File NR CG1-*02451C@1
WR Doc ID 5404191

State of Washington
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REPORT OF EXAMINATION
FOR WATER RIGHT CHANGE

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

PRIORITY DATE	WATER RIGHT NUMBER
April 17, 1952	CG1-*02451C@1 (originally application # 2451, permit # 2248, and Ground Water Certificate 1766)

MAILING ADDRESS	SITE ADDRESS (IF DIFFERENT)
Enfield Farms, Inc. 1064 Birch Bay Lynden Road Lynden, WA 98264	300 E Bartlett Road Lynden, WA 98264

Total Quantity Authorized for Withdrawal or Diversion

WITHDRAWAL OR DIVERSION RATE	UNITS	ANNUAL QUANTITY (AF/YR)
150	GPM	30

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

Purpose

PURPOSE	WITHDRAWAL OR DIVERSION RATE			ANNUAL QUANTITY (AF/YR)		PERIOD OF USE (mm/dd)
	ADDITIVE	NON-ADDITIVE	UNITS	ADDITIVE	NON-ADDITIVE	
Irrigation	150		GPM	30		04/15 - 10/01

IRRIGATED ACRES		PUBLIC WATER SYSTEM INFORMATION	
ADDITIVE	NON-ADDITIVE	WATER SYSTEM ID	CONNECTIONS
32.6	34		

Source Location

COUNTY	WATERBODY	TRIBUTARY TO	WATER RESOURCE INVENTORY AREA
WHATCOM	GROUNDWATER		1-NOOKSACK

SOURCE FACILITY/DEVICE	PARCEL	WELL TAG	TWP	RNG	SEC	QQ Q	LATITUDE	LONGITUDE
WELL IW-1	390306250235	BHE780	39N	03E	06	NW SE	N48.89783	W122.47591
WELL IW-2	390306331217	BHE781	39N	03E	06	NW SE	N48.89782	W122.47190
WELL IW-3	390306263130	BHE782	39N	03E	06	SW SE	N48.89352	W122.47472
Future Well	390306220166	NA	39N	03E	06	NE SW	-	-
Future Well	390306151102	NA	39N	03E	06	SE SW	-	-
Future Well	390306169204	NA	39N	03E	06	NE SW	-	-
Future Well	390306250235	NA	39N	03E	06	NW SE	-	-

Datum: NAD83/WGS84

Place of Use (See Attached Map)

PARCELS (NOT LISTED FOR SERVICE AREAS)

390306263130, 390306250235, 390306151102, 390306169204, 390306220166, and 390306331217

LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE

Approximately 81.6 acres located in the South ½ of Section 6, Township 39 North, Range 03 East, W.M., Whatcom County, WA as detailed below:

390306263130 -- W 1/2 W 1/2 SE-EXC W 1/2 N 1/2 N 1/2 THEREOF-LESS RDS
390306250235 -- W 1/2 N 1/2 N 1/2 W 1/2 W 1/2 SE- LESS RDS
390306151102 -- BEAP ON NLY LI OF CO RD 108 20 FT N-1339.27 FT E OF SW SEC COR-TH NLY 657.44 FT WH MARKS POB-TH NLY 657.44 FT TO E-W 1/16 LI OF SW 1/4-TH ELY 313.72 FT ON E W 1/16 LI-TH SLY 658.27 FT-TH WLY 312.10 FT TO POB
390306169204 -- E 1/2 W 1/2-W 1/2 E 1/2 NE SW-LESS RD
390306220166 -- E 1/2 E 1/2 NW SW-EXC N 5 ACRES THEREOF-THAT PTN DAF-N 10 FT OF TR DAF-THAT PTN OF SE SW DAF-BEAP ON NLY LI OF CO RD 108 20 FT N-1960.23 FT E OF SW SEC COR-TH NLY 1318.21 FT TO E/W 1/16 LI OF SW 1/4
390306331217 -- E 1/2 NW SE-EXC S 396 FT THEREOF-EXC PTN DAF-THAT PTN OF E 1/2 NW SE DAF-BEG AT NW COR OF E 1/2-TH N 89 DEG 12'44" E ALG NLY LI OF E 1/2 303.92 FT-TH S 00 DEG 05'18" W 20 FT TO SLY R/W LI OF BARTLETT RD-POB-TH S 00 DEG 05'18" W 100 FT-TH N 89 DEG 12'44" E

Proposed Works

Three wells (IW-1, IW-2, and IW-3) that are less than 50 feet deep and are completed in the Sumas Outwash aquifer. The irrigation system consists of 5-inch diameter mainlines with 5-inch to 2-inch sub-mains serving six irrigation zones. A pumphouse facility contains sand filters for particle removal and a meter for fertigation. Water is delivered to berries using drip irrigation. When crops are irrigated with travelling big gun sprinklers, the reels are connected to the mainlines with flexible hose.

Development Schedule

BEGIN PROJECT	COMPLETE PROJECT	PUT WATER TO FULL USE
Started	December 31, 2014	December 31, 2019

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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

Relationship to Other Water Rights
GWC 1766, GWC 6931, and G1-00291C are authorized for a combined total of 420 gpm and 61.3 af/yr for the irrigation of 66.6 acres within the same place of use.

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, 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

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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.

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 water is available from the source in question; that there will be no impairment of existing rights; that the purpose of use is beneficial; and that there will be no detriment to the public interest.

Therefore, I ORDER approval of Application No. CG1-*02451C@1 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).

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 _____ day of _____ 2014.

_____

Jacqueline Klug, 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.

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INVESTIGATOR'S REPORT

Water Right Control Number CG1-*02451C@1
Enfield Farms, Inc.

BACKGROUND

This report serves as the written findings of fact concerning Water Right Application Number CG1-*02451C@1.

Three change applications are being processed concurrently for Enfield Farms related to the Bartlett Road Fields. These change applications are CG1-*02451C@1, CG1-*09989C@1, and CG1-00291C. The overall goal is to have each water right include the same place of use, the same points of withdrawal, and to expand the number of irrigated acres to allow for the combined irrigation of up to 66.6 acres through the use of deficit irrigation so that the instantaneous rate, annual volume, and annual consumptive quantity under the water rights remain the same.

