

MEMO

State of Idaho

Department of Water Resources

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Date: November 26, 2018
To: James Cefalo, Water Resources Program Manager
Cc: Sean Vincent, P.G., Hydrology Section Manager
From: Jennifer Sukow, P.E., P.G., Hydrology Section
Subject: Hydrology staff review of application for transfer 82496

This memorandum summarizes my review of application for transfer 82496, which requests to transfer groundwater right 29-14257 from a location near Pocatello to a location near Idaho Falls (Figure 1). The application has been protested by the Surface Water Coalition (SWC), which raised two issues of concern at a pre-hearing conference. The SWC is concerned that the water right has not been used for many years. The SWC is also concerned that the change in point of diversion will constitute a new diversion from the eastern Snake Plain aquifer (ESPA). Hydrology staff was asked to answer the following questions related to the SWC's second concern:

"Is the existing point of diversion within the ESPA? If not, is there a hydrologic connection between the existing point of diversion and the ESPA? What is the nature of that connection?"

The existing point of diversion (POD) for water right 29-14257 is located within the lower Portneuf River Valley (LPRV) aquifer, as described by Welhan (2006)¹. The LPRV aquifer is hydraulically connected to the ESPA and there is not a definitive boundary at the transition between the aquifers. Figure 2 shows the location of the existing POD, the LPRV aquifer as delineated by Welhan (2006), the ESPA area of common groundwater, and the model grid for version 2.1 of the eastern Snake Plain aquifer model (ESPAM2.1). Note the northern portion of the LPRV aquifer overlaps with the ESPA area of common groundwater, and both aquifers are included in the ESPAM2.1 model domain.

¹ Welhan, 2006, *Water Balance and Pumping Capacity of the Lower Portneuf River Valley Aquifer, Bannock County, Idaho*. Staff Report 06-5, Idaho Geological Survey, Moscow, Idaho, 33 p.

