Documentation: Land Use Vision – Implemented Targets (LUV-it) Land Use Forecast Product

May 2023

Following the adoption of VISION 2050 in 2020 and subsequent adoption of countywide growth targets in 2022, PSRC is releasing an updated Land Use Vision forecast product. Land Use Vision – Implemented Targets (LUV-it) was developed to be consistent with these updated growth allocations and policies. The timing of the release supports the comprehensive plan updates due in 2024, as well as other studies that benefit from having a consistent representation of the growth the region is collectively planning for through 2050. The projections are also consistent with the goal established in the VISION 2050 Regional Growth Strategy to accommodate most of the region's growth (65% of the population and 75% of the employment) in regional growth centers and near current and planned high-capacity transit service. Using the agency's UrbanSim land use model and the latest set of base year inputs, projections of households, people and jobs have been developed for a combination of jurisdictional and zonal geographies. Member jurisdictions may also contact PSRC staff for customized tabulations for other study areas.

Introduction

The Land Use Vision – Implemented Targets (LUV-it) forecast product is designed to represent a future year distribution of people and jobs consistent with current growth policies. This includes as central inputs the VISION 2050 Regional Growth Strategy and adopted countywide growth targets. Using these policy inputs, sub-regional control totals are established – primarily at the jurisdictional-level or below – and the agency's UrbanSim land use model is used to allocate growth within each jurisdiction.

The adoption of VISION 2050 and the Regional Growth Strategy (RGS) in October 2020 led off a cycle of growth policy updates, with implementation through countywide growth targets completed at various points in 2022. The local planning cycle will culminate with the adoption of updated local comprehensive plans in 2024. The forecast product provides starting point inputs suitable for use in the comprehensive plan update efforts, as well as other major regional studies requiring future year projections consistent with adopted policy.

Approach

As in prior LUV forecast products, once the sub-regional control totals are established as inputs, UrbanSim is run in "allocation mode." Adhering to the control totals, the model is used to distribute the growth within the jurisdiction. The key inputs to these sub-regional control totals are the VISION 2050 RGS and the adopted 2044 countywide growth targets, developed to implement the RGS. Using these inputs, PSRC staff established sub-regional future year growth projections of people, households and jobs. The geography modeled is comprised of the jurisdictions and unincorporated areas that have published growth targets, augmented with more detailed breakouts where needed to recognize other growth policies.

In working with the adopted RGS and growth targets, PSRC's methodology acknowledged differences in how each county represented and translated the 2017-50 RGS to 2044 growth targets. In the few instances where there are

measurable differences, LUV-it aligns with adopted targets to ensure the projections will fully represent the collective growth that each jurisdiction is planning for in their comprehensive plan updates.

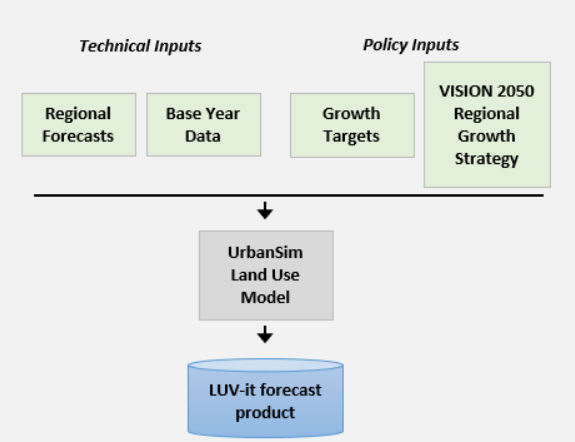
Given this emphasis on reflecting countywide growth targets, PSRC has adjusted the naming convention for this data product. Rather than being published as a numerical sequel to the LUV.2 product, the new product's title is Land Use Vision - Implemented Targets (LUV-it). While the 2044 growth targets are significantly more aligned with the VISION 2050 Regional Growth Strategy than previous iterations, some geographies show higher or lower growth than otherwise indicated by the Regional Growth Strategy. Where there are discrepancies, the forecast product reflects the growth trajectory established by the 2044 target to support the comprehensive plan update modeling. LUV-it is a data product only and does not endorse countywide growth targets as consistent with VISION 2050.

Scope and Intended Uses

Figure 1 summarizes the major data sources used as inputs to UrbanSim in the development of LUV-it. This updated forecast product was focused on meeting a core set of criteria:

- Develop sub-regional control totals consistent with the 2044 countywide growth targets and the VISION 2050 RGS.
- Incorporate the most recent base year inputs represented by the 2018 Base Year dataset.
- Extend the future year horizon to 2050, while explicitly representing the target horizon year 2044 and providing additional intermediate year outputs.
- Account for future year travel conditions consistent with the 2022 Regional Transportation Plan (RTP) system plan.

Figure 1 – LUV-it Primary Inputs



PSRC envisions the LUV-it product serving as the primary land use input for modeling and other analysis during the next several years. While recognizing that jurisdictions will be developing internal growth distribution scenarios for their individual comprehensive plan updates, LUV-it can provide both a starting point for that work and projections for adjacent jurisdictions for modeling and analysis requiring external projections, such as modeling travel into, out of or through a jurisdiction's transportation system. Following the completion of local comprehensive plan updates in 2024 or 2025, PSRC expects to develop an updated LUV product ahead of the next Regional Transportation Plan update required in 2026.

From Targets to Control Totals

The overall methodology used by LUV-it can be summarized in three main steps:

Adjust and standardize adopted countywide growth targets

While all four counties adopted growth targets extending to the year 2044, there are numerous differences in the input data and assumptions used to arrive at the final targets. For all jurisdictions or sub-jurisdictions with a growth target (the Target Geographies), published figures were adjusted and baselined to 2020 to establish 2020-

2044 changes in total population, households and jobs. From there, the growth targets were extrapolated to 2050 and interpolated backwards to derive intermediate year figures.

Expand from Target Geographies to Control Geographies
To better align the modeled geographies with growth policies, additional breakouts were added to better account for resource areas and military bases, given assumptions about low or no growth in these areas. In some instances, affiliated UGAs were separated out from "parent" jurisdictions using prior policy interpretations from the VISION 2050 RGS modeling.

For the Metro Cities, Core Cities and High-Capacity Transit (HCT) Communities regional geographies, develop sub-jurisdiction control totals for regional growth centers and areas in close proximity to HCT service.
In the RGS, HCT areas for focused growth are defined as:

- ½ mile radius around light rail stations, commuter rail stations, streetcar and ferry terminals
- ¼ mile radius around bus rapid transit (BRT) stations and stops
- All remaining regional growth center areas (mostly captured in the buffered HCT areas)

The RGS established a regional goal of accommodating 65% of the region's population growth and 75% of the employment growth into these centers and HCT growth areas. For LUV-it, this is represented by splitting growth in the Metro, Core and HCT Community regional geography jurisdictions into two subsets: aggregate HCT areas and aggregate non-HCT areas. Growth was initially allocated to these subsets consistent with the percent share of each jurisdiction's land development capacity in the HCT and non-HCT portions (for example, if a city's HCT areas contain 30% of its remaining residential development capacity, then an initial 30% of the total population/household growth for that jurisdiction was assigned to the HCT area). Those initial capacity-based growth shares were then adjusted upwards until the 65%/75% thresholds were achieved, with the scale of the adjustments tied to each jurisdiction's remaining development capacity. Regardless of the starting or scaled-up shares, a maximum of 90% of a jurisdiction's overall growth was allocated to HCT areas (unless the initial HCT capacity share was higher than 90%).

