DEPARTMENT OF ECOLOGY
State of Washington

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION
Change of Place of Use
Water Right Change Application No. CS4-ADJ24P64

PRIORITY DATE	CLAIM NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
1886- Class 1			Johnson Creek Superseding Certificate of Adjudicated Water Right No. 64

NAME
Hi-Lo Orchards Limited Partnership

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
351 Johnson Creek Road	Riverside	WA	98849

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Johnson Creek

TRIBUTARY OF (IF SURFACE WATERS)
Okanogan River

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
0.85		254.74

QUANTITY, TYPE OF USE, PERIOD OF USE
0.85 cubic feet per second; 233.1 acre-feet per year for the irrigation of 81 acres seasonally between April 15 and September 15.

LOCATION OF DIVERSION(S)

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
#1: Approximately 120 feet south and 1150 feet west of the north quarter corner of Section 10, T. 34 N., R. 26 E.W.M.
#2: Approximately 680 feet south and 790 feet west of the northeast corner of Section 9, T. 34 N., R. 26 E.W.M.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
#1: NW¼NE¼NW¼	10	34 N.	26 E.W.M.	49	Okanogan
#2: SW¼NE¼NE¼	9	34 N.	26 E.W.M.	49	Okanogan

PARCEL NUMBER(S)	LATITUDE	LONGITUDE	DATUM
#1: 342610-0013	48.46751	-119.55359	NAD 83
#2: 342609-1001	48.46598	-119.56296	NAD 83

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
N/A	N/A	N/A

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED
[Attachment 1 shows location of the authorized place of use and point(s) of diversion]

1. Within that portion of the S½SW¼ lying north of Johnson Creek Road, Section 3, T. 34 N., R. 26 E.W.M. (Parcel No. 342603-0021.)
2. Within that portion of the S½SE¼ lying south of Riverside Cutoff Road, Section 4, T. 34 N., R. 26 E.W.M. (Parcel Nos. 342604-0010 and 342604-0022 but excluding Parcel No. 342604-0009.)
3. Within that portion of the SE¼SW¼ lying south of Riverside Cutoff Road, Section 4, T. 34 N., R. 26 E.W.M. (Parcel No. 342604-0024.)
4. Within the NE¼NE¼ of Section 9, T. 34 N., R. 26 E.W.M. (Parcel No. 342609-1001.)
5. Within the NW¼NE¼ of Section 9, T. 34 N., R. 26 E.W.M. (Parcel No. 342609-1004.)
6. Within the E½NE¼NW¼ of Section 9, T. 34 N., R. 26 E.W.M. (Parcel No. 342609-0009.)
7. Within the N½NW¼ of Section 10, T. 34 N., R. 26 E.W.M. (Parcel No. 342610-0014 but excluding Parcel Nos. 342610-0012 and 342610-0015.)

DESCRIPTION OF PROPOSED WORKS

Diversion #1 is within the NW¼NE¼NW¼ of Section 10 and utilizes a 30 horsepower centrifugal pump with a 6-inch mainline going one direction and a 5-inch mainline going the opposite direction, both feeding water through both impact and micro-spray sprinklers. A meter is present.

Diversion #2 is within the SW¼NE¼NE¼ of Section 9 and utilizes a 15 horsepower centrifugal pump with a 6-inch mainline going one direction and a 4-inch mainline going the opposite direction feeding water through impact and micro-spray sprinklers. A meter is present.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Begun	September 15, 2010	September 15, 2012

Measurements, Monitoring, Metering, and Reporting

1. An approved measuring device shall be 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.

2. Water use data shall be recorded weekly. The maximum rate of diversion and the annual total volume shall be submitted to Ecology by January 31st of each calendar year.

3. The following information shall be included with each submittal of water use data: owner, contact name if different, mailing address, daytime phone number, WRIA, Certificate No., source name, annual quantity used including units, maximum rate of diversion including units, monthly meter readings including units, peak monthly flow including units, purpose of use, fish-screen status, open channel flow or pressurized diversion, and period of use.

4. In the future, Ecology may require additional parameters to be reported or more frequent reporting. Ecology prefers web based data entry, but does accept hard copies. Ecology will provide forms and electronic data entry information. http://www.ecy.wa.gov/pubs/ecy070170.pdf.

5. WAC 173-173 describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements." http://www.ecy.wa.gov/programs/wr/measuring/measuringhome.html

Scheduling and Inspections

6. Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above provisions, and to inspect at reasonable times any measuring device used to meet the above provisions and to conduct inspections to determine compliance with the required Farm Plan.

Fish Screening Criteria

7. The intake shall be screened at all times in accordance with Department of Fish and Wildlife screening criteria. http://wdfw.wa.gov/hab/engineer/habeng.htm.