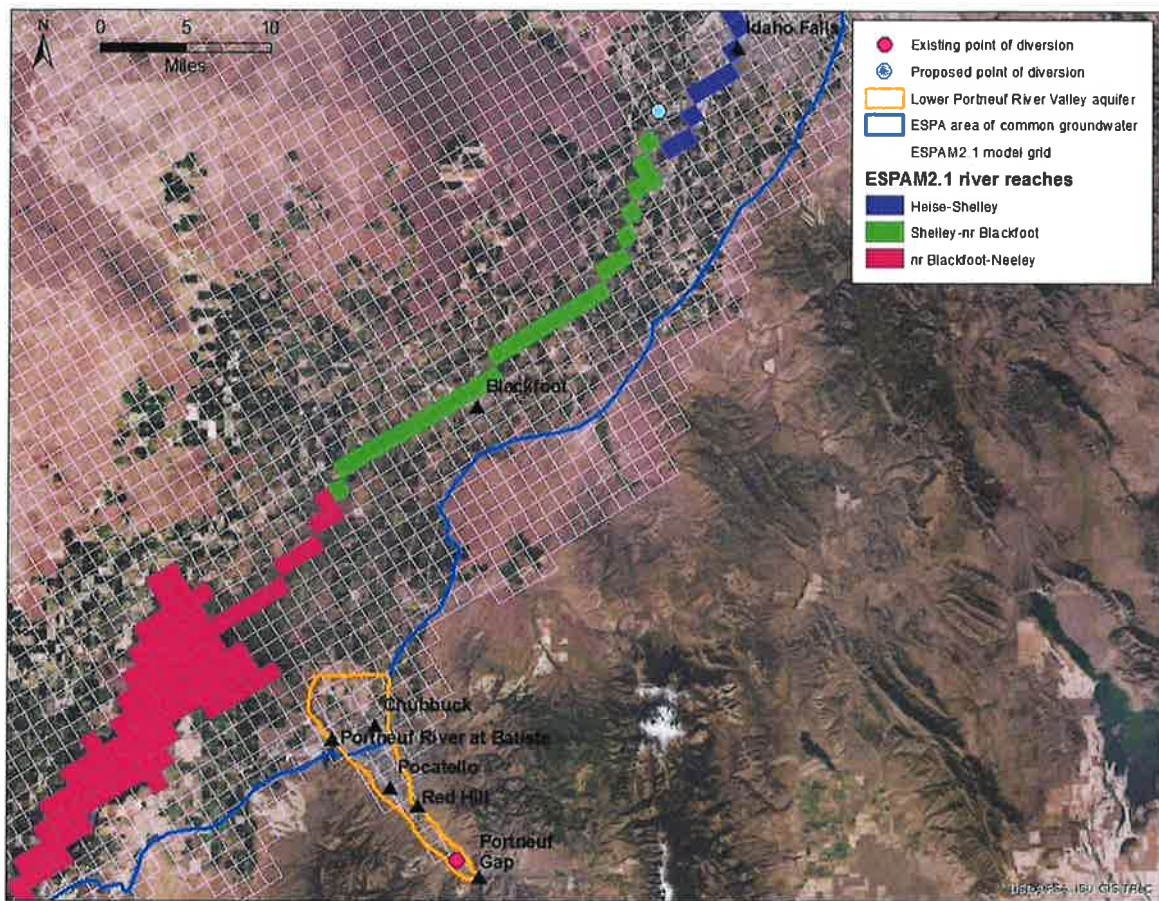


Figure 1. Location of current and proposed points of diversion.

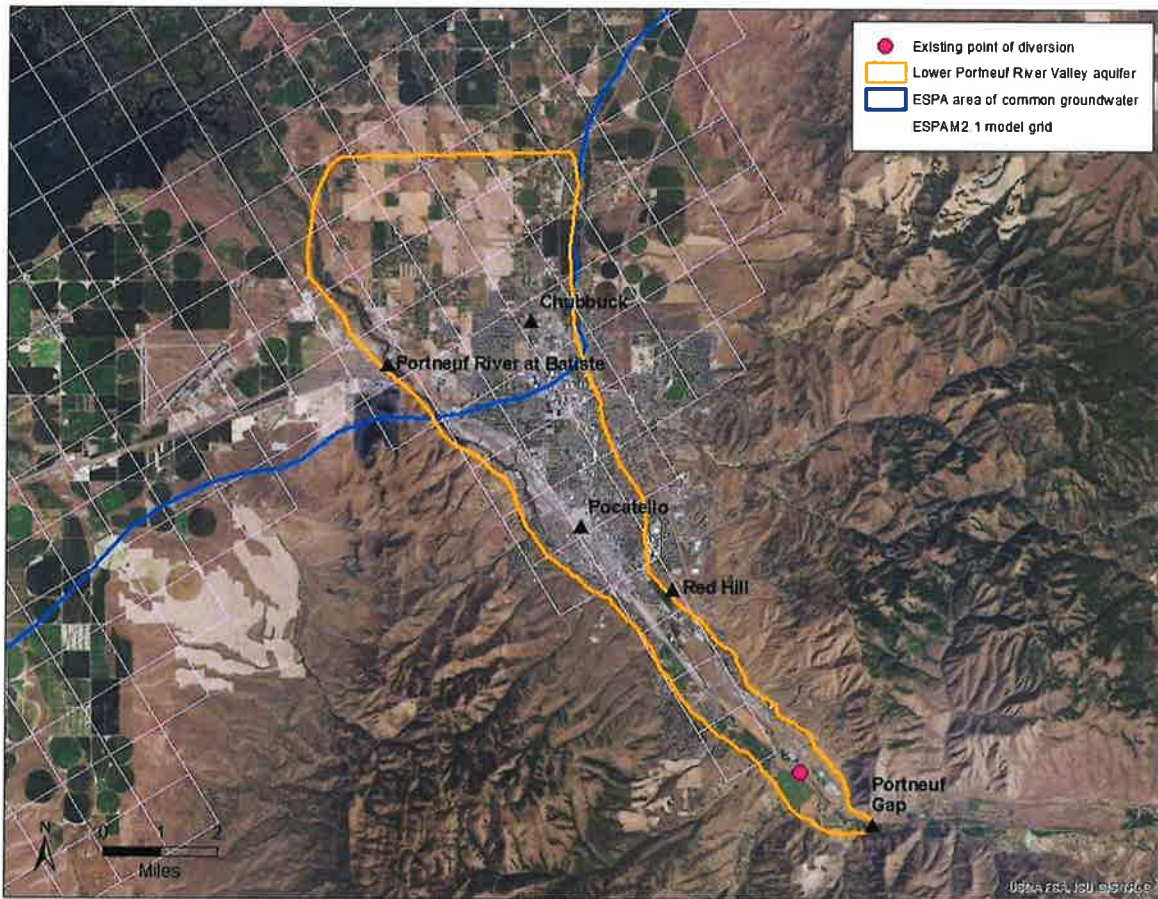


Figure 2. Location of existing point of diversion and the LPRV aquifer as delineated by Welhan (2006).

