Memorandum
WRE Committees Technical Support

To:	Angela Johnson, Washington State Department of Ecology
From:	Malia Bassett and Dan Graves, HDR
Copy:	Chad Wiseman, HDR
Date:	July 31, 2019
Subject:	Growth Projections Deliverable: tabular summary of growth projections by subbasin for each WRIA (Work Assignment 1, Task 3)

1.0 Introduction

HDR is providing technical support to the Washington State Department of Ecology (Ecology) and the Watershed Restoration and Enhancement (WRE) committees for Water Resource Inventory Areas (WRIAs) 10, 12, 13, 14, and 15. This memorandum provides a summary of the deliverable for Work Assignment 1, Task 3, Growth Projections.

HDR worked with King County, Kitsap County, Pierce County, the Tacoma-Pierce County Health Department (TPCHD), Thurston County, the Thurston Regional Planning Council, and Mason County to define growth projection methods and growth projections. An account of data requests, meetings, and other correspondence are detailed in HDR's June 14 and 28, 2019, status update memoranda (Appendix A).

2.0 Growth Projection Methods by County

The two general methods used in these projections are Method 1, identifying buildable rural residential properties and projecting the likelihood of development of a permit-exempt connection over the next 20 years and Method 2, identifying historical trends based on the issuance of building permits and the rate of growth projected over the next 20 years. As discussed in previous summaries, except for Mason County, all counties have elected to either do the growth projections in-house or to collaborate with HDR by providing HDR the data and have HDR create the growth projection based on the data. Thurston, Mason, King, and Kitsap Counties have specified that they would like to use a variation of Method 1 and Pierce County has elected to use Method 2, to predict domestic permit-exempt connections.

HDR has worked with individual counties, health districts, and water service providers to understand their regulations, available data, county characteristics, and specific nuances that could affect growth projections. This collaboration has resulted in methods that are county-specific. Each county, either in a group effort with HDR or individually, has identified the method it would like to use and how it would like its growth projections conducted.

Summaries of the applied growth projection methodologies by county are provided in the subsections below.

2.1 Kitsap County

1. Conduct land capacity analysis.
2. Apply 200-foot (ft) buffer to waterline spatial data set to remove parcels that, when built upon, will require connection to a purveyor.
3. Determine subbasin share of historical building permits from 2002–2019.
4. Determine remaining buildout capacity of each subbasin between parcels within and outside of the waterline 200 ft buffer (future growth will be distributed within subbasins based on share of buildout capacity within the subbasin, relative to distance from waterline.)
5. Apply rural target growth in accordance with the proportions of buildout capacity identified in step 4.
6. Adjust for number of population per household (2.5 persons/household).

2.2 King County

Using historical growth data to project future growth: 18-year (2000–2017) data set of building permits for new units.

1. Use centroid of parcel data to determine location information: WRIA/water district service areas.
2. Use County parcel data for water service attribute data to determine public versus private.
3. Link building permit data and parcel data.
4. Determine the number of building permits that are:
    a. Public (pub) water
    b. Private (pvt) water (aka permit-exempt well)
    c. Other (unknown/null): used this to estimate the percentage error
5. Calculate the percentage of each type of building permit.
6. Use the annual (projected) number of permits per year multiplied by the percentage of permits on private water to determine a projected number of permit-exempt wells per year.
7. Multiply the number of permit-exempt/year by 20 for the estimated total of permit-exempt wells over a 20-year period.
8. Apply projections to subbasin delineation.

2.3 Thurston County

1. Countywide population forecast: obtain medium series population forecast from Office of Financial Management (OFM).
2. Develop residential capacity estimates.
3. Forecast allocation: distribute to parcels based on recent residential development and permit trends, where capacity is available.
4. Once allocated, consider which growth is likely to be with a permit-exempt well based on the following criteria:
    a. All growth in incorporated cities will connect to a municipal water system
    b. Located outside group A/B system and more than 300 ft away from known supply main
    c. Patterns among past development
    d. Number of predicted developments in each subbasin had number of available connections to water systems in the subbasin subtracted out

See Appendix B for Thurston County methods description.

2.4 Mason County

1. Import Mason County Comprehensive Plan 2036 population projection data.
2. Interpolate 2018–2038 data for population, housing, and land area:

a. Straight-line interpolations for Shelton Urban Growth Area (UGA), Allyn UGA, Belfair UGA, and Rural County

3. Compare 2038 additional population and housing to buildout capacity to ensure that buildout is not exceeded.
4. Calculate zoning percent allocation for each area:

    a. Based on buildout capacity of units by zoning for each area

5. Allocate additional housing since 2018 to zoning categories based on percent allocation.
6. Spatially apply growth projections to parcels available for development.
7. Remove growth unlikely to rely on a permit-exempt well.
8. Apply subbasins.

See Appendix C for a detailed description of growth projection and allocation methods.

2.5 Pierce County

1. Map parcels that are unlikely to have a new permit-exempt well:
    a. Define parcels that could accommodate development of a domestic, single-family connection to a permit-exempt well
    b. Project permit-exempt well connection growth over 20 years, and allocate growth spatially to parcels defined in step a above
2. The result is a map of parcels that are potentially developable:

    a. Summarize by subbasin

3. Permit-exempt well forecast methodology:
    a. Obtain TPCHD well database
    b. Apply growth forecasts based on historical rates of permit-exempt well installations projected forward 20 years for domestic single-family connections
    c. Analyze trends in permit-exempt wells by time and location (by subbasin)
    d. Estimate growth of permit-exempt well connections for 20-year period
    e. Distribute growth by subbasin

See Appendix D for a detailed description of growth projection and allocation methods.

3.0 Growth Projections by WRIA

County growth projection data were binned by WRIA subbasin. Because WRIAs 10, 14, and 15 are composed of multiple counties, individual county growth projections were combined to yield WRIA growth projections, binned by subbasin.

Table 3-1 shows growth projection data for WRIA 10 (King and Pierce Counties).

Table 3-1. WRIA 10 Growth Projection (King and Pierce Counties)

Number of Permit-Exempt Wells Added between 2018 and 2038			
Subbasin	**King**	**Pierce**	**Total**
Carbon River	--	109	109
Lower Puyallup River	--	102	102
Lower White River	--	52	52
Middle White River	81	--	81
South Prairie Creek	--	167	167
Upper Puyallup River	--	165	165
Upper White River	--	12	12
Total	81	607	688

Table 3-2 shows growth projection data for WRIA 12 (Pierce County).

Table 3-2. WRIA 12 Growth Projection (Pierce County)

Number of Permit-Exempt Wells Added between 2018 and 2038	
Subbasin	**Total**
Chambers	4
Clover Creek	141
Sequalitchew	--
Total	145

Table 3-3 shows growth projection data for WRIA 13 (Thurston County).

Table 3-3. WRIA 13 Growth Projection (Thurston County)

Number of Permit-Exempt Wells Added between 2018 and 2038	
Subbasin	**Total**
Boston Harbor	236
Cooper Point	171
Deschutes Lower	341
Deschutes Middle	715
Deschutes Upper	29
Johnson Point	412
McLane	163
Spurgeon Creek	88
Woodland Creek	270
Total	2,425

Table 3-4 shows growth projection data for WRIA 14 (Mason and Thurston Counties).

Table 3-4. WRIA 14 Growth Projection (Mason and Thurston Counties)

Number of Permit-Exempt Wells Added between 2018 and 2038			
Subbasin	**Mason**	**Thurston**	**Total**
Case	347	--	347
Goldsborough	424	--	424
Harstine	108	--	108
Hood	79	--	79
Kennedy	52	497	549
Mill	437	--	437
Oakland	1,240	--	1,240
Skookum	369	--	369
Total	3,056	497	3,553

Table 3-5 shows growth projection data for WRIA 15 (Kitsap, Pierce, King, and Mason Counties).

Table 3-5. WRIA 15 Growth Projection (Kitsap, Pierce, King, and Mason Counties)

Number of Permit-Exempt Wells Added between 2018 and 2038					
Subbasin	**King**	**Pierce**	**Mason**	**Kitsap**	**Total**
Bainbridge Island	--	--	--	489	489
Hood Canal	--	--	950	1,139	2,089
McNeil Island, Anderson Island, Ketron Island	--	38	--	--	38
South Sound	--	940	244	718	1,902
Vashon-Maury Island	368	--	--	--	368
West Sound	--	--	--	2,320	2,320
Total	368	978	1,194	4,666	7,205

4.0 Next Steps

Ecology and each WRE committee will evaluate these initial growth projections and request changes to the county methods as alternative growth projection scenarios, if necessary.

Appendix A

Growth Projection Status Updates

Status of WREC Committees Technical Support

Task 3 Growth Projections

June 14, 2019

County Efforts

HDR began working with the Counties through in-person meetings on May 13, 2019 and May 16, 2019. Since then, regular weekly contact has been maintained with each County to identify main points of contact, complete data transfers and connect the County's GIS specialists with HDR's GIS specialists.

HDR has reached out to the Muckleshoot Indian Tribe, Puyallup Tribe, Squaxin Island Tribe, Nisqually Tribe, Skokomish Tribe, Suquamish Tribe, and the Port Gamble S'Klallam Tribe. We received responses from Carla Carlson of the Muckleshoot Indian Tribe and Sam Phillips of the Port Gamble S'Klallam Tribe. Both stated that they do not anticipate future growth to be connected to anything but the city or tribe water supply. To date, HDR has not received communication responses from any of the other tribes.

Data acquisition request forms were created for each WRIA and sent to each County through representatives from the Department of Ecology. Data was rated by priority, with High Priority data needed by June 10, 2019, Medium Priority needed by July 31, 2019 and Low Priority needed by August 31, 2019.

To date, the following High Priority data requests are outstanding for Task 3 - Growth Projections:

- WRIA 10 (King County and Pierce County)
    - Anticipating receiving County growth projections for PE domestic well connections by subbasin and full WRIA from King County early July 2019; Need TPCHD's historical well database(Item 3-1); Need Group A and Group B water system service areas from King County, we have only received VMI to date (Item 3-4). Need salt water intrusion areas, indicating unlikely PE well installation from King and Pierce County and TPCHD (Item 3-6).

- WRIA 12 (Pierce County)
    - Need salt water intrusion areas, indicating unlikely PE well installation from Pierce County and TPCHD (Item 3-6).

- WRIA 13 (Thurston County)
    - Need County growth projections for PE domestic well connections by subbasin and full WRIA from (Item 3-1); Need GIS database of sewer lines if available from Thurston County (Item 3-4); Need salt water intrusion areas, indicating unlikely PE well installation from Thurston County (Item 3-6); Need estimates of persons per household in unincorporated areas from Thurston County (Item 3-7); Need additional relevant information from Counties and Cities that regulate land use and development from Thurston County and TRPC (Item 3-9).

