File NR CG1-*02564CWRIS
WR Doc ID 5723979

DEPARTMENT OF ECOLOGY
State of Washington

State of Washington
REPORT OF EXAMINATION FOR WATER RIGHT CHANGE

Changed Place of Use
Added or Changed Point of Withdrawal/Diversion

PRIORITY DATE	WATER RIGHT NUMBER
10/9/1952	GWC 1221 (G1-*02564CWRIS)

MAILING ADDRESS	SITE ADDRESS (IF DIFFERENT)
Kevin Berendsen/Berendsen Dairy 3125 East Badger Road Everson, WA 98247 Phone: 360-815-4455	9264 Van Buren Road Everson, WA 98247

Total Quantity Authorized for Withdrawal or Diversion

WITHDRAWAL OR DIVERSION RATE	UNITS	ANNUAL QUANTITY (AF/YR)
180	GPM	58

Total withdrawals or diversions from all sources must not exceed the total quantity authorized for withdrawal or diversion listed above.

Purpose

	WITHDRAWAL OR DIVERSION RATE			ANNUAL QUANTITY (AF/YR)		
PURPOSE	ADDITIVE	NON-ADDITIVE	UNITS	ADDITIVE	NON-ADDITIVE	PERIOD OF USE (mm/dd)
Irrigation	180		GPM	58		04/15-10/01

IRRIGATED ACRES		PUBLIC WATER SYSTEM INFORMATION	
ADDITIVE	NON-ADDITIVE	WATER SYSTEM ID	CONNECTIONS
39	0		

Source Location

COUNTY	WATERBODY	TRIBUTARY TO	WATER RESOURCE INVENTORY AREA
Whatcom	Groundwater		01

SOURCE FACILITY/DEVICE	PARCEL	WELL TAG	TWP	RNG	SEC	QQ Q	LATITUDE	LONGITUDE
Proposed Well	400408187336	NA	40N	04E	08	E ½ SE ¼ SE ¼ NW ¼	NA	NA

Place of Use (See Attached Map)

Datum: NAD83/WGS84

PARCELS
400408187336
LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE
SE ¼ NW ¼ and that portion of the SW ¼ NW ¼ lying east of Johnson Creek, all in Section 8, Township 40 North, Range 4 East, W.M.

Proposed Works

A well will be drilled to tap the Abbottsford-Sumas aquifer and will provide water to a drip irrigation system for the intended production of either raspberries or blueberries.

Development Schedule

BEGIN PROJECT	COMPLETE PROJECT	PUT WATER TO FULL USE
December 31, 2015	December 31, 2019	December 31, 2022

Measurement of Water Use

How often must water use be measured?	Weekly
How often must water use data be reported to Ecology?	Annually (Jan 31)
What volume should be reported?	Total Annual Volume
What rate should be reported?	Annual Peak Rate of Withdrawal (gpm)

Provisions

Wells, Well Logs and Well Construction Standards

All wells constructed in the state must meet the construction requirements of WAC 173-160 titled "Minimum Standards for the Construction and Maintenance of Wells" and RCW 18.104 titled "Water Well Construction." Any well which is unusable, abandoned, or whose use has been permanently discontinued, or which is in such disrepair that its continued use is impractical or is an environmental, safety or public health hazard must be decommissioned.

All wells must be tagged with a Department of Ecology unique well identification number. If you have an existing well and it does not have a tag, please contact the well-drilling coordinator at the regional Department of Ecology office issuing this decision. This tag must remain attached to the well. If you are required to submit water measuring reports, reference this tag number.

Installation and maintenance of an access port as described in WAC 173-160-291(3) is required.

Measurements, Monitoring, Metering and Reporting

An approved measuring device must be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", WAC 173-173, which describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition the Department of Ecology for modifications to some of the requirements.

Recorded water use data shall be submitted via the Internet. To set up an Internet reporting account,

To appeal you must do the following within 30 days of the date of receipt of the Order.

File your appeal and a copy of this Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.

- Serve a copy of your appeal and this Order on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.
- You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 **Pollution Control Hearings Board** 1111 Israel RD SW Ste 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608 **Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

Signed at Bellevue, Washington, this 11th day of August, 2014.

Mr. Jerry Liszak, Acting Section Manager

For additional information visit the Environmental Hearings Office Website: http://www.eho.wa.gov. To find laws and agency rules visit the Washington State Legislature Website: http://www1.leg.wa.gov/CodeReviser.

ATTACHMENT--LEGAL DESCRIPTION FOR PLACE OF USE

contact the Bellingham Field Office. If you do not have Internet access, you can still submit hard copies by contacting the Bellingham Field Office for forms to submit your water use data.

Proof of Appropriation

The water right holder must file the notice of Proof of Appropriation of water (under which the superseding certificate of water right is issued) when the permanent distribution system has been constructed and the quantity of water required by the project has been put to full beneficial use. Once Ecology has accepted the Proof of Appropriation form, the applicant shall retain the services of a Certified Water Rights Examiner (CWRE) to verify the extent of the perfected right and prepare the necessary documentation to allow Ecology to issue a water right certificate for this project. The certificate will reflect the extent of the project perfected within the limitations of this authorization. Elements of a proof inspection may include, as appropriate, the source(s), system instantaneous capacity, beneficial use(s), annual quantity, place of use, and satisfaction of provisions. Information on hiring a CWRE is available on Ecology's website at: http://www.ecy.wa.gov/programs/wr/rights/cwrep.html or by calling the appropriate Ecology regional office.

Schedule and Inspections

Department of Ecology personnel, upon presentation of proper credentials, will have access at reasonable times, to the project location, and to inspect at reasonable times, records of water use, wells, diversions, measuring devices and associated distribution systems for compliance with water law.

Real Estate Excise Tax

This decision may indicate a Real Estate Excise Tax liability for the seller of water rights. The Department of Revenue has requested notification of potentially taxable water right related actions, and therefore will be given notice of this decision, including document copies. Please contact the state Department of Revenue to obtain specific requirements for your project. Phone: (360) 570-3265. The mailing address is: Department of Revenue, Real Estate Excise Tax, P.O. Box 47477, Olympia WA 98504-7477 Internet: http://dor.wa.gov/. E-mail: REETSP@DOR.WA.GOV.

Findings of Facts

Upon reviewing the investigator's report, I find all facts, relevant and material to the subject application, have been thoroughly investigated. Furthermore, I concur with the investigator that the water right is partially eligible for change, the additional well will tap the same body of public groundwater as the original well; there will be no impairment of existing rights; the combined total withdrawal from the original and the additional wells will not enlarge the right; and there will be no detriment to the public interest.