Between the Portneuf Gap and Batiste Road, the Portneuf River is perched and is not hydraulically connected to the aquifer (Welhan, 2001²; Welhan 2006). Figure 3 is a geologic cross-section of the LPRV presented by Welhan (2001). The section represented in Figure 3 is located approximately ¼ mile northwest of the existing POD. As discussed in Welhan (2006), diversion of groundwater from the LPRV aquifer for consumptive use reduces aquifer storage in the LPRV aquifer and reduces tributary underflow from the LPRV aquifer to the ESPA. This connectivity between the LPRV aquifer and the ESPA is consistent with the representation of this area in ESPAM version 2.1 and the ESPA Model Transfer Spreadsheet (ETRAN) version 3.3.

² Welhan, 2001, *Ground-Water Interactions Near the Highway Pond Gravel Pit, Pocatello, Idaho*. Staff Report 01-3, Idaho Geological Survey, Moscow, Idaho, 34 p.

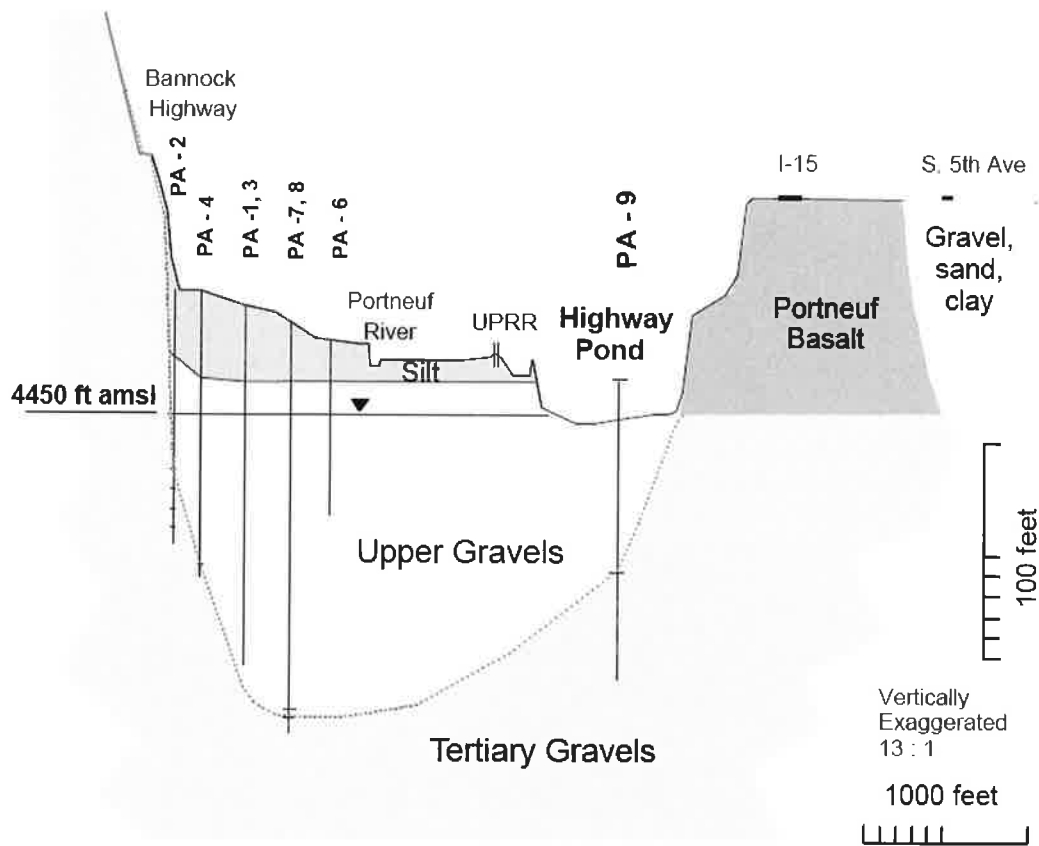


Figure 3. Geologic cross-section of the LPRV aquifer near the existing POD (from Welhan, 2001)