- WRIA 14 (Mason County, Kitsap County and Thurston County)
    - Need zoning from Mason County (Item 3-2); Need County growth projections for PE domestic well connections by subbasin and full WRIA from Thurston County; Need GIS database of sewer lines from Thurston County and Mason County (Item 3-4); Need Group A and Group B water system service areas from Mason County (Item 3-5); Need salt water intrusion areas, indicating unlikely PE well installation from Mason and Thurston County (Item 3-6); Need estimate of persons per household in unincorporated areas from Mason and Thurston County (Item 3-7).

- WRIA 15 (Kitsap County, Pierce County , King County and Mason County)
    - Anticipating receiving County growth projections for PE domestic well connections by subbasin and full WRIA from King County early July 2019 (Item 3-1); Need zoning from Mason County

(Item 3-2); Need Group A and Group B water system service areas from Mason County (Item 3-5); Need water service areas from Pierce County (Item 3-5).

Methodologies

The two methodologies proposed within HDR scope include identifying buildable rural residential properties and projecting the likelihood of development of a permit exempt connection over the next 20 years (Method 1) and identifying historical trends based on the issuance of building permits and the rate of growth projected over the next 20 years (Method 2). HDR understands that each county has a different set of regulations, available data and factors that are specific to the characteristics of development. HDR, through contact and collaboration with Counties, health districts and water service providers, are allowing for a county-specific process. This means that the county is expected to identify the method they would like to use and how they would like the growth projections to be conducted. Below is a summary of the outcome of the May 13 and May 16 meetings held between HDR, Ecology and the Counties in which the Counties identified which method they would like to use and how they would like HDR to be involved.

- Thurston County: Method 1, will coordinate with TRPC on the growth methodology and will provide growth projection results to HDR.
- Pierce County: Method 2, intends a collaboration between the County, TPCHD and HDR.
- Mason County: Method 1, stated that they have limited capacity and would like HDR to develop growth forecasts and report back to County regarding methodology and results. Mason County and HDR have agreed to use the Mason County Plan (2036) as a base estimate for allocating growth projections, and accounting for different county-specific scenarios once the base is established; and also use median Office of Financial Management (OFM) population growth data.
- King County: Method 1, intends to do the work in-house since are already working on similar projections in other WRIAs and will provide methodology and results to HDR when complete.
- Kitsap County: Method 1, the County has data and will work in-house and will collaborate with water service providers and health district to provide growth projection results to HDR.

In summary, except for Mason County, all Counties have elected to do the growth projections either in-house or provide HDR the data and have HDR run the numbers. Except for Pierce County, each county has specified that they would like to use a variation of Method 1 to predict domestic permit exempt connections. At this point, this is a high-level summary, however, until the data acquisition requests are fulfilled, considered, and processed with the individual Counties, HDR cannot provide a more detailed approach for growth projections due to the fact that the methodology is dependent on the data.

A “Decision Tree” chart was provided to County meeting participants as a high-level method to sort relevant data. This “Decision Tree” chart can be modified to reflect individual County characteristics and methodology.

Upcoming Concerns

- King County has indicated that they will get information to us the beginning of July.
- A public records request to TPCHD needed to be made for locations of existing permit exempt wells and information has not been received yet but is being processed.

Technical Memorandum
WRE Committees Technical Support

To:	Angela Johnson, Washington State Department of Ecology
From:	Malia Bassett and Dan Graves, HDR
Copy:	Chad Wiseman, HDR
Date:	June 28, 2019
Subject:	Status of Growth Projections (Work Assignment 1, Task 3)

1.0 Introduction

HDR is providing technical support to the Washington State Department of Ecology (Ecology) and the Watershed Restoration and Enhancement (WRE) committees for Water Resource Inventory Areas (WRIAs) 10, 12, 13, 14, and 15. This technical memorandum provides an update on Work Assignment 1, Task 3, Growth Projections.

On June 14, 2019, HDR provided a status update for work that had been completed to date on Task Order 1, Task 3: Growth Projections (see Attachment A). This included a detailed summary of the county meetings on May 13 and May 16, 2019, and efforts that involved following up with regular contact and receiving data transfers, as available; creating a data acquisition request form for each WRIA and sending it to each county through representatives from Ecology; and HDR reaching out to each tribe that has jurisdiction within the applicable WRIAs.

The following serves as an update on work completed since June 14 through June 30, 2019.

2.0 County Efforts: Data Acquisition

HDR created data acquisition request forms for each WRIA and sent them to each county through representatives from Ecology. Data were rated by priority, with high-priority data needed by June 10, 2019, medium-priority data needed by July 31, 2019, and low-priority data needed by August 31, 2019. The following incudes a summary of the high-priority data requests that are still outstanding, and what was received since June 14 for Task 3: Growth Projections:

- WRIA 10 (King and Pierce Counties):
    - Anticipating receiving King County growth projections for permit-exempt domestic well connections by subbasin and full WRIA from King County early July 2019; need Group A and Group B water system service areas from King County—we have received only Vashon-Maury Island to date (Item 3-4); need saltwater intrusion areas, indicating unlikely permit-exempt well installation from King and Pierce Counties (Item 3-6).
    - Received since June 14: Tacoma-Pierce County Health Department's (TPCHD's) historical well database (Item 3-1).
- WRIA 12 (Pierce County):

- Need saltwater intrusion areas, indicating unlikely permit-exempt well installation from Pierce County and TPCHD (Item 3-6).
- Received since June 14: TPCHD's historical well database (Item 3-1).

- WRIA 13 (Thurston County):
  - Need geographic information system (GIS) database of sewer lines if available from Thurston County (Item 3-4); need saltwater intrusion areas, indicating unlikely permit-exempt well installation from Thurston County (Item 3-6); need estimates of persons per household in unincorporated areas from Thurston County (Item 3-7); need additional relevant information from counties and cities that regulate land use and development from Thurston County and Thurston Regional Planning Council (TRPC) (Item 3-9).
  - Received since June 14: County growth projections for permit-exempt domestic well connections by subbasin and full WRIA from Thurston County (Item 3-1).
- WRIA 14 (Mason and Thurston Counties):
  - Need County growth projections for permit-exempt domestic well connections by subbasin and full WRIA from Thurston County (Item 3-1); need buildout capacity and parcel subdivision potential from Mason County (Item 3-2); need GIS database of sewer lines from Thurston and Mason Counties (Item 3-4); need Group A and Group B water system service areas from Mason County (Item 3-5); need saltwater intrusion areas, indicating unlikely permit-exempt well installation from Mason and Thurston Counties (Item 3-6); need estimate of persons per household in unincorporated areas from Mason and Thurston Counties (Item 3-7).
  - Received since June 14: zoning from Mason County (Item 3-2).
- WRIA 15 (Kitsap, Pierce, King, and Mason Counties):
  - Anticipating receiving County growth projections for permit-exempt domestic well connections by subbasin and full WRIA from King County in early July 2019 (Item 3-1); need Group A and Group B water system service areas from Mason County (Item 3-5); need water service areas from Pierce County (Item 3-5).
  - Received since June 14: see data received from counties in other WRIAs.

As a result of receiving several data requests, HDR has been able to work toward solidifying growth projection methodology with each county. However, outstanding data items and follow-up clarification are needed, which HDR will continue to work toward fulfilling. Additionally, in the near future, the Ecology and HDR team will review the acquisition spreadsheets to update data needs based on recent project and technical committee development.

3.0 Methodologies

The two methodologies proposed within HDR scope include identifying buildable rural residential properties and projecting the likelihood of development of a permit-exempt connection over the next 20 years (Method 1) and identifying historical trends based on the issuance of building permits and the rate of growth projected over the next 20 years (Method 2). As discussed in the last summary, except for Mason County, all counties have elected to do the growth projections either in-house or collaborate with HDR by providing HDR the data and have HDR create the growth projection based

on the data. Thurston, Mason, King, and Kitsap Counties have specified that they would like to use a variation of Method 1 and Pierce County has elected to use Method 2, to predict domestic permit-exempt connections.

HDR has worked with each individual county, health districts, and water service providers to understand their regulations, available data, county characteristics, and specific nuances that could affect growth projections. This collaboration has resulted in methods that are county-specific. Each county, either in a group effort with HDR or individually, has identified the method it would like to use and how it would like its growth projections conducted.

See below for a detailed approach for growth projections by county:

- Thurston County: HDR received draft growth projections from Thurston County on June 19, 2019. Growth projection methodologies were the same as those described in the WRIA 11 plan:
    - Within incorporated city boundaries, all future growth will be served by a municipal water utility.
    - Within urban growth areas (UGAs), Thurston County calculated a percentage of the number of estimated new connections that would rely on a permit-exempt well, using patterns of past development from the County's permitting system.
    - Parcels with a septic system and outside a Group A/B water system boundary were presumed to have a permit-exempt well connection.
    - All rural connections outside a Group A/B water system were assumed to connect to a permit-exempt well.
- The County provided projections for the two proposed subbasin alternatives. The WRIA 13 workgroup selected subbasin alternative 2 as the preferred alternative, and recommended the subbasin delineation and growth projections to the WRE committee. The committee accepted the subbasin delineations and the first draft of growth projections.
- Pierce County: On May 19, 2019, HDR met with Pierce County and the following conceptual process for permit-exempt well growth projections include:
    I. Map parcels that are unlikely to have a new permit-exempt well
        a. Define parcels that could accommodate development of a domestic, single-family connection to a permit-exempt well
        b. Project permit exempt well connection growth over 20 years, and allocate growth spatially to parcels defined in step a above
    II. The result is a map of parcels that are potentially developable
        a. Summarize by subbasin
    III. Permit-exempt well forecast methodology
        a. Obtain TPCHD well database (by June 28)
        b. Apply growth forecasts based on historical rates of permit-exempt well installations projected forward 20 years for domestic single-family connections
        c. Analyze trends in permit-exempt wells by time and location (by subbasin)

    d. Estimate growth of permit-exempt well connections for 20-year period
    e. Distribute growth by subbasin

- Mason County: On June 14, 2019, HDR had a conference call with Mason County to determine the details of Mason County growth projections. County representatives indicated that they will comment on the parcel selection flow chart with Mason County-specific considerations. The growth projections will be based on projections already developed in the Mason County Comprehensive Plan. HDR will develop a spreadsheet establishing growth projections by zoning in the three Mason County UGAs and the rural areas. The projections in the spreadsheet will then be distributed across the parcels available for development in GIS, which will result in subbasin-allocated growth projections.
- King County: King County has performed a GIS buildable-lands analysis, including buildout estimates. King County will consider the buildout analysis as the upper bound of growth potential, which can be refined depending on subbasin delineations and WRE committee input. King County has indicated that it will provide information to HDR in the beginning of July.
- Kitsap County: Kitsap County is considering using the buildout analysis as the growth forecast upper bound, which can then be dialed back for forecasted 20-year growth per growth projections, geographic development targets, and density trends described in the Kitsap County Comprehensive Plan. Kitsap County provided HDR with its growth projections, but it did not originally include Bainbridge Island data, so Kitsap County is currently in the process of updating the projections.