A substantial amount of technical work was required to progress through these three main stages to the final control totals for the modeling effort. More detailed descriptions of the development of control totals are available in Appendix A, while the process of developing the sub-jurisdiction splits of growth into HCT and non-HCT areas is documented in Appendix B. For those wishing to understand more, please contact PSRC staff (information at the end of this document and the appendices) for those details.

Base Year Data Inputs

The LUV-it projections use PSRC's current modeling 2018 Base Year inputs. As with prior base year datasets, the core representations of on-the-ground conditions – parcels and the buildings on them – are generated from assessors' data. To this representation, synthetic populations of Households, Persons and Jobs are created from block group-level estimates drawn from OFM and LODES data and placed onto parcels and into specific buildings using a variety of data preparation tools developed internally by PSRC.

An updated collection and translation of local zoning regulations was completed in 2020 and used to update the future year land use (FLU) database, which is combined with the base year parcel data to generate estimated remaining development capacity at the parcel level. PSRC also maintains a file with select significant regional development projects that are expected to occur in specific years and locations, referred to as Major Planned

Developments (MPDs). For the 2018 data, a more comprehensive representation of the near-term development pipeline was generated from CoStar data and added as inputs. For more information on the Base Year Inputs, please refer to Appendix C of this document.

Running UrbanSim and Generating Results

Generating the results from the model simulations involves the following UrbanSim land use modeling procedures for consistency with adopted growth policy inputs:

Allocation Mode

To conduct the modeling work, the sub-regional control total inputs are used as direct inputs to the PSRC UrbanSim land use model. Using what is referred to as "Allocation Mode," UrbanSim allocates population and employment growth to parcels in each geography consistent with the given control total, so that the specified total number of households, people and jobs are placed in that geography during the designated year. This specialized procedure is only run at five-year intervals, although for the LUV-it product, the year 2044 replaces 2045 in the 2020-2050 span to align with the horizon year for adopted targets. Running Allocation Mode also involves the following modifications:

- Relaxed Development Capacity Constraints: UrbanSim normally interprets allowed unit densities as a hard constraint. For LUV-it, the model has been adapted to relax this constraint when a jurisdiction's control total is larger than its currently planned/zoned capacity, so the control total can always be accommodated.
- Conditional MPDs: UrbanSim allows modelers to insert known future developments – typically, large projects already given local approval to proceed. In Allocation Mode, these developments may be built, but not fully occupied, depending on the amount of household or employment growth in the jurisdiction's control totals.

Additional policy representations:

To represent additional adopted growth policies (beyond the focused growth in regional growth centers and HCT areas described earlier), the modeling also incorporates:

- Boosted growth in regional growth centers: Modeled capacity is given a 25% boost to reflect the collective impact of regional and local policies designed to focus growth in designated regional growth centers. Boosts were not applied to designated manufacturing industrial centers, recognizing the different role these areas play in accommodating job growth from industrial land use types).
- Future transportation system impacts: UrbanSim is modeled in parallel with the PSRC SoundCast activity-based travel model, with outputs from UrbanSim converted to SoundCast inputs and vice versa, every 10 years in the simulation. The land use projections therefore receive updated inputs on how travel accessibilities (travel time and costs) will change given future year system improvements, pricing changes and increased usage from population and employment growth.

Final Published Product

To fully round out the projections to total population and total employment, PSRC must add estimates for data not included in the UrbanSim modeling:

- PSRC projects group quarters as a part of the Regional Macroeconomic Forecast, and this provides the regional total for the group quarters population in the Land Use Vision. Rather than model the placement

of these populations in UrbanSim, 2010 block-level locations of group quarters are scaled up to the regional total in a given year.

- The military is a significant employer in the region, but changes in the number or location of personnel are not a function of the local economy. PSRC handles this job category outside UrbanSim, relying on published estimates of existing personnel assigned to regional bases and near-term announced changes. Except for the announced changes, PSRC assumes no change to these estimates.

As with prior LUV products, LUV-it projections have been produced for a set of standard geographies, including regional, county and jurisdictional-level reporting, using city boundaries as of January 2022. The full list includes:

- County – King, Kitsap, Pierce and Snohomish counties.
- Cities – All incorporated areas using boundaries as of January 1, 2022. Also included are the remaining unincorporated areas within the urban growth boundary and the rural area in each county (note that the Silverdale UGA is reported separately from the remaining Kitsap County unincorporated urban areas given its status as a Core City with a regional growth center).
- Forecast Analysis Zone (FAZ) – A 219-zone system developed by aggregating Census geographies and historically used to summarize PSRC land use forecasts since the 1980s.
- Traffic Analysis Zone (TAZ) – A further disaggregation of the FAZ geography to meet the finer-grain spatial detail desired when doing travel demand modeling.
- 2010 Census Tracts – As defined by the U.S. Census Bureau.
- Target Geographies (NEW) – The specific geographies used by the counties when adopting their updated local growth targets.
- Control Geographies (NEW) – A further disaggregation of the Target Geographies to account for special growth areas – namely military bases, tribal lands, rural agriculture and natural resource areas, and select affiliated portions of the urban growth areas with low or no growth assumptions.

The parcel-level outputs will subsequently be available for specialized data requests, whereby users can submit GIS shapefiles of the desired tabulation geography, and staff can tabulate LUV-it outputs accordingly.

Disclaimer

The LUV-it forecasts are designed to represent a future year distribution of people and jobs consistent with current growth policies and the other inputs. Given uncertainty is present in any forecast product, users should note this is **one possible distribution** of growth. The inputs and outputs to the process have undergone significant review, with the aim of providing users with **a reasonable distribution** of future year people and jobs. Users should, however, adjust results to better align with more recent information, updated assumptions or more specific local knowledge of development trajectories where warranted. For citation purposes, adjusted numbers should identify PSRC LUV-it forecasts as a starting point and should correspondingly document the nature and scale of adjustments.

Summary

The Land Use Vision – Implemented Targets forecast product provides users with future-year projections of people, households and jobs out to 2050. Using adopted 2044 countywide growth targets as a key input, the product uses control totals for jurisdictions and other geographies to reflect an allocation of growth consistent with the goals and guidance established in VISION 2050. Then, using the agency's UrbanSim land use model and the most recent set of base year inputs, that growth is distributed within jurisdictions and geographies. PSRC envisions this product serving as a key starting point input for the comprehensive plan updates due in 2024, at which point another update will be scheduled to incorporate changes in local land use plans and zoning.

For more information about the modeling work, contact Mark Simonson at msimonson@psrc.org. To find out more about the UrbanSim model inputs, contact Peter Caballero at pcaballero@psrc.org. For questions about VISION 2050 and the Regional Growth Strategy, contact Liz Underwood-Bultmann at lunderwood-bultmann@psrc.org.