The existing point of diversion is located within the area represented by ESPAM2.1, which includes the entire LPRV aquifer extending northwest of the Portneuf Gap. However, the limitations of the one-square-mile model grid required approximation of the model boundary at the narrow southern end of the LPRV aquifer, so the existing POD is located approximately ½ mile outside of the nearest active model cell. For the existing POD, modeling the impact of pumping in the adjacent active model cell (104,121) is appropriate.

The applicant's consultant, JCH Engineering & Consulting, PLLC (JCH), submitted an ESPA transfer spreadsheet analysis performed with ETRAN version 3.2. JCH states that model cells (103,121) and (104,121) are inactive. These model cells are active in ESPAM version 2.1, but a bug in ETRAN version 3.2 prevented the user from selecting these cells as FROM or TO model cells. This bug has been corrected in ETRAN version 3.3, which is available on the IDWR

website³. While JCH's analysis uses model cell (102,121) as the FROM cell, an analysis I performed using ETRAN version 3.3 and model cell (104,121) as the FROM cell yields similar results. In both analyses, net depletion increases are less than 2 acre-feet per trimester for each reach.

Although the hydraulic connectivity of the LPRV aquifer and the ESPA supports the validity of the transfer spreadsheet analysis, the analysis is only valid if the volume of water modeled at the FROM well has actually been used continuously from 1951 through 2017. Evapotranspiration (ET) data computed by the University of Idaho using Mapping EvapoTranspiration at high Resolution with Internalized Calibration (METRIC) are available at the existing place of use for the irrigation seasons of 1986, 1992, 1996, 2000, 2002, 2006, 2008, 2009, 2010, 2011, 2013, 2015, 2016 and 2017. The METRIC ET data indicate little or no irrigation occurred at the place of use during these years, and do not support the modeled diversion of 32 AF/year at the FROM well. Figure 4 through Figure 7 show examples of METRIC ET at the existing place of use for water right 29-14257 for the 2013 and 2015 through 2017 irrigation seasons. Although METRIC ET data are not available for 2014, Normalized Difference Vegetation Index (NDVI) data can be viewed on Climate Engine⁴ for additional years. Attachment A shows mean NDVI data for the irrigation seasons of 2013 through 2018. The vegetation index was relatively low throughout these irrigation seasons, indicating little or no irrigation occurred at the place of use in recent years.

³ <https://idwr.idaho.gov/water-rights/transfers/resources.html>

⁴ Desert Research Institute and University of Idaho, <http://climateengine.org/>.