Therefore, I ORDER partial approval of Application No. CG1-*02564CWRIS subject to existing rights and the provisions specified above.

Your Right To Appeal

You have a right to appeal this Order to the Pollution Control Hearings Board (PCHB) within 30 days of the date of receipt of this Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

BACKGROUND

This report serves as the written findings of fact concerning Water Right Application Number CG1-*02564C. This water right was originally issued to John J. Stadt, Jr., but is now owned by the Berendsen Dairy through acquisition of the place of use (POU). The right is for irrigation with an instantaneous rate of 180 gallons per minute (gpm) and an annual volume of 58 acre-feet per year (af/yr) for the irrigation of 39 acres. The applicant wishes to move the point of withdrawal (POW) and water use to a different parcel of land located approximately 0.75 miles northwest of the current POU, while maintaining all of the other attributes of the water right.

The original POW (referred to in this report as well IW-1) was a 36-inch-diameter well dug to a depth of 22 feet and located in the middle of the original POU. This original well can no longer be located. In the late 1980s, a new well was drilled on the Berendsen Dairy property located approximately 0.75 miles west-southwest of the original POU. The newer well (referred to in this report as well IW-2) is an 8-inch-diameter, 56-foot-deep well. Pipe was laid from well IW-2 to the POU to allow irrigation to continue on the property from this new well. This change in POW was done without authorization and is considered a *de facto* change. If this change application is approved, the applicant plans to drill a new well in the vicinity of the new POU. Well IW-2 is also associated with another water right and will remain in operation under that water right.

The applicant wishes to establish a new POU and proposes to drill a new well or wells in the new POU, which is proposed to tap the same body of public ground water as the original wells.

EXISTING Water Right Attributes

Water Right Owner:	Berendsen Dairy (name on certificate is John L. Stadt, Jr.)
Priority Date:	5/29/1952
Place of Use	SE ¼ SE ¼, less road, Sec. 8, Twp. 40 N., Rge. 4 E., W.M.

County	Waterbody	Tributary To	WRIA
Whatcom	Well		01 - Nooksack

Purpose	Rate	Unit	Af/yr	Begin Season	End Season
Irrigation of 39 acres	180	GPM	58	Irrigation Season	

Source Name	Parcel	Well Tag	Twp	Rng	Sec	QQ Q	Latitude	Longitude
IW-1 (original – abandoned)	400408458073	NA	40N	4E	8	SE SE	48.96551	-122.31172
IW-2 (current *de facto change*)	400417333464	NA	40N	4E	17	NW NE	48.96306	-122.31719

GPM = Gallons per minute; Af/yr = Acre-feet per year; Sec. = Section; QQ Q = Quarter-quarter of a section; WRIA = Water Resource Inventory Area; E.W.M. = East of the Willamette Meridian; Datum in NAD83/WGS84.

REQUESTED Water Right Attributes

Applicant Name:	Kevin Berendsen/Berendsen Dairy
Date of Application:	4/13/2013
Place of Use	Parcel No. 400408187336 SE NW-SW NW LY E OF JOHNSON CREEK

County	Waterbody	Tributary To	WRIA
Whatcom	Groundwater		01 - Nooksack

Purpose	Rate	Unit	Af/yr	Begin Season	End Season
Irrigation	180	GPM	58	April 15	October 1

Source Name	Parcel	Well Tag	Twp	Rng	Sec	QQ Q	Latitude	Longitude
Well	400408187336	NA	40N	4E	8	S ½ NW	NA	NA

GPM = Gallons per minute; Af/yr = Acre-feet per year; Sec. = Section; QQ Q = Quarter-quarter of a section; WRIA = Water Resource Inventory Area; E.W.M. = East of the Willamette Meridian; Datum in NAD83/WGS84.

Legal Requirements for Requested Change

The following is a list of requirements that must be met prior to authorizing the proposed change in POU and POW.

Public Notice

RCW 90.03.280 requires that notice of a water right application be published once a week, for two consecutive weeks, in a newspaper of general circulation in the county or counties where the water is to be stored, diverted and used. Notice of this application was published in the *Lynden Tribune* on September 4, 2013 and September 11, 2013. In an email on December 4, 2013, Ms. Michele Curtis, of the Department of Ecology's Northwest Regional Office, confirmed that no protests were received on this application.

Consultation with the Department of Fish and Wildlife

The Department of Ecology must give notice to the Department of Fish and Wildlife (WDFW) of applications to divert, withdraw or store water. On May 19, 2014, a summary of the proposed decision was provided to Mr. Steve Boessow, Water Rights Biologist with WDFW, and on June 12, 2014, he provided a letter stating that WDFW does not oppose the approval of this change application. The letter emphasizes the importance of fish in Johnson Creek and acknowledges that this change will neither increase the quantity of water being used, nor the number of acres irrigated. The letter also expresses support for requiring metering and reporting.

Consultation with the Lummi Nation and Nooksack Tribe

The Lummi Nation and Nooksack Tribe were notified of the water right change applications by Ecology. Neither the Lummi Nation, nor the Nooksack Tribe provided comments.

State Environmental Policy Act (SEPA)

A water right application is subject to a SEPA threshold determination (i.e., an evaluation whether there are likely to be significant adverse environmental impacts) if any one of the following conditions are met.

(a) It is a surface water right application for more than 1 cubic foot per second (cfs), unless that project is for agricultural irrigation, in which case the threshold is increased to 50 cfs, so long as that irrigation project will not receive public subsidies;
(b) It is a groundwater right application for more than 2,250 gpm;
(c) It is an application that, in combination with other water right applications for the same project, collectively exceed the amounts above;
(d) It is a part of a larger proposal that is subject to SEPA for other reasons (e.g., the need to obtain other permits that are not exempt from SEPA); or
(e) It is part of a series of exempt actions that, together, trigger the need to do a threshold determination, as defined under WAC 197-11-305.

Because this application does not meet any of these conditions, it is categorically exempt from SEPA and a threshold determination is not required.

Water Resources Statutes and Case Law

RCW 90.03.380(1) states that a water right that has been put to beneficial use may be changed. The point of diversion, POU, and purpose of use may be changed if it would not result in harm or injury to other water rights.