Other Conditions

8. Since Ecology still has a need to understand the land to which each water right is appurtenant and in order to provide the applicant the flexibility in crop management, the applicant shall:

   Submit a Farm Plan to Ecology to be due February 15, 2010, and every year thereafter. The Farm Plan must describe each planted crop on each developed field (as authorized under Superseding Certificate No. 64) and explain how water will be distributed and used to irrigate each crop under this authorization. The Farm Plan will include a discussion of how pumping from the two authorized points-of-diversion will be coordinated to ensure the water-right limitations are not exceeded. Additionally, the Farm Plan shall include a map that identifies the total Hi-Lo Orchards Limited Partnership holdings, as authorized under Superseding Certificate Nos. 64 and 65, illustrating specific acreage planted under each water right within the authorized places of use to be irrigated under each water right. Each year when water is to be used under this authorization, this map shall be updated and submitted to Ecology by February 15th along with the previous years' Farm Plan data submittal.

9. Use of water on the terraced and terrace/upland lands within the expanded place of use as authorized under Recommendations of this Report of Examination, shall be contingent upon the water right holder's maintenance of highly efficient water delivery systems and use of up-to-date water conservation practices that optimize consumptive use, thereby eliminating return flows on said lands. Some such practices can be found at http://www.nrcs.usda.gov/technical/standards/nhcp.html. A description of the lands which this provision refers to is as follows:

   Those portions of Okanogan County Parcels 342603-0021; 342604-0010; and 342604-0022 lying northerly of Johnson Creek Road and southeasterly of Riverside Cutoff Road AND those portions of Parcel Nos. 342604-0022; 342604-0024; and 342609-0009 lying southerly of Johnson Creek Road and Riverside Cutoff Road and northerly of the following described line: Commencing at the NE corner of Sec 9, T. 34 N., R. 26E.W.M; thence North 68°6'45"W 1408 feet to the true point of BEGINNING; thence South 79° 33' 45" West 167 feet; thence South 81° 40' 28" West 190 feet; thence South 81° 42' 10" West 223 feet; thence South 62° 3' 7" West 235 feet; thence South 34° 28' 36" West 128 feet; thence South 29° 21' 28" West 252 feet; thence South 88° 17' 25" West 308 feet; thence South 1° 30' 27" East 175 feet; thence South 85° 14' 11" West 55 feet;

thence South 3° 41' 29" East 143 feet; thence South 37° 7' 32" West 135 feet; thence South 53° 13' 37" West 160 feet; thence South 74° 32' 20" West 132 feet; thence South 80° 36' 39" West 174 feet; thence South 80° 2' 50" West 133 feet; thence North 2° 8' 13" West 594 feet; thence North 88° 21' 49" West 643 feet to the terminus of this line.

FINDINGS OF FACT AND DECISION

Upon reviewing the investigator's report I find all facts relevant and material to the subject application have been thoroughly investigated. Furthermore, I find the proposed change as recommended will not be detrimental to existing rights.

Therefore, I ORDER approval of the recommended change in place of use under Surface Water Change Application No. CS4-ADJ24P64, subject to existing rights and the provisions specified above.

You have a right to appeal this order. To appeal this you must:

- File your appeal with the Pollution Control Hearing Board within 30 days of the "date of receipt" of this document. Filing means actual receipt by the Board during regular office hours.
- Serve your appeal on the Department of Ecology within 30 days of the "date of receipt" of this document. Service may be accomplished by any of the procedures identified in WAC 371-08-305(10). "Date of receipt" is defined at RCW 43.21B.001(2).

Be sure to do the following:

- Include a copy of this document that you are appealing with your Notice of Appeal.
- Serve and file your appeal in paper form; electronic copies are not accepted.

1. To file your appeal with the Pollution Control Hearings Board:

Mail appeal to:	OR	Deliver your appeal in person to:
Pollution Control Hearings Board PO Box 40903 Olympia WA 98504-0903		Pollution Control Hearings Board 4224 – 6th Ave SE Rowe Six, Bldg 2 Lacey WA 98503

2. To serve your appeal on the Department of Ecology:

Mail appeal to:	OR	Deliver your appeal in person to:
Department of Ecology Appeals Coordinator PO Box 47608 Olympia WA 98504-7608		Department of Ecology Appeals Coordinator 300 Desmond Dr SE Lacey WA 98503

3. And send a copy of your appeal packet to:

Mark Schuppe, Acting Section Manager
Department of Ecology
15 W Yakima Ave Ste 200
Yakima WA 98902-3452

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.

Signed at Yakima, Washington, this 30TH day of June 2009.