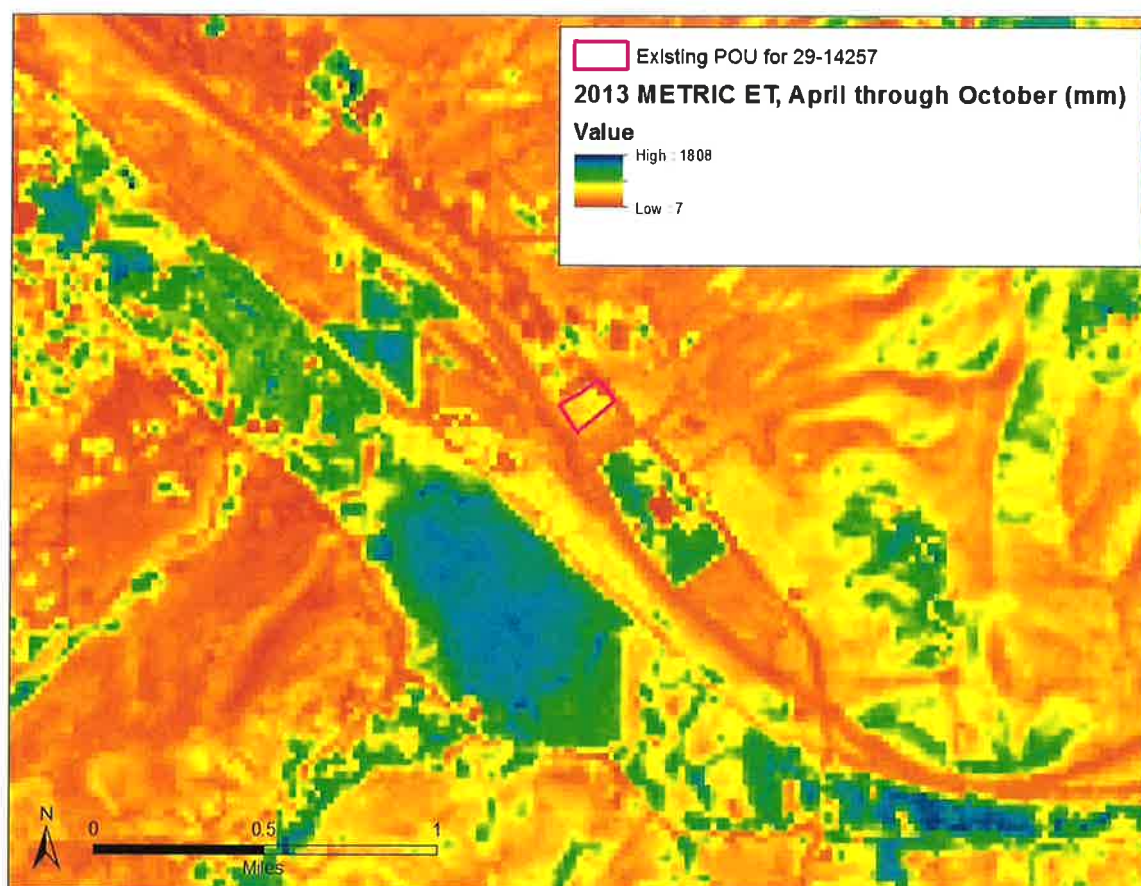


Figure 4. 2013 METRIC ET at existing place of use

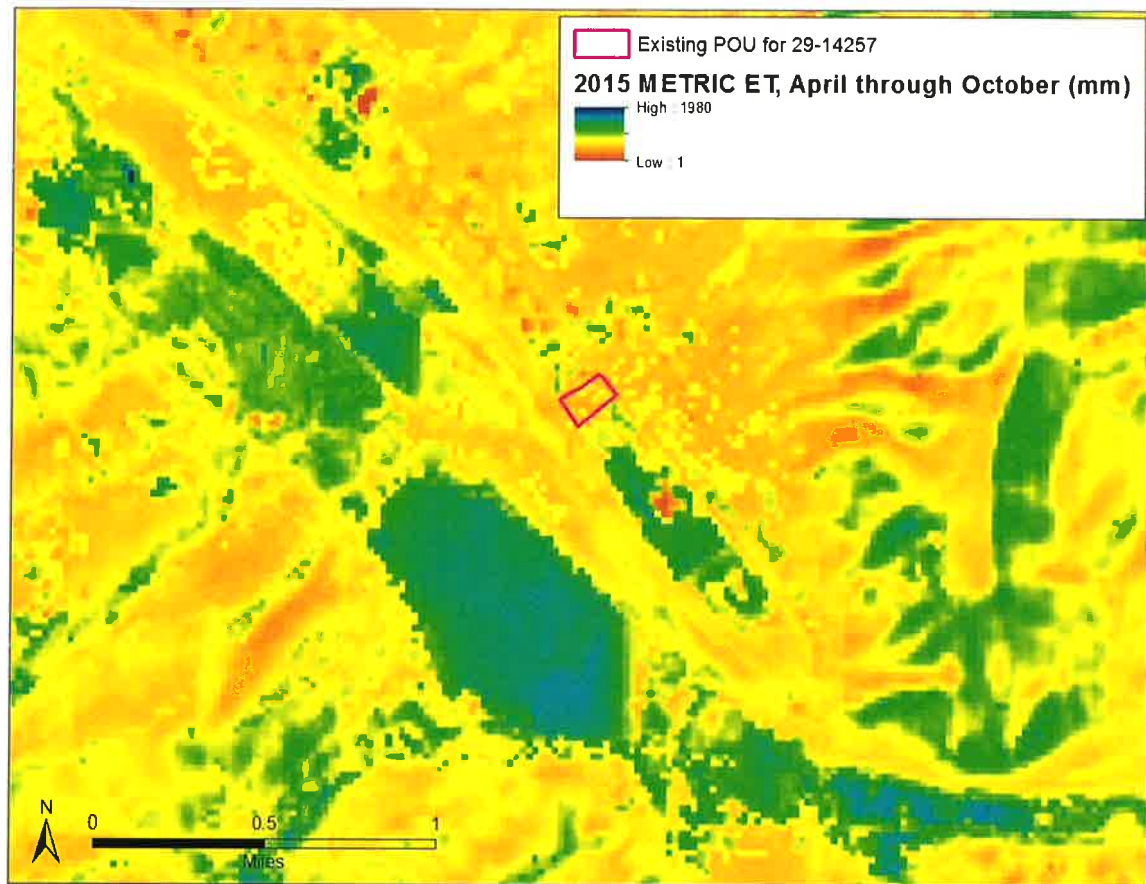


Figure 5. 2015 METRIC ET at existing place of use

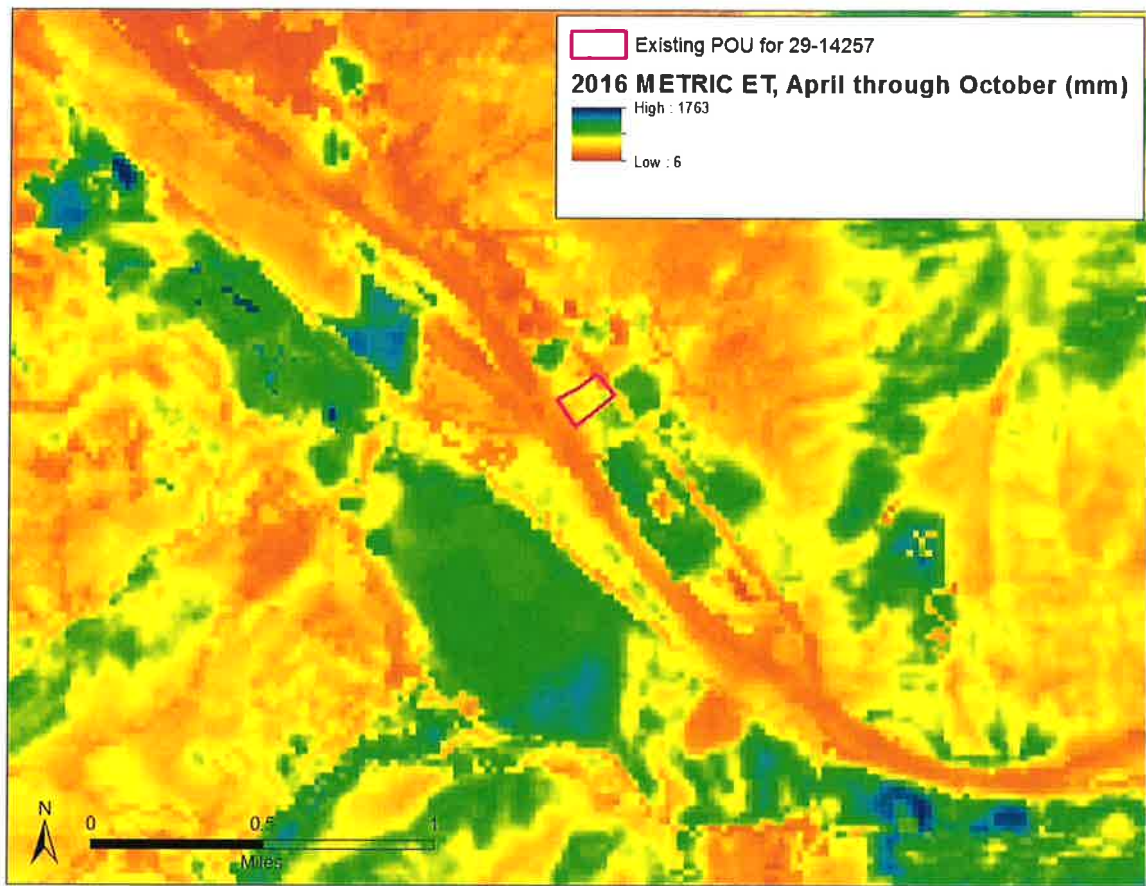


Figure 6. 2016 METRIC ET at existing place of use

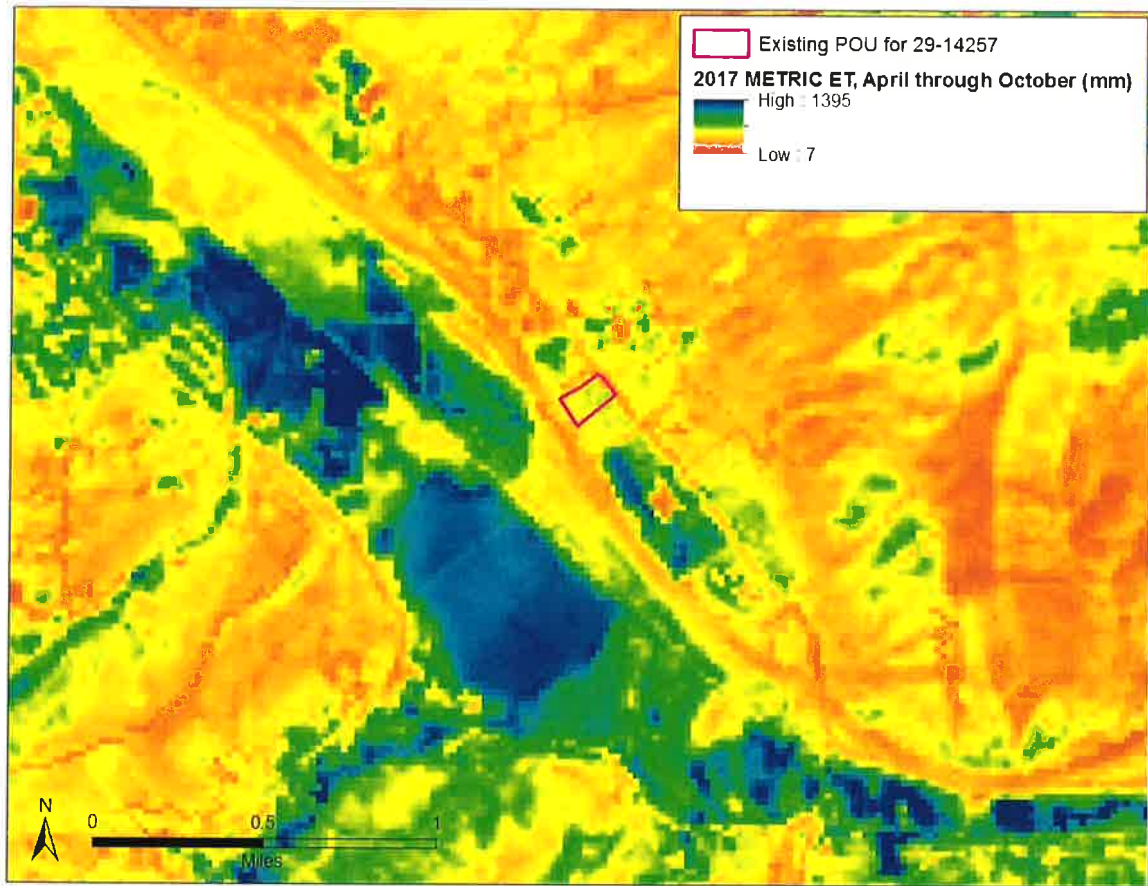


Figure 7. 2017 METRIC ET at existing place of use

In conclusion, the existing point of diversion is located within the LPRV aquifer, which is hydraulically connected to the ESPA. Reduction of pumping for consumptive use within the LPRV aquifer will result in an increase in inflow from the LPRV aquifer to the ESPA. However, METRIC ET and NDVI data indicate the historic use modeled in the transfer spreadsheet analysis submitted by the applicant has not occurred in recent years.

ATTACHMENT A. Normalized Differential Vegetation Index (NDVI) from <http://climateengine.org/>.
(Rectangle indicates approximate location of current place of use.)