Appendix A – Turning Growth Targets Into Control Totals

The process of developing the LUV-it sub-regional control totals for the UrbanSim modeling work involved a series of technical adjustments needed to convert adopted local growth targets into specific forecasts of people, households and jobs not only for 2044, but for an extrapolated year 2050 and intermediate year totals from 2020 to 2040. To accomplish this, PSRC staff developed methodologies customized to the nuances of each county's growth targets. This appendix outlines these methodologies in more detail.

Each county adopted updated growth targets extending to 2044, but the baseline year and definitions of residential and non-residential units adopted varied as shown in Figure A-1. In three instances – King County's residential and non-residential targets, and Snohomish County's non-residential targets – 2019 data was used as the basis for quantifying growth. On the residential side, King adopted only housing unit targets, rather than the total population measures published by the other counties. And for non-residential targets, both King and Snohomish counties adjusted the sector definition of total employment to remove the resource/construction sector.

Figure A-1: Adopted Growth Target Measure Definitions by County

		Residential Targets		Non-Residential Targets	
County	Date of Adoption	Base Year	Measure(s)	Base Year	Measure(s)
King	12/14/21 (1)	2019	Housing Units	2019	Total Jobs without Resource / Construction sector
Kitsap	1/23/2023	2020	Total Population (2)	2020	Total Jobs
Pierce	8/16/2022	2020	Total Population, Housing Units	2020	Total Jobs
Snohomish	2/23/2022	2020	Total Population (2)	2019	Total Jobs without Resource / Construction sector

(1) Amended 12/6/2022 with changes to City of Sammamish

(2) Snohomish and Kitsap counties are planning to complete housing targets in 2023

The jurisdictions and geographies that received growth targets were organized into a list of Target Geographies as shown in Figure A-2.

Turning Adopted Targets Into Modeling Inputs

After assembling the published growth targets data from each county, PSRC made a series of modifications to arrive at the final sub-regional control totals used as inputs to UrbanSim. Given the nuances of each county's growth targets, not every county was the subject for each modification. Below is a summary of the action taken, with the impacted counties listed in parenthesis.

Rebase targets to 2020 (King, Snohomish)

In a few instances, adopted growth targets begin with 2019 estimates. PSRC prepared updated estimates for the geographies listed in adopted targets – aka the "Target Geographies" – and recomputed the targets as change from 2020.

Figure A-2 Target Geographies by County and Regional Geography

King County		*Kitsap County*		*Pierce County*		*Snohomish County*	
ID	*Target Geography*	*ID*	*Target Geography*	*ID*	*Target Geography*	*ID*	*Target Geography*
Metro Cities		**Metro Cities**		**Metro Cities**		**Metro Cities**	
1	Bellevue	65	Bremerton	77	Tacoma	125	Everett
2	Seattle	67	Bremerton UGA	**Core Cities**		**Core Cities**	
Core Cities		**Core Cities**		78	Auburn	126	Bothell
3	Auburn	68	Silverdale	79	Lakewood	127	Lynnwood
4	Bothell	**HCT Communities**		80	Puyallup	**HCT Communities**	
5	Burien	69	Bainbridge Island	81	University Place	128	Arlington
6	Federal Way	70	Kingston UGA	**HCT Communities**		129	Bothell MUGA
7	Issaquah	71	Port Orchard	82	DuPont	130	Edmonds
8	Kent	72	Port Orchard UGA	83	Fife	131	Edmonds MUGA
9	Kirkland	73	Poulsbo	84	Fircrest	132	Everett MUGA
10	Redmond	74	Poulsbo PUTA	85	Mid-County, Parkland-Spanaway-Midland, South Hill	133	Larch Way Overlap
11	Renton	**Cities and Towns**		86	Sumner	135	Lynnwood MUGA
12	SeaTac		n/a	**Cities and Towns**		136	Marysville
13	Tukwila	**Uninc Urban Areas**		87	Bonney Lake	138	Mill Creek
HCT Communities		75	Central Kitsap UGA	88	Buckley	139	Mill Creek MUGA
14	Des Moines	**Rural Areas**		89	Carbonado	140	Mountlake Terrace
15	Federal Way PAA	76	Kitsap Rural	90	Eatonville	141	Mukilteo
16	Kenmore			91	Edgewood	142	Mukilteo MUGA
17	Lake Forest Park			92	Gig Harbor	**Cities and Towns**	
18	Mercer Island			93	Milton	143	Brier
19	Newcastle			94	Orting	144	Darrington
20	North Highline			95	Pacific	145	Gold Bar
22	Renton PAA - East Renton			96	Roy	146	Granite Falls
23	Renton PAA - Fairwood			97	Ruston	147	Index
24	Renton PAA - West Hill			98	South Prairie	148	Lake Stevens
25	Shoreline			99	Steilacoom	149	Monroe
26	Woodinville			100	Wilkeson	150	Snohomish
Cities and Towns				**Uninc Urban Areas**		151	Stanwood
27	Algona			107	Pierce UGA	152	Sultan
28	Beaux Arts			**Rural Areas**		153	Woodway
29	Black Diamond			124	Pierce Rural	**Uninc Urban Areas**	
30	Carnation					155	Arlington UGA
31	Clyde Hill					156	Brier MUGA
32	Covington					157	Darrington UGA
33	Duvall					158	Gold Bar UGA
34	Enumclaw					159	Granite Falls UGA
35	Hunts Point					161	Lake Stevens UGA
36	Maple Valley					162	Lake Stickney Gap
37	Medina					163	Maltby UGA
38	Milton					164	Marysville UGA
39	Normandy Park					166	Monroe UGA
40	North Bend					167	Mountlake Terrace MUGA
41	Pacific					168	Paine Field Area
42	Sammamish					169	Silver Firs Gap
43	Skykomish					170	Snohomish UGA
44	Snoqualmie					172	Stanwood UGA
45	Yarrow Point					174	Sultan UGA
Uninc Urban Areas						175	Woodway MUGA
46	Auburn PAA					**Rural Areas**	
48	Bellevue PAA					176	Snohomish Rural
49	Black Diamond PAA						
51	Issaquah PAA						
52	Kent PAA						
53	King UGA						
57	Newcastle PAA						
58	Pacific PAA						
60	Redmond PAA						
61	Sammamish PAA						
62	King no growth UGA						
Rural Areas							
64	King Rural						

Convert housing unit targets to households and household population (King)
King County's residential growth targets were specified in housing units, with county staff converting total population growth allocations from the VISION 2050 RGS to housing units using assumptions about housing vacancy rates, average persons per household and the proportion of total population made up by population in group quarters housing. To convert housing units back to the number of households and household population needed for UrbanSim, the process was reverse-engineered, as outlined below:

- Develop year 2044 housing units estimates: The adjusted housing unit targets for each geography (2020-2044) were applied to 2020 Census housing unit estimates.
- Apply vacancy rate assumptions to derive 2044 households: Using the vacancy rate assumptions from the original King County technical work, individual vacancy rates for each Target Geography – drawn from Census data – were adjusted based on the projected change at the regional geography level.
- Apply persons per household assumptions to derive household population: Similarly, person per household assumptions from the King County technical work were used to project forward individual Target Geography person per household ratios from the 2020 Census and subsequently applied to the estimated 2044 households to derive household population.