Change Application CG1-*02451C@1 is a request to add two existing additional points of withdrawal (IW-1 and IW-2), allow for future wells to be drilled within the place of use, increase the size of the place of use to match the entire Bartlett Road Fields property, and increase the total number of irrigated acres allowed under the water right. The proposed place of use for G1-*02451C is the same area as the proposed place of use for the Change Applications associated with water rights G1-*09989C (Butler) and G1-00291C (Holleman), which are also owned by Enfield Farms, Inc.

EXISTING Water Right Attributes

Water Right Owner:	**Enfield Farms, Inc.**
Priority Date:	4/17/1952
Place of Use	W ¼ SE ¼, Section 6, Township 39 North, Range 3 East, W.M.

County	Waterbody	Tributary To	WRIA
Whatcom	Groundwater		1-Nooksack

Purpose	Rate	Unit	af/yr	Begin Season	End Season
Irrigation of 20 acres	150	GPM	30	Irrigation Season	

Source Name	Parcel	Well Tag	Twp	Rng	Sec	QQ Q	Latitude	Longitude
Well IW-3	390306263130	BHE782	39N	03E	06	SW SE	N48.89352	W122.47472

Sec = Section; QQ Q = Quarter-quarter of a section; Datum in NAD83/WGS84.

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REQUESTED Water Right Attributes

Applicant Name:	**Enfield Farms, Inc.**
Date of Application:	8/29/2012
Place of Use:	390306263130, 390306250235, 390306151102, 390306169204, 390306220166, and 390306331217. LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE Approximately 81.6 acres located in the South ½ of Section 6, Township 39 North, Range 03 East, W.M., Whatcom County, WA as detailed below:

Parcel Number	Legal Description
390306331217	E 1/2 NW SE-EXC S 396 FT THEREOF-EXC PTN DAF-THAT PTN OF E 1/2 NW SE DAF-BEG AT NW COR OF E 1/2-TH N 89 DEG 12'44" E ALG NLY LI OF E 1/2 303.92 FT-TH S 00 DEG 05'18" W 20 FT TO SLY R/W LI OF BARTLETT RD-POB-TH S 00 DEG 05'18" W 100 FT-TH N 89 DEG 12'44" E
390306263130	W 1/2 W 1/2 SE-EXC W 1/2 N 1/2 N 1/2 THEREOF-LESS RDS
390306220166	E 1/2 E 1/2 NW SW-EXC N 5 ACRES THEREOF-THAT PTN DAF-N 10 FT OF TR DAF-THAT PTN OF SE SW DAF-BEAP ON NLY LI OF CO RD 108 20 FT N-1960.23 FT E OF SW SEC COR-TH NLY 1318.21 FT TO E/W 1/16 LI OF SW 1/4
390306151102	BEAP ON NLY LI OF CO RD 108 20 FT N-1339.27 FT E OF SW SEC COR-TH NLY 657.44 FT WH MARKS POB-TH NLY 657.44 FT TO E-W 1/16 LI OF SW 1/4-TH ELY 313.72 FT ON E W 1/16 LI-TH SLY 658.27 FT-TH WLY 312.10 FT TO POB
390306169204	E 1/2 W 1/2-W 1/2 E 1/2 NE SW-LESS RD
390306250235	W 1/2 N 1/2 N 1/2 W 1/2 W 1/2 SE- LESS RDS

Source: Whatcom County Assessor's data base at http://property.whatcomcounty.us/propertyaccess/?cid=0

County	Waterbody	Tributary To	WRIA
Whatcom	Groundwater		1-Nooksack

Purpose	Rate	Unit	af/yr	Begin Season	End Season
Irrigation	150	GPM	30	April 15	October 1

Source Name	Parcel	Well Tag	Twp	Rng	Sec	QQ Q	Latitude	Longitude
Well IW-1	390306250235	BHE780	39N	03E	06	NW SE	N48.89783	W122.47591
Well IW-2	390306331217	BHE781	39N	03E	06	NW SE	N48.89782	W122.47190
Well IW-3	390306263130	BHE782	39N	03E	06	SW SE	N48.89352	W122.47472
Future Well	390306220166	NA	39N	03E	06	NE SW	-	-
Future Well	390306151102	NA	39N	03E	06	SE SW	-	-
Future Well	390306169204	NA	39N	03E	06	NE SW	-	-
Future Well	390306250235	NA	39N	03E	06	NW SE	-	-

Sec = Section; QQ Q = Quarter-quarter of a section; 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 changes in the point of withdrawal, the place of use, and the number of irrigated acres.

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 Bellingham Herald* on Thursday, March 28 and Thursday, April 4, 2013.

Ms. Dorothy Glenn, of the Department of Ecology's (Ecology) Northwest Regional Office, reported on October 15, 2013, that Ecology had received no protests on the three water right change applications associated with the Enfield Farms Bartlett Road project (CG1-*02451C@1, CG1-00291C, and CG1-*09989C).

Consultation with the Department of Fish and Wildlife

Ecology must give notice to the Washington Department of Fish and Wildlife (WDFW) of applications to divert, withdraw, or store water. On August 29, 2013, RH2 Engineering, Inc., (RH2) sent notice of our intent to process three groundwater change applications for Enfield Farms to Mr. Steven Boessow at the WDFW. On August 30, 2013, Mr. Boessow requested to see the supporting documents provided by Associated Earth Sciences, Inc., (AESI) from 2012. Mr. Boessow was provided with those documents. On September 9, 2013, Mr. Boessow provided a letter with his recommendations in which he identified that Wiser Lake Creek contains coho, cutthroat trout, and other resident game and non-game fish and raising some potential concerns. After additional communication with RH2, Mr. Boessow submitted another letter on December 19, 2013. In that letter, he emphasized that WDFW is very concerned about salmon and trout in the Nooksack Watershed but will not oppose the approval of the changes because they understand that the quantity of water to be withdrawn will not be increased.

Mr. Boessow also stated that water right applications may trigger review under the State Environmental Policy Act (SEPA). This issue is addressed in the SEPA discussion in the next section.

State Environmental Policy Act

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, unless that project is for agricultural irrigation, in which case the threshold is increased to 50 cubic feet per second, so long as that irrigation project will not receive public subsidies
(b) It is a groundwater right application for more than 2,250 gallons per minute
(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)
(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, place of use, 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 groundwater certificate 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 2) change the manner or place of use of the water if the following conditions apply:

(a) The additional or replacement well taps the same body of public groundwater 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)).
(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; and
(d) Geologic materials that allow for storage and flow with recognizable boundaries or effective barriers to flow.

