**To:** Puyallup-White (WRIA 10) Watershed Restoration and Enhancement Committee

**From:** Rebecca Brown, Committee Chair

**Date:** February 26, 2020

**Re:** Consumptive Use Estimate Recommendation

**At the April 1, 2020 Watershed Restoration and Enhancement Committee meeting, the Chair will seek a formal decision on the 20-year consumptive water use estimate to be included in the plan. The consumptive water use estimate based on the workgroup recommendation for WRIA 10 is 277.4 acre-feet per year/0.38 cubic feet per second.**

**Background**

The WRIA 10 Watershed Restoration and Enhancement Committee Chair will hold a vote on consumptive use estimates at the April 1, 2020 committee meeting. The committee and workgroup landed on a preliminary consumptive use estimate at the November 6, 2019 with an expectation that the workgroup would develop a recommendation to the committee in early 2020. The workgroup met on February 19, 2020 to review the preliminary consumptive use estimate and make a recommendation for the 20-year consumptive water use estimate to be included in the plan.

**PE Well Projections**

The committee moved forward using the moderate projection for PE domestic wells, which is 688 wells.

**Consumptive Use Estimate**

On October 21, 2019, the workgroup discussed the consumptive use estimate, focusing on the outdoor irrigation analysis conducted by HDR. HDR provided their methodology and answered questions. HDR provided additional information on their methodology and statistics on a webinar on October 28, 2019.

HDR’s initial analysis yielded an average outdoor irrigation area of 0.17 acres. The analysis returned a large number of parcels without detectable outdoor irrigation. HDR used an arbitrary value of 0.05 acres to account for the outdoor water use that may occur but was not detected in the analysis. Using the 0.05 value instead of zero yielded an average outdoor irrigation area of 0.20 acres. From there, HDR calculated the 95% Upper Confidence Level (UCL) as 0.27 acres.[[1]](#footnote-1)

Concerns remained from WDFW and other entities regarding the sample size used to conduct the outdoor irrigation analysis, and the use of 0.05 as the non-detect value. Additional questions revolved around the different values returned from GeoEngineers work in WRIAs 7, 8, and 9. HDR and GeoEngineers checked each other’s work. GeoEngineers analyzed 10 parcels from WRIA 10, and HDR analyzed 10 parcels from WRIA 9.

At the November 6, 2019 full committee meeting, the committee agreed to a preliminary consumptive use estimate using the outdoor irrigation area of 0.27 acres. The reason behind using the 95% UCL was that the outdoor irrigation area was unlikely to be higher than the 95% UCL.

The committee used the following inputs to estimate the consumptive use in WRIA 10:

* Outdoor irrigation area based on 95% UCL (0.27 acres).
* Average irrigation requirement based on Washington Irrigation Guide (16.1 inches/year).
* Irrigation efficiency (75%).
* Outdoor consumptive use (80%).
* Indoor use (60 gal/day/person).
* Indoor consumptive use (10%).
* Average persons per household (2.5 people).
* PE well projection (moderate projection: 688).

The preliminary consumptive use estimate the committee agreed to use is 0.38 cfs and 277.4 afy. The committee agreed to make a final consumptive use decision after results from the GeoEngineers/HDR cross-check were available, and after we had more information on the other questions and concerns.

**Outstanding Questions:** The committee had several outstanding questions about the consumptive use estimate. The responses to these questions are listed below:

* What is the consumptive use of the legal limit for comparison?
	+ See the [updated CU Calculator](https://app.box.com/s/1bn9mgy1uwoyj053x9jofjurzer6i9lu).
* What are the results from the HDR and GeoEngineers review?
	+ Both GeoEngineers and HDR stand by their work and each other’s work.
	+ People do not water their lawns at the rate required for turf grass, so differences between watered and not watered lawns are difficult to discern, which led to some differences in interpretation by individual analysts.
	+ Their [full report](https://app.box.com/s/y8ow0pn9925nr4zjx3rwc0nzgoyo0n0h) is available on Box.
* How has HDR responded to WDFW’s concerns on sample size/methodology?
	+ HDR sent WDFW a number of statistical analyses on the outdoor irrigation analysis as requested by WDFW.
	+ WDFW has stated that the additional statistics did not address their concerns.
	+ WDFW emphasized the importance of offset projects in the plan. Their concern with the methodology of the outdoor irrigation analysis will not jeopardize their support of the plan as a whole.
* Is there a more scientific approach to addressing the non-detect values, rather than using an arbitrary 0.05 acres?
	+ HDR calculated the minimum and 5th percentile values of the delineated parcels with a detected irrigated area. The tables below show the minimum size (0.04 acres) and 5th percentile (0.06 acres) of detected irrigated areas in WRIA 10 and across the five South Sound watersheds. The average 5th percentile across all five watersheds is 0.03 acres.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Statistic** | **WRIA 10** | **WRIA 12** | **WRIA 13** | **WRIA 14** | **WRIA 15** | **All** |
| Number of Detected Acreages | 37 | 48 | 31 | 31 | 36 | 183 |
| Minimum (acres) | 0.04 | 0.02 | 0.01 | 0.03 | 0.02 | 0.01 |
| 5th Percentile (acres) | 0.06 | 0.03 | 0.03 | 0.03 | 0.02 | 0.03 |