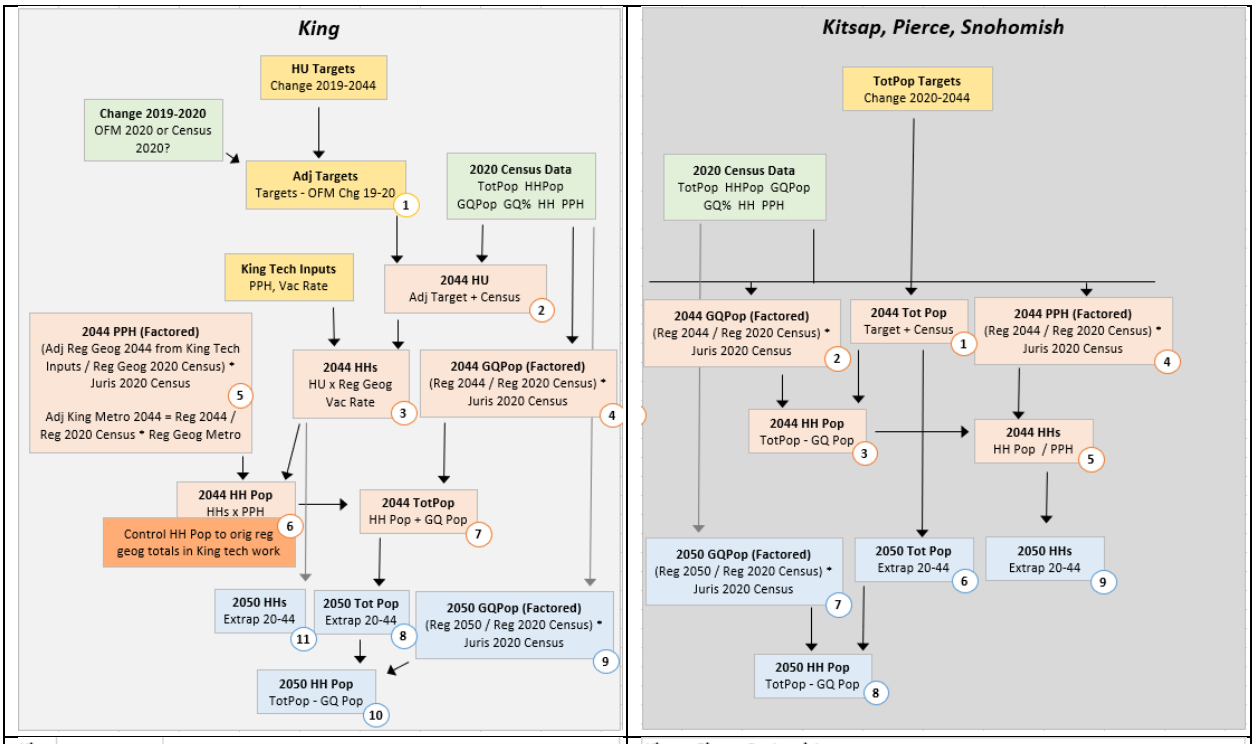
Separate total population into household population and group quarters population (All):
In Kitsap, Pierce and Snohomish counties, residential targets were published as total population estimates, with total population including both the household population and group quarters population components. Year 2044 group quarters population estimates were derived for each target geography by drawing on the forecasted regional growth rate for group quarters population from PSRC's regional forecasts and applying that growth rate to year 2020 Census estimates. Subtracting the 2044 group quarters population yields the 2044 household population needed for UrbanSim modeling (year 2044 group quarters population were also estimated for King County although year 2044 household population was already calculated from the housing unit targets as detailed earlier).

Account for resource and construction sector jobs in the job growth targets (King, Snohomish):
In King and Snohomish counties, jobs in the resource and construction sector were removed prior to setting growth targets, citing the difficulty of placing these jobs in permanent locations. For UrbanSim, however, these jobs are added back into the simulation. First, the region's resource and construction jobs forecast for 2044 were allocated to the county level using year 2020 shares of that sector's jobs in each county. The corresponding 2044 resource and construction jobs for King and Snohomish were paired with actual 2020 county estimates to determine the 2020-2044 change. That change was then allocated to each target geography in the county proportional to the share of that county's 2020 resource and construction jobs found in that target geography. The corresponding aggregate 2044 totals by target geography was then refactored to match the original 2044 county estimates.

Extrapolate out to 2050 and interpolate back to 2020 (All)
Once the 2044 totals were determined in each jurisdiction, a straight extrapolation of annual change from 2020 to 2044 was used to extend the totals for each target geography out to 2050. The 2020 actual estimates and the extrapolated 2050 were then used similarly to interpolate the remaining years where control totals are used in UrbanSim – 2025, 2030, 2035 and 2040.

To visualize the step-by-step adjustment for both residential and non-residential growth targets, Figures A-3 and A-4 lay out the key steps in a flow chart format, with numbered summaries below for easier reference. PSRC staff can provide additional information on the process and results upon request (see the staff contact list at the end of the document).

Figure A-3: Converting Adopted Residential Growth Targets into 2044 and 2050 Projected Totals



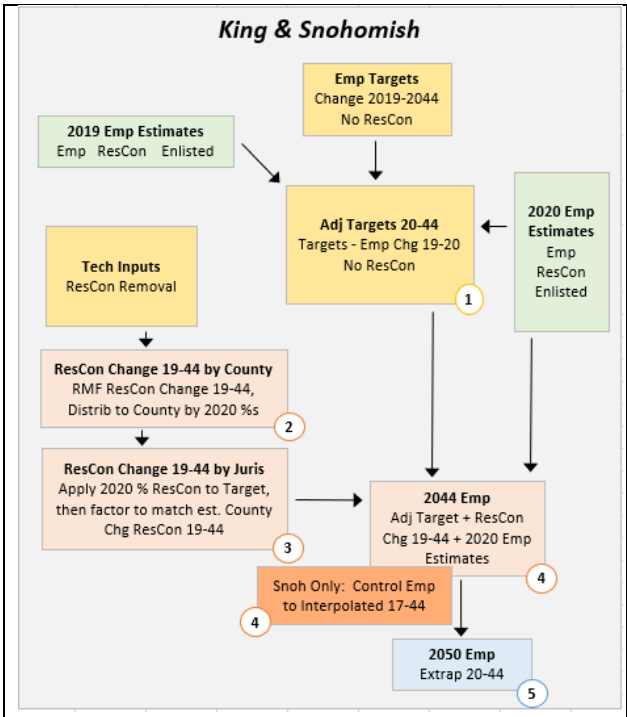
King		
1	Adj Targets	Subtract Chg HU 19-20 from OFM from Target
2	HU 2044	Add HU 20-44 Targets to 2020 Census HU
3	HH 2044	Apply Vacancy Rate by Reg Geog (from King tech work) to 2044 HU
4	GQ Pop 2044	Factor 2020 Census GQ Pop by RMF Growth 20-44
5	PPH 2044 - 1	Adjust 2044 PPH by Reg Geog (from King tech work) if needed for consistency w REF 2020-2044 change
5	PPH 2044 - 2	Factor 2020 Census PPH Change in RegGeog PPH (Adjust 44 / Census 20)
6	HH Pop 2044	Multiply HH by PPH to derive initial 2044 HH Pop
6	HH Pop 2044	Factor initial estimates to match totals by regional geography in King's technical assumptions.
7	TotPop 2044	Add GQ Pop to HH Pop
8	TotPop 2050	Extrapolate from 2020 & 2044
9	GQ Pop 2050	Factor 2020 Census GQ Pop by RMF Growth 20-50
10	HH Pop 2050	Subtract GQ Pop from TotPop
11	HH 2050	Extrapolate from 2020 & 2044

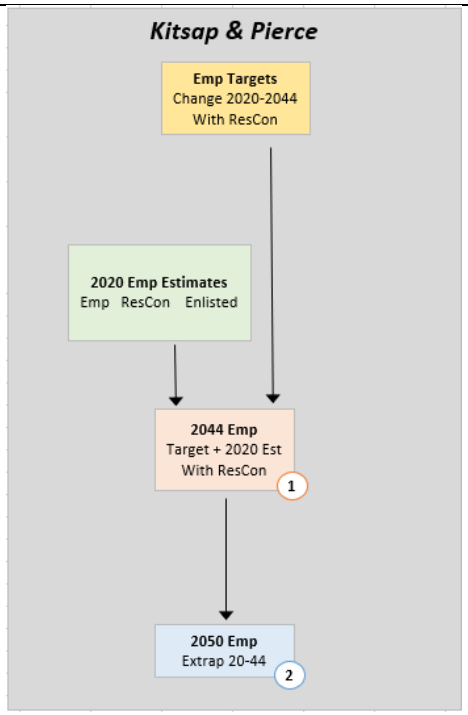
Kitsap, Pierce, Snohomish		
1	TotPop 2044	Add TotPop 20-44 Targets to 2020 Census TotPop
2	GQ Pop 2044	Factor 2020 Census GQ Pop by RMF Growth 20-44
3	HH Pop 2044	Subtract GQ Pop from TotPop
4	PPH 2044	Factor 2020 Census PPH by RMF Change 20-44
5	HH 2044	Divide HH Pop by PPH
6	TotPop 2050	Extrapolate from 2020 & 2044
7	GQ Pop 2050	Factor 2020 Census GQ Pop by RMF Growth 20-50
8	HH Pop 2050	Subtract GQ Pop from TotPop
9	HH 2050	Extrapolate from 2020 & 2044

Expanding Target Geographies to Control Geographies

To better align the modeled geographies with growth policies, the next stage of developing control totals for UrbanSim was separating select Target Geographies to better account for resource areas and military bases, given assumptions about low or no growth in these areas. In some instances, affiliated UGAs were separated out from

Figure A-4: Converting Adopted Non-Residential Growth Targets Into 2044 and 2050 Projected Totals





King, Snohomish		
1	Adj Targets	Subtract Chg Emp 19-20 from Target
2	ResCon 2044 -1	Establish County ResCon sector change: RMF Chg 20-44, distrib by county's % region in 2020
3	ResCon 2044 -2	Calc initial ResCon chg 20-44 by applying jurisdiction 2020 % ResCon to target, then factor to match county totals
4	Emp 2044	Add Adj 20-44 Targets , 2020 Emp Estimates, and ResCon change
4	Emp 2044	Snoh Only: Factor 2044 totals by regional geography to match 2017-44 interpolated RGS, includng adjustment in Snoh tech work for annexations
5	Emp 2050	Extrapolate from 2020 & 2044

Kitsap, Pierce		
1	Emp 2044	Add Emp 20-44 Targets to 2020 Emp Estimates
2	Emp 2050	Extrapolate from 2020 & 2044

"parent" jurisdictions using prior policy interpretations from the VISION 2050 RGS modeling. This became the Control Geography list. The full list of modifications is detailed below:

King County Affiliated UGAs

For the handful of King County cities that are not part of the contiguous UGA (the Rural Cities), their affiliated UGA areas were modeled separately from the rest of King's Urban Unincorporated area using results from the VISION 2050 RGS modeling. These areas included:

- Carnation UGA
- Covington UGA
- Duvall UGA
- Enumclaw UGA
- North Bend UGA
- Snoqualmie UGA

King No Growth UGAs

Several areas were identified by King County staff as having little development capacity left and were modeled collectively as No Growth UGAs:

- Bear Creek UPD
- Milton PAA
- Tukwila PAA

Military Bases

Given that activity levels on military bases are functions of factors outside of modeled socioeconomic and land development conditions, PSRC accounts for known changes to personnel and then holds the activity level constant through the forecast. For example, PSRC monitors vessels assigned to the naval bases in Kitsap and Snohomish counties and modifies projections based on average staffing levels per vessel but does not project changes beyond what has been announced. For modeling purposes, then, the following installations were modeled separately from the jurisdictions where they are located, receiving no portion of the allocated job growth of that jurisdiction:

- Bremerton NBK
- Bangor NBK (separate from Kitsap Rural)
- Everett NSE
- JBLM (separate from Pierce Unincorporated)

Rural Agricultural and Resource Areas

VISION 2050 provides additional guidance on limiting growth on designated agricultural lands and resource areas. Similar to military bases, these areas were identified and separated from the rest of the rural areas in each county, and modeled using no growth scenarios, consistent with both policy and current zoning constraints.

The final list of Control Geographies formed the basis for the allocation modeling performed in UrbanSim. Appendix B documents one additional set of adjustments, which was to distribute the growth within each modeled geography in the Metro Cities, Core Cities and HCT Communities regional geographies to collectively represent the VISION 2050 RGS goal of accommodating 65% of the regional population growth and 75% of the employment growth within areas served by high-capacity transit.

For more information, please contact Mark Simonson (msimonson@psrc.org).

Appendix B: Allocating Growth to High-Capacity Transit Areas

Introduction

The RGS established a regional goal of accommodating 65% of the region's population growth and 75% of the employment growth into regional growth centers and high-capacity transit station areas. For LUV-it, this is represented by splitting growth in the Metro, Core and HCT Communities regional geographies into two subsets: aggregate HCT areas and aggregate non-HCT areas. Growth was initially allocated to these subsets consistent with the percent share of each jurisdiction's land development capacity in the HCT and non-HCT portions (for example, if a city's HCT areas contain 30% of its remaining residential development capacity, then an initial 30% of the total population/household growth for that jurisdiction was assigned to the HCT area). Those initial capacity-based growth shares were then adjusted upwards until the 65%/75% thresholds were achieved, with the scale of the adjustments tied to each jurisdiction's remaining development capacity. Regardless of the starting or scaled-up shares, a maximum of 90% of a jurisdiction's overall growth was allocated to HCT areas (unless the initial HCT capacity share was higher than 90%).

In the RGS, HCT areas for focused growth are defined as:

- ½ mile radius around light rail stations, commuter rail stations, streetcar and ferry terminals
- ¼ mile radius around bus rapid transit (BRT) stations and stops
- All remaining regional growth center areas (mostly captured in the buffered HCT areas)

A summary description of the capacity-based procedure to allocate growth in each Metro, Core and HCT Community jurisdiction is provided below.

Methodology:

To start, the procedure sums up the parcel-level development capacity in each jurisdiction, in terms of housing units and non-residential square footage. The maximum development densities allowed on each parcel are taken from the same future year land use inputs used in UrbanSim's simulations. The square footage numbers are converted to estimated jobs, and the totals are split into capacity estimates for the composite HCT areas versus the non-HCT areas in each jurisdiction.

Using the shares of capacity by HCT and Non-HCT areas, the jurisdiction's growth from 2020-2050 is then split accordingly as the starting point. The regional growth assigned to HCT areas is summed up and compared to the RGS 65/75% goals, and if the growth falls short of the regional goal, multiple rounds of adjusting the share of each jurisdiction's growth going to HCT areas begins, with the adjustment factors determined as follows:

- Each jurisdiction's remaining HCT area capacity is compared to the region's remaining HCT area capacity and the jurisdiction's share determined.
- That share is used to adjust upwards the HCT capacity split and applied to the 2020-2050 growth target to get the adjusted amount assigned to HCT areas.
- The HCT area share is capped at either 90% of a jurisdiction's growth or the initial starting HCT area share if the starting point capacity split exceeded 90%. In that case, the capped jurisdiction's capacity is removed from future adjustment factor calculations.

- Once the iteration is completed, the progress towards the RGS 65/75% goal is reassessed, and another iteration initiated if the goal remains unmet.

Example

Below is an example of a jurisdiction progressing through the process of allocating household growth to regional growth centers and HCT areas, using University Place's inputs. The initial capacity analysis shows 56.2% of the city's current remaining housing capacity located in centers and HCT areas. Applying that share to their 8,252 household growth target results in an initial allocation of 4,638 households to centers and HCT areas. After all jurisdictions' initial allocations are calculated, the aggregate total is checked and found to be short of the regional goal of 65%. The process then begins iteratively adjusting shares for jurisdictions with capacity remaining in centers and HCT areas. University Place's remaining capacity represents about 0.5% of the regional figure. The resulting adjustment factor raises the centers and HCT allocation in University Place from 56.2% to 56.3% initially. By the 10th iteration, the allocation has risen to 58.4%. By the final iteration (32nd overall), the share has increased to 67.8% as capacity is used up across the region.

Figure B-1: Example of Allocating Growth to HCT Areas – University Place

City Housing Unit Capacity

Total Housing Capacity in City	Capacity in HCT Area	Capacity in Rest of City	% Capacity in HCT Area
12,735	7,157	5,578	56.2%

Household Growth 2020-2050 and Initial Allocation to HCT Area

Total HH Growth in City	Initial HCT Area % Growth % Allocation	Initial HH Growth in HCT Area	Initial HH Growth to Rest of City	Remaining HCT Area Capacity	Remaining Rest of City Capacity
8,252	56.2%	4,638	3,615	2,520	1,964

After the initial allocations, the sum of all residential growth in HCT areas falls short of the 65% regional share goal. All jurisdictions with capacity remaining have their shares of growth headed to HCT areas adjusted upwards incrementally until the 65% goal is reached.

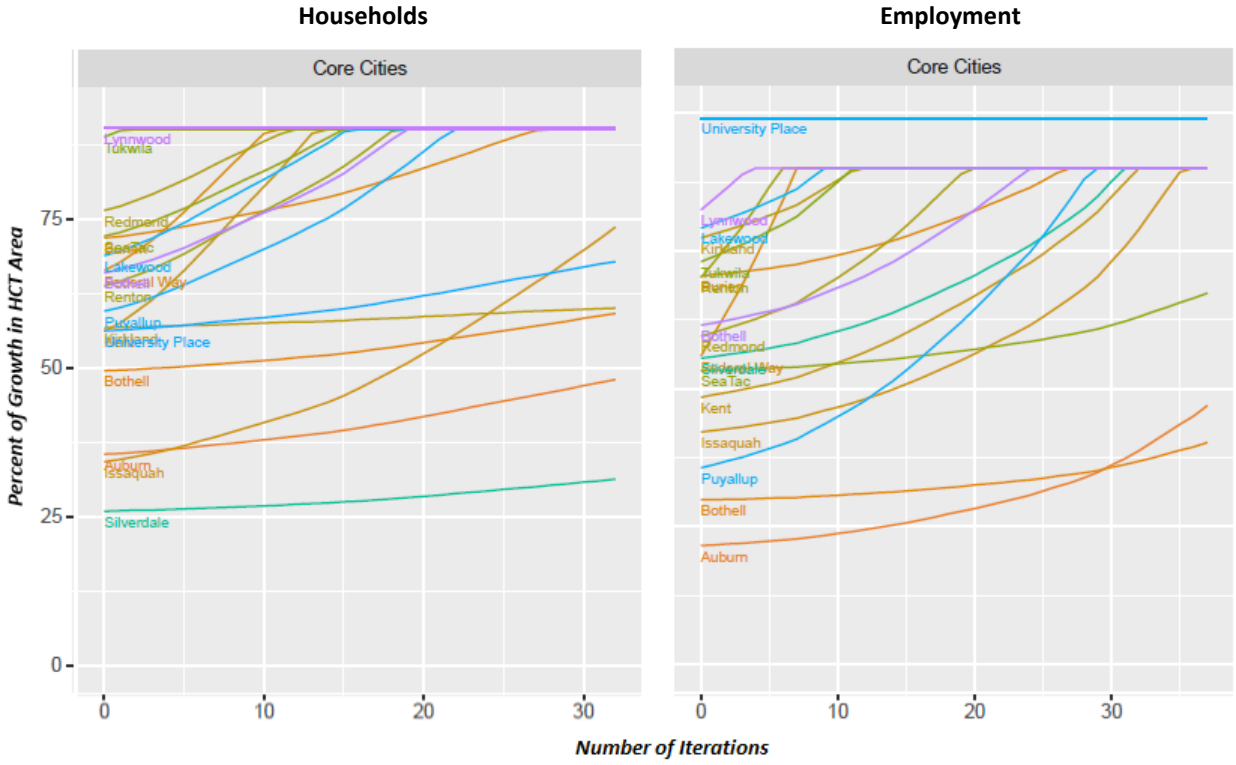
Interative Adjustments to the HCT Area Growth Share

Iteration	Remaining HCT Area Capacity	Share of Remaining Regional HCT Area Capacity	Prior HCT Area Growth Allocation	Factor: Apply to Initial HCT Area Growth Allocation	Adjusted HCT Area Growth Allocation	Total HH Growth in City	Adjusted HH Growth in HCT Area	Adjusted HH Growth in Rest of City
1	2,520	0.5%	56.2%	1.002	56.3%	8,252	4,649	3,604
2	2,509	0.6%	56.3%	1.005	56.5%	8,252	4,662	3,590
3	2,495	0.6%	56.5%	1.009	56.7%	8,252	4,677	3,575
⋮								
10	2,358	0.9%	58.2%	1.040	58.4%	8,252	4,821	3,431
⋮								
32	1,600	1.7%	67.3%	1.207	67.8%	8,252	5,598	2,655

Results

The plots in Figure B-2 below summarize visually how the centers and HCT area shares of growth were adjusted within the region's Core Cities jurisdictions. The overall slope of the lines reflects the level of adjustments from iteration to iteration, until the final regional goals are achieved. Steeper lines indicate jurisdictions with extra zoned capacity to take on larger shares. Flat sections indicate either a jurisdiction has hit its capacity or the maximum amount of growth assignable to the HCT areas of 90%.

Figure B-2 Adjusted HCT Growth Shares Over Each iteration – Core Cities Example



As a final visual summary, Figure B-3's bar charts display the final results for all jurisdictions in the Metro, Core and HCT Communities regional geographies, with the blue bars representing the initial, and sometimes final, capacity-based centers and HCT areas allocation share and the red bars the final adjusted figures (that is, the share of growth assigned to HCT areas beyond that suggested by the share of capacity in those areas) once the adjustment process has iterated enough to achieve the regional 65/75% growth objectives.

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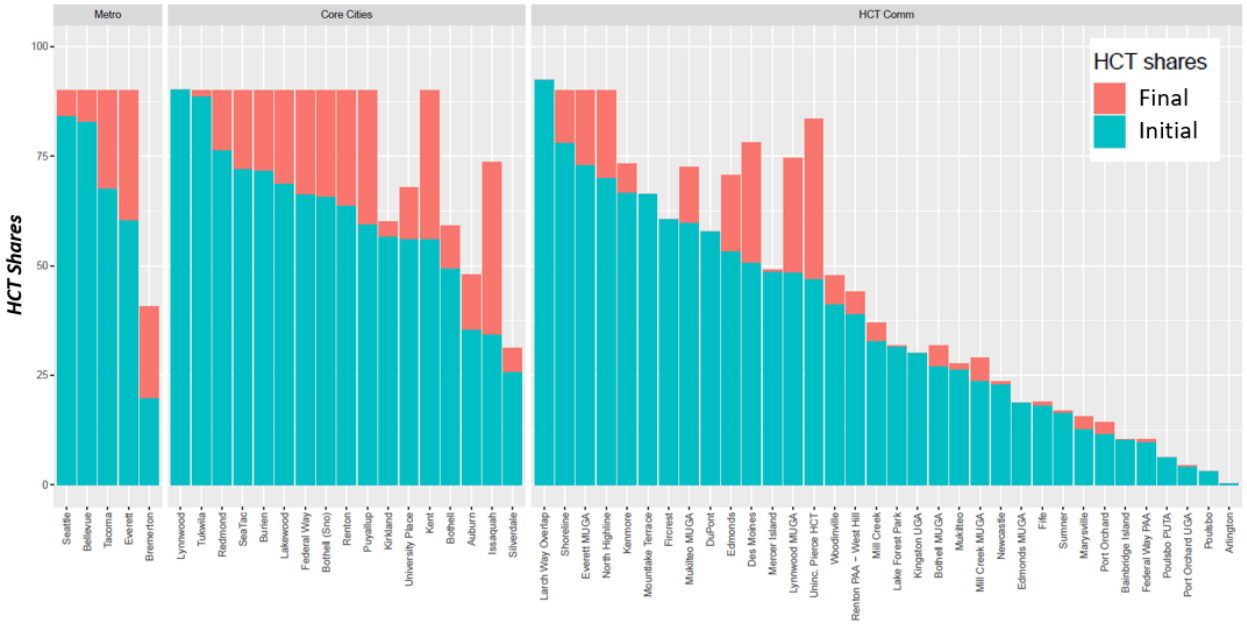
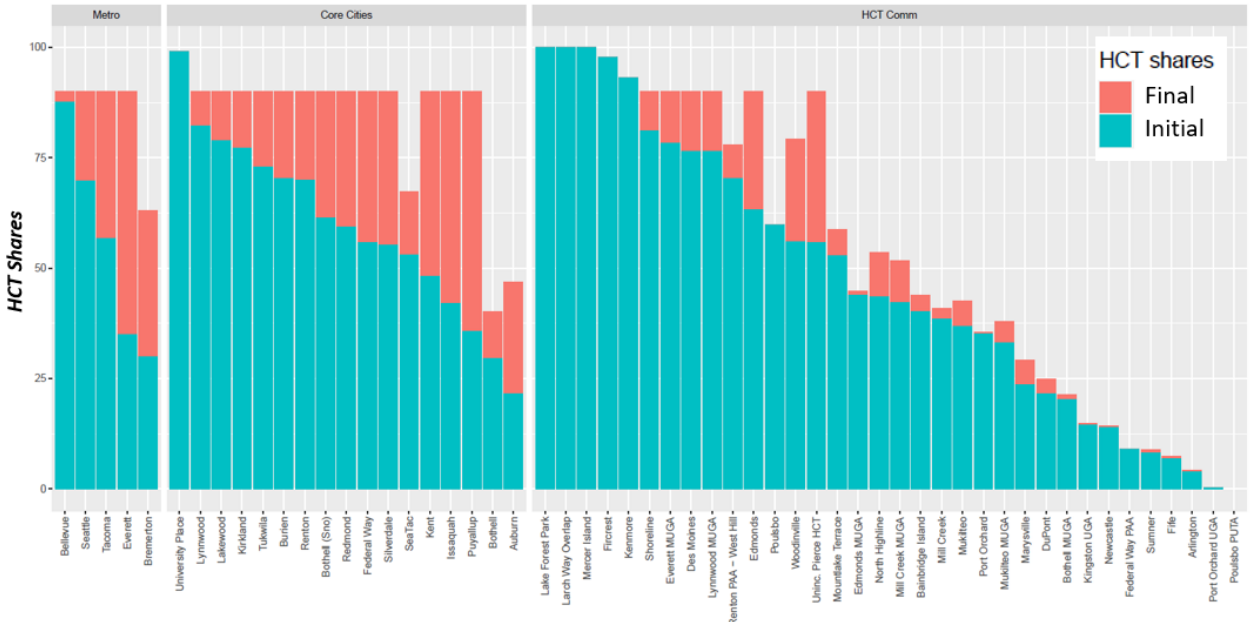
Figure B-3: Initial and Final HCT Shares by Jurisdiction

Households



Employment



Appendix C – Base Year 2018 Database

To support the agency's UrbanSim land use model, PSRC assembles a large database from a variety of sources which combined offer a set of estimated conditions for a given starting point year. The most current version of this dataset, the Base Year Database, was assembled in 2021 to represent year 2018 on-the-ground conditions for the four-county central Puget Sound region. This appendix provides additional details on how this data is assembled.

The 2018 Base Year Database consists of five primary datasets: parcels, buildings, households, persons and jobs. The data is structured so that the parcel is the primary geographic unit. All buildings are placed on a parcel record, and each household and job is placed in a building record. Each person record is part of a household record. With that structure, the UrbanSim model output then can be aggregated up to any geography able to be represented in GIS. While PSRC publishes forecast results to a set of standard geographies, users that can supply the appropriate GIS shapefile can obtain outputs via a custom data request.

Beyond the five primary datasets, two other key pieces of the database are detailed here: the Future Year Land Use (FLU) information and an inventory of planned developments. The FLU file is a collection of zoning coverages and regulations from the region's jurisdictions that provides UrbanSim with the allowable development densities for every parcel. The list of planned developments is programmed to occur in the simulation outside of the model's regular predictive process.

Parcels and Buildings

The parcels and buildings datasets were derived from 2018 county assessor extracts. For this update, PSRC staff downloaded the data directory from county websites in January-February of 2019 to get a complete accounting of changes during 2018. The raw assessor extracts are then assembled, a process where key tables and select fields from each county's files are extracted and condensed into single parcels and buildings tables for each county. From there, the contents are reviewed for issues such as null values, codes that represent missing values, etc., and the data adjusted where feasible. Below are wider-scale adjustments that should be noted:

> *Consistency between parcel records and polygons:* Discrepancies can exist between the GIS shapefile representations available of county parcels and the actual attribute records. PSRC staff work to reconcile this so every polygon is represented in the flattened parcels table.
>
> *"Stacked" parcels:* Often parcels under condominium ownership are represented with multiple polygons overlapping each other and multiple attribute records associated with one or more of these parcels. PSRC consolidates these records into single parcel records with one or more buildings as needed.
>
> *Imputation of missing housing units:* PSRC found that in Kitsap and Snohomish counties, the number of housing units in multifamily buildings was often missing. Staff turned to external data sources where possible to either provide an estimated housing unit count or inform an imputation process. External data sources included extracts from the agency's CoStar subscription and a file obtained from the Snohomish County PUD detailing service hookup count.
>
> After that targeted set of adjustments, PSRC compared the number of housing units in the database versus the estimated number of households from OFM's Small Area Demographic Estimates data. In census block groups where the estimated number of housing units is below the OFM household estimate, additional imputation is done to ensure all households can be placed within a building and on a parcel.

To finalize the assembly process, PSRC standardizes the records across counties – for example, collapsing over 1,000 unique land use codes into approximately 30 standard classifications of current use of the parcel, with a similar process occurring with the building records. Uses are then reconciled by comparing the codes for building records with those of their parcel. After additional quality control checks are completed, including comparing

county-level totals with other exogenous data sources – such as published summaries from the assessor's offices – the data is assembled into a single regional file.

Households and Persons

UrbanSim represents each household and person in the region as individual records, simulating their location choices over time. The households and persons datasets were created using the PopulationSim program. PopulationSim used the American Community Survey (ACS) data and 2018 Office of Financial Management (OFM) data as inputs to create synthetic households and persons at the 2010 census block group geography. OFM data provides the total number of households /persons, while the attributes – households income, age, gender, number of children, etc. – are taken from ACS distributions. Once households/persons were assigned at the block group level, those households/persons were then allocated to parcels and buildings.

Jobs

After historically using job estimates from PSRC's Covered Employment estimates (drawn from the Quarterly Census of Employment and Wages [QCEW] database), the agency transitioned to using the LEHD Origin-Destination Employment Statistics (LODES) data product for base year employment estimates. The benefit of using LODES is that the employment data is not subject to data suppression, with the tradeoff being LODES has some data adjusted intentionally to protect the confidentiality of individual employers. Consistent with the confidentiality requirements, PSRC staff make a series of adjustments to the published LODES census block totals to account for some major discrepancies between QCEW and LODES. The jobs by sectors breakouts are aligned with the 12 specific sectors used in the UrbanSim model, and the job estimates by block are then dissolved into individual job records that are placed in buildings and onto parcels.

Future Year Land Use (FLU)

A key part of the UrbanSim model is an interpretation of what development is allowed on parcels – both the type of development (residential, office, commercial, industrial, and/or mixed use) and the density – reflected in either dwelling units per acre (DU/acre) or floor area ratio (FAR). PSRC staff assembled a GIS shapefile inventory of the region's zoning data, named the Future Year Land Use (FLU) file, by contacting and/or downloading available datasets from each jurisdiction. Staff then researched the online regulations for all measures that could impact density – besides DU/acre and FAR – that also included things like setback requirements, height restrictions and incentivized density bonuses. A second part of the process researched the use tables, which were combined with the general description of each zoning category's intent, to arrive at permissible development types that are used in UrbanSim.

Not every zoning category specified allowable densities in either DU/acre or FAR. For the current implementation of UrbanSim, those values needed to be derived then from data that was available. For those categories that did specify DU/acre or FAR, PSRC staff estimated those from two sources. First, if the same zoning category existed in the previous FLU dataset (from 2015/2016) and previous DU/acre or FAR values were estimated then, those were carried forward into this version. For the remaining zoning categories, staff developed a regression model to predict these measures based on what regulations were specified – for example, what a likely maximum FAR value might be given setback requirements and height restrictions. Roughly 40 to 45% of the zoning categories overall specified DU/acre and FAR limits, with 40-45% drawn from the prior FLU version, and the remaining 10 to 20% relying on the regression model to impute values.

Note that, given the long-range timeframe of PSRC's land use forecasts, the maximum allowable densities assume that developers will make full use of incentivized bonuses, so that the land capacity tends toward a maximum allowable level. Also note that, once the core FLU allowable uses and densities are determined, adjustments are made to account for restrictions outside of the zoning code, including right of way, environmental constraints, parks and open spaces, or specialized land use parcels such as military bases, schools and other public-owned land.

Planned Developments

UrbanSim's structure includes a series of models that run for each year in the simulation. At the top of the list is the land development model, which predicts which parcels will be developed (or redeveloped) and to what land

use types, based on an estimated amount of demand given the growth in population and jobs. PSRC supplements the results of the land development model by explicitly representing development that is either in the pipeline (actively going through the planning/permitting process or under construction) or is a larger, regional-scale development. This is done by adding a Major Planned Developments table to the inputs, specifying parcels, years and amount of either housing units or nonresidential square feet to be added outside of the land development model's outputs.

PSRC develops the contents of the planned developments table from two sources:

- For the regional-scale projects, PSRC relies on media sources and local staff comments. Note that for longer-range projects, some professional judgement is necessary in terms of schedule and likely levels of buildout.
- For the pipeline projects, PSRC extracts information from a subscription-only database provided by CoStar. This database assembles and maintains a listing of projects categories by the current stage of development. PSRC reviewed the coded status of each of these projects and selected ones that were further along towards completion for this list.

Summary and Limitations

Users of the data should keep in mind the primary purpose of the data is to provide inputs for the UrbanSim land use model. As such, the emphasis is on placing households, persons and jobs on parcels consistent with estimates aggregated to census blocks and block groups. As needed, PSRC staff make a series of adjustments to assessors' data to accommodate those aggregate estimates, as well as other issues identified in the data. Consequently, analysis based on the Base Year 2018 dataset may differ from other studies that use assessors' data as inputs.

Similarly, local zoning regulations have been simplified to represent the maximum allowable residential and non-residential densities. Estimates of land development capacity may differ depending on how the regulations are translated to allowable development densities.

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