RCW 90.03.380(1) states that the acreage irrigated under a water right may be enlarged if the annual consumptive quantity is not increased. The annual consumptive quantity is the average of the highest 2 years, of the most recent 5-year period of ongoing beneficial use of the water right.

INVESTIGATION

Site Visit/Site Description

On September 18, 2013, Mr. Andrew B. Dunn from RH2 and Mr. Tom Buroker from Ecology met with Mr. Andy Enfield and Mr. Dan Lambert from Enfield Farms and Mr. Chuck Lindsay, their consultant from Associated Earth Sciences, Inc., to perform the site visit. An initial discussion took place at the Enfield Farm office to discuss general and specific farm operations and the proposed transfers before the group traveled to the proposed place of use.

Mr. Enfield confirmed that over the past two seasons (the time elapsed since supporting documentation was prepared for the change application submittal), only raspberries have been grown on the Bartlett Road Fields.

With respect to crop rotation, Mr. Enfield indicated that raspberries are often grown on a field for 5 to 10 years before being removed. After removal, the fields are usually planted with either potatoes or wheat for one to three seasons before being replanted in raspberries. In the past, Enfield Farms has also planted strawberries in the rotation, but has not done that since the mid-1990s. When wheat is grown, it does not need to be irrigated. When potatoes are grown, they are irrigated with travelling big gun sprinklers. When strawberries were grown, they were irrigated with a travelling big gun, but Mr. Enfield might use drip tape if planted in the future.

Mr. Enfield provided RH2 with a map showing the wells, mainlines, sub-mains, and the six irrigation zones on the property. The mainline is 5-inch diameter pipe, while the sub-mains range from 5 inches to 2 inches in diameter. In addition to the well pumps, there is also a pump house that contains a McCrometer flow meter, sand filters for particle removal, and plumbing to allow for introduction of fertilizer into the irrigation system (fertigation).

The three wells that serve water to this farm can be turned on or off to meet the irrigation need and demand. The irrigation season is weather dependent, but is typically from May through September. At times, Enfield Farms has started irrigation in April and continued into October when weather conditions have called for a longer irrigation period. Enfield Farms utilizes soil moisture probes to determine when each field needs to be irrigated. Enfield Farms also employs a full-time Irrigation Specialist and a full-time Agronomist that visit each acre being irrigated approximately twice a week during the irrigation season to check soil moisture and to look for system leaks. All irrigation is demand-based as opposed to simply being on a regular schedule. No irrigation was occurring during the site visit due to recent rains.

For all raspberries on this property, water is delivered through drip irrigation. The placement of the drip tape depends on which cultivar of raspberry is being grown in a particular field. For fields with the Meeker cultivar, T-tape is buried and drip irrigation is provided subsurface. This irrigation method is easier to install and more protected than hanging drip tape. However, for fields with the newer Wakefield cultivar, the roots are so aggressive they will infiltrate into and clog the drip system if it is buried. So, on fields with Wakefield raspberries, hanging drip tape is utilized. Enfield Farms is moving toward planting all fields with Wakefield raspberries and so hanging drip tape will be the water delivery method in the near future.

Each well site was visited to confirm the well location and provide global positioning system (GPS) coordinates. Depth to static water level measurements were taken at all three wells during the site visit using a water level probe. The measurements obtained are discussed in the Hydrogeology section of this ROE. Workers were cutting out the old canes and tying the new canes into the candy cane shape to prepare them for over-wintering and next year's harvest. Rows are typically spaced at 10-foot centers to allow for mechanical harvesting.

Homes located within the proposed place of use have their own private wells for domestic use. The one exception is the Scholten home, which has a separate pump installed in well IW-1 that provides domestic water service to their home.

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, Landsat imagery, irrigation guides, the site visit, and weather records.

Affidavit

An affidavit relating to knowledge of farming and irrigation practices on the Bartlett Road fields under water right G1-*02451C was provided by Mr. Andy Enfield, signed and notarized on September 16, 2013. In that affidavit, Mr. Enfield indicates that the information provided in the AESI report dated August 16, 2012, regarding the farming and irrigation practices associated with this water right, is true and correct to the best of his knowledge.

Instantaneous Rate

AESI (2012) indicates that well IW-3 has a 25 horsepower (hp) submersible pump (Berkeley 7T25-350) and motor (Franklin Electric 25 hp electric) installed. The pump curve provided by AESI (2012) indicates that, at its highest efficiency, the pump will produce 345 gpm at 221 feet of total dynamic head. This pumping rate is in excess of the 150 gpm authorized under this water right. However, due to submittal of a Showing of Compliance with RCW 90.44.100(3) form and a *de facto* change made in the past, this well is currently also utilized as a point of withdrawal for other Enfield Farms water rights (G1-00291C and G1-*09989C) used to irrigate this property.

The combined pumping rate from all three existing wells when operating at peak efficiency (IW-1 = 145 gpm, IW-2 = 110 gpm, and IW-3 = 345 gpm), is approximately 600 gpm, which exceeds the combined water right limit of 420 gpm allowed under water rights G1-00291C, G1-*02451C, and G1-*09989C.

Therefore, the instantaneous rate of 150 gpm has been maintained through beneficial use from well IW-3 and is available for transfer.

Irrigated Acres

The place of use is the same for water rights G1-*02451C and G1-*09989C. The annual volume granted under G1-*02451C was 30 acre-feet per year (af/yr) for irrigation of 20 acres. Later, when water right G1-*09989C was issued, it indicated that the total annual volume under G1-*02451C and G1-*09989C shall not exceed 51 af/yr for irrigation of 34 acres. For this analysis, RH2 reviewed the entire place of use.

Aerial photos of the Enfield Farms Bartlett Road fields property were provided with the application packet. These aerial photos were labeled with the following dates: 05/04/1972, 06/1989, 07/15/1998, 07/31/2005, 04/29/2006, 08/17/2006, 09/06/2006, 2008, 05/30/2009, 09/10/2009, and 08/25/2011. The aerial photos from 1998 to present were viewed using Google Earth™. Additional aerial photos were obtained from the Western Washington University map library and dated 08/06/1955, 06/07/1966, 07/15/1976, and 1984.