A “decision tree” chart was provided to County meeting participants as a high-level method to sort relevant data. This chart is being modified to reflect each individual county methodology if they wish to use it as a tool for explanation.

4.0 Upcoming Concerns

The following is a list of upcoming concerns that need to be addressed:

- Outstanding data needs described in Section 2.0 should be addressed. The highest-priority data need is the growth data set from King County.
- Additional clarification is needed as a result of data received from TPCHD. It is unknown how long it will take to receive answers to HDR’s questions.

Attachment A

June 14, 2019, Growth Projections Status Update

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Status of WREC Committees Technical Support

Task 3 Growth Projections

June 14, 2019

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Methodologies

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In summary, except for Mason County, all Counties have elected to do the growth projections either in-house or provide HDR the data and have HDR run the numbers. Except for Pierce County, each county has specified that they would like to use a variation of Method 1 to predict domestic permit exempt connections. At this point, this is a high-level summary, however, until the data acquisition requests are fulfilled, considered, and processed with the individual Counties, HDR cannot provide a more detailed approach for growth projections due to the fact that the methodology is dependent on the data.

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Appendix B

Thurston County Growth Projection Methods

Thurston Growth Projections Using TRPC Data

Population and Employment Land Supply Assumptions

Population growth projections for Thurston County are produced by Thurston Regional Planning Council every three to five years. Projections represent the expected growth based on currently adopted plans and policies. The general forecast methodology is a three-step process:

1. Countywide Population Forecast. TRPC uses the medium-series population forecast developed by the Office of Financial Management for the countywide population forecast. The countywide forecasts are developed by OFM for Growth Management Act-related planning. (OFM Documentation)

2. Residential Capacity Estimates. For each parcel in Thurston County, an estimate of how many new dwellings units could be built is developed. These residential capacity estimates are based on adopted zoning and observed housing densities, critical area constraints, existing development, and other factors. Additional assumptions are made for capacity on redevelopable property. The 2018 Forecast update also includes considerations for ESA-listed species: 10 percent of soils "more preferred" by Mazama pocket gophers was added to critical areas in the rural, unincorporated county to account for habitat preserved as part of HCP mitigation. (Population and Employment Land Supply Assumptions)

3. Population Forecast Allocations. Countywide population growth is allocated (distributed) to parcels based on recent residential development and permit trends, and where capacity is available. The growth allocated to a neighborhood will never exceed residential capacity minus the market factor – the percent of capacity not available because property owners are not willing to develop. Additional assumptions are included for new accessory dwelling units and family member units. (Population Forecast Allocations)

Some general assumptions that guide the entire forecast process are given below.

This section taken directly from the Population and Employment Land Supply Assumptions document.

General Assumptions

1. All assumptions are consistent with the adopted Comprehensive Plans, Development Regulations, and Capital Facility plans of Thurston County's local jurisdictions current to April 1, 2017.

2. There is general agreement that the availability of water rights is a major issue affecting residential, commercial, and industrial development potential in the Thurston County region, in both urban and rural areas.

3. Based on capital facilities and water planning efforts by local jurisdictions, the analysis assumes that local cities and towns will be able to provide water and other capital facilities services to much of the area they have designated as urban growth areas.

4. Much of the rural residential water supply is met through exempt wells. The model assumes that this pattern will continue in the future. While legislative action in response to the Hirst Decision allows continued drilling of exempt wells there remains uncertainty about future water supply.

5. The model makes explicit assumptions as to the availability of wastewater treatment facilities in Bucoda and Rainier during the planning horizon. Population and Employment Land Supply Assumptions Page 6

6. The current land use pattern will have an influence on the future land use pattern in Thurston County. It is the combination of zoning, market factors, and existing patterns that will determine the future land use pattern in Thurston County.

7. Zoning densities achieved in the future are assumed to be similar to those for projects that are currently in the development pipeline.

Permit Exempt Connections

To relate the population growth and land supply to the projection of permit exempt connections, the data can be manipulated and evaluated by separating parcels based on their location, jurisdiction, and type of connection. Population and dwelling unit forecasts are estimated by sub-basin; city, urban growth area (UGA), and rural county; and by household type: single family, multifamily, or manufactured homes.

Q&As

Q1. Does the projected growth include existing connections?

A1. Yes. You would subtract the 2040 data from the 2017 data to see the growth.

Q2. Do projections consider City and County water system plans?

A2. The assumptions for both water and sewer assume that utilities will be extended as development occurs. The assumptions are consistent with the Comprehensive Plans and the Capital Facilities Plans of Thurston County's jurisdictions. Water system plans identify what actions the cities and counties need to take to serve projected population growth.

Q3. **Does Thurston County have a water system plan?**

A3. Yes – The South County Coordinated Water System Plan (2000) and North Thurston County Coordinated Water System Plan (1996). However, there is also information in the Capital Facilities Plan (2018-2023), which states that Thurston County does not provide municipal water to rural areas, with the exception of those areas where a public health-related issue or water quality concern necessitates county involvement, per policy. The county owns 3 water systems (Boston Harbor, Grand Mound, and Tamoshan).

Q4. Is the presence of federally protected pocket gophers considered in the available land analysis used to determine growth projections?

A4. Yes. Some land supply is removed for federally protected Mazama pocket gophers by including ten percent of soils designated as "more preferred" with critical areas.

Q5. Are you able to provide a range of growth projections? (High, medium/median, low)

A5. No. The types of considerations evaluated for the projections do not allow for an easy range of development expected. The estimate is completed under "average" conditions, and while projections have been fairly accurate, actual projections could be (and have been) higher or

lower than expected for shorter time periods, as explained in the Final Document on Land Supply Assumptions.

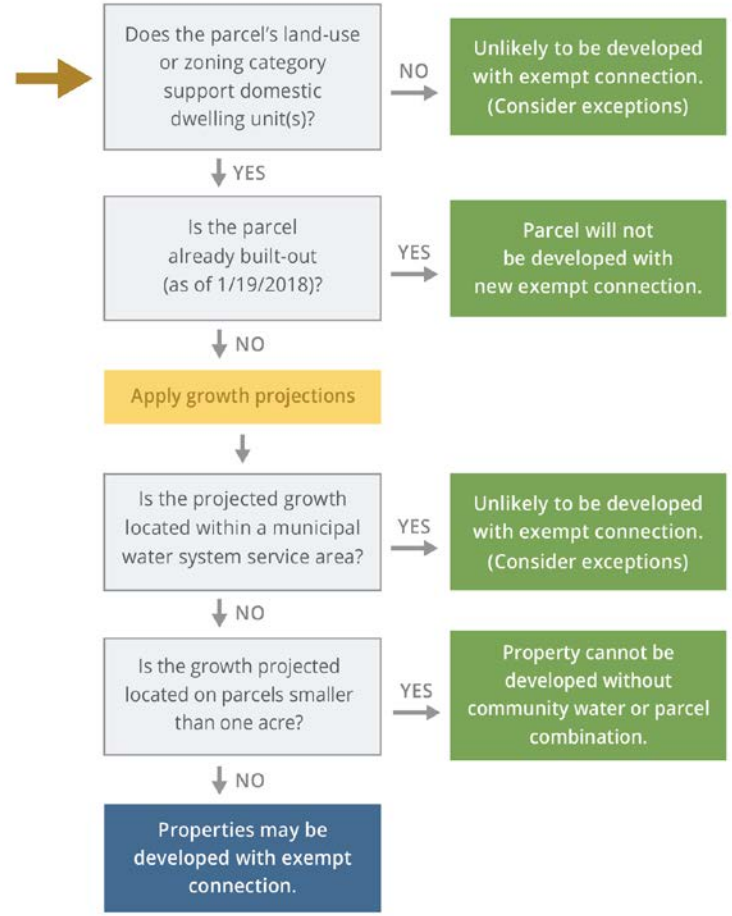
Q6. What time period are growth projections based on?

A6. The forecast estimates use a base of 2017, so it is not a “historical” dataset. This is for reasons previously discussed like the concerns with skewed data from the recession. Please see the Final Document on Land Supply Assumptions for details.

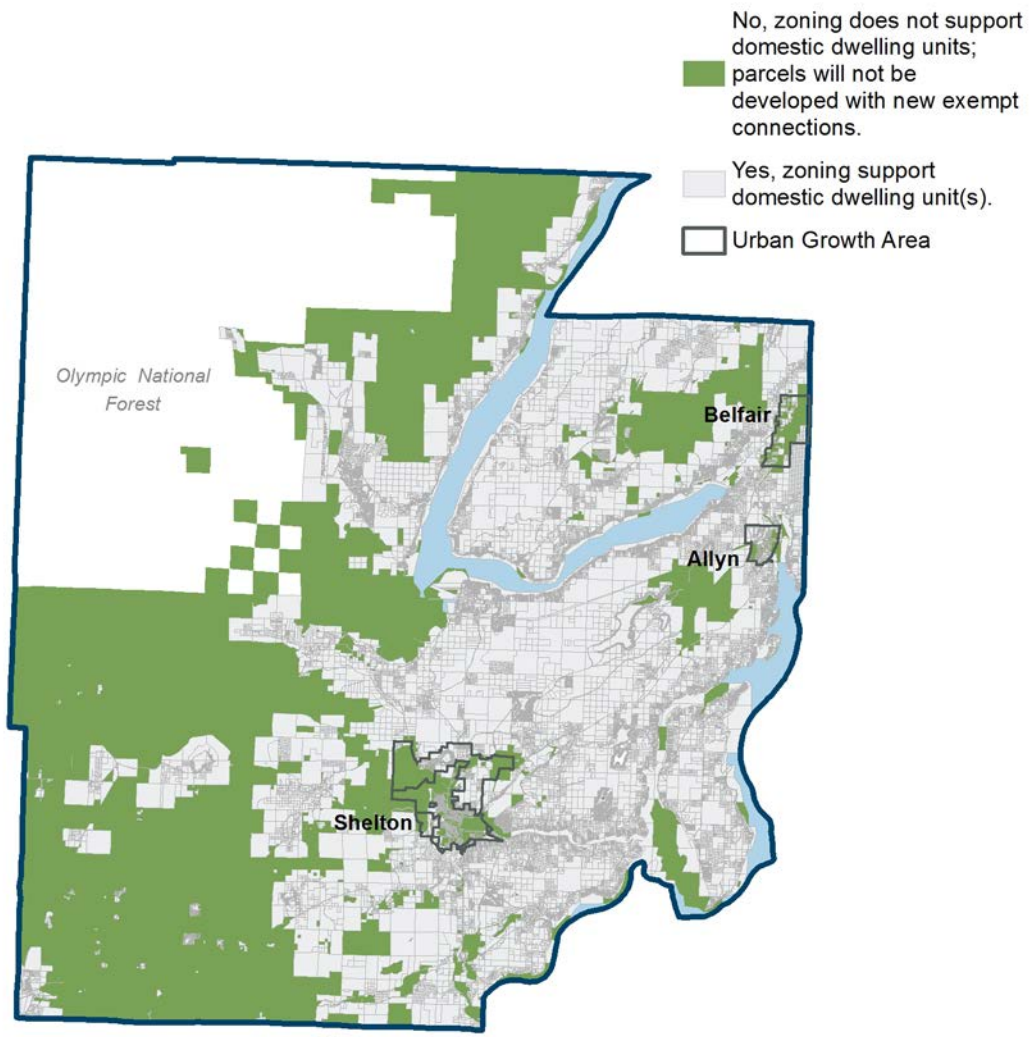
Appendix C

Mason County Growth Projection Analysis

Decision Tree for Assessing County Parcel Data



Does the parcel's land-use or zoning category support domestic dwelling unit(s)?



