

AMENDED WATER TRANSFER WORKING GROUP PROJECT DESCRIPTION

APPLICATION NO./COURT CLAIM NO.		
Acquavella Court Claim No. 00777, (A) 05114		
APPLICANT NAME	CONTACT NAME	TELEPHONE NO.
Milton and Geraldine Downs	Jeff Slothower	(509) 925-6916
WATER RIGHT HOLDER'S NAME (if different)		EMAIL
		jslothower@lwahsd.com

DATE OF APPLICATION	PRIORITY DATE
5/17/16	June 30, 1885

WATER SOURCE:	CROP:
Teaway River	Clover
INSTANTANEOUS QUANTITY:	ANNUAL QUANTITY:
0.44 cfs – irrigation	143 - irrigation 2 - stock water
PERIOD OF USE:	
May 1 to September 15	
PLACE OF USE:	PURPOSE OF USE:
That portion of the E½ of Section 14, T. 20 N., R. 16 E.W.M., described as follows: Commencing at the east quarter corner of said section; thence north to the south right of way of the Teaway Road; thence northwesterly to the intersection of said road and 3M Ditch, being the point of beginning; thence northwesterly along said right of way 700 feet, more or less; thence southerly 90 feet, more or less, to the old railroad right of way; thence southeasterly along the said right of way 2000 feet, more or less; thence easterly 80 feet, more or less, to Mason Creek; thence northeasterly along the west bank of said creek to the 3M Ditch; thence northwesterly along the south bank of said ditch to the point of beginning. [SEE ATTACHED MAP]	Irrigation of 22 acres and stock water
IRRIGATION METHOD:	
Flood (gated pipe)	

CONSUMPTIVE USE CALCULATION:
<p>Consumptive use associated with the irrigation of 22 acres was calculated using Ecology's <i>Guidance 1210-Determining Irrigation Efficiency and Consumptive Use</i> (Ecology, 2005) and the Washington irrigation Guide (WIG) developed by Washington State University under contract to Ecology (Peters, 2013). Calculations of consumptive use for irrigation of timothy hay are shown on Table 1. The following paragraphs provide the assumptions and sources of data used in the water use calculations.</p> <p>The main components for estimating consumptive water use are the crop irrigation requirement (CIR) for the crop type and geographic location; the irrigated acreage for a given crop; the total irrigation requirement (TIR) or total</p>

water applied to the field; and an evaporative component (%Evaporation) describing evaporative losses of water due to factors other than crop evapotranspiration and based on the irrigation method. Monthly CIR values for timothy hay were selected from the revised WIG for Cle Blum. The TIR and irrigated acreage were set equal to the full irrigation water right authorization, including additional water available in May and June, of 143 afy and 22 acres. The % Evaporation of 5 percent was selected as the recommended value from Guidance 1210 for surface irrigation methods.

Applying the above values, the calculated consumptive water use is 53.99 afy.

Table 1 - Consumptive Use Calculation, Adjudicated Claim 00777
Downs Water Right, Cle Elum, WA

Month	CIR in inches	CIR in ac-ft	TIR in inches	TIR in ac-ft	CU in inches	CU in ac-ft
January	0.00	0.00	0.00	0.00	0.00	0.00
February	0.00	0.00	0.00	0.00	0.00	0.00
March	0.00	0.00	0.00	0.00	0.00	0.00
April	0.00	0.00	0.00	0.00	0.00	0.00
May	2.58	4.89	7.82	14.33	2.95	5.41
June	4.61	8.45	14.07	25.80	5.31	9.74
July	5.15	9.44	15.72	28.82	5.94	10.88
August	6.32	11.59	19.29	35.37	7.28	13.36
September	4.67	8.56	14.26	26.14	5.36	9.87
October	2.24	4.11	6.84	12.54	2.58	4.73
November	0.00	0.00	0.00	0.00	0.00	0.00
December	0.00	0.00	0.00	0.00	0.00	0.00
Total	25.55	46.84	78.00	143.00	29.46	53.99

Location: Cle Elum
 Acres: 22
 Crop: Timothy (Grass Hay)
 Irrigation Method: Flood (Gated Pipe)
 Application Efficiency: 33%
 %Evaporation: 5%