The Washington Supreme Court has held that Ecology, when processing an application for change to a water right, is required to make a tentative determination of extent and validity of the claim or right. This is necessary to establish whether the claim or right is eligible for change. *R.D. Merrill v. PCHB* and *Okanogan Wilderness League v. Town of Twisp.*

RCW 90.44.100 allows Ecology to amend a ground water right to (1) allow the user to construct a replacement or additional well at a new location outside of the location of the original well, or to (2) change the manner or POU of the water, if:

(a) The additional or replacement well taps the same body of public ground water as the original well. RCW 90.44.100(2)(a);
(b) Where a replacement well is approved, the user must discontinue use of the original well and properly decommission the original well. RCW 90.44.100(2)(b);
(c) Where an additional well is constructed, the user may continue to use the original well, but the combined total withdrawal from all wells shall not enlarge the right conveyed by the original permit or certificate. RCW 90.44.100(2)(c); and
(d) Other existing rights shall not be impaired. RCW 90.44.100(2)(d).

When changing or adding points of withdrawal to groundwater rights (RCW 90.44.100), or when consolidating exempt wells with an existing permit or certificate (RCW 90.44.105), the wells must draw from the *same body of public groundwater*. Indicators that wells tap the *same body of public groundwater* include:

(a) Hydraulic connectivity.
(b) Common recharge (catchment) area.

(c) Common flow regime.
(d) Geologic materials that allow for storage and flow, with recognizable boundaries or effective barriers to flow.

Cost Reimbursement Processing

This application is being processed under a Cost Reimbursement Agreement between the applicant and the Department of Ecology. The applicant selected RH2 Engineering, Inc., (RH2) to process this application on Ecology's behalf. The change application is being processed without requiring processing of previously filed water right change applications, as allowed under RCW 90.03.265, since the transfers will not diminish the water available to earlier pending applicants for changes or transfers from the same source of supply.

INVESTIGATION

The current POU under this certificate includes property owned not only by the Berendsen's (Parcel 400408458073), but also by the Nooksack Valley School District (Parcel 400408498012). A statement signed August 27, 2013, by Mr. Mark Johnson (Superintendent of Schools, Nooksack Valley) indicated that the school district does not claim any interest in the water right and therefore, the water right can be transferred off of the school district property.

Site Visit

On December 12, 2013, Mr. Andrew B. Dunn and Mr. Jim Bucknell from RH2 and Mr. Tom Buroker from Ecology met with Messrs. Kevin and Auggie Berendsen and Mr. Chuck Lindsay, their consultant from Associated Earth Sciences, Inc., (AESI) to perform the site visit. Before travelling to the proposed POU, we met at the company office and discussed general and specific farm operations and the proposed transfer.

The Berendsens explained that their family had recently gotten out of the dairy business, which was run by Auggie, and Kevin, who is educated as an agronomist, wants to transfer the water right to a different property that was determined to be better for growing blueberries and/or raspberries.

The Berendsens explained that the crops grown on the original POU were pasture and corn that were used to feed the dairy cows. Historically, they have rotated between grass and corn. Typically, they planted the field in grass for 4 years and then planted corn for 3 to 5 years before returning to grass. They indicated that they have on occasion started irrigating in April and finished in October when conditions require it. The original POW was reportedly filled in years ago and could not be located by the Berendsens to confirm if it had been properly decommissioned. The well that has been providing water to this property (IW-2) is located south of E. Badger Road near the main barn structure. The Berendsens indicated that a 6-inch mainline runs across E. Badger Road and is on the southern edge of the property on the north side of the road, home, manure lagoon, and the Nooksack Valley High School parking lot.

Well IW-2 reportedly has a 7.5- horsepower (hp) submersible pump and a 50 hp booster pump (Berkeley B3ZPLS). No depth to water measurement could be taken due to the size of the pump drop pipe (6-inch diameter) inside the well (8-inch diameter), but the Berendsens indicated that the static water level this time of year should be close to ground surface.

The proposed POU lies approximately 0.75 miles to the northwest of the original POU and is accessed from Van Buren Road. The applicant has yet to drill a well in this area and wanted to wait to see if there would be any hydrogeologic restrictions on well placement before spending the money to drill. The applicant's preferred location is west of Johnson Creek, where power is more readily available and reportedly the groundwater quality is better (less iron).

The land that is proposed to be irrigated lies east of Johnson Creek and was most recently planted in corn. The Berendsens indicated that they have not irrigated this land before. Kevin Berendsen said the entire parcel appears very suitable for blueberries and raspberries would also appear to be a good option although there is a swale that runs generally northeast to southwest where the land surface is lower and the soil may be too wet for certain varieties of raspberries.

History of Water Use

Information on the history of water use under this water right was pieced together from a variety of sources, including an affidavit, pump curves, aerial photos, irrigation guides, the site visit, and weather records.

The current POU encompasses roughly 39 acres of existing parcels 400408458073 and 400408498012. The POU is described on the water right certificate as the southeast ¼ of the southeast ¼ of Section 8, Township 40 north, Range 4 east, W.M.

Affidavit

One affidavit, by Mr. Kevin Berendsen, relating to knowledge of farming and irrigation practices on the property under GWC 1212 (G1-*02546C) was provided with the change application. The affidavit was signed and notarized on March 8, 2013. In that affidavit, Mr. Berendsen states that he has been familiar with the farming and irrigation operations on the property since 1990 and the operational, historical, farming, irrigation, and general water use practices described in the AESI report (2013), are "true and correct" to the best of his knowledge.

Instantaneous Rate

A pump curve was obtained for the booster pump (Berkeley Model B3ZPLS with 9" impeller) that is located at the well IW-2 wellhead. According to the pump curve this pump will produce approximately 640 gpm at a total dynamic head of 250 feet (108 pounds per square inch) at the best efficiency point. The big gun nozzle being utilized for irrigation was a Nelson 1.5-inch diameter taper bore nozzle. The spacing between risers was reported to be 250 feet and Mr. Auggie Berendsen indicated that the spray reaches to the adjacent riser when irrigating for an irrigation diameter of approximately 500 feet. Using Nelson Irrigation Corporation product literature, it was confirmed that the 1.5-inch-diameter taper bore nozzle will irrigate a diameter of 500 feet at a pressure of 100 pounds per square inch. Review of the information suggests that well IW-2 is capable of producing approximately 640 gpm, which is in excess of the 360 gpm combined instantaneous rate authorized under GWC 1212 (this right) and GWC 1416, which have both been utilizing this well as the POW. The use of this well under GWC 1212 has been through a *de facto* change since no change authorization exists in the file. Therefore, it is reasonable to conclude that the instantaneous rate of 180 gpm as authorized under this water right has been maintained through beneficial use from well IW-2, through the *de facto* change, and the full rate is available for transfer.

With this transfer, the water right holder needs to reduce the pumping rate of well IW-2 to prevent exceeding the rate authorized under GWC 1416 (180 gpm).

