Cedar-Sammamish (WRIA 8) WREC

Summary of Technical Work

Updated: February 21, 2020

This document provides a summary of the key technical components of the WRIA 8 Watershed Restoration and Enhancement Plan: subbasins, growth projections, consumptive use, project and action identification, adaptive management and implementation (optional), and net ecology benefit evaluation (optional). This document summarizes the methods, results, Committee decision, and the status of the technical memos. For more information on methods and results, see the technical memos.

	Results	Committee Decision	Technical Memo Status
Subbasin	12 subbasins	- Decision at September WREC meeting	Final draft 2/21/20
Growth Projection	967 new PE wells	- Discussion at August and September WREC meeting. - Agreed to move forward without a vote.	Final draft 2/21/20
Consumptive Use	425.4 – 698.9 acre feet/year	- Discussion at October, December and January WREC meeting. - Requires additional discussion.	Final draft 2/21/20
Projects & Actions			
Adaptive Management & Implementation			
Net Ecological Benefit			

Subbasins

Status

The WRIA 8 WREC approved the subbasin delineations at the September 26, 2019 meeting.

Background

Dividing the Cedar-Sammamish WRIA into subbasins is an essential step in developing a plan that complies with the law. RCW 90.94.030(3)(b) states "The highest priority recommendations must include replacing the quantity of consumptive water use during the same time as the impact and in the same basin or tributary." The Final Guidance for Determining Net Ecological Benefit (Final NEB Guidance) (GUID-2094; Ecology 2019) states that, "Planning groups must divide the WRIA into suitably sized subbasins to allow meaningful analysis of the relationship between new consumptive use and offsets. Subbasins will help the planning groups understand and describe location and timing of projected new consumptive water use, location and timing of impacts to instream resources, and the necessary scope, scale, and anticipated benefits of projects. Planning at the subbasin scale will also allow planning groups to consider specific reaches in terms of documented presence (e.g., spawning and rearing) of salmonid species listed under the federal Endangered Species Act."

Methods

The technical workgroup used existing HUC-12s and King County drainage basins, reviewed interim growth projections from Snohomish and King Counties, and applied the following guiding principles to develop subbasin delineations:

- Combine HUC-12s and King County drainage basins in areas of the watershed that are urbanized and have existing water service and are therefore unlikely to have new homes using permit-exempt domestic wells.
- Keep distinct subbasins for HUC-12s and King County drainage basins with higher projected growth of new homes using permit-exempt domestic wells.

Results

WRIA 8 is divided into 12 subbasins, described below and shown in Figure 1.

- Seattle/Lake Union: Middle Puget Sound - Seattle Lower, Elliot Bay, and Lake Union drainage basins are combined into one subbasin.
- Puget Sound Shorelines: The Pipers Creek, Middle Puget Sound – Seattle Upper, Boeing Creek, and Middle Puget Sound – Shoreline drainage basins (King County) are combined with the Shell Creek Frontal Puget Sound HUC-12 (Snohomish County) to form one subbasin.
- Swamp/North: Swamp Creek and North Creek HUC-12s (Snohomish County) are combined with the Swamp and North Creek drainage basins (King County) to form one subbasin.
- Little Bear: The Bear Creek - Sammamish River HUC-12 (Snohomish County portion only) is combined with the Little Bear Creek drainage basin (King County) to form one subbasin.
- Sammamish River Valley: The Sammamish River drainage basin is one subbasin.
- Bear/Evans: Bear Creek and Evans Creek drainage basins (King County) are combined with the Bear Creek HUC-12 (Snohomish County) to form one subbasin.
- Greater Lake Washington: East Lake Sammamish and Lake Washington Creeks are combined into one subbasin. This includes the following HUC-12 subwatersheds and drainage basins:

    - Lake Washington – Sammamish River HUC-12; and
    - East Lake Washington (ELW) Kenmore North, ELW Kenmore South, ELW Bellevue North, ELW Renton, Lyon Creek, McAleer Creek, Thornton Creek, West Lake Washington (WLW) Lake Forest Park, WLW Seattle North, WLW Seattle South, Juanita Creek, Juanita Bay, Forbes, Creek, Kelsey Creek, Mercer Slough, and Mercer Island drainage basins.
- May/Coal: Coal Creek and May Creek drainage basins are combined.
- Lake Sammamish Creeks: East Lake Sammamish, West Lake Sammamish and Tibbets Creek drainage basins are combined.
- Issaquah: Issaquah Creek drainage basin is one subbasin.
- Lower Cedar: Lower Cedar River drainage basin is one subbasin.
- Upper Cedar: Upper Cedar River drainage basin is one subbasin.