Notes:

CIR - Crop Irrigation Requirement, from recent Ecology-funded updates to the Washington Irrigation Guide completed by Washington State University
 TIR - Total Irrigation Requirement, selected as total authorized diversion under Claim 00777
 Application Efficiency - Calculated as CIR/TIR
 CU - Consumptive use, equals TIR*(Application Efficiency + %Evaporation)
 %Evaporation, percentage of TIR evaporated due to factors other than crop evapotranspiration, selected from Ecology Guidance 1210 for surface irrigation methods

NARRATIVE DESCRIPTION OF PROJECT:

The requested change is to allow the water right to be used for instream flow purposes, including but not limited to mitigation of out of priority water uses.

Once the transfer is complete, the applicant intends to enter into a Trust Water Right Agreement with Ecology.

ADDITIONAL INFORMATION:

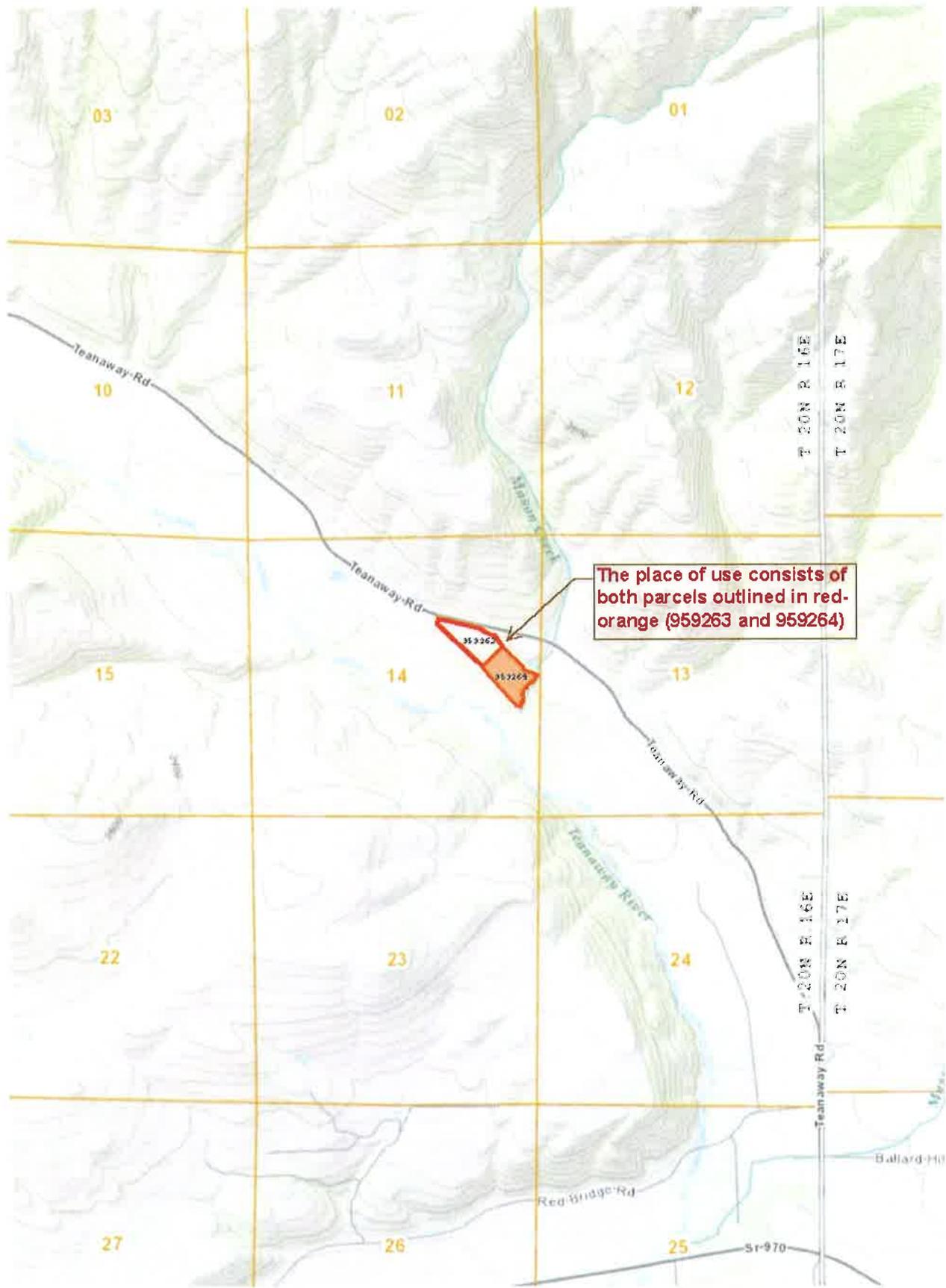
Based upon feedback from the Water Transfer Working Group meeting and based upon a request from the Washington State Department of Ecology regarding consumptive use associated with stock water, the Applicant has Joe Morrice of Aspect Consulting review and provide additional information on the methodology used to calculate the consumptive use and on the consumptive use associated with the stock water element of the water right. Mr. Morrice's memorandum is attached hereto as Exhibit A. Mr. Morrice concludes the consumptive associated with the stock water is .58 acre-feet per year. In the attached memorandum, Mr. Morrice also provides background information on how the irrigation component of the consumptive use was arrived at.