Irrigated Acres

GWC 1221 is the only irrigation water right associated with the existing POU. So, all irrigated acres within the place of use can be attributed to this water right.

Aerial photos of the property were provided with the application packet (AESI, 2013). These aerial photos were labeled with the following dates: 1951, 1961, 1975, 7/15/1998, 7/5/1976, 6/26/1987, 1991, 7/20/1998, 8/9/2004, 7/31/2005, 8/17/2006, 10/12/2006, 7/9/2007, 5/30/2009, 9/10/2009, 2010, 8/25/2011, 9/29/2012, and 5/5/2013. The aerial photos from 1998 to present were also viewed using Google Earth™.

Review of aerial photos was performed to determine the number of acres irrigated historically within the place of use. The oldest aerial photo reviewed was from 1951, which predates the issuance of the permit by approximately 1 year. In the 1951 aerial photo, there are a number of structures in the south-central portion of the POU. These structures are likely either a residence or dairy with outbuildings. It is likely at that time that the full 39 acres were being irrigated since the certificate was issued shortly thereafter. Between 1989 and 1991 a manure lagoon was constructed on the property north of the buildings, which reduced the number of acres being farmed and irrigated. Between 1991 and 1998 the Nooksack Valley High School constructed a parking lot on the southeastern corner of the property, which further reduced the acres being farmed and irrigated. The POU remains in this same configuration to the present day.

Over the history of the water right, the minimum number of acres that have been irrigated, based on the aerial photographs, occurred from 1998 to the present. GIS was used to calculate the number of acres being farmed over this time, and that number is 32 acres.

During this review it was noted that there were not well defined pathways within the corn indicative of the operation of a moving big gun sprinkler for irrigation of corn. This question was presented to the water right holder and on March 12, 2014, Mr. Kevin Berendsen responded with photos of the tractor that is used to pull the wheeled sprinkler platform off of the reel. This tractor has high-clearance with aligned front and rear wheels that are able to keep both sets of wheels between the rows while driving across the field. Mr. Berendsen also indicated that for corn they typically apply water more heavily early in the season and then stop once the corn gets to be a certain height to avoid damaging the corn due to the irrigation method.

Annual Volume

Based on the evidence collected through review of the aerial photos, affidavit, site visit, and communication with Kevin Berendsen, 32 out of the authorized 39 acres have been irrigated within the POU under this water right.

There is currently no water meter installed on the POW. Even if there was, this well is being used as the POW under multiple water rights and so it would be difficult to determine how much of the metered water was applied to the POU. The same problem is true of trying to look at power meter records. Therefore, RH2 relied on the Washington Irrigation Guide (WIG, 1992 update), older irrigation guides (1982 and 1969), weather data, and Water Resources Guidance GUID-1210 to estimate the highest annual volume of water pumped under this water right.

The first thing to be determined is the crop irrigation requirement (CIR). This is the amount of water that the crop would need to not experience any stress due to water availability. For this particular site, the Clearbrook WIG station was used. The data from the WIG (1992) suggests that, with a 2-year return interval, the crop irrigation requirement for a pasture/turf crop is 12.79 inches and for a corn crop is 6.90 inches. From the WIG data, it is apparent that the highest water use crop grown within the POU is pasture/turf.

The WIG (1992) CIR estimates are for an average year and are based on average weather data that does not include at least the last 20 years. The University of Washington – Climate Impacts Group has predicted that over the next 10 to 30 years, average air temperatures in the Pacific Northwest will be 2 to 3 degrees Fahrenheit higher than the 1970 to 1999 averages and that less precipitation will occur during the summer months due to global climate changes in Washington State. The result of these changes has been warmer and drier irrigation seasons in Whatcom County. For example, the available weather data shows that the period of May through September was on average 1.3 degrees Fahrenheit warmer from 2009 through 2013, than the average temperature from the Clearbrook station provided in the WIG (**Table 1**). Therefore, it is apparent that, because the WIG values are based on older weather data, utilizing the WIG estimated CIR would result in underestimating the amount of irrigation water an irrigator has actually been using over the most recent years.

Station Circular 512 (Irrigation Water Requirements Estimates for Washington, November 1969) and EB1513 (Irrigation Requirements for Washington Estimates and Methodology, 1982) show that, for the Bellingham station (closest location to the site), the crop irrigation requirement will increase as the return period increases. These documents show an increase of 2 to 3 inches going from the 2-year to the 5-year and 10-year return intervals.

Table 1. Weather Comparison of WIG Averages to Actual Data

	Temperature (degrees F)			Precipitation (inches)		
Irrigation Season	WIG Average	Actual	Difference (Actual - WIG)	WIG Average	Actual	Difference (Actual - WIG)
2009	59.00	61.38	2.38	11.67	11.5	0.17
2010		59.51	0.51		16.72	5.05
2011		59.29	0.29		12.36	-0.69
2012		59.74	0.74		9.82	1.85
2013		61.74	2.74		13.71	-2.04

- Irrigation season is considered to be May through September.
- Annual data is from the Clearbrook weather station.
- Weather data was obtained from www.wrcc.dri.edu.

Publication EB1513 presents CIR estimates for various crops (based on average weather data from 1948 through 1973) and 2-, 5-, 10-, and 20-year return intervals to account for climatic variability. Publication EB1513 states that the CIR 2-year return period values will be adequate on the average, once every 2 years. Similarly, the 5-year CIR values, 10-year CIR values and 20-year CIR values will be adequate on the average, 4 of 5 years, 9 of 10 years, and 19 of 20 years, respectively. Again, it should be noted that these CIR values and return periods are based on weather data collected from 1948 through 1973 and,

as discussed above, likely underestimate the current CIR values and return interval time periods due to ongoing global climate change.

Publication EB1513 indicates that, for Bellingham (closest location to site), the pasture/turf crop CIR increased by approximately 23 percent going from the 2-year to the 10-year return interval. Increasing the WIG pasture/turf CIR by 23 percent results in a 15.73 inch CIR for pasture/turf. RH2 has assumed that increasing the WIG values to represent the anticipated 10-year return interval for the crop is a reasonable way to estimate the actual CIR for this water right.

Ecology guidance document 1210 indicates that the efficiency of the moving big gun irrigation methods utilized by Berendsen Dairy to irrigate pasture/turf and corn ranges between 55 percent and 75 percent, with an average of 65 percent (Ecology Guidance 1210).

Table 2 contains calculations of the annual volume based on the WIG. One is using the values straight from the WIG and the second is adjusting the WIG values upward to account for climate change and a longer return interval, as discussed above.