Landsat imagery was spot-checked for the following dates: 08/01/1986, 08/04/1987, 08/12/1990, 07/27/1996, 08/02/1998, 08/21/2005, 07/10/2010, and 07/05/2011. The Landsat imagery shows different colors of red through the irrigation season and from year to year, which suggests that crops are rotated on the farm. This is consistent with the observed aerial photos and discussion with Mr. Andy

Enfield, as well as his affidavit. Vigorous plant growth shows as bright red when viewed in color infrared (band 4-3-2).

An aerial photo dated May 4, 1972 (AESI, 2012), shows that the entire place of use was being farmed and likely irrigated, except for a patch of trees in the center of the field, that remains to this day, and the area around a home located on the south-central edge of the field along E Pole Road. There was no home on the northern side of the field at that time and it is likely that the cumulative 34 acres identified on the two water rights was being irrigated.

Construction of the home to the north along E Bartlett Road in the 1990s reduced the number of acres being irrigated within the place of use by approximately 1 acre. Measurement of the acres growing raspberries within the place of use using the 2006 and 2009 National Agriculture Insurance Program (NAIP) aerial photos suggests that approximately 32.2 acres were irrigated. Since G1-*02451C is the older of the two water rights appurtenant to the property, and more than the 20 authorized acres are and have been consistently irrigated within the place of use, the water right is tentatively determined to be valid for the entire 20 acres. The remaining irrigated acres and discrepancy between the authorized and actual irrigated acres within the place of use will be addressed in the ROE for change to G1-*09989C.

Annual Volume

Based on review of the aerial photos and Landsat imagery, 20 acres have been irrigated under this water right. While there is a water meter located in the pump house to allow fertigation, there are currently no water meters installed on the points of withdrawal. Therefore, RH2 relied on the current Washington Irrigation Guide (WIG, 1985), 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. AESI (2012) proposed averaging the crop irrigation requirements for raspberries at the three closest stations (Blaine, Bellingham 3 SSW, and Clearbrook) since the Bartlett Road Fields are approximately equidistant between them. RH2 agrees that this is a reasonable assumption. The average of the data from the WIG (1985) suggests that with a 2-year return interval, the crop irrigation requirement for a raspberry crop is 16.93 inches.

The WIG (1985) CIR estimates are for an average year and are based on almost 30 years of weather data collected from 1951 to 1980. 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 significantly 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 degree Fahrenheit warmer from 2008 through 2012, than the average temperature from the Blaine, Bellingham 3 SSW, and Clearbrook stations provided in the WIG (**Table 1**). Therefore, it is apparent that, because the WIG values are based on weather data from 1951 to 1980, utilizing the WIG estimated CIR would result in underestimating the amount of irrigation water an irrigator has actually been using over at least the last five 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.

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)
2008	58.70	59.15	0.45	9.80	10.12	0.32
2009		**61.03**	**2.33**		**8.00**	**-1.80**
2010		59.43	0.73		13.49	3.69
2011		59.30	0.60		9.71	-0.09
2012		**59.71**	**1.01**		**8.34**	**-1.46**

Notes:
Irrigation season is considered to be May through September.
Annual data is average of the Clearbrook, Blaine, and Bellingham 3 SSW weather stations.
Weather data from 2008 through 2011 was provided with the change applications (AESI, 2012) and data for the 2012 irrigation season was obtained from www.wrcc.dri.edu. Data was not yet available for the 2013 irrigation season at the time this report was drafted and that is why the most recent year was excluded from consideration.

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 each 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 the 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 raspberry crop CIR increased by approximately 17 percent going from the 2-year to the 10-year return interval. Increasing the WIG raspberry CIR by 17 percent results in a 19.81 inch CIR for raspberries. RH2 has assumed that increasing the WIG values to represent the anticipated 10-year return interval for each crop is a reasonable way to estimate the actual CIR over the past five years.

Ecology guidance document 1210 indicates that the efficiency of the trickle/drip micro-irrigation methods utilized by Enfield Farms to irrigate raspberries ranges between 70% and 95%, with an average of 88%. Guidance document 1210 indicates that farmers that operate systems near the higher end of the range often exhibit the following:

- Newer system infrastructure
- Active maintenance program
- Knowledge of seasonal crop evapotranspiration rates
- Scheduling irrigation in response to crop demand
- Ground-truthing of soil moisture.

Enfield Farms is a family-owned business that has been in operation in Whatcom County for over 40 years. Their system exhibits each of these characteristics. They replace their irrigation system infrastructure on a routine schedule or when they observe signs of wear that could lead to a loss of water. They operate a research facility and routinely develop new strains of raspberries and other crops that require less water and are more resistant to disease. They are recognized experts regarding farming practices in Whatcom County. For these reasons, the efficiency of trickle/drip micro-irrigation systems used in the Enfield Farms fields is assumed to be average to high.

However, since the water right is limited to a total irrigation requirement of 18 inches, which is lower than the estimated actual crop irrigation requirement (19.81 inches), it is reasonable to conclude that the full annual volume of 30 af/yr granted with the original water right has been used and not lost due to non-use without sufficient cause.

Proposed Use

The primary goals of Change Application CG1-*02451C@1 are to add two existing additional points of withdrawal (IW-1 and IW-2), allow for future wells to be drilled within the place of use, increase the size of the place of use to match the entire Bartlett Road Fields property, and increase the number of irrigated acres allowed under the water right. This application is tied to change applications for the following water rights:

- G1-*02451C (GWC 1766)
- G1-00291C
- G1-*09989C (GWC 6931)

The applicant wishes to expand the place of use allowed under all three rights to the same place of use, thus allowing the use of all three sources anywhere within the new place of use.

As discussed in the next section, the quantity of water allowed for the expansion of acreage will be the average consumptive quantity as calculated based on the average of the 2 highest years of use in the last 5 years of continuous beneficial use. The applicant intends to use deficit irrigation. Therefore, Enfield Farms intends to apply water at less than the optimum amount required by the plants as a means of maximizing the efficiency of its water use on the fields, rather than maximizing its per-plant output. This irrigation technique will allow Enfield Farms to stay within the limits of its water right as authorized by Ecology.

Annual Consumptive Quantity

A change in the place of use, point of diversion (withdrawal), and or purpose of use of a water right to enable irrigation of additional acreage or the addition of new uses may be permitted if the change results in no increase in the annual consumptive quantity (ACQ) of water used under the water right (RCW 90.03.380). ACQ means the estimated or actual amount of water diverted in a year, allowed under a water right, reduced by the estimated annual amount of return flows. This quantity is then averaged using the greatest 2 years of use within the most recent 5-year period of continuous beneficial use of the water right.