Additionally, in speaking with the Department of Ecology there were concerns about the anticipated future use of the water once the transfer is completed. This transfer is being processed because it is no longer possible to irrigate the place of use because the 3M Ditch diversion was destroyed and all of the water rights that were formerly

diverted from the Teanaway River and carried through the 3M Ditch have now been either changed to other uses and/or alternative diversion points have been located. Thus, this is a permanent transfer of the purpose of use of the water right to instream flow and mitigation for out-of-priority uses and change in place of use from the authorized place of use to instream flow within the Teanaway and Yakima Rivers. The only definite future plans the Applicant has for the water right is to take approximately one (1) consumptive acre-foot of the water right and set it aside for future domestic water mitigation associated with up to two (2) houses on the existing place of use and the remainder of the consumptive acre-foot on houses that could be constructed in the future on property the Applicant owns within the Teanaway River Basin. Any use of the water once in trust to mitigate for domestic use would require that the domestic use mitigation occur consistent with existing Department of Ecology rules, regulations and process. The Applicant will agree to bring any future use of the consumptive use for mitigation of domestic purposes back to the Water Transfer Working Group. The Applicant does not intend to create a "water bank" that would sell mitigation certificates to the general public.

The remainder of the consumptive use associated with the water right will remain instream, protected in trust, and be used for instream flow purposes until the Applicant sells the water right and/or determines it is appropriate to use the water for another purpose. In the event the Applicant sells the water and a new owner desires to remove the water from trust, that will require a change and transfer application to be processed, which will ensure the change and transfer occurs consistent with Department of Ecology rules, regulations and processes, including bringing the proposed transfer back to the Water Transfer Working Group for review.

The Applicant's legal counsel, Jeff Slothower, and a representative of Aspect Consulting will be present at the next meeting of the Water Transfer Working Group on October 3, 2016.



The place of use consists of both parcels outlined in red-orange (959263 and 959264)



MEMORANDUM

Project No.: 130303-01

September 14, 2016

To: Jeff Slothower, Lathrop, Winbauer, Harrel, Slothower & Denison L.L.P.

A handwritten signature in black ink, appearing to read "Joe Morrice", is written over a light blue horizontal line.

From: Joe Morrice, LHG, CWRE
Associate Hydrogeologist
jmorrice@aspectconsulting.com

Re: **Supplemental Information in Support of
Change Application No. CS4-00777sb3@12 (KITT-16-04)**

This memorandum provides supplemental information in support of water right Change Application No. CS4-00777sb3@12. This change application is being processed through the Kittitas County Water Conservancy Board (Board) under application number KITT-16-04. I understand that two questions have been raised regarding the estimated consumptive use of the water right presented in the November 25, 2013 memorandum *Court Claim 00777 Consumptive Use Assessment* (Aspect, 2013). The first question was what consumptive use is associated with the 2 acre-feet per year (afy) for year-round stock water use under the water right confirmed by the Yakima County Superior Court in 2001. The second question concerned the source of crop irrigation requirements (CIR) applied in estimating irrigation consumptive use.