Mark C. Schuppe

Mark Schuppe, Acting Section Manager
Water Resources Program

BACKGROUND

Description and Purpose of Requested Change

On March 15, 2004, Greg Baker of Hi-Lo Orchards Limited Partnership submitted an application to the Department of Ecology (Ecology) requesting a change in the place of use (POU), under Johnson Creek Superseding Certificate of Adjudicated Water Right Nos. 64 and 65. The original certificates, Johnson Creek Adjudicated Certificate Nos. 64 and 65, were confirmed by the Okanogan County Superior Court during the Johnson Creek Adjudication and were issued on August 27, 1926. They were replaced by Superseding Certificate of Adjudicated Water Right Nos. 64 and 65 (hereafter referred to as Certificate Nos. 64 and 65), pursuant to a change authorized by Ecology in 1995. Certificate No. 64 is the subject of this Report of Examination (ROE). The current change application was accepted and assigned Surface Water Change Application No. CS4-ADJ24PP64. The applicant seeks to exercise long-term crop patterning in order to rotate crops over a larger range of acres without increasing irrigated acres.

Attributes of the Certificate and Proposed Change

Table 1: Summary of Existing Attributes and Proposed Changes to Certificate No. 64

Attributes	Superseding Adjudicated Certificate	Proposed
Name	Harry Baker	Hi-Lo Orchards Limited Partnership
Priority Date | Date of Application	1886 | Class 1	March 15, 2004
Instantaneous Quantity	0.85 cubic feet per second	No change
Annual Quantity	324 acre-feet per year	No change
Source	Johnson Creek	No change
Point(s) of Diversion	**No. 1**: 200 feet south and 800 feet west of the north quarter corner of Section 10, being within the NW¼NE¼NW¼ of Section 10, T. 34 N., R. 26 E.W.M. **No. 2**: 680 feet south and 700 feet west of the northeast corner of Section 9, being within the SW¼NE¼NE¼ of Section 9, T. 34 N., R. 26 E.W.M., Okanogan County, Washington.	No change
Purpose of Use	Irrigation of 81 acres	No change
Period of Use	April 15–September 15 annually	No change
Place of Use	1. N½NE¼NE¼, and the E½NE¼NW¼NE¼, Section 9; 2. N½NW¼, Section 10; 3. S½SE¼SE¼ and E½SE¼SW¼SE¼, Section 4; 4. SW¼SW¼, Section 3 lying south of Johnson Creek Road all in T. 34 N., R. 26 E.W.M., Okanogan County, Washington.	1. Within that portion of the S½SW¼ lying north of Johnson Creek Road, Section 3, T. 34 N., R. 26 E.W.M. (Parcel No. 342603-0021.) 2. Within that portion of the S½SE¼ lying south of Riverside Cutoff Road, Section 4, T. 34 N., R. 26 E.W.M. (Parcel Nos. 342604-0010 and 342604-0022 but excluding Parcel No. 342604-0009.) 3. Within that portion of the SE¼SW¼ lying south of Riverside Cutoff Road, Section 4, T. 34 N., R. 26 E.W.M. (Parcel No. 342604-0024.) 4. Within the NE¼NE¼ of Section 9, T. 34 N., R. 26 E.W.M. (Parcel No. 342609-1001.) 5. Within the NW¼NE¼ of Section 9, T. 34 N., R. 26 E.W.M. (Parcel No. 342609-1004.) 6. Within the E½NE¼NW¼ of Section 9, T. 34 N., R. 26 E.W.M. (Parcel No. 342609-0009.) 7. Within the N½NW¼ of Section 10, T. 34 N., R. 26 E.W.M. (Parcel No. 342610-0014 but excluding Parcel Nos. 342610-0012 and 342610-0015.)

Legal Requirements for Proposed Change

In order to make a water right change decision, Ecology must determine that the following requirements are met:

Statement of Authorities
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 90.03.380(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.

Public Notice
Public Notice of the change application was given in the Omak-Okanogan County Chronicle of Okanogan, Washington on April 21 and 28, 2004.

There was one combined protest received from a group of individuals, the Johnson Creek Water Users, during the 30-day protest period, which expired on May 29, 2004. Their objections will be addressed later in this report.

State Environmental Policy Act (SEPA)
A water right application is subject to SEPA threshold determination if any of the following conditions are met:

- 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 (cfs), so long as that irrigation project will not receive public subsidies.
- It is a ground water right application for more than 2,250 gallons per minute (gpm).
- It is an application that, in combination with other water right applications for the same project, collectively exceeds the amounts above.
- Is 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).
- 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.

This application does not meet any of the proceeding conditions, and is therefore categorically exempt from the provisions of the SEPA of 1971, RCW 43.21C.