Decision Tree for Assessing County Parcel Data

Does the parcel's land-use or zoning category support domestic dwelling unit(s)?

NO → Unlikely to be developed with exempt connection. (Consider exceptions)

YES ↓

Is the parcel already built-out (as of 1/19/2018)?

YES → Parcel will not be developed with new exempt connection.

NO ↓

Apply growth projections ↓

Is the projected growth located within a municipal water system service area?

YES → Unlikely to be developed with exempt connection. (Consider exceptions)

NO ↓

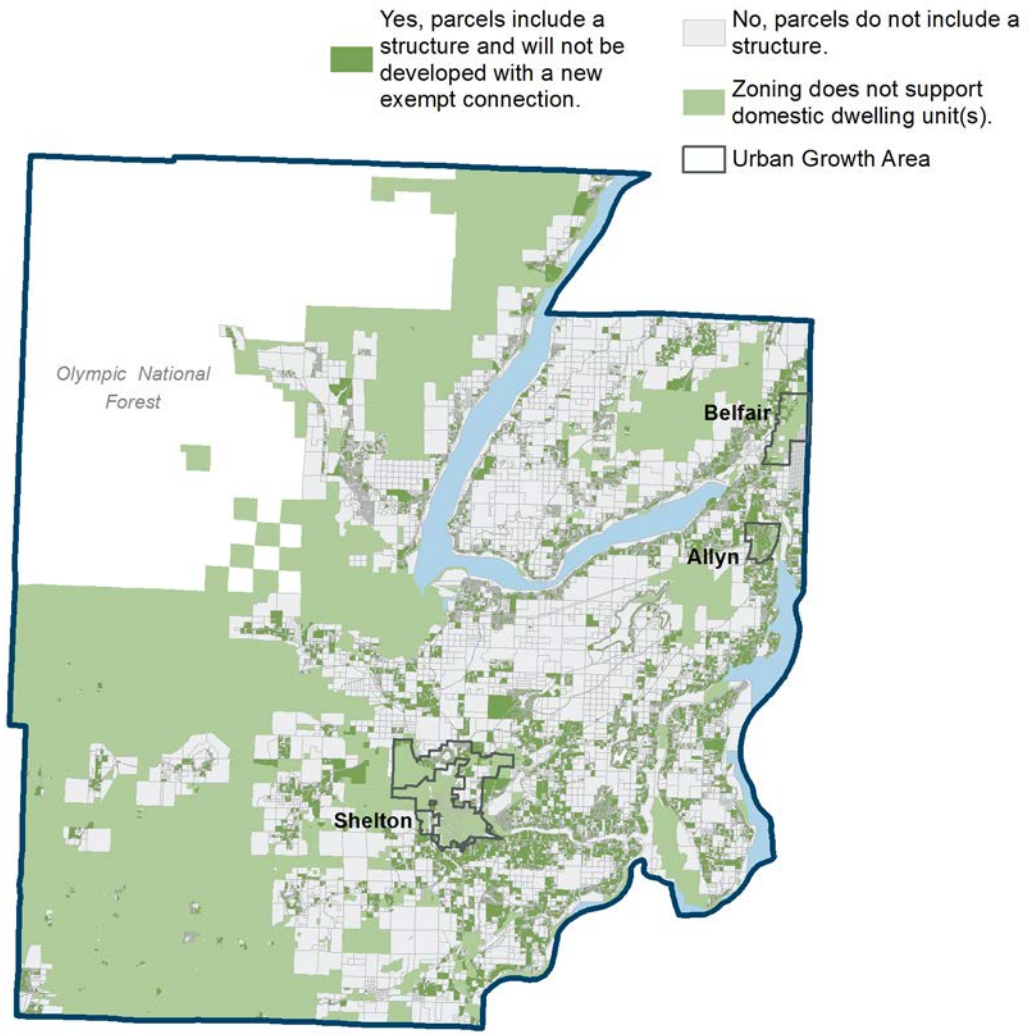
Is the growth projected located on parcels smaller than one acre?

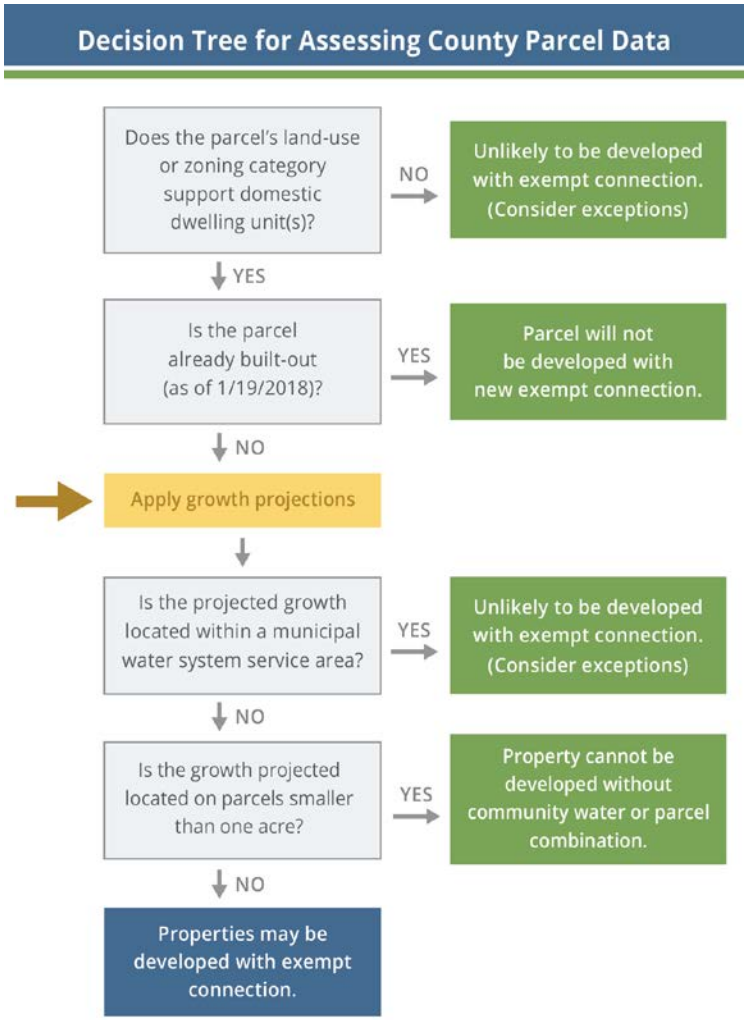
YES → Property cannot be developed without community water or parcel combination.

NO ↓

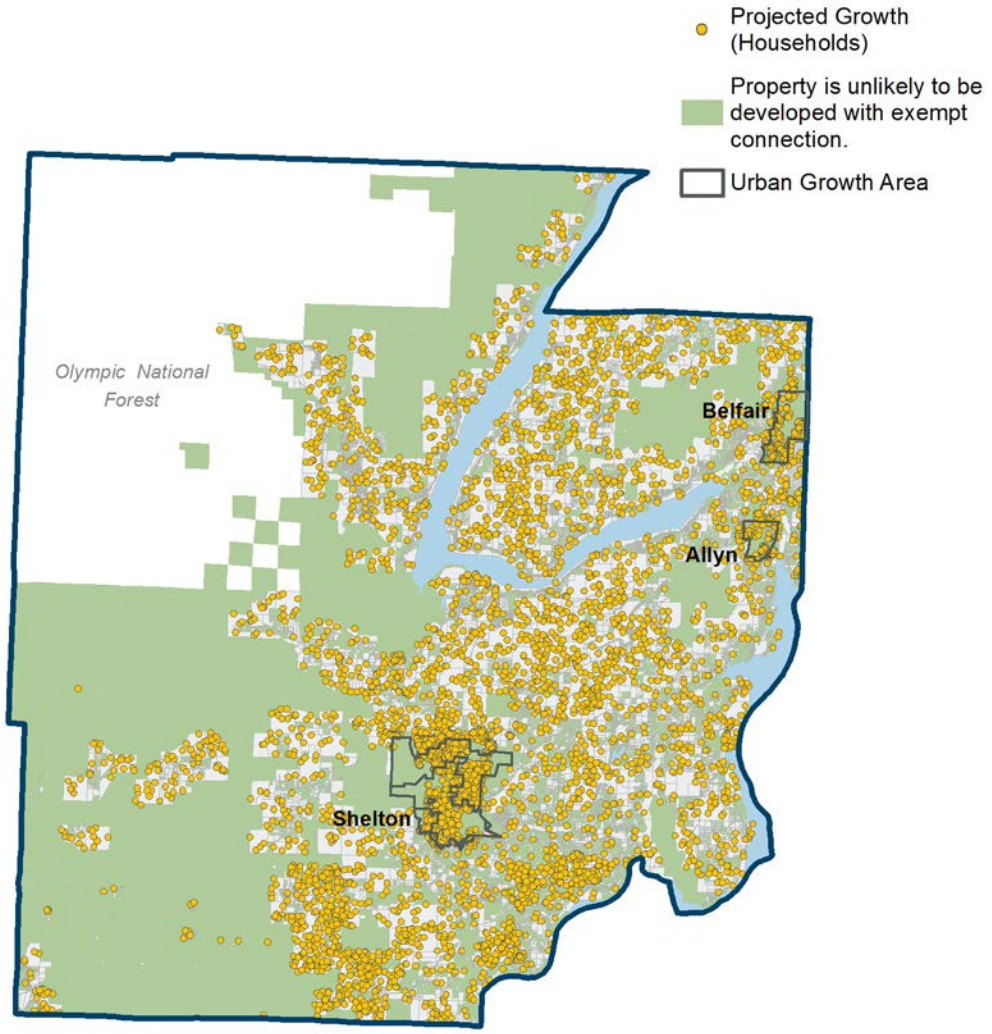
Properties may be developed with exempt connection.