The following sections address these questions.

Stockwater Consumptive Use

The water right was confirmed for 2 afy of year-round stock water use. Based on information provided by the water right holder, they typically pastured 40 cow-calf pairs at the property each year. Associated stock water use was estimated based on non-residential water demand requirements listed in Table 5-2 of the Washington State Department of Health (DOH) Water system Design Manual (DOH, 2009). The listed average stock water requirement for cows is 15 gallons per day (gpd) per head. Based on the reported 40 cow-calf pairs kept on the property year-round, the estimated annual stock water use is 219,000 gallons, or about 0.67 afy.

Stock water use is mostly consumptive, through respiration and evaporation, with a minor portion of return flow associated with animal wastes. Limited data on the consumptive use of stock water are available. Provisional stock water use data compiled by the United States Geological Survey (USGS) Washington Water Science Center (<http://wa.water.usgs.gov/data/wuse/main.cnty.95.txt>)

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presents total and consumptive stock water use by county. Based on these data, the consumptive use of stock water in Kittitas County is 87 percent of total use. Given a total stock water use of 0.67 afy, the consumptive stock water use under the subject water right is 0.58 afy.

Crop Irrigation Requirements

The CIRs used to estimate irrigation consumptive use under the subject water right do not rely on the 1985 Washington Irrigation Guide Appendix A (WIG), which is outdated both in terms of source data and the analytical methods used to calculate CIRs. Instead, an updated, site-specific CIR relying on the most current data set, updated crop coefficients, and a more defensible analytical method (Penman-Monteith method) that incorporates temperature, solar radiation, wind speed, and humidity data was used in evaluating the subject water right. Use of the site-specific CIR represents the best available science for assessing irrigation consumptive use and is a more defensible basis for estimating consumptive water use under the subject water right than the 1985 WIG.

Calculation of Site-Specific CIRs

The calculation of site-specific CIRs used to determine consumptive use under the subject water right uses the most current climate data and best available analytical methods to determine consumptive crop water use and irrigation water requirements. The calculation methods, data, and results have been presented in academically peer-reviewed and published papers, including Peters, et al., 2013. Of note, the calculation of site-specific CIRs include:

1. **Recent Climate Data.** Since publication of the WIG, an additional 30 years (1980 to 2010) of climate data have been collected. These data document the most recent climate conditions and account for recent climate change. Whenever possible, the most recent 30 years of data were used to give representative averages as well as estimates of variability around that average. This data came from five different sources, including: Cooperative Observer Program (COOP), U.S. Bureau of Reclamation (Agrimet), Washington State University (AgWeatherNet), and the Automated Service Observation System — Automated Weather Observation System (ASOS/AWOS). After collecting as much data as possible, the data were removed or combined based on set criteria relating to quality, representativeness, and redundancy. In the case of KITT-16-04, the Cle Elum station was selected as most representative of local conditions.

This compares to the 1985 WIG, which uses only average temperature data from 1951 to 1980 from a geographically limited number of weather stations. In addition, the origins and quality of these data are poorly documented. In fact, according to Ecology's online Frequently Asked Questions (Ecology, 2012), data sets and computations from the 1985 WIG are not available, a bibliography of sources that provided the data are not available, data cleaning methods are not described, and source of crop coefficients use to translate reference evapotranspiration (ET) to a specific crop cannot be replicated.

Based on this information, it is clear that the calculation of site-specific CIRs are based on a more defensible and higher-quality set of climate data that are more representative of local conditions than the WIG.

2. **Reference Evapotranspiration.** Defined as the ET rate from a fully vegetated reference crop (usually alfalfa or grass) that is actively growing, not short of water, and of a

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standardized uniform height, the reference ET in the 1985 WIG was calculated using a temperature-only-based model (Blaney-Criddle method). Calculation of site-specific CIRs used a revised version of the Penman-Monteith model to calculate reference ET. This model incorporates solar radiation, wind speed, and humidity data in addition to temperature. Use of the model was selected as the standard method for estimating ET by the technical committee on Evapotranspiration in Irrigation and Hydrology (ASCE EWRI, 2005) by the American Society of Civil Engineers (ASCE).