The ACQ analysis for this change application will be performed on the 2008 through 2012 irrigation seasons. Based on the data available, it appears that 2009 and 2012 represent the years when weather

conditions would require application of the most irrigation water. Therefore, based on this data, these 2 years will be used as the 2 highest years of use within the last 5 years of consecutive water use.

As was discussed in the History of Water Use section above, there are no metering records that would allow an evaluation of annual TIR or ACQ for each of the past 5 years. However, the annual quantity estimate previously discussed indicates that it is reasonable to assume that the entire water right duty of 20 af/yr has been used on the property over the past 5 years. Therefore, the highest annual volume withdrawn under this water right, for which the water right holder can get credit, was estimated to be the water right maximum annual quantity of 20 af/yr when 20 acres of raspberries were irrigated. Furthermore, the crop irrigation requirements for raspberries was estimated to be 19.81 inches (1.65 feet) once corrected for climate variability. Since the estimated crop irrigation requirement over the past five years, and especially during the 2009 and 2012 irrigation seasons, was higher than the water right duty of 18 inches, it is reasonable to conclude that all irrigation water applied would be fully utilized by the crop, which would make the water use 100 percent consumptive in those years. Therefore, the annual consumptive quantity is equal to both the tentative determination and the water right limit of 18 inches (1.5 feet), or 30 af/yr, for this water right.

Since the proposed use requests to increase the number of irrigated acres, the depth of water that can be applied over the irrigation season is equal to 11 inches (0.92 feet) as determined through the ACQ analysis, which is much less than the crop irrigation requirement in an average year. In his affidavit (dated September 16, 2013), Mr. Andy Enfield acknowledged that if the change is approved, Enfield Farms will be deficit irrigating its crops (applying less water than the crop can consume) and that the deficit irrigation practices are reasonable and adequate for growing the crops they plan to grow on these fields.

Period of Use

The water right record for G1-*02451C identifies the period of use for irrigation as during the irrigation season. The change application CG1-*02451C@1 requests that the period of use be April 15 to October 1. On the site visit, Mr. Enfield indicated that this is a reasonable definition of the irrigation season. Therefore, the period of use will be clarified as being April 15 to October 1, as requested by the applicant.

Other Rights Appurtenant to the Place of Use

Groundwater certificate G1-*09989C is appurtenant to the same place of use as G1-*02451C. From the water right record, it appears that this relationship was acknowledged by the state upon issuance of G1-*09989C and the total irrigated acres under both rights is equal to a combined maximum of 34 acres. Water right change application have been submitted on groundwater certificates G1-*09989C and G1-00291C, which are being processed concurrently with this change application and which would establish the same place of use for all three of the related water rights and would allow the use of all three sources to irrigate any portion of the expanded place of use.

Permit-exempt wells are used by the home owners located within the existing and proposed place of use for their own residential domestic, stockwatering, and lawn and garden irrigation needs and, as such, are not a part of the evaluation of available water for these water rights.

There are two water right claims whose mapped place of use is associated with a portion of the proposed place of use (Parcel No. 390306331217). The place of use described on both water right claims is the E ½ NW ¼ SE ¼, EXCEPT Southerly 396 feet, Section 6, T39N, R3E, W.M.

Water Right Claim G1-049695CL
- Name: Al M. DeGrood
- Quantity of Water Claimed: 6 gpm
- Annual Quantity Claimed: 26.5 af/yr
- Irrigation Acres Claimed: 14
- Date of First Putting Water to Use: June 1972
- Purpose for Which Water is Used: Berry Farming

Water Right Claim G1-049697CL
- Name: Al M. DeGrood
- Quantity of Water Claimed: 12 gpm
- Annual Quantity Claimed: 1 af/yr
- Date of First Putting Water to Use: 1960+/-
- Purpose for Which Water is Used: Domestic

One claim is likely for the irrigation occurring on this property and one is for the domestic uses associated with the home located in the northeast corner of the identified place of use. However, both water right claims indicate that the date of first use of groundwater is after 1945, when the groundwater code (RCW 90.44) was enacted. Therefore, it is tentatively assumed that the water right claim G1-049695CL is not valid and water right claim G1-049697CL represents a permit-exempt water right for domestic use outside of the proposed place of use.

Hydrologic/Hydrogeologic Evaluation

A separate hydrogeologic memorandum was prepared by Andrew B. Dunn, L.G., L.HG., focusing on the same body of public groundwater test and impairment (RH2 Engineering Technical Memorandum, December 2, 2013). 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 place of use involved in these water right changes lie within the geographic feature commonly referred to as the Nooksack Lowland. The Nooksack Lowland is a low-lying region located south of the Lynden Terrace and the Nooksack River, but north of the King Mountain Upland.

All of the existing and proposed points of withdrawal fall within the Wiser Lake/Cougar Creek subbasin as defined by the Water Resources Inventory Area (WRIA) 1 watershed planning group, except for a very small portion of one parcel, and are completed within the Sumas outwash aquifer. The Sumas outwash aquifer is composed of medium to coarse sand at this location and is up to 60 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. Groundwater flow in this location varies from surface water flow in that all groundwater beneath the project site flows to the north toward Wiser Lake (**Figures 1** and **2**). Recharge to the aquifer is almost exclusively through vertical infiltration of precipitation. The water table is less than 10 feet below ground surface in the late summer and

fluctuates by approximately 4 feet over the course of the year due to changes in recharge and groundwater use.

Pumping impacts on neighboring wells

Nearby water rights were reviewed to determine the approximate distance between the proposed wells and existing wells for purposes of calculating the anticipated interference drawdown in the neighboring wells. In addition to the existing on-site wells (IW-1, IW-2, and IW-3), Enfield Farms has requested the ability to add additional wells in the future on the remaining parcels within the proposed place of use that do not currently have wells on them (Parcels 390306220166, 390306151102, 390306169204, and 390306250235). Since exact locations for the future wells have not been specified, analysis for impact will be done assuming that the wells are located on the edge of the parcel boundaries closest to any neighboring wells with which they could interfere. This "worst-case" assumption is made to be as protective of neighboring well users as possible. The closest water rights, not held or operated by Enfield Farms, to either the closest existing Enfield well or the potential future points of withdrawal were approximately 200 to 500 feet away.