* + HDR calculated the mean and 95% UCL substituting the South Sound 5th percentile, the arbitrary 0.05 acres, and the WRIA 10 5th percentile for the non-detect values for comparison.

|  |  |  |
| --- | --- | --- |
| **Statistic** | **95% UCL Distribution** | **WRIA 10** |
| PE Parcel Sample Pool |   | 978 |
| Sample Size |   | 80 |
| Standard Deviation (acres) |   | 0.31 |
| Mean  (acres) |   | 0.17 |
| 95% UCL, 0.03 imputed for zeros (acres) | Gamma | 0.26 |
| 95% UCL, 0.05 imputed for zeros (acres) | Gamma | 0.27 |
| 95% UCL, 0.06 imputed for zeros (acres) | Gamma | 0.27 |
| 95% UCL (acres) | Non-parametric | 0.32 |

**Workgroup Discussions:** The workgroup made several observations based on the information provided by HDR:

* The workgroup noted the different non-detect values did not make much difference in the 95% UCL distribution.
* The workgroup noted the importance of accounting for outdoor water that was not used for irrigation, such as flower gardens and car washing.
* The workgroup requested information on the adjacent WRIAs to compare.
	+ The table below summarizes work completed in WRIAs 7-12, including the average irrigated area and sample size from the GeoEngineers and HDR work, the projected new permit-exempt wells, and consumptive use estimate in acre-feet per year.
	+ Please note that these committees have not necessarily made formal decisions on the permit-exempt well projections and/or consumptive use estimates, so these numbers are subject to change.

| WRIA | Irrigated Area (acre) | Irrigated Area Analysis Sample Size | Projected New Permit-Exempt Wells | Consumptive Use Estimate AFY |
| --- | --- | --- | --- | --- |
| 7 | 0.21 | 393 | 3,389 | 797.4 |
| 8 | 0.32 | 153 | 967 | 425.4 |
| 9 | 0.30 | 211 | 632 | 247.7 |
| 10 | 0.27 | 80 | 688 | 277.4 |
| 12\* | 0.21 | 80 | 145 | 57.4 |

\*WRIA 12 irrigated area based on the 95% UCL. New PE well and CU estimate based on moderate projection. The low growth projection is 78 new wells and the high growth projection is 228 new wells.

* Concerns about methodology and other uncertainties will be documented in the plan.

**Next Steps:** The committee will make a final decision on the consumptive use estimate at the April 1, 2020 meeting. **The workgroup recommends continuing to use the 95% UCL for the outdoor irrigated area of 0.27 acres. The workgroup recommends a consumptive use estimate of 0.38 cfs/277.4 acre-feet per year.**

**Offset Target**

The workgroup discussed whether to set an “offset target”—a value higher than the consumptive use estimate that provides an additional safety factor to account for uncertainty inherent in the analysis.

The workgroup recommended not setting offset target for the following reasons:

* Ecology staff have noted that the method used to estimate consumptive use is inherently conservative.
* The workgroup would prefer to spend more effort and time developing a robust project list with offsets that exceed the consumptive use estimate.

**Next Steps:** The workgroup will recommend not setting an offset target at the March 4 committee meeting for consideration. The committee and workgroup will continue developing a robust project list.

1. The 95% Upper Confidence Level assuming 0's are non-detects, replaced with 0.05 acres; Parameteric (Gamma or Lognormal). [↑](#footnote-ref-1)