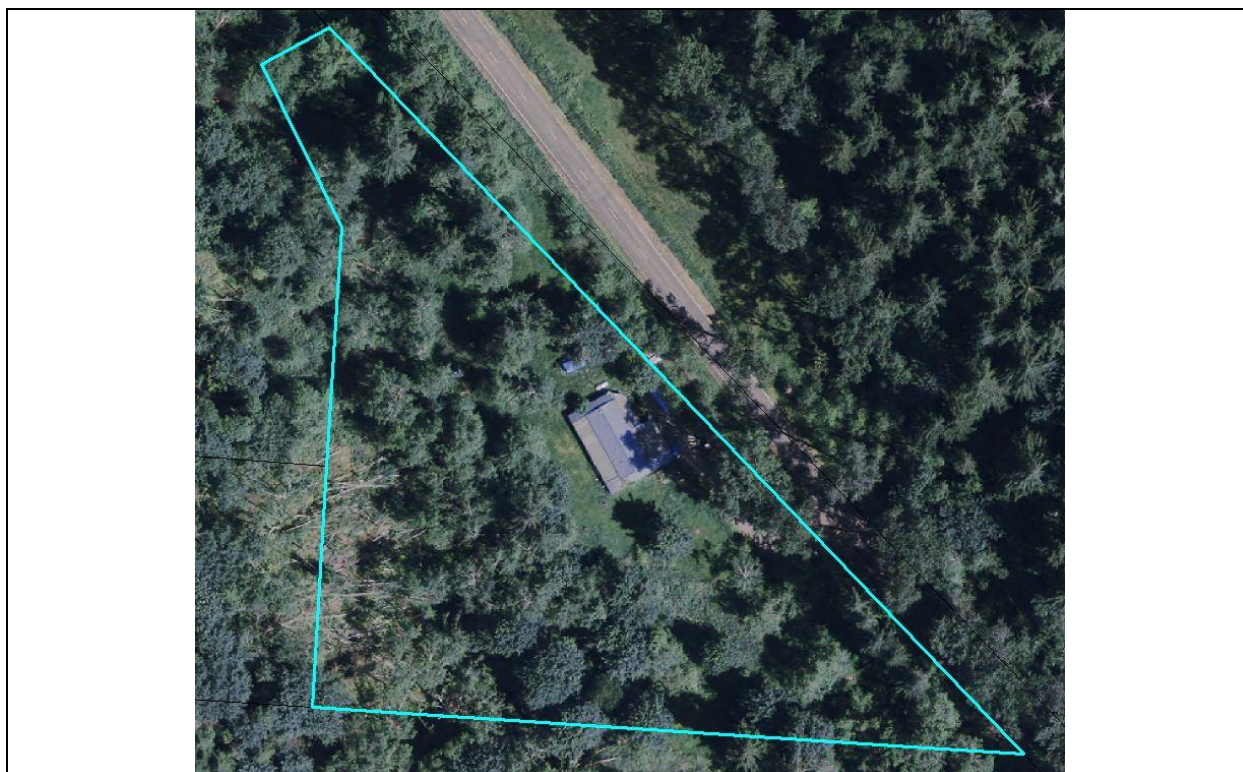
The average impervious area coverage on lots this size was 8 percent. The range was 3 percent to 14 percent. Photos are from 2012 unless otherwise indicated.



This 2.2 acre property contains a large home, detached garage, and driveway. The impervious area is 10 percent or 9,900 square feet.



This 1.9 acre property contains a large home with attached garage and large parking area. The impervious area is 10 percent or 8,200 square feet.



This 3.6 acre property contains a small home and driveway. The impervious area is 3 percent or 4,000 square feet.



This 2.4 acre property contains several buildings and a large driveway. The impervious area is 13 percent or 13,600 square feet.

Medium Sized Rural Lots – 4.6 to 9.5 acres

The average impervious area coverage on lots this size was 5 percent. The range was 2 percent to 12 percent. Photos are from 2012 unless otherwise indicated.

2000	
2012	
This 5-acre property contains a primary residence, garage, and driveway. The impervious area is 12 percent or 26,000 square feet.	



This 5 acre property contains a primary residence, garage, and driveway. The impervious area is 8.5 percent or 19,000 square feet.



This 5-acre property contains a primary residence, garage, and driveway. The impervious area is 8 percent or 19,000 square feet (excluding the road at the edge of the property).



This 5.5-acre property contains a primary residence, attached garage, and driveway. The impervious area is 4.5 percent or 10,000 square feet.