In addition to the general recognition that the Penman-Monteith method provides superior results compared to the Blaney-Criddle method, use of Penman-Monteith is consistent with existing Ecology guidance. Ecology's Water Resources Program Guidance (GUID-1210; Ecology, 2005), *Determining Irrigation Efficiency and Consumptive Use* (Page 4, second paragraph), recognizes that the Penman-Monteith-based model used in site-specific calculations relies on a broader array of climate data, and is "more accurate" than the temperature-based Blaney-Criddle method used in the 1985 WIG. The guidance notes that in most cases, there are only minor differences in ET calculated by the different methods; but that in some cases, differences are as much as 20 percent. The guidance also explicitly allows for the empirical derivation of a site-specific CIR (Page 6, third paragraph). Reference to allowing use of the Penman-Monteith equation is referenced by Ecology's Water Resources Program Procedure (PRO-1210), *Calculating and Applying the Annual Consumptive Quantity (ACQ)* (Ecology, 2010).

Specific to the subject water right, the authorized place of use is located in the Upper Kittitas Basin, where wind is a significant factor contributing to the CIRs. The WIG does not account for the effects of wind, while the site-specific calculation does explicitly account for wind. Therefore, it is clear that the methods used in calculation of site-specific CIRs for the subject water right are more representative of local crop demands than those presented in the WIG.

3. **Crop Coefficients.** The crop coefficient represents the effect of crop growth stage, soil resistance, crop height, and surface reflectance on a plant's water use, and change as plants grow and develop. Development of the crop coefficients reported in the WIG are poorly documented, and were developed using different evapotranspiration equations that produce different reference values for either alfalfa or grass.

After thorough review of existing literature, researchers determined that crop coefficients reported by Agrimet are the most representative for Washington State. Notable reasons for this determination are:

- Most of the Agrimet-reported crop coefficients were developed using field research by the United State Department of Agriculture (USDA) Agricultural Research Service;
- Development of the Agrimet crop coefficients are well documented;
- Most of the crop coefficients were developed in Kimberly, Idaho, in close proximity and in similar climate to Eastern Washington; and

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- It is accepted practice to use the Agrimet crop coefficients in Washington State.

Prior to use in the site-specific calculations, the Agrimet-reported crop coefficients were adjusted for use with the ASCE Penman-Monteith reference equations using scientifically accepted methods. In addition, to account for different climates and their respective growing seasons across the state, the typical crop coefficient versus day of year curve was converted to growing degree days (GDD), and then summed to determine cumulative GDD.

The outcome of the methodology used to derive the crop coefficients was a crop-specific coefficient to be used across Washington State, regardless of local climate conditions. Use of the coefficients yield a more accurate location-specific CIR than those included in the 1985 WIG.

Limitations

Work for this project was performed for Milton & Geraldine Downs (Client), and this memorandum was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This memorandum does not represent a legal opinion. No other warranty, expressed or implied, is made.

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References

ASCE EWRI 2005. The American Society of Civil Engineers (ASCE) Standardized Reference Evapotranspiration Equation. ASCE EWRI Standardization of Reference Evapotranspiration Task Committee Report.

Peters, R.T, Nelson, L., and Karimi, T., 2013. Consumptive Use and Irrigation Water Requirements for Washington.

Ecology, 2005. GUID-1210, Water Resource Program Guidance, Determining Irrigation Efficiency and Consumptive Use. October, 11, 2005.

Ecology, 2010. Water Resources Program Procedure (PRO-1210), Calculating and Applying the Annual Consumptive Quantity (ACQ). Revised October 12, 2010.

Ecology, 2012. Frequently Asked Questions, Water Resources Program, Updating the Washington Irrigation Guide, Publication Number 12-11-004. January 2012.

Washington State Department of Health, 2009. Water System Design Manual, Publication DOH 331-123. December 2009.