INVESTIGATION

In considering this application for change, the investigation included but was not limited to, research and/or review of:

- The State Water Code, administrative rules, and policies.
- Existing water rights on file.
- Notes from site visit on March 8, 2007 and February 13, 2008.
- Notes from communication and correspondence with the applicant.
- Topographic and local area maps.
- Aerial photographs of the site.
- Department of Ecology Guidance 1210.
- Washington Irrigation Guide.
- AgriMet.
- Other studies, reports, and file notes.

History of Water Use

The subject property of this application, which is owned by Gregg Baker of Hi-Lo Orchards, lies adjacent to and north and south of Johnson Creek, approximately 6 miles north of Omak and is located in the Okanogan River Basin, WRIA 49. A total of 138.7 acres from Johnson Creek are authorized to be irrigated under two certificates, Certificate Nos. 64 and 65, which were both originally issued in 1926 pursuant to the Johnson Creek Adjudication (Okanogan County Superior Court Decree No. 6126). The original authorized place of use (POU) for Certificate No. 64 historically laid adjacent to and east Certificate No. 65 and includes all or part of the following Parcel Nos.: 342603-0021, 342604-0009, 342604-0010, 342604-0022, 342609-1001, 342609-1004, 342610-0012, 342610-0014, and 342610-0015 (see Figure 1). The proposed POU for Certificate No. 64 includes most of the same lands as the original POU for Certificate No. 64 and includes some lands that overlap with the proposed POU for Certificate No. 65, creating a larger POU to accomplish the requested crop rotation but without increasing irrigated acreage, specifically Parcel Nos. 342603-0021, 342604-0010, 342604-0022, 342604-0024, 342609-0009, 342609-1001, 342609-1004, and 342610-0014 but excluding Parcel Nos. 342604-0009, 342609-0008, 342610-0012, 342610-0015 (see Figure 2). The lands being irrigated are currently planted in orchard and alfalfa.

Figure 1: Original Authorized POU and Parcels

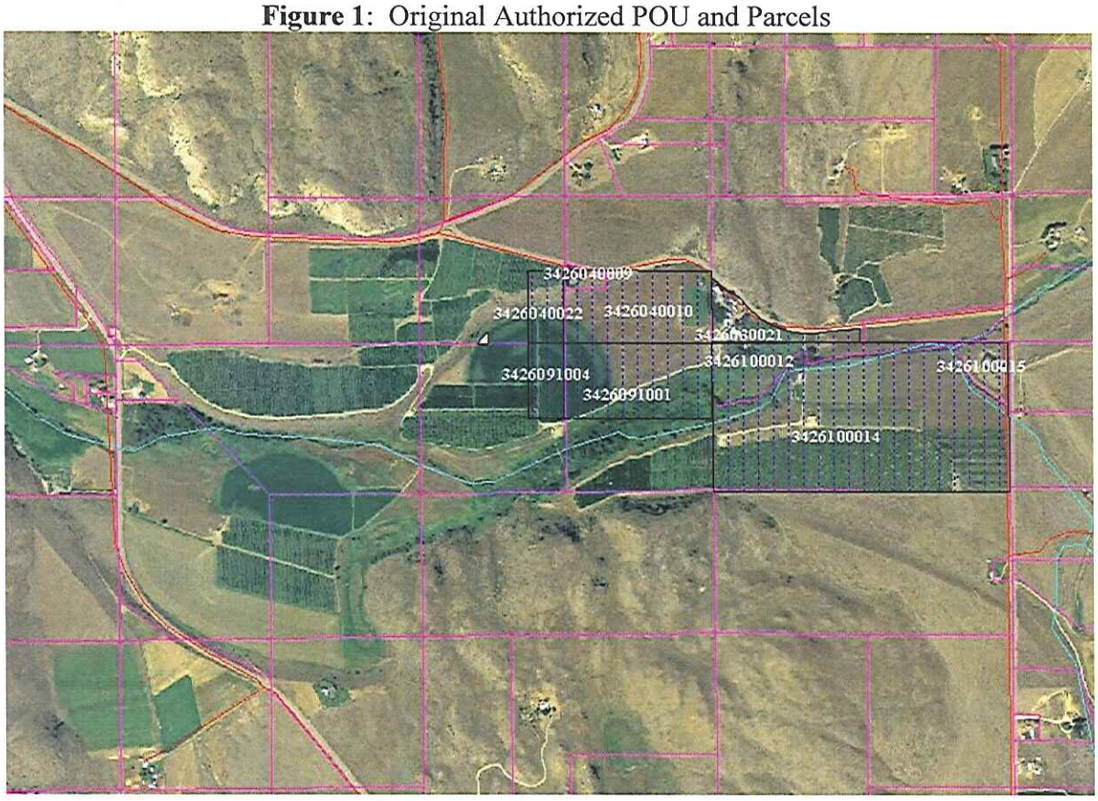