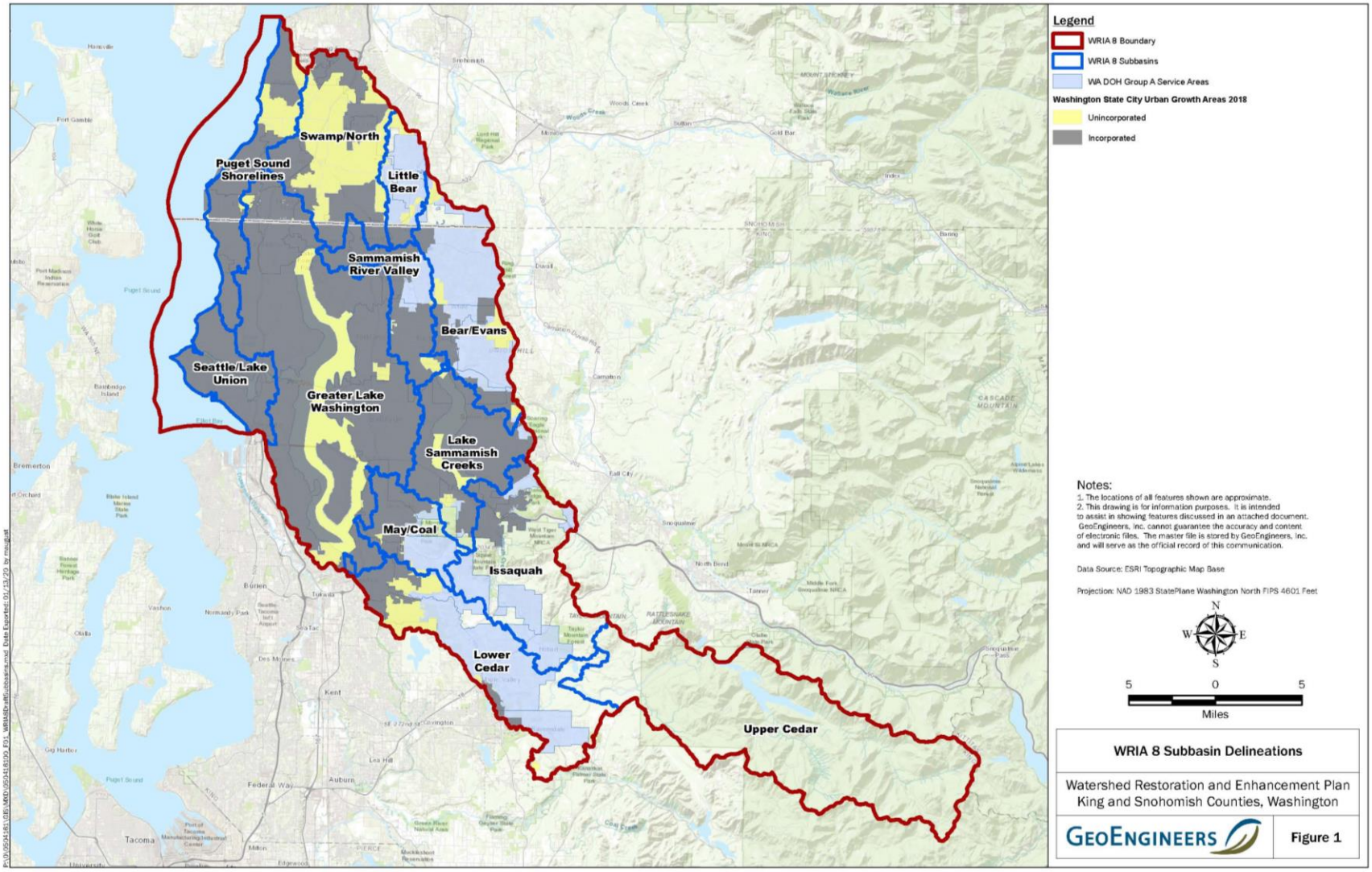

Figure 1: WRIA 8 Subbasins

Growth Projections

Status

At the September 26, 2019 meeting, the WRIA 8 WREC agreed to move forward with 967 as the 20 year permit-exempt well growth projection to develop the consumptive use estimate. The Committee decided not to hold a formal vote. The Committee can revisit the growth projections later in the planning process, if needed.