Table 2. Annual Volume Calculated Using Various Methods

Method	CIR (inches)	Application Efficiency	TIR (inches)	TIR (feet)	Volume (af/yr)
Straight WIG 2-year return interval	12.79	65%	19.68	1.64	52.5
Adjusted WIG 10-year return interval	15.73	65%	24.20	2.02	64.6

- Crop is pasture/turf.
- Irrigation method is moving big gun.
- Straight WIG CIR is from Clearbrook Station.
- 10-year return interval is the straight WIG times 1.23.
- 32 acres of irrigation.
- Application efficiency is equal to the average values provided in Ecology Guidance 1210.
- Water right limit is 58 af/yr.

Since the water right is limited to an annual volume of 58 af/yr, it is reasonable to conclude that the full annual volume granted with the original water right has been used and not lost due to non-use without sufficient cause, even though less than the originally authorized acres have being irrigated.

Proposed Use

The applicant requests to transfer the POU and POW to allow for irrigation of the same number of originally authorized acres (39) on a different property located approximately 0.5 miles to the northwest. The anticipated crop for this new place of use is either blueberries, or raspberries. The proposed irrigation method for the new field will be trickle/drip.

If the change is approved, irrigation will cease on the current place of use. Any crop grown will be reliant on the naturally-occurring soil moisture and irrigation season precipitation.

Other Rights Appurtenant to the Place of Use

The Water Resources Explorer was used to determine what rights might be appurtenant to the existing and proposed place of use.

The Berendsens do not hold any other water rights on either the existing or proposed POU, besides the water right that is the subject of this report of examination for change.

There is one water right certificate and one claim whose place of use includes the proposed POU. These water rights are listed in **Table 3**, along with the purposes of use.

Table 3. Water Rights Appurtenant to the Proposed Place of Use Not Held By Berendsen

Water Right Name	Water Right Number	Purpose of Use
City of Sumas	G1-26398C	Municipal
William D. Aho	G1-053559CL	Domestic and Stock

Both of the appurtenant water rights are for different purposes of use. Therefore, the overlap of these water rights with the proposed POU does not present a problem.

Hydrologic/Hydrogeologic Evaluation

A separate hydrogeologic memorandum was prepared by Adam Neff, L.G., of RH2 and reviewed by Andrew B. Dunn, L.G., L.HG., focusing on the same body of public groundwater test and impairment (RH2 Engineering Technical Memorandum, May 27, 2014). A summary of that memorandum is presented here and more detail can be obtained from the memorandum, located in the water right file.

The points of withdrawal and POU involved in this water right change lie within the geographic feature commonly referred to as the Sumas Trough. The Sumas Trough is a low-lying region located north of the Nooksack River, east of the Lynden Terrace, and northwest of Sumas Mountain (**Figure 1**).

All of the existing and proposed points of withdrawal fall within the Johnson Creek subbasin as defined by the Water Resources Inventory Area (WRIA) 1 Initiating Governments (2002). All wells are completed within the Sumas outwash aquifer. The Sumas outwash aquifer at this location is composed of sand and gravel that ranges from 80 to 120 feet thick. Deeper sediments (Everson Glaciomarine Drift) are fine-grained and do not yield water in sufficient quantities, or of high enough quality, to be used for irrigation supply. Recharge to the Sumas outwash aquifer is almost exclusively through vertical infiltration of precipitation. The water table is from 5 to 10 feet below ground surface in the late summer and fluctuates by approximately 5 feet over the course of the year due to changes in recharge and groundwater use. In this area the Sumas outwash aquifer is directly connected to the many ditches and tributaries associated with Johnson Creek.

The groundwater contours created by Cox and Kahle (1999) include the project site (**Figure 2**). Generally, groundwater in this portion of the Sumas aquifer flows from the northwest to southeast; from Laxton and Judson Lakes toward the Sumas River, until it reaches the Sumas tough where it then changes to a north to northeast flow path, following the drainage direction of Johnson Creek and the Sumas River (**Figure 2**).

Pumping Impacts on Surface Water Bodies and Surface Water Rights

Johnson Creek is a year round watercourse that bisects the proposed POW area. According to the letter from Mr. Steve Boessow (June 12, 2014, WDFW Water Rights Biologist) and SalmonScape (http://apps.wdfw.wa.gov/salmonscape/map.html), this stream provides habitat for a number of salmon and trout species, including presumed bull trout presence.

There are three surface water right diversions (S1-*13456CWRIS, S1-*10825CWRIS, S1-*09968CWRIS) located downstream of the proposed POW area (**Figure 1**) but upstream of the potential impacts from the original POW associated with this water right. These three surface water rights total 1.22 cfs of diversion. Based on Ecology's total maximum daily load (TMDL) report, the flow within Johnson Creek at river mile 8.2 (located just upstream of the proposed POW area), ranges from 0.2 to 38 cfs. Culhane reported flows within Johnson Creek approximately 2,000 feet downstream (JC-10) of the proposed POW area between June 1, 1993, and October 18, 1993, ranged from 2 to 15 cfs. Depending on the time of year, these surface water rights may be 60 to 100 percent of the entire flow within Johnson Creek during low flow conditions.

The proposed POW area is immediately adjacent to Johnson Creek while the original POW was more than 3,800 feet from the creek. Based on the Hunt method (2003) for estimating surface water impacts due to groundwater pumping withdrawals, the original POW had little to no influence directly on Johnson Creek. Any impact to the creek would have been via the Clearbrook Ditch just west (710 feet) of the original POW and only during periods of flow. It is unknown how frequent and what quantity of flow is within the ditch. During periods of flow within the Clearbrook Ditch the impact to Johnson Creek would have then been located approximately 1 river mile downstream from the proposed POW area at the confluence of the ditch and Johnson Creek. Impacts to Johnson Creek from withdrawals within the proposed POW area vary greatly depending on the location of the well. Again, using the Hunt method, along with considerations for groundwater flow direction (northeast), withdrawal locations west of Johnson Creek would likely have a significant impact on the stream. These modeled impacts ranged from 0.2 to 0.4 cfs, or 20 to 100 percent of the flow within the creek during low flow conditions.

Impacts from pumping within the proposed POW area diminish to the east of Johnson Creek. Groundwater capture modeling from the Environmental Protection Agency (EPA) Well Head Protection Area (WHPA) Delineation Manual indicates that the lateral extent of the capture zone is approximately 900 feet from the pumping source. Since groundwater flow is to the northeast, the well needs to be at least 900 feet from Johnson Creek as measured in the northwest direction to avoid impacting Johnson Creek in this area.