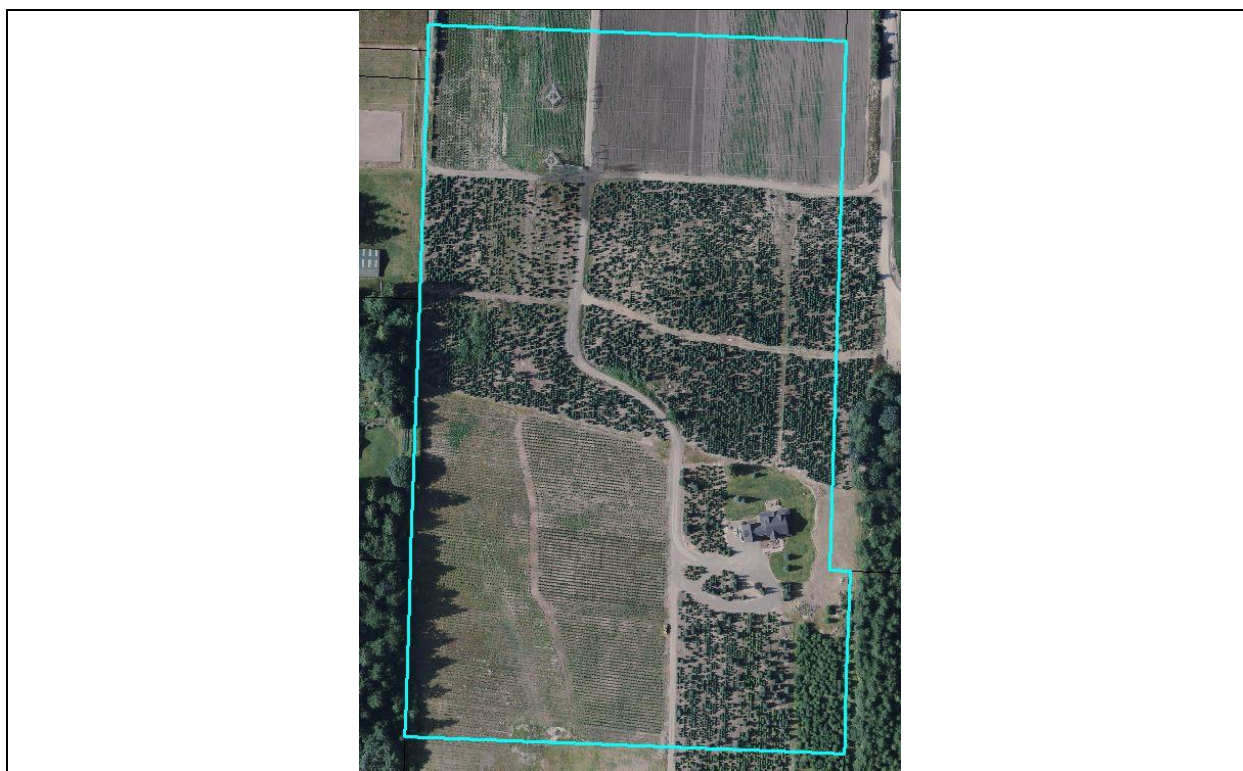
This 7-acre property contains a primary residence, garage, and driveway. The impervious area is 6.6 percent or 21,000 square feet.

Large Resource and Residential Lots – 9.5 to 40 acres

The average impervious area coverage on lots this size was 5 percent. The range was 2 percent to 12 percent. Photos are from 2012 unless otherwise indicated.



This 15-acre property contains a primary residence, driveway, and access road. The impervious area is 3.9 percent or 25,000 square feet.



This 25-acre farm contains a primary residence and numerous access roads. The impervious area is 5.8 percent or 66,000 square feet. It is enrolled in the current use agriculture tax program.



This 40 acre farm contains a primary residence, other buildings, and an access road. The impervious area is 2.4 percent or 43,000 square feet. It is enrolled in the current use agriculture tax program.



Closeup.



This 66 acre farm contains numerous farm buildings as well as a long access road. The impervious area is 4.1 percent or 118,000 square feet. It is enrolled in the current use agriculture tax program.



Closeup



This 98 acre farm contains several buildings and roads. The impervious area is 1.3 percent or 57,300 square feet. It is enrolled in the current use agriculture tax program. Impervious estimates do not include gravel roads.



Closeup.



Relationship to Stormwater Flow Control

Based on Department of Ecology guidance, any development in unincorporated Thurston County that fits the criteria below requires a review by Thurston County Water Resources staff to ensure it meets runoff flow-control standards:

- More than 5,000 square feet new impervious surfaces
- Converting more than three quarters of an acre from native vegetation to lawn or landscaping

- Clearing of more than two-and-a-half acres of native vegetation to pasture

Depending on soils and property-specific characteristics, flow-control mechanisms may be put into place to manage stormwater.

Options:

Option A - Leave impervious area thresholds in zoning code as they are currently.

Option B - Place modest impervious area thresholds in zoning districts where none exist to better align with how development is actually occurring. For example, place limits of 10 percent impervious area for all lots larger than 4.6 acres.

Option C - Place low impervious area thresholds in watersheds and basins that still have a Sensitive or Intact current condition. In Green Cove Creek basin, for example, lots greater than one acre have an impervious surface limit of five percent. Allow a mechanism for the limits to be increased, by using pervious pavements or purchasing development rights.

Appendix E.