Background

The WRE Plan needs to address impacts on streamflows from consumptive use from new domestic permit-exempt wells anticipated between January 19, 2018 and January 18, 2038. The WRE Plan must estimate growth projections for the watershed for January 2018 through January 2038 (at a minimum). Based on the projected growth, the plan will estimate the amount of rural growth and associated water use from new permit exempt well connections.

Ultimately, WRE Plan growth projections need to address the following two primary questions:

1. How many new permit-exempt domestic well connections (PE wells) could be installed throughout the watershed over the next 20 years?
2. Where could the PE sourced growth occur at the subbasin level?

WRIA 8 includes parts of unincorporated King and Snohomish County and 30 incorporated cities and towns.

Methods

- King County and Snohomish County used historical building permit and year-built data to predict PE well growth over the 20 year planning horizon. This methodology assumes that the rate and general location of past growth will continue over the 20-year planning horizon.
    - Snohomish County estimated the number of new homes using PE wells based on distance from existing water service lines.
    - King County estimated the number of new homes using PE wells based on past water service connection rates.
- GeoEngineers estimated new wells within the UGA based on analysis of data in the Ecology Well Log Database.
- King County completed a PE Well Potential Assessment and Snohomish County completed a Rural Capacity Analysis to determine whether a subbasin has capacity for the number of wells in the 20-year projection.
    - The King County PE Well Potential Assessment showed a capacity shortfall of 1 well in the Upper Cedar subbasin, which is mostly protected from development. Therefore, the projected PE well in the Upper Cedar subbasin was reallocated to the adjacent Lower Cedar subbasin.
    - The Snohomish County Rural Capacity Analysis showed a capacity shortfall of 59 wells in the Little Bear subbasin. These 59 wells were reallocated to the Bear/Evans subbasin because it is adjacent and has similar growth patterns.

Results

GROWTH PROJECTIONS FOR NEW PE WELLS IN WRIA 8 – CEDAR-SAMMAMISH 2018 TO 2038

Subbasins[1]	King County Past Trends[2]	Snohomish County Past Trends[3]	UGA Well Log Spot Check[4]	Total PE Wells[5] per Subbasin[6]
Seattle/Lake Union	0	--	0	0
Puget Sound Shorelines	0	--	2	2
Swamp/North	0	0	5	5
Little Bear	0	118	0	118
Sammamish River Valley	8	--	0	8
Bear/Evans	138	92	4	234
Greater Lake Washington	0	--	4	4
May/Coal	15	--	0	15
Lake Sammamish Creeks	6	--	0	6
Issaquah	235	--	0	235
Lower Cedar	338	--	2	340
Upper Cedar	0	--	0	0
Totals	**740**	**210**	**17**	**967**

Notes:

1 = Subbasins from proposal approved at September 26, 2019 WRE Committee meeting.
2 = Based on 20-year estimate of potential new PE wells in unincorporated King County, plus 6% error.
3 = Based on 20-year estimate of potential new PE wells in unincorporated Snohomish County.
4 = Based on spot-check of Ecology Well Report Viewer database. Accounts for potential wells within the incorporated and unincorporated Urban Growth Areas (UGAs) over the 20-year planning period.
5 = "PE Wells" is used to refer to new homes associated with new permit-exempt wells and also new homes added to existing wells on group systems relying on permit-exempt wells.
6 = Includes redistribution of 1 well from Upper Cedar subbasin to Lower Cedar subbasin in the King County portion of WRIA 8 and 59 wells from Little Bear subbasin to Bear/Evans subbasin in the Snohomish County portion of WRIA 8.