Is the parcel already built-out (Does it include a structure)?





Projected Growth



Decision Tree for Assessing County Parcel Data

Does the parcel's land-use or zoning category support domestic dwelling unit(s)?
- NO → Unlikely to be developed with exempt connection. (Consider exceptions)
- YES ↓

Is the parcel already built-out (as of 1/19/2018)?
- YES → Parcel will not be developed with new exempt connection.
- NO ↓

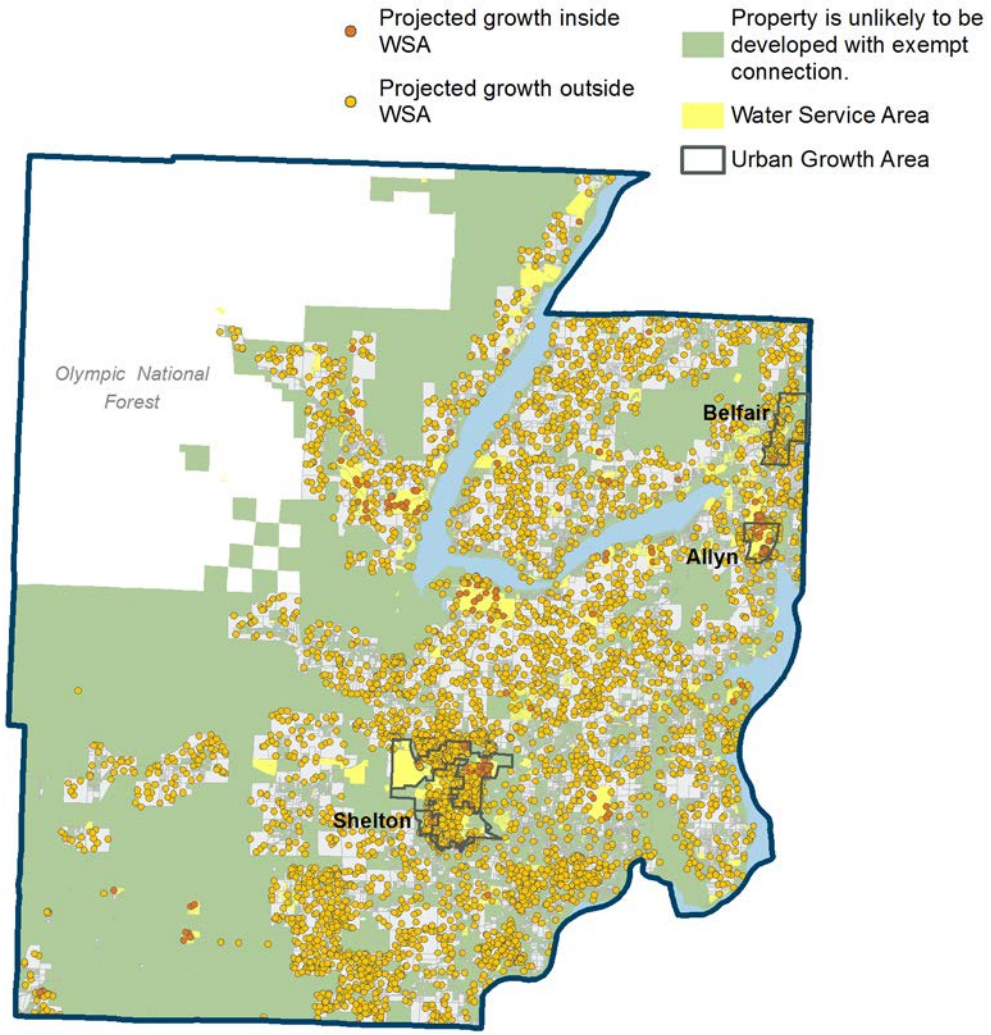
Apply growth projections ↓

Is the projected growth located within a municipal water system service area?
- YES → Unlikely to be developed with exempt connection. (Consider exceptions)
- NO ↓

Is the growth projected located on parcels smaller than one acre?
- YES → Property cannot be developed without community water or parcel combination.
- NO ↓

Properties may be developed with exempt connection.

Is the projected growth located within a municipal water service area (WSA)?



Decision Tree for Assessing County Parcel Data

Does the parcel's land-use or zoning category support domestic dwelling unit(s)?
- NO → Unlikely to be developed with exempt connection. (Consider exceptions)
- YES ↓

Is the parcel already built-out (as of 1/19/2018)?
- YES → Parcel will not be developed with new exempt connection.
- NO ↓

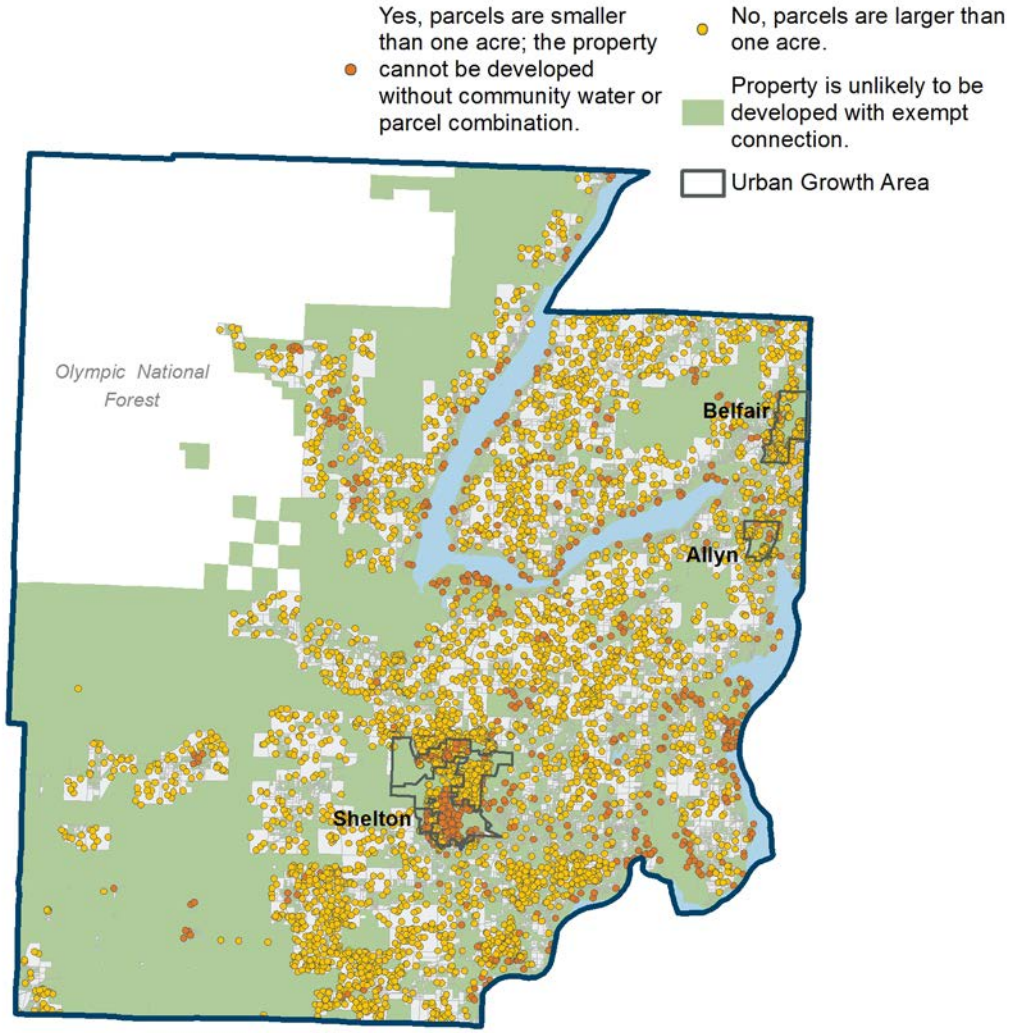
Apply growth projections ↓

Is the projected growth located within a municipal water system service area?
- YES → Unlikely to be developed with exempt connection. (Consider exceptions)
- NO ↓

Is the growth projected located on parcels smaller than one acre?
- YES → Property cannot be developed without community water or parcel combination.
- NO ↓

Properties may be developed with exempt connection.

Is the growth projected located on parcels smaller than one acre?



Decision Tree for Assessing County Parcel Data

Does the parcel's land-use or zoning category support domestic dwelling unit(s)?

NO → Unlikely to be developed with exempt connection. (Consider exceptions)

YES ↓

Is the parcel already built-out (as of 1/19/2018)?

YES → Parcel will not be developed with new exempt connection.

NO ↓

Apply growth projections ↓

Is the projected growth located within a municipal water system service area?