Interference drawdown was calculated using a high and low range estimate for transmissivity of 64,000 gallons per day per foot (gpd/ft) and 15,000 gpd/ft respectively. The storage coefficient was estimated to be 0.2 since it is an unconfined aquifer. If the combined instantaneous rate (420 gpm) of all three water rights being changed is pumped continuously from one well until the annual volume is reached (62 af/yr), the maximum anticipated interference drawdown at a distance of 100, 500, and 1,000 feet is 13.9 feet, 4.1 feet, and 1.2 feet, respectively, with a maximum radius of influence of 3,102 feet. These data indicate that the anticipated interference drawdown drops off rapidly with distance from the pumping well.

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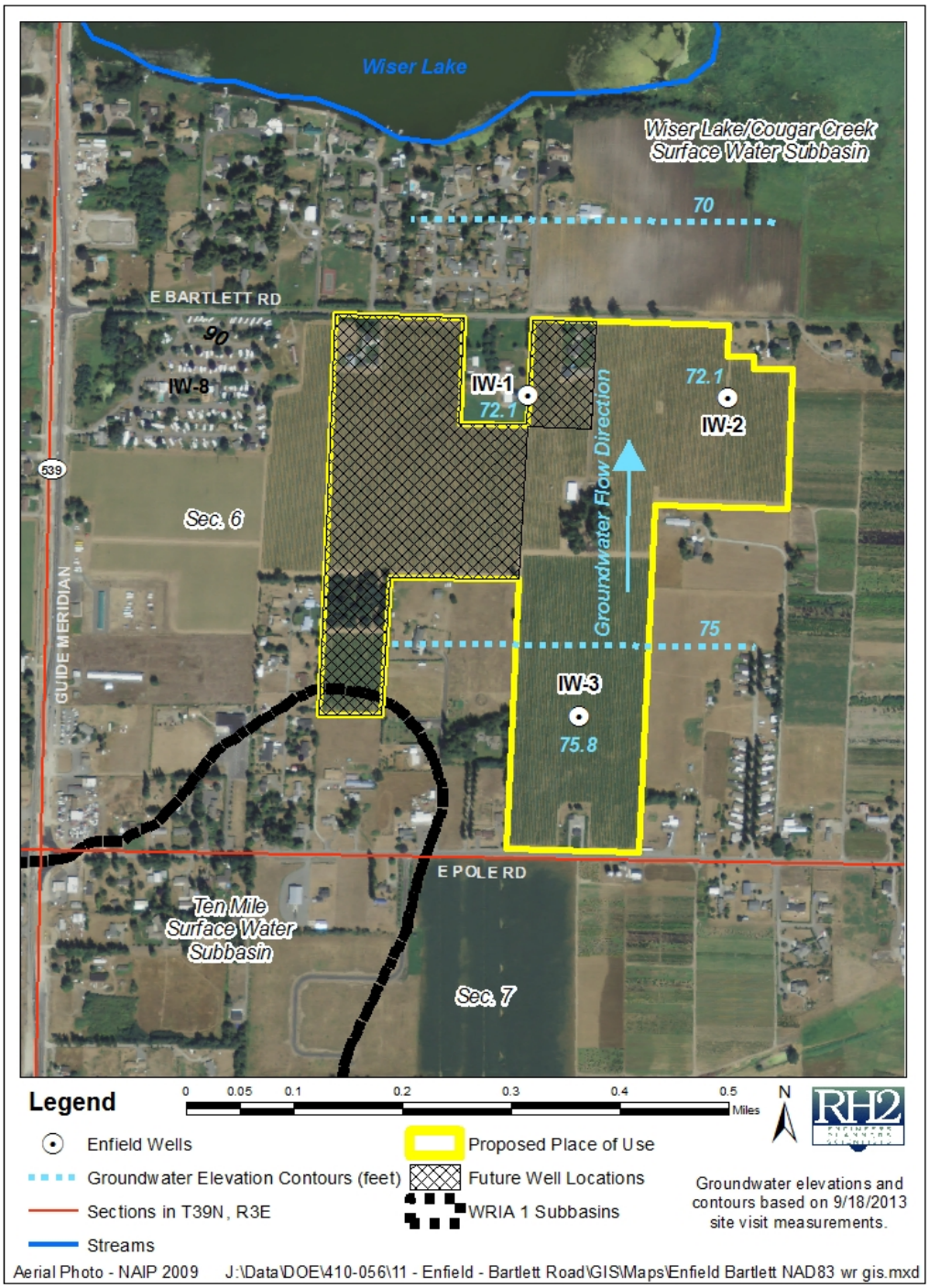

Figure 1. Original and Proposed Points of Withdrawal with Groundwater Flow.

(Groundwater elevations and flow directions based on September 18, 2013, water level measurements. WRIA 1 subbasin boundaries delineated through the WRIA 1 Watershed Management Project, 2002.)