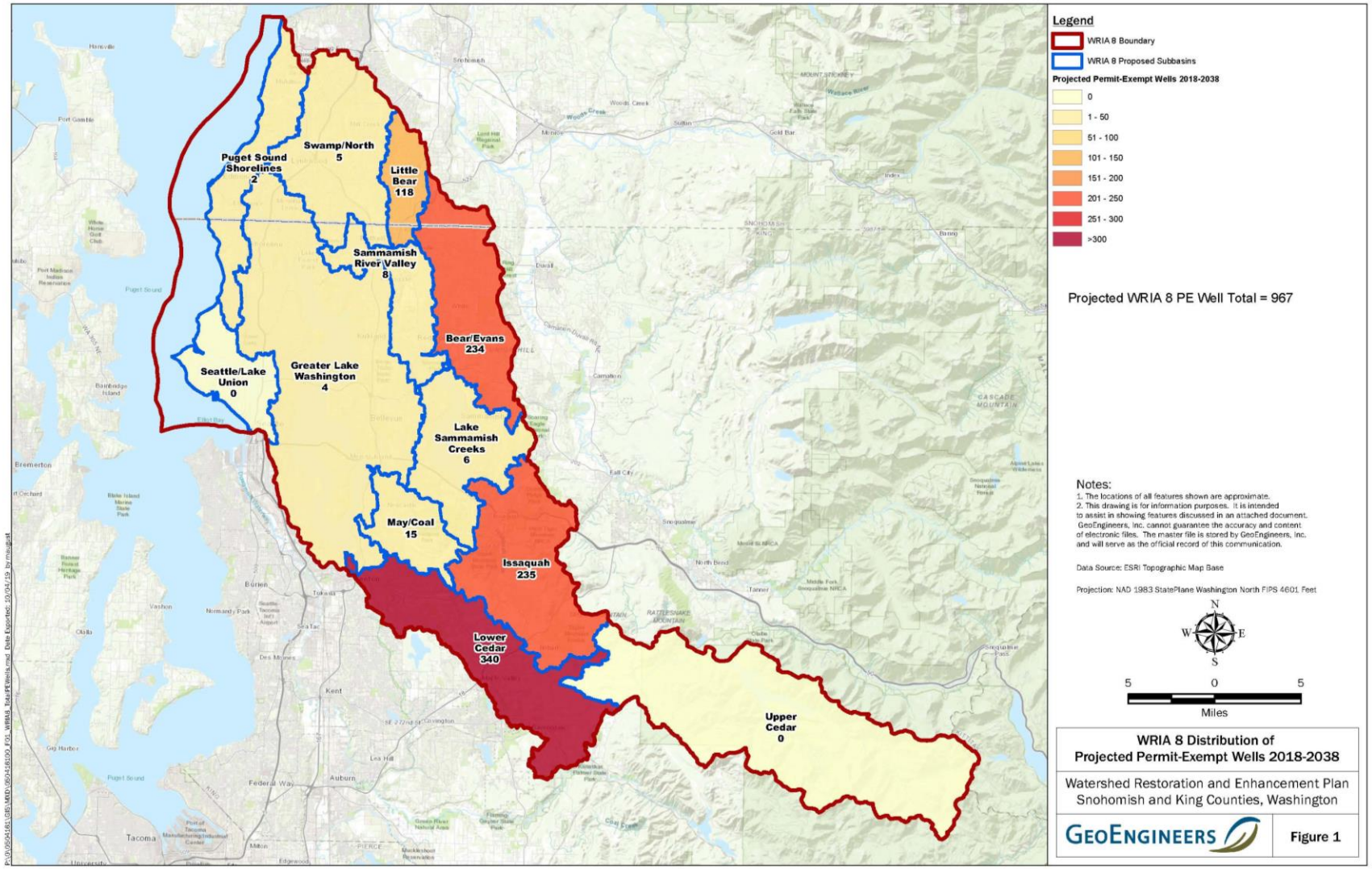

Figure 2: WRIA 8 Projected Permit-Exempt Wells 2018-2038

Consumptive Use

Status

The WRIA 8 WREC discussed the consumptive use estimate at the October, December and January WREC meetings.

At the January 28 meeting, CELP disagreed with using the consumptive use estimate based on average measured yard size. The chair and facilitator will continue to work individually with Committee members to try to get consensus on a consumptive use estimate.

Background

The WRIA 8 Watershed Restoration and Enhancement Plan (Plan) must include projects and actions that offset the consumptive use from future domestic permit-exempt wells. Consumptive water use is water that is evaporated, transpired, consumed by humans, or otherwise removed from an immediate water environment. For watershed planning purposes, consumptive use is water that is drawn from groundwater via a domestic permit-exempt well and not replaced through the septic system, irrigation return flow, or other means.