YES → Unlikely to be developed with exempt connection. (Consider exceptions)

NO ↓

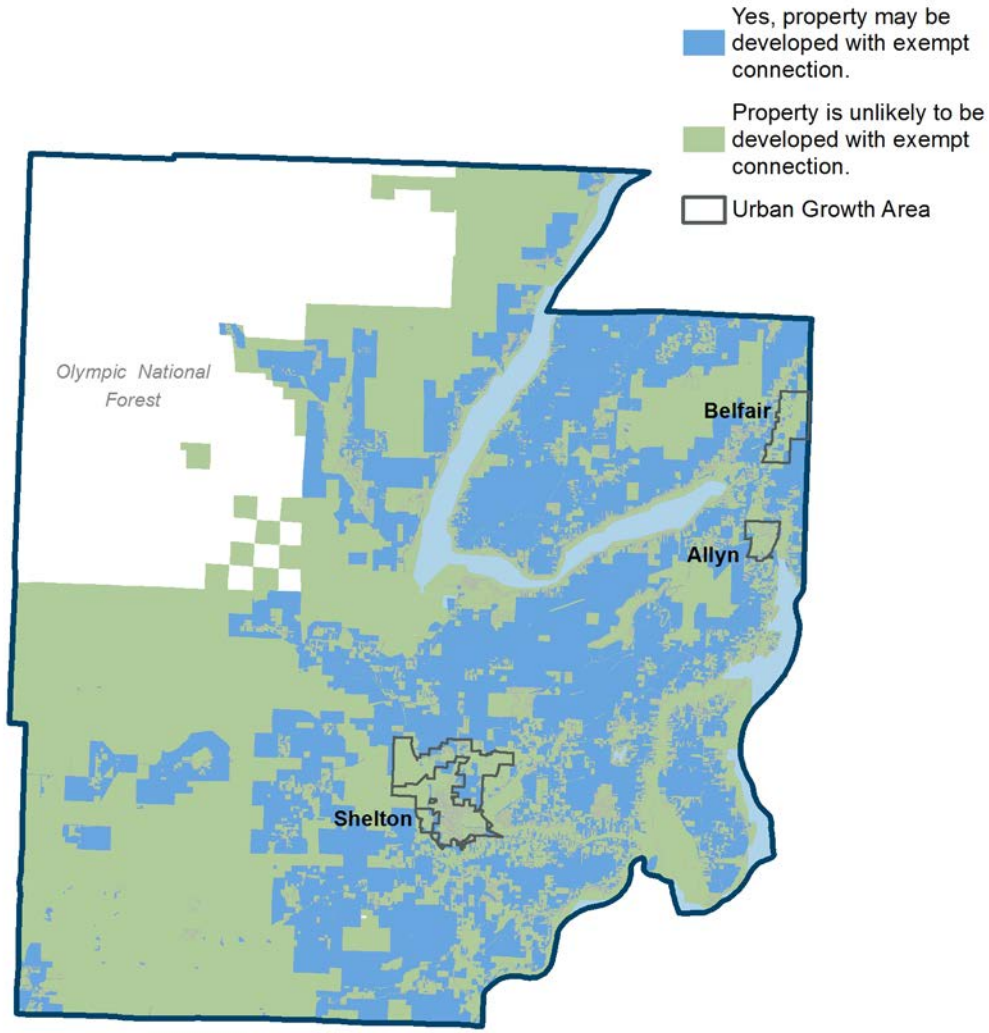
Is the growth projected located on parcels smaller than one acre?

YES → Property cannot be developed without community water or parcel combination.

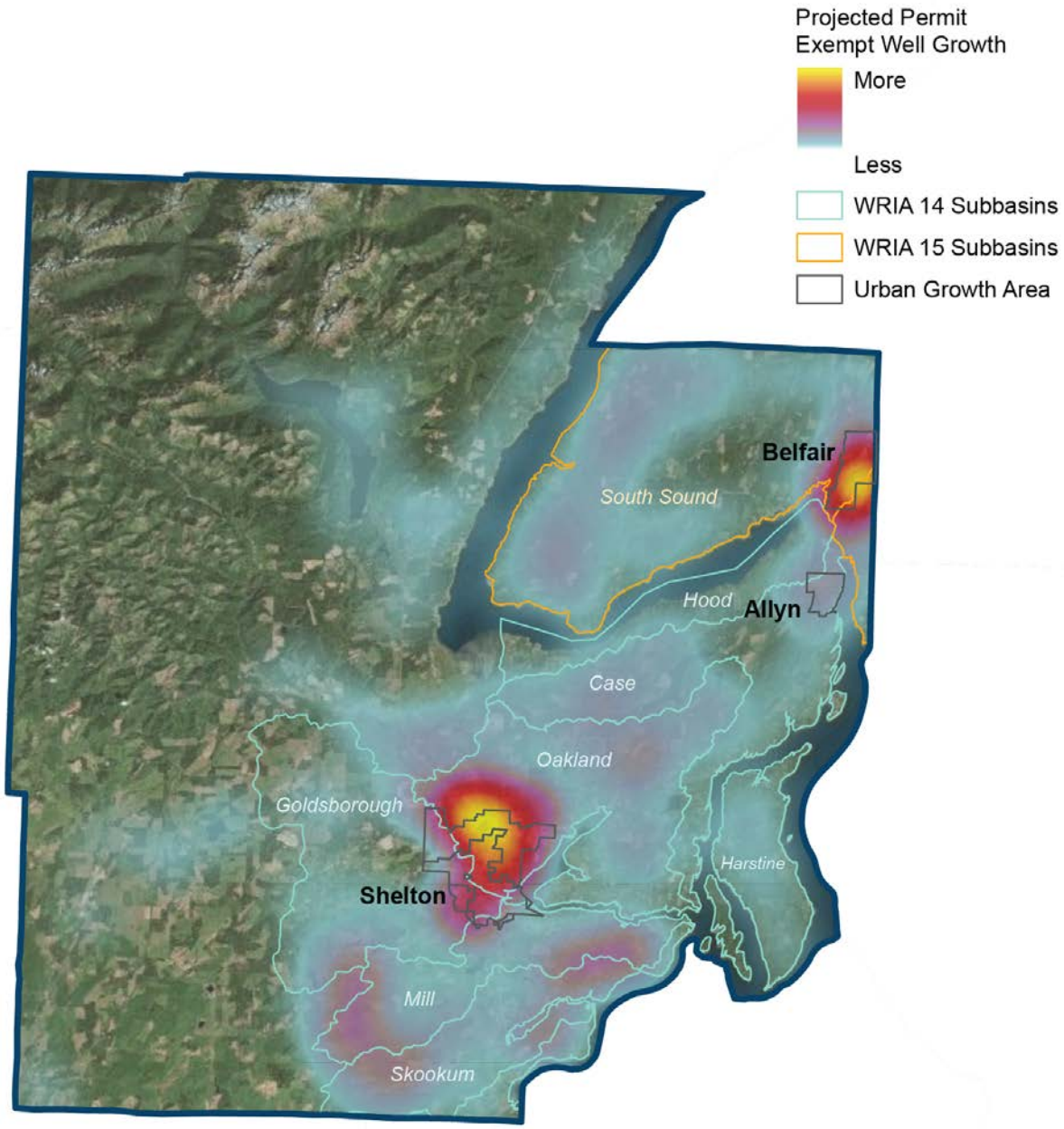
NO ↓

→ Properties may be developed with exempt connection.

Properties may be developed with exempt connection.