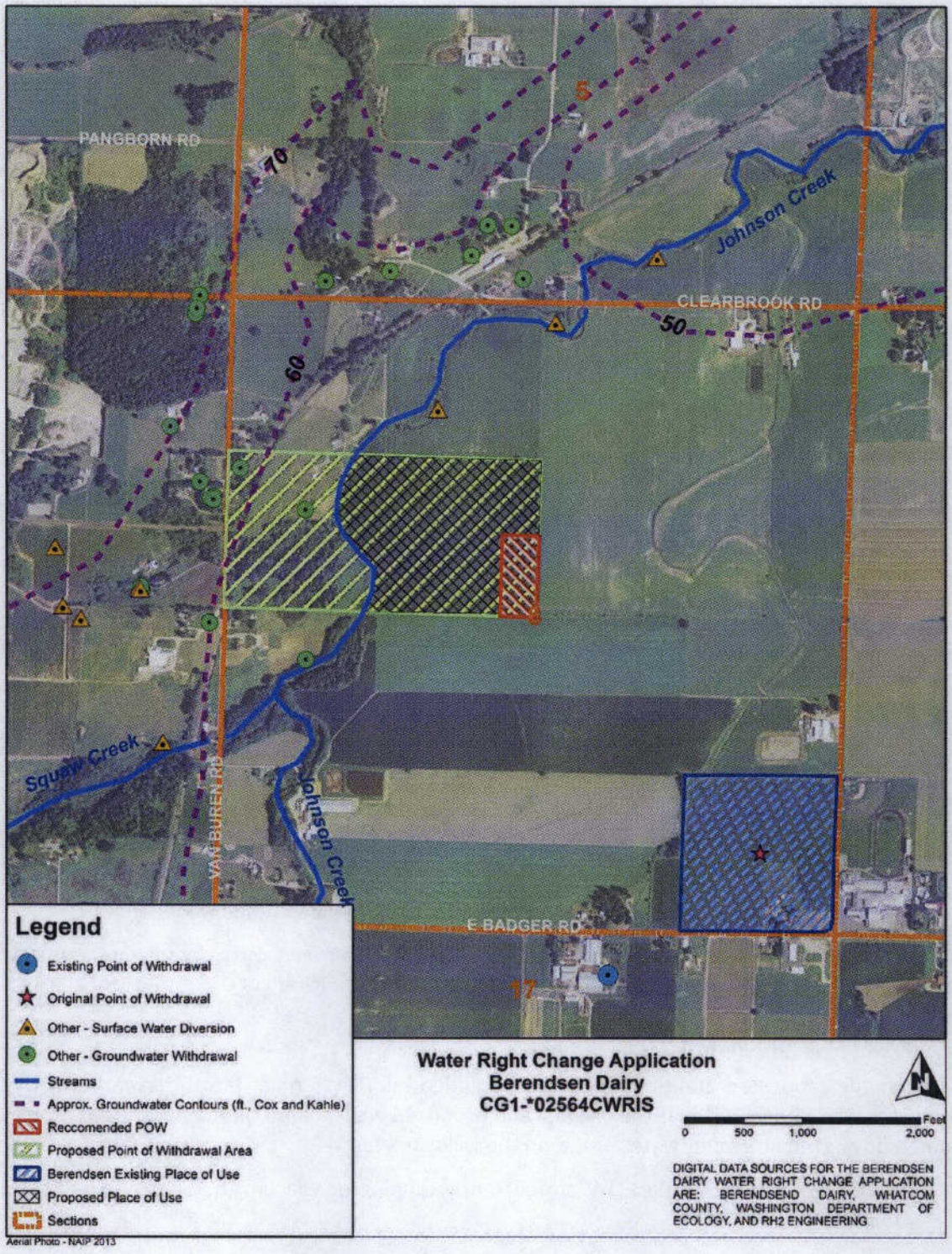

Figure 1. Existing Well, Proposed, and Recommended Well Locations

(Groundwater elevations and flow directions based on Cox and Kahle, 1999)