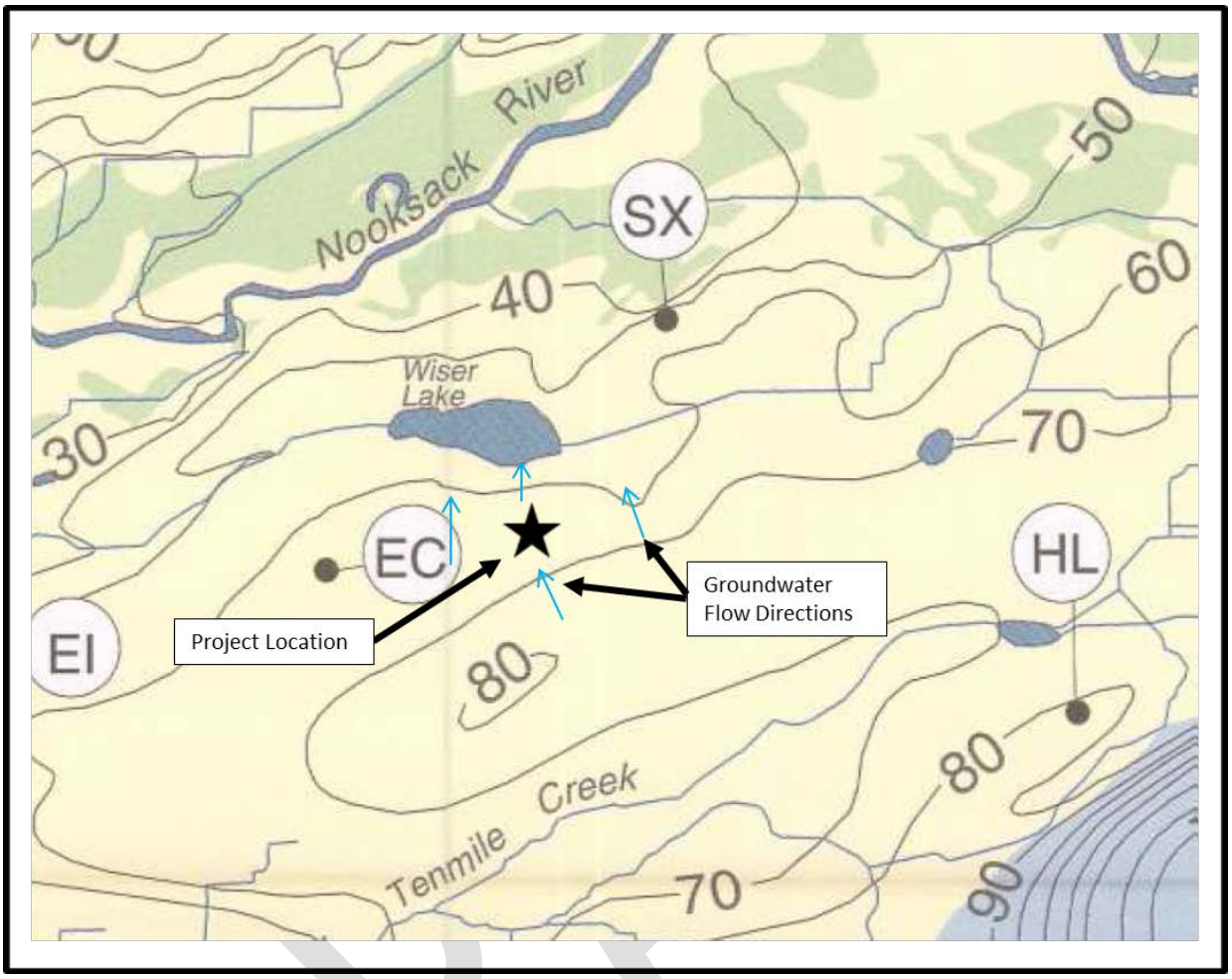

Figure 2. Potentiometric Surface Map from Cox and Kahle (1999)

(Figure shows approximate location of the Enfield Farms project with groundwater contours with 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 points of withdrawal to be added to each groundwater right, all points of withdrawal must tap the same body of public groundwater. RH2 has concluded that all existing and proposed wells located on the Bartlett Road Fields property tap the same body of public groundwater based on the following facts.

1. All of the existing and potential future points of withdrawal are currently tapping or will tap the shallow Sumas outwash aquifer.
2. Groundwater flow for the area is to the north or northwest toward Wiser Lake.
3. No groundwater flow divides or flow boundaries exist between any of the existing or proposed future points of withdrawal.
4. The maximum distance between any of the existing or potential future proposed wells is 0.5 miles.

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 locations. Therefore, the change will not cause any impairment of minimum instream flows.

Impairment, Qualifying Ground Water 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 ground water withdrawal facilities are defined as those wells which in the opinion of the Department 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 existing Enfield wells do not fully penetrate the aquifer. So, there is a substantial thickness of aquifer deeper than the existing wells that will remain saturated and available for use.
2. The aquifer, while thicker than at other locations in Whatcom County, is still relatively thin and it is reasonable and feasible for all water users to fully penetrate the aquifer (typically a total depth of less than 60 feet).
3. The hydraulic conductivity of the aquifer is moderate to moderately high.
4. The aquifer is unconfined, which results in a higher storage coefficient (specific yield) and limits the extent of interference (drawdown) than if the aquifer was confined.

Pumping a well completed in an aquifer with a moderate hydraulic conductivity and high storage coefficient (such as the Sumas outwash aquifer) will tend to create a shallow cone of depression around

the well. This shallow and wide cone of depression tends to lead to minimal interference drawdown in neighboring wells.

On September 3, 2013, Ecology was asked if it had received any complaints from well owners near the Bartlett Road Farm related to declining water levels, excessive seasonal drawdowns, and wells pumping air. On September 4, 2013, Ms. Kasey Cykler, Ecology WRIA 1 Watermaster, responded that Ecology had not received any complaints in that area.

Public Interest Considerations

The changes proposed by the applicant will not be detrimental to the public welfare.

Consideration of Protests and Comments

This application was not protested by any party.

Table 2. Summary of Recommended Water Right Change Decisions, Enfield Farms, Bartlett Road Fields

Water Right	Qi (gpm)	Qa (af/yr)	Irrigated Acres	Place of Use	Points of Withdrawal
G1-00291C	150	10.3	11.2	Bartlett Road Fields	IW-1, IW-2, IW-3, and future wells
G1-*02451C (GWC 1766)	150	30	32.6		
G1-*09989C (GWC 6931)	120	21.0	22.8		
Total	420	61.3	66.6		

Conclusions
The changes requested will not impair existing rights nor be detrimental to the public welfare. Given that no formal protests were received and the comments by the WDFW have been addressed, the change should be approved as recommended below.

RECOMMENDATIONS

Based on the investigation and conclusions included in this ROE, RH2 recommends that this request for a water right change be 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:

- 150 gpm (additive)
- 30 af/yr (additive)
- Irrigation of 32.6 acres (additive) and 34 acres (non-additive)
- April 15 to October 1

Points of Withdrawal

SOURCE FACILITY/DEVICE	PARCEL	WELL TAG	TWP	RNG	SEC	QQ Q	LATITUDE	LONGITUDE
WELL IW-1	390306250235	BHE780	39N	03E	06	NW SE	N48.89783	W122.47591
WELL IW-2	390306331217	BHE781	39N	03E	06	NW SE	N48.89782	W122.47190
WELL IW-3	390306263130	BHE782	39N	03E	06	SW SE	N48.89352	W122.47472
Future Well	390306220166	NA	39N	03E	06	NE SW	-	-
Future Well	390306151102	NA	39N	03E	06	SE SW	-	-
Future Well	390306169204	NA	39N	03E	06	NE SW	-	-
Future Well	390306250235	NA	39N	03E	06	NW SE	-	-

Place of Use

The place of use includes the following areas:

Whatcom County Parcel Numbers: 390306263130, 390306250235, 390306151102, 390306169204, 390306220166, and 390306331217

LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE

Approximately 81.6 acres located in the South ½ of Section 6, Township 39 North, Range 03 East, W.M., Whatcom County, WA as detailed below:

Parcel Number	Legal Description
390306331217	E 1/2 NW SE-EXC S 396 FT THEREOF-EXC PTN DAF-THAT PTN OF E 1/2 NW SE DAF-BEG AT NW COR OF E 1/2-TH N 89 DEG 12'44" E ALG NLY LI OF E 1/2 303.92 FT-TH S 00 DEG 05'18" W 20 FT TO SLY R/W LI OF BARTLETT RD-POB-TH S 00 DEG 05'18" W 100 FT-TH N 89 DEG 12'44" E
390306263130	W 1/2 W 1/2 SE-EXC W 1/2 N 1/2 N 1/2 THEREOF-LESS RDS
390306220166	E 1/2 E 1/2 NW SW-EXC N 5 ACRES THEREOF-THAT PTN DAF-N 10 FT OF TR DAF-THAT PTN OF SE SW DAF-BEAP ON NLY LI OF CO RD 108 20 FT N-1960.23 FT E OF SW SEC COR-TH NLY 1318.21 FT TO E/W 1/16 LI OF SW 1/4
390306151102	BEAP ON NLY LI OF CO RD 108 20 FT N-1339.27 FT E OF SW SEC COR-TH NLY 657.44 FT WH MARKS POB-TH NLY 657.44 FT TO E-W 1/16 LI OF SW 1/4-TH ELY 313.72 FT ON E W 1/16 LI-TH SLY 658.27 FT-TH WLY 312.10 FT TO POB
390306169204	E 1/2 W 1/2-W 1/2 E 1/2 NE SW-LESS RD
390306250235	W 1/2 N 1/2 N 1/2 W 1/2 W 1/2 SE- LESS RDS

Source: Whatcom County Assessor's data base at http://property.whatcomcounty.us/propertyaccess/?cid=0

Report by: _____

Jim Bucknell – RH2 Engineering, Inc. Date

DRAFT

Report by: _____

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

Reviewed by: _____

Buck Smith - Water Resources Program Date

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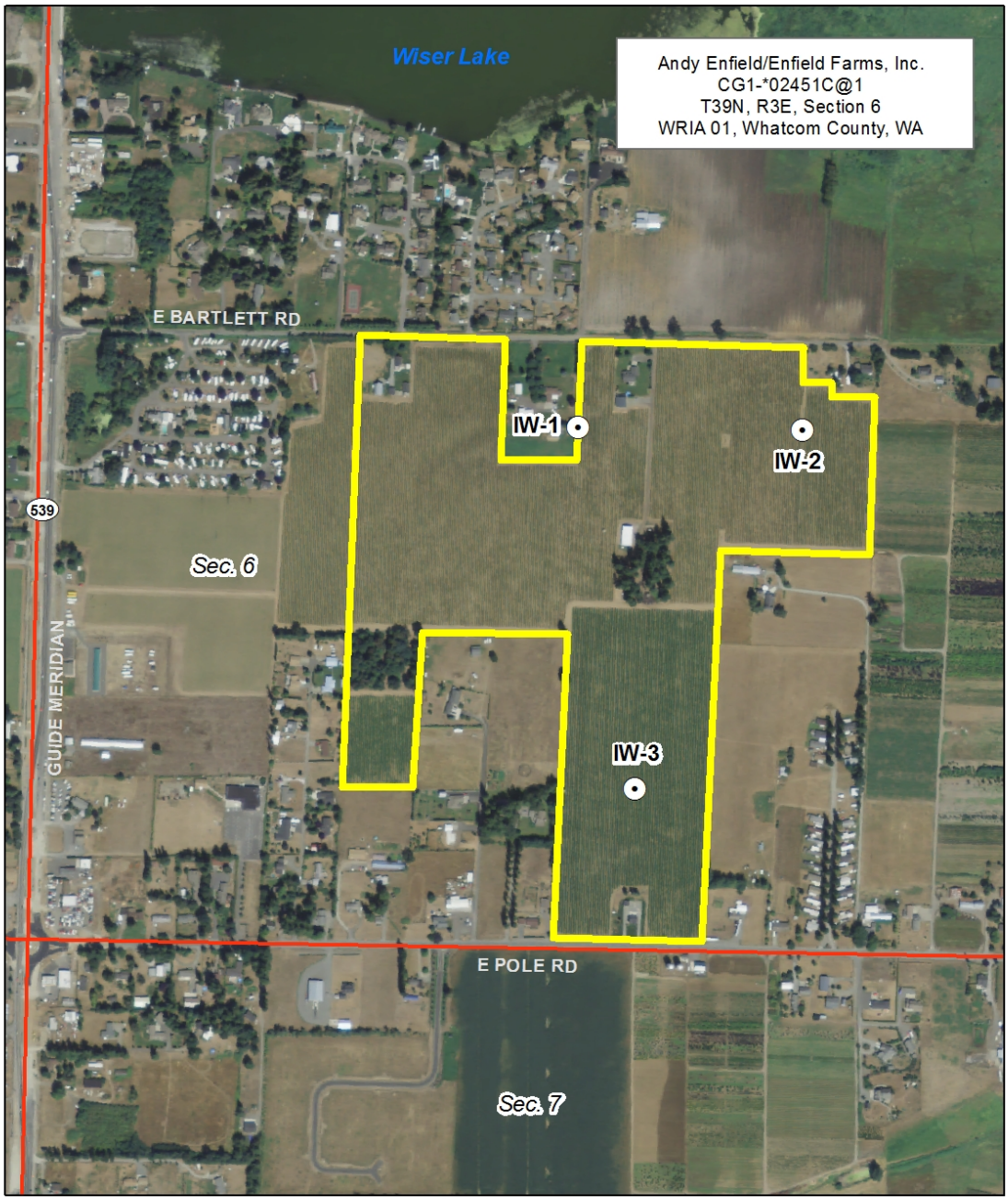
ATTACHMENT



Legend

- Authorized Point of Withdrawal
- Authorized Place of Use
- Sections in T39N, R3E

Aerial Photo - NAIP 2009

Place of use and point(s) of withdrawal are as defined on the cover sheet under the headings, 'Source Location' and 'Legal description of Authorized Place of Use.'