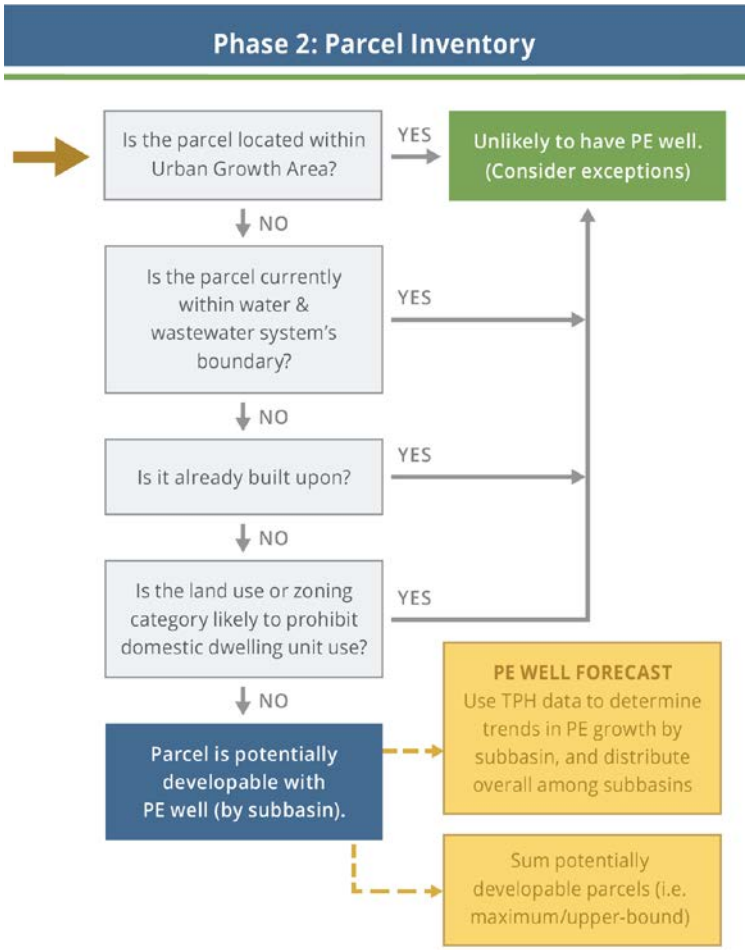


Mason County Growth Projection Analysis

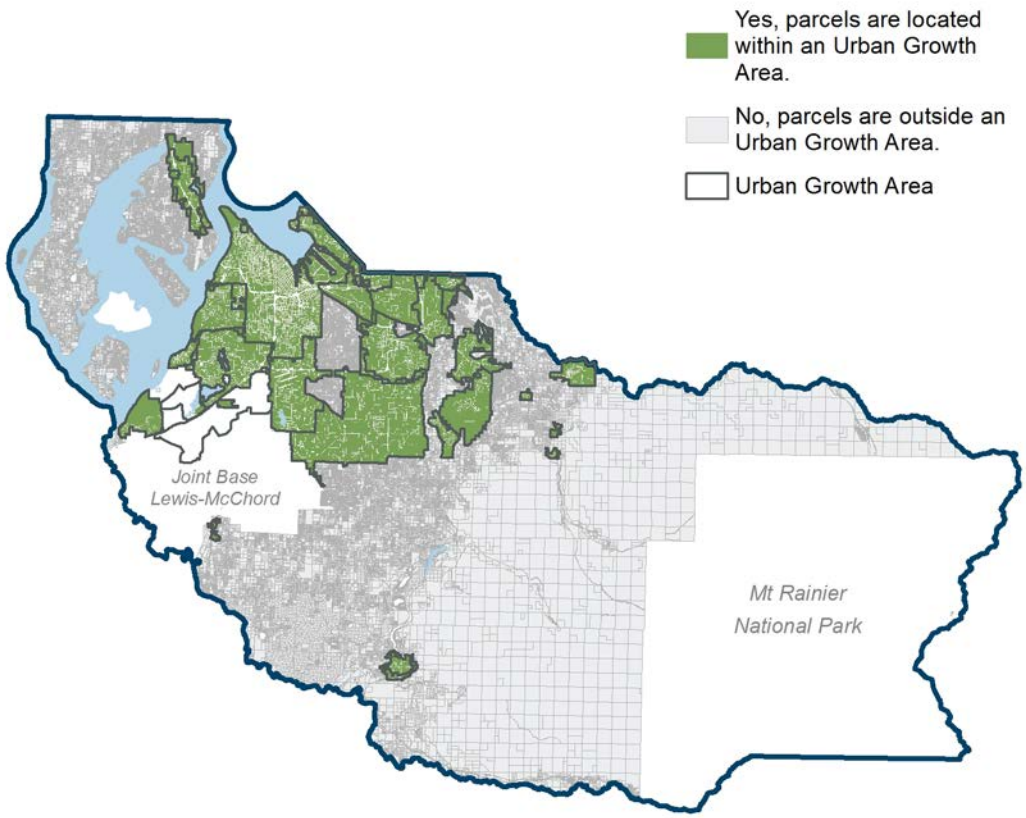


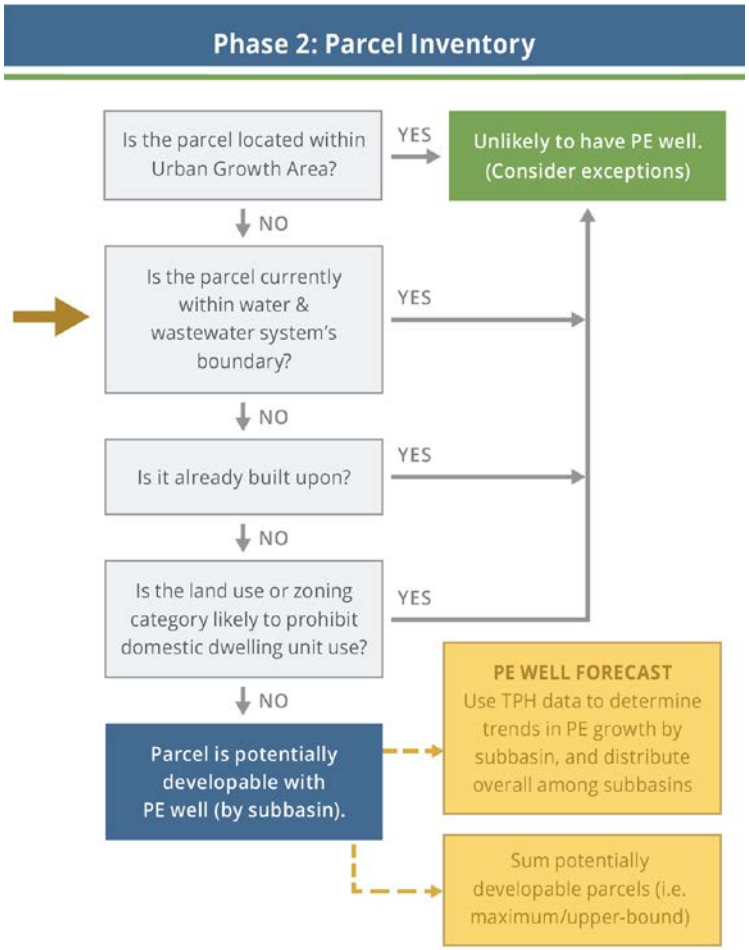
Appendix D

Pierce County Growth Projection and Allocation Methods

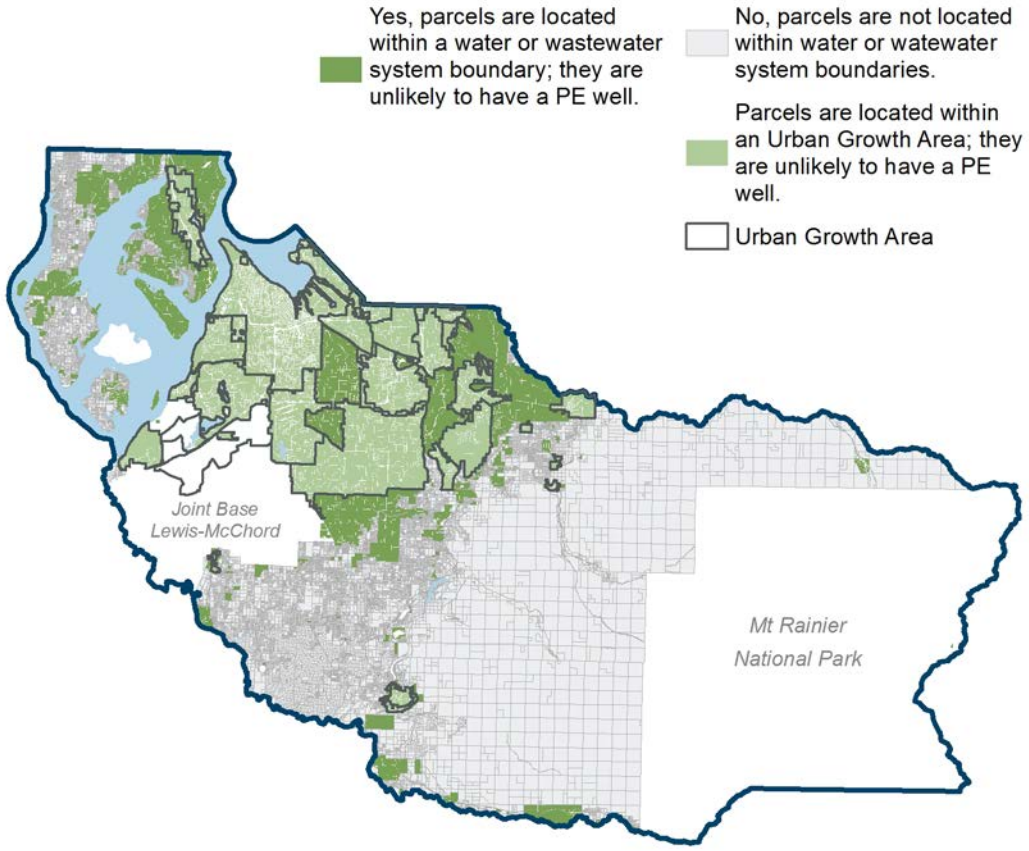


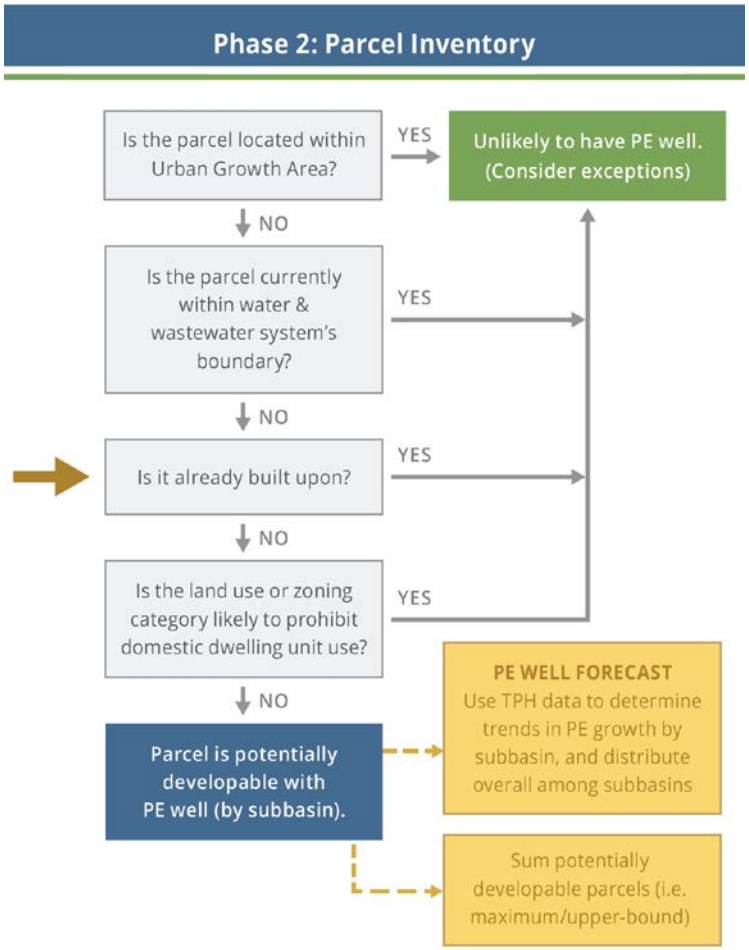
Is the parcel located within an Urban Growth Area (UGA)?