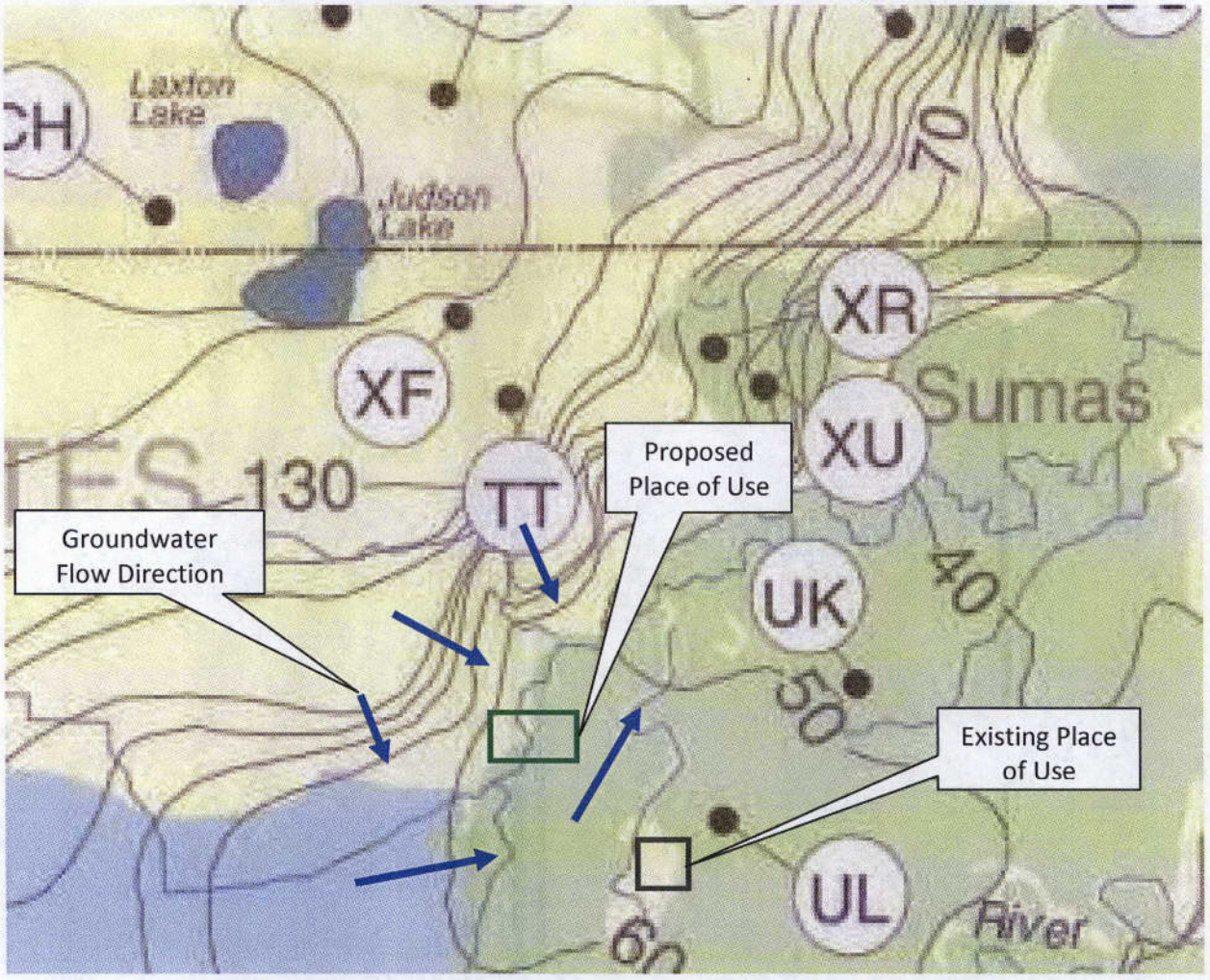

Figure 2. Potentiometric Surface Map from Cox and Kahle (1999)

(Figure shows approximate location of the Berendsen Dairy project with groundwater contours (elevation in feet). Flow direction arrows were added in the vicinity of the project for clarity.)

Same Body of Public Groundwater

In order for the requested additional POW to be added, all POWs must tap the same body of public groundwater. RH2 concluded that the existing and proposed well located on the Berendsen property tap the same body of public groundwater based on the following facts:

1. The original and proposed POW are currently tapping or will tap the shallow Sumas outwash aquifer.
2. The original and proposed POW are located within the Johnson Creek subbasin.
3. Groundwater flow for the area is ultimately to the northeast. No groundwater flow divides or flow boundaries exist between the existing and proposed POWs.

4. The potential maximum distance between the existing and proposed well is about 1 mile.

Pumping Impacts on Neighboring Wells

The proposed exact POW location had not yet been determined when the change application was submitted, but was proposed to be located in the S ½ of the NW ¼ of Section 8, Township 40 North, Range 4 East, W.M. The Berendsen's preferred location is west of Johnson Creek due to the proximity to a power source and anticipated better water quality. However, given the potential for impacts on Johnson Creek (administratively closed water body) upstream of where it has occurred historically due to exercise of this water right, a new well located west of or in close proximity to Johnson Creek was determined to not be allowed and a much smaller area within the originally requested well location was recommended for approval based on the impacts to Johnson Creek and potential for impairment of surface water right holders. Therefore, the potential pumping impacts on neighboring wells will only be reviewed for the recommended well location, which is the E ½ of the SE ¼ of the SE ¼ of the NW ¼ Section 8, Township 40 North, Range 4 East, W.M. (**Figure 1**).

Interference drawdown was calculated using a high and low estimate for the transmissivity of 263,000 and 90,000 gallons per day per foot (gpd/ft), respectively, and assuming a saturated aquifer thickness of 90 feet. The storage coefficient was estimated to be 0.005 since the aquifer is semi-confined. A pumping rate of 180 gpm was used and calculations were made based on different pumping durations and distances between the pumping and neighboring wells.

The theoretical radius of influence, which varies solely by pumping duration when aquifer properties are the same, is calculated to be a maximum of approximately 34,000 feet if a well operates continuously until the annual volume is pumped (72.9 days). The largest calculated drawdown at a distance of 1,000 feet from the well was 1.4 feet of drawdown (2 percent of aquifer saturated thickness). Given the high transmissivity of the aquifer, aquifer saturated thickness, and distance of the neighboring wells (greater than 1,600 feet) from the recommended well location, there will be no impairment of existing groundwater rights due to the proposed change.

Impairment Considerations

Impairment of Minimum Instream Flow Water Rights

The term "instream flow" is used to identify a specific stream flow (typically measured in cfs) at a specific location for a defined time, and typically following seasonal variations. Instream flows are usually defined as the stream flows needed to protect and preserve instream resources and values, such as fish, wildlife and recreation. Instream flows are most often described and established in a formal legal document, typically an adopted state rule.

Once established, a minimum flow constitutes an appropriation with a priority date as of the effective date of the rule establishing the minimum flow (RCW 90.03.345). Thus, a minimum flow set by rule is an existing right which may not be impaired (RCW 90.03.345; RCW 90.44.030).

The proposed changes will cause no greater impact on minimum instream flows established in Chapter 173-501 WAC than exist with the originally approved well location. Therefore, the change will not cause any impairment of minimum instream flows.

Impairment of Surface Water Rights

Maintaining an adequate setback between the new well and Johnson Creek will prevent a reduction of the flow in Johnson Creek upstream of where flow reduction has occurred historically. This setback is needed to prevent impairment of the surface water rights located immediately downstream of the proposed place of use. Calculations indicate that within the originally requested POW location of the S ½ NW ¼, Section 8, Township 40 North, Range 4 East, W.M. the new well must be limited to the E ½ of the SE ¼ of the SE ¼ of the NW ¼, Section 8, Township 40 North, Range 4 East, W.M. (**Figure 1**).

Impairment, Qualifying Groundwater Withdrawal Facilities, and Well Interference

There are three concepts that are important when considering whether a withdrawal of water from a well would impair another existing water right. The concepts are defined as follows:

- Impairment is an adverse impact on the physical availability of water for a beneficial use that is entitled to protection, i.e., water rights that are both senior and junior in priority to the right the applicant seeks to change.
- Qualifying groundwater withdrawal facilities are defined as those wells which in the opinion of the Department of Ecology are adequately constructed. An adequately constructed well is one that (a) is constructed in compliance with well construction requirements; (b) fully penetrates the saturated thickness of an aquifer or withdraws water from a reasonable and feasible pumping lift (WAC 173-150); (c) the withdrawal facilities must be able to accommodate a reasonable variation in seasonal pumping water levels; and (d) the withdrawal facilities including pumping facilities must be properly sized to the ability of the aquifer to produce water.

As discussed in the Hydrologic/Hydrogeologic Evaluation section, no impairment is expected to occur in neighboring wells as a result of pumping in the wells associated with this water right change application, for the following reasons.

1. The distance to neighboring wells.
2. The aquifer is relatively thick (80 to 120 feet).
3. The hydraulic conductivity of the aquifer is high.
4. The calculated drawdown is less than 5 percent of the aquifer saturated thickness, even in the pumping well.