Tumwater Subdivision Recommendations

To: City of Tumwater — John Doan, City Administrator; Michael Matlock, Community Development Director; Tim Smith, Planning Manager; Dan Smith, Water Resources Manager
From: Thurston County — Allison Osterberg, Assoc. Planner; Thurston Regional Planning Council — Veena Tabbutt, Sr. Planner; Michael Burnham, Assoc. Planner; Fred Evander, Sr. Planner
Date: March 11, 2015
Subject: Options for new subdivisions near wetlands and high groundwater flooding

Issue:

The Tumwater Comprehensive Plan seeks to promote orderly, cost-effective development that best: utilizes available land; retains parks, open space and trails; reduces impacts on wetlands; and minimizes flooding (see Tumwater Comprehensive Plan Land Use Goals 2, 6, 7, and 8). These goals are important, though difficult to meet, in locations that experience high groundwater flooding and areas near wetlands.

As part of its *Guiding Growth—Healthy Watersheds: Science to Local Policy* project, Thurston County and Thurston Regional Planning Council staff examined land use changes to improve water quality amid the Black Lake, McLane Creek and Woodard Creek basins. The project team examined existing regulations for areas near wetlands and high groundwater flooding amid Tumwater’s urban growth area within the Black Lake Basin and proposed potential changes to City zoning and subdivision code standards (below). Tumwater staff could consider such recommendations as part of ongoing efforts to integrate low-impact development principles and practices into City codes and standards, per state Department of Ecology municipal stormwater permit requirements.

Recommendations:

1. Allow grouped units such as duplexes, townhouses, fourplexes as part of new development.

Existing zoning standards in the Rural/Sensitive Resource (RSR) and Single-Family Low Density Residential (SFL) zones of the Tumwater Municipal Code (the two zones typically used near wetlands and high groundwater hazards) permit only single-family detached units to be built (see TMC Sections 18.08.020 and 18.10.020).

Allowing a broader range of housing in new developments — for example, on parcels five acres and larger — would permit additional flexibility for builders that seek to reduce the footprint of the development, while still allowing the projects to reach their allowed density. Potential precedents for this approach are found in two zones within the Lacey Municipal Code. Within the McAllister Springs Geologically Sensitive Area, the zone allows for two- and three-unit structures, so long as the units do not exceed five percent of the total lots. The Moderate Density Zone in Lacey takes the concept a step further and does not specify any of the housing types allowed. The code simply says that a residential

use that meets the allowed density of the zone is permitted. This second approach could be especially useful for larger parcels near wetlands and high groundwater flooding areas that are surrounded by relatively undeveloped lands (where the impact of attached housing options on neighboring landowners is limited).

2. Require narrower streets in developments near wetlands and amid high groundwater areas.

Tumwater has two different standards for both local streets and cul-de-sacs — a standard facility and a narrower street option. For Local Residential Streets, the standard right-of-way width is 55 feet (with 5-foot wide sidewalks on both sides, 6-foot planters, and a 32-foot road width). The narrow option is similar in character, but it allows a 20-foot pavement width. Where water is a problem and traffic volumes do not warrant a bigger facility, the road width could be limited to 20 feet to minimize the necessary amount of impervious surface. Changing the road width would require support from the Tumwater Public Works and Fire departments, as emergency vehicles must be able to navigate the roadway.

3. Base the number of permitted units on density rather than minimum lot size.

Existing zoning requirements in the Tumwater Municipal Code establish both a maximum density and a minimum lot size for new developments. For example, within the Residential/Sensitive Resource (RSR) zone, the zone has a maximum density of 4 units per acre and minimum lot sizes of 9,500 square feet in regular subdivisions and 7,600 square feet in cluster developments (see TMC Section 18.08.050.D). This use of two measurements to account for density is often unnecessary and can be unproductive, especially when minimum lot size standards are used near sensitive natural features.

Use of minimum lot size requirements often encourages developers to lay out lots to ensure that the lots meet a minimum square footage, rather than addressing other more important considerations such as the preservation of natural areas or appropriate building orientations. Basing the number of allowed units solely on density (units per acre), rather than dimension standards/lot size, gives developers more flexibility (while still allowing the same number of units) and permits individuals to design lots in the way that most makes sense — whether the parcels created end up being 5,000 or 12,000 square feet in size. Use of density alone will also typically promote more preservation of natural areas, because developers will be able to achieve the number of units or densities allowed on the site without having to extend new lots into or near sensitive features to meet required minimum lot sizes.

4. Make the storm system and natural areas a key part of the development's open space and an extension of people's yards.

When developments include homes oriented to a high-quality open space network, housing units feel well spread out, even when individual lots are small. Making water a key feature of this system adds a pleasant element, and helps make the environmental functions that occur within the subdivision more visible to neighboring residents.

This approach is currently incentivized within the Tumwater Municipal Code¹, though the spaces created do not always contribute to the overall aesthetics of the community and the sense that the homes are situated near natural areas. To maximize the aesthetic value of stormwater systems and natural areas,

¹ Developers that incorporate stormwater systems into a neighborhood's open space/park areas do not have to remove the area when calculating net density. Otherwise, open space/park areas are netted out of the density calculation, which can reduce the number of allowed units.

additional requirements to receive the bonus could be added that specify how stormwater should be integrated into developments. Attractive landscaping that gives stormwater ponds a more natural look and the orientation of some homes and yards toward storm ponds and natural areas may be key requirements to consider as part of these standards.