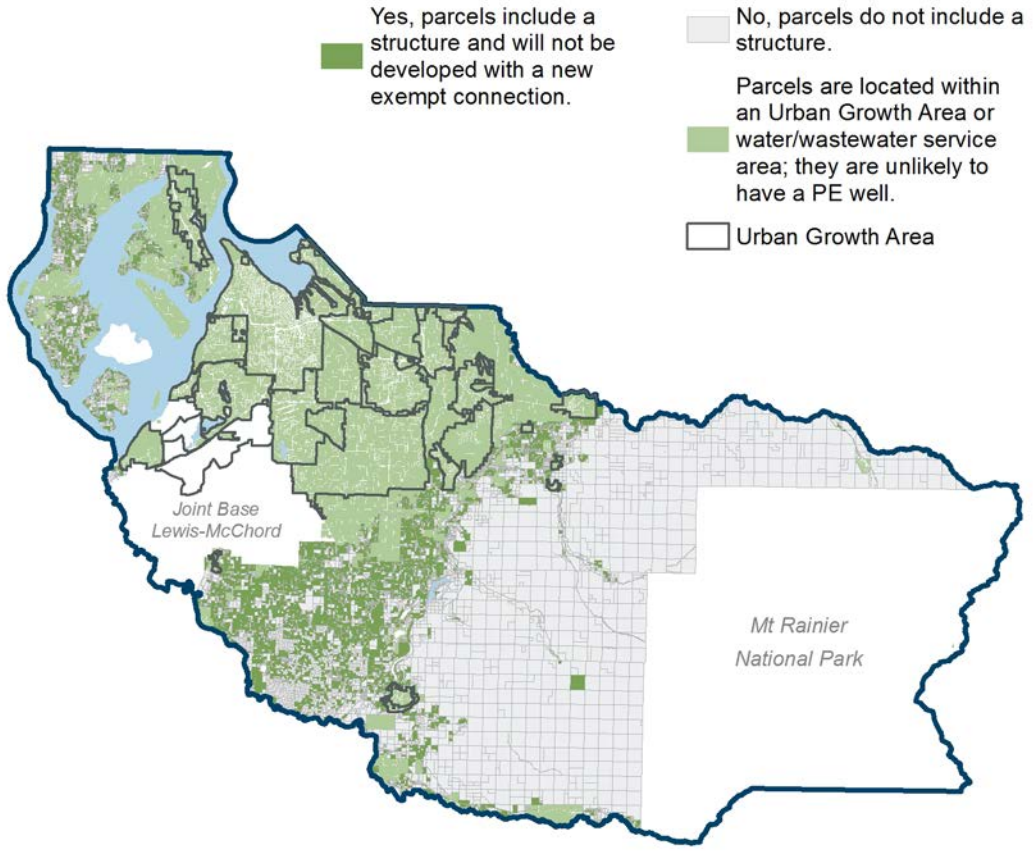


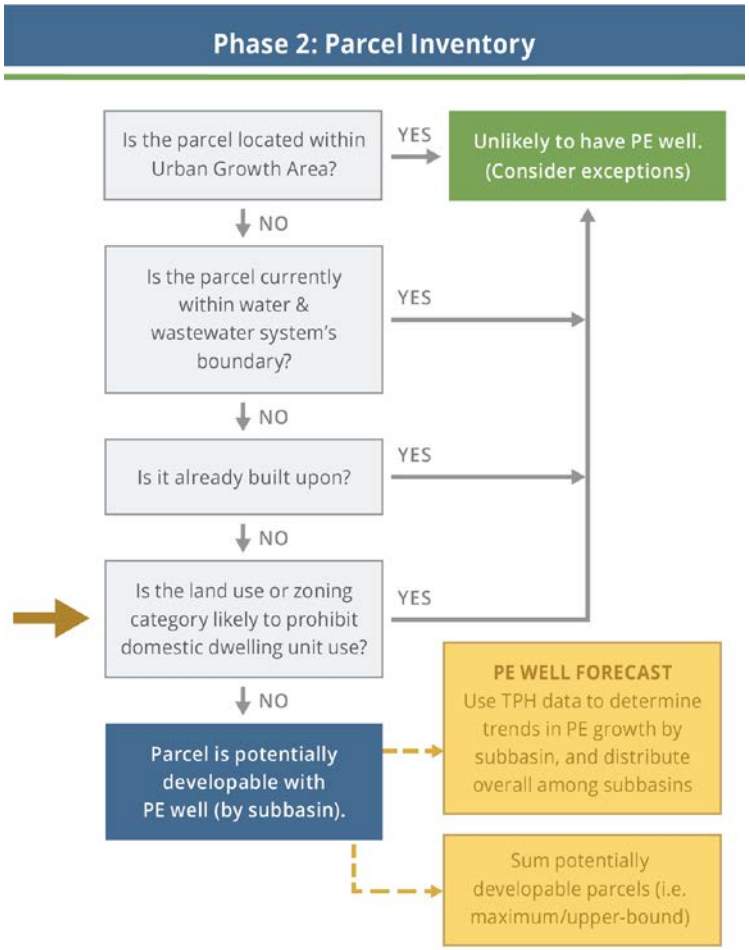
Is the parcel located within a water or wastewater system boundary?



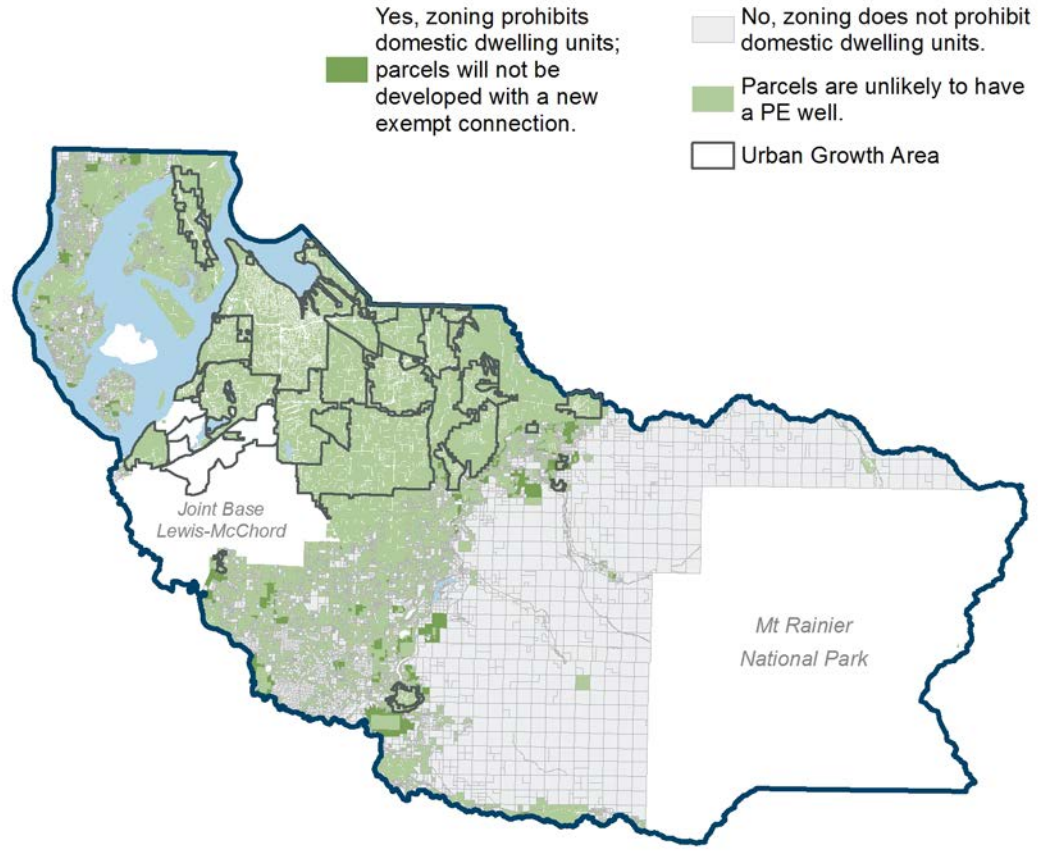


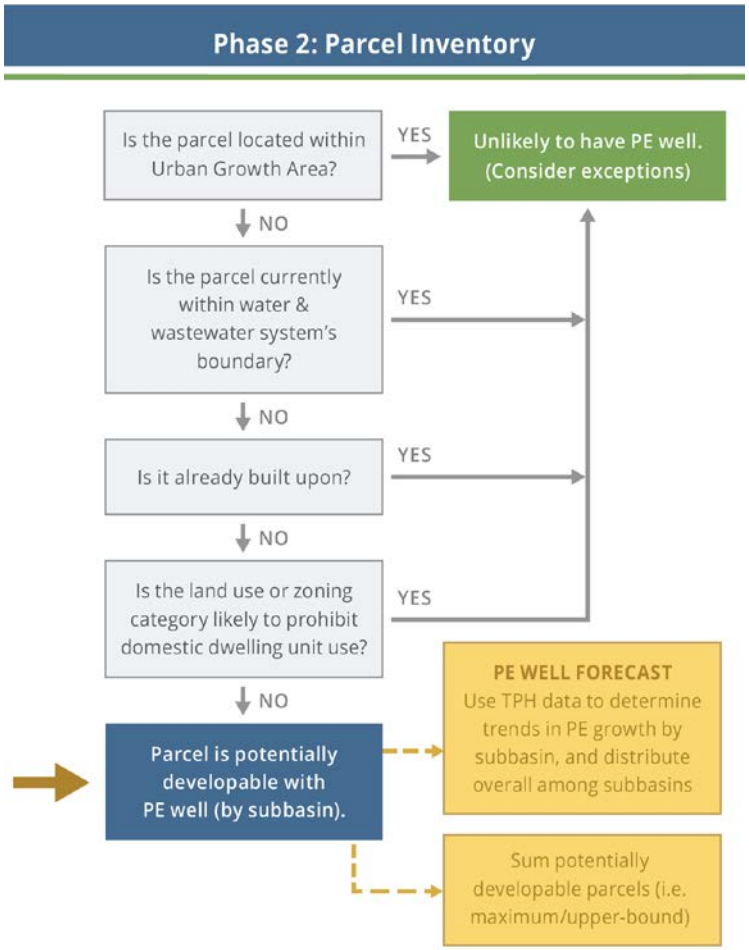
Is the parcel already built upon?



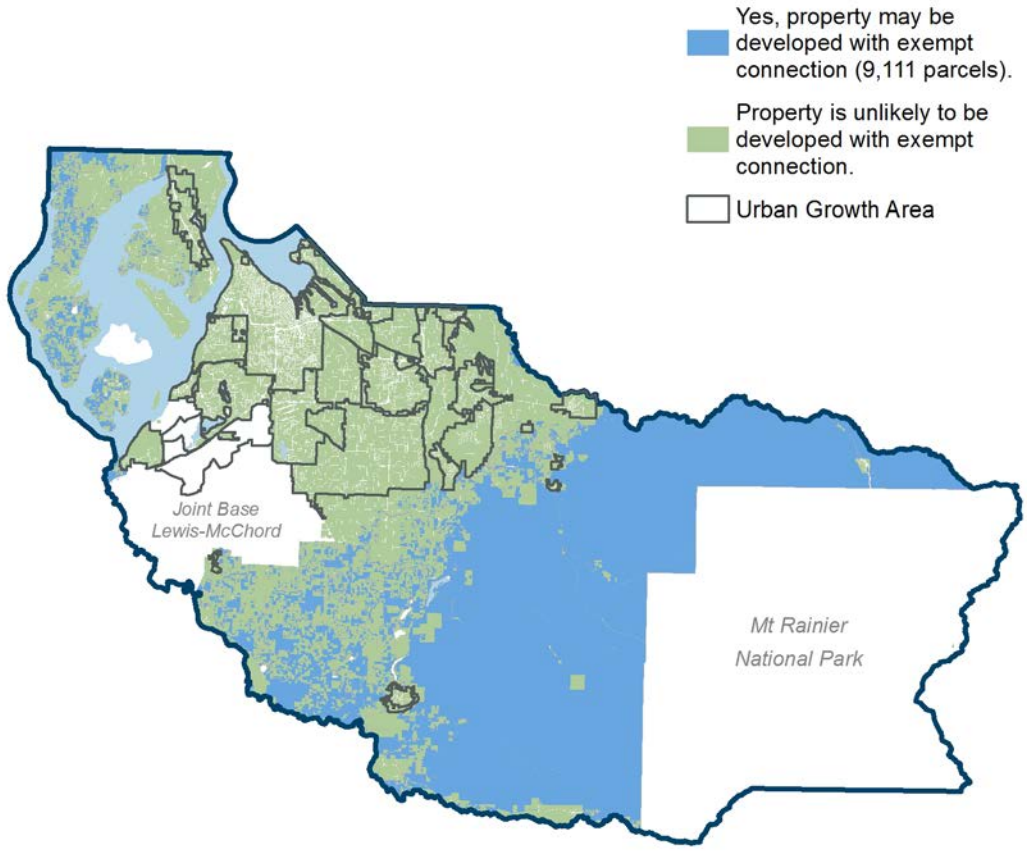


Does the land use or zoning prohibit domestic dwelling units?





Parcel is potentially developable with PE well.



Pierce County Growth Projection Analysis