Pumping a well completed in a thick aquifer with a high hydraulic conductivity and moderate storage coefficient will tend to create a very broad, but thin, cone of depression around the well. This minimal drawdown in the aquifer prevents there from being a negative impact to neighboring wells.

Public Interest Considerations

Consideration of Protests and Comments

This application was not protested by any party. On June 12, 2014, WDFW provided a letter stating it does not oppose the approval of this change application. The letter emphasizes the importance of fish in Johnson Creek and acknowledges that this change will neither increase the quantity of water being used, nor the number of acres irrigated. The letter also expresses support for requiring metering and reporting. Therefore, the comments do not justify denial of the change application.

Conclusions

Given that the general public and the Lummi Indian Business Council did not protest this change application and the WDFW has stated that it does not oppose the approval of this application, the change will not be detrimental to the public welfare.

RECOMMENDATIONS

Based on the above investigation and conclusions, I recommend that this request for a water right change be partially approved in the amounts and within the limitations listed below and subject to the provisions listed above

Purpose of Use and Authorized Quantities

The amount of water recommended is a maximum limit and the water user may only use that amount of water within the specified limit that is reasonable and beneficial:

180 gpm
58 acre-feet per year
Irrigation of 39 acres
April 15 through October 1

Point of Withdrawal:

E ½ SE ¼ SE ¼ NW ¼, Section 8, Township 40 North, Range 4 E .W.M.

Place of Use:

As described on Page 2 of this Report of Examination.

Report by: Jim Bucknell 8/11/2014

Jim Bucknell – RH2 Engineering, Inc. Date

State of Washington Hydrogeologist 822 Licensed Geologist

ANDREW B. DUNN

Report by: 8/11/2014

Andrew B. Dunn, L.G., L.HG., CWRE – RH2 Engineering, Inc. Date

J. R. "BUCK" SMITH

Reviewed by: Buck Smith 8/11/14

Buck Smith, L.G., L.HG. - Water Resources Program Date

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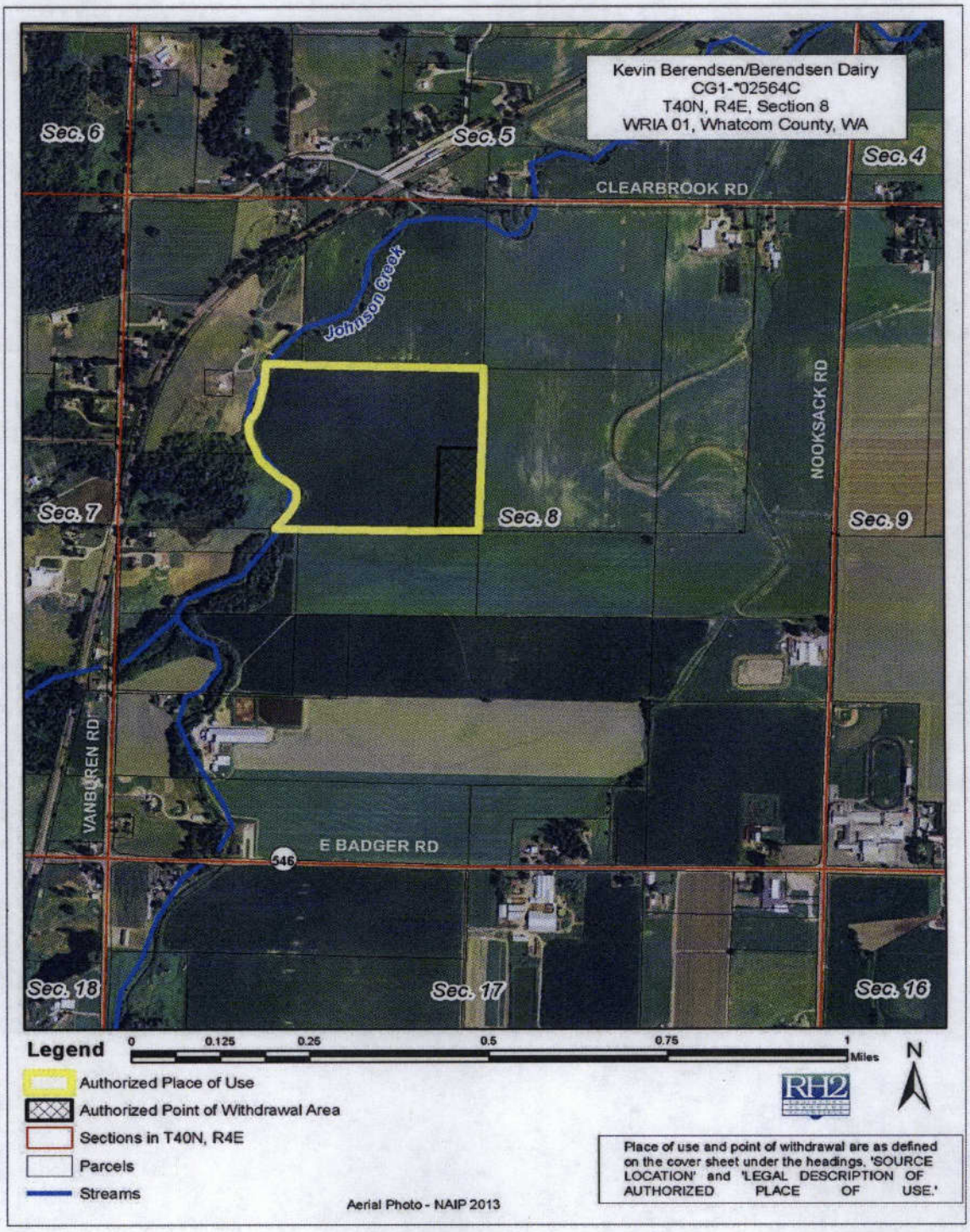
ATTACHMENT


Kevin Berendsen/Berendsen Dairy
CG1-*02564C
T40N, R4E, Section 8
WRIA 01, Whatcom County, WA
Sec. 6
Sec. 5
Sec. 4
CLEARBROOK RD
Johnson Creek
NOOKSACK RD
Sec. 7
Sec. 8
Sec. 9
VANBUREN RD
E BADGER RD
546
Sec. 18
Sec. 17
Sec. 16
Legend
0
0.125
0.25
0.5
0.75
1
Miles
N
Authorized Place of Use
Authorized Point of Withdrawal Area
Sections in T40N, R4E
Parcels
Streams
Aerial Photo - NAIP 2013
RH2
Place of use and point of withdrawal are as defined on the cover sheet under the headings, 'SOURCE LOCATION' and 'LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE.'