Methods

Methodology is based on Appendix A of the Department of Ecology's Net Ecological Benefit guidance and documented in further detail in the Consumptive Use Estimates Work plan prepared by the GeoEngineers team. The key assumptions are:

Indoor use:

- 60 gallons per day per person
- 10% consumptive

Outdoor use:

- Household lawn size based on average irrigated footprint per subbasin
- Crop irrigation requirement based on requirements for turf grass in the Washington Irrigation Guide
- Irrigation efficiency of 75%
- 80% consumptive

The technical consultants also estimated consumptive use for two additional scenarios.

1. One home with legal maximum 0.5-acre irrigated lawn area per permit-exempt well. Assumes 60 gallons per day per person indoor use and 0.5-acre outdoor irrigation use.
2. Legal right to 950 gallons per day (maximum annual average withdrawal) per well connection for indoor and outdoor household use. Assumes 60 gallons per day per person indoor use and remainder to outdoor use.

The Committee was interested in reviewing these consumptive use scenarios to inform the planning process.

Results

WRIA 8 ANNUAL CONSUMPTIVE USE FOR ONE HOME WITH SUBBASIN AVERAGE YARD

Subbasin ID	# PE Wells Anticipated in Subbasin	Irrigated Area per Well (ac)	Per Well Consumptive Use (gpd)			Total Consumptive Use (af/yr)
			Indoor	Outdoor	Total	
Puget Sound Shorelines	2	0.28†	16.5	372.8	389.3	0.9
Swamp/North	5	0.28†	16.5	338.2	354.7	2.0
Little Bear	118	0.28	16.5	318.8	335.3	44.3
Sammamish River Valley	8	0.28‡	16.4	345.5	361.9	3.2
Bear/Evans	234	0.31	16.4	352.5	368.9	96.7
Greater Lake Washington	4	0.28†	16.4	381.0	397.4	1.8
May/Coal	15	0.33‡	16.4	422.9	439.3	7.4
Lake Sammamish Creeks	6	0.31‡	16.4	380.3	396.7	2.7
Issaquah	235	0.37	16.4	421.6	438.0	115.3
Lower Cedar	340	0.33	16.4	380.5	396.9	151.2
WRIA 8 Aggregated	**967**	**0.33**	**16.4**	**376.3**	**392.7**	**425.4**

† Representative measured value not available; uses Little Bear subbasin average irrigated area.
‡ Calculated average not used due to small sample size. Surrogate subbasin used: Little Bear for Sammamish River Valley, Lower Cedar for May/Coal, and Bear/Evans for Lake Sammamish Creeks.

WRIA 8 AVERAGE RESIDENTS PER HOUSEHOLD

Subbasin	% Projected Wells by County		Avg. People per Rural Household
	King	Snohomish	
Puget Sound Shorelines		100%	2.75
Swamp/North		100%	2.75
Little Bear		100%	2.75
Sammamish River Valley	100%		2.73
Bear/Evans	59%	41%	2.74
Greater Lake Washington	100%		2.73
May/Coal	100%		2.73
Lake Sammamish Creeks	100%		2.73
Issaquah	100%		2.73
Lower Cedar	100%		2.73
WRIA Total	**77%**	**23%**	**2.73**

WRIA 8 IRRIGATED FOOTPRINT SUMMARY

Subbasin	Parcels Analyzed	Total Irrigated Area (ac)	Average Irrigated Area (ac)
Bear/Evans	39	12.2	0.31
Issaquah	33	12.3	0.37
Lake Sammamish Creeks	1	1.5	0.31†
Little Bear	37	10.2	0.28
Lower Cedar	35	11.6	0.33
May/Coal	6	1.4	0.23†
Sammamish River Valley	2	0.3	0.28†
Full Analysis	**153**	**49.4**	**0.32**

† Calculated averages not used due to small sample size. Adjacent subbasins substituted.

WRIA 8 CONSUMPTIVE USE SCENARIOS

The Committee was interested in reviewing these consumptive use scenarios to inform the planning process.

Scenario	Average Annual Total Water Use (gpd) †	Average Indoor Use (gpd)	Average Annual Outdoor Use (gpd)	Annual Consumptive Use (acre-feet/year)
Snohomish County PUD*	237	170	370	75.3
1 home, average measured yard	634	164	470	425.4
1 home, 0.5 ac yard	882	164	718	640.0
1 home using 950 gpd (annual average)	950	164	786	698.9

* Data from 2015 and 2017. Average use for parcels ≥1 acre.

†Reported values are total water use, not consumptive use.

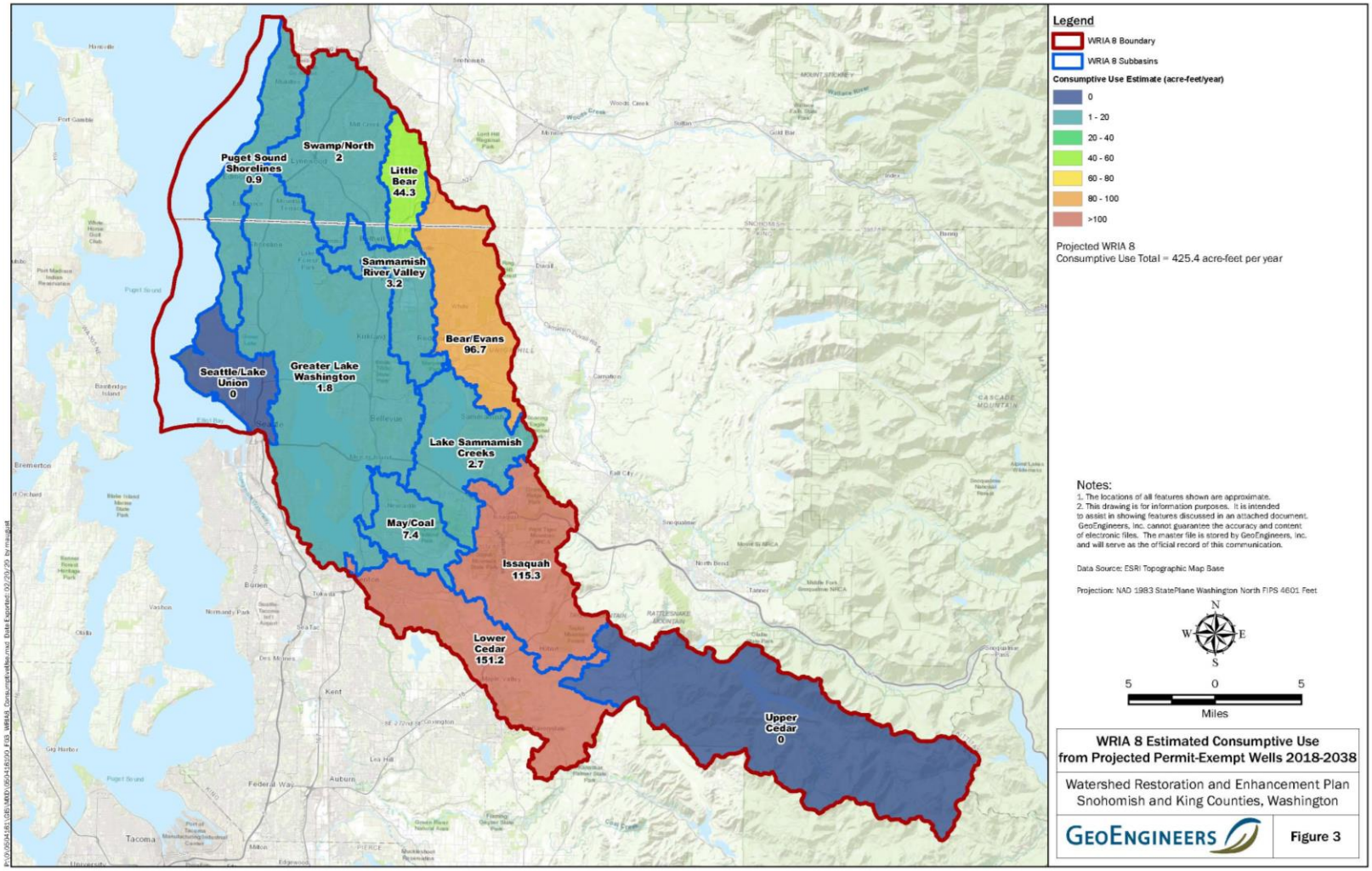

Figure 3: Estimated Consumptive Use from 1 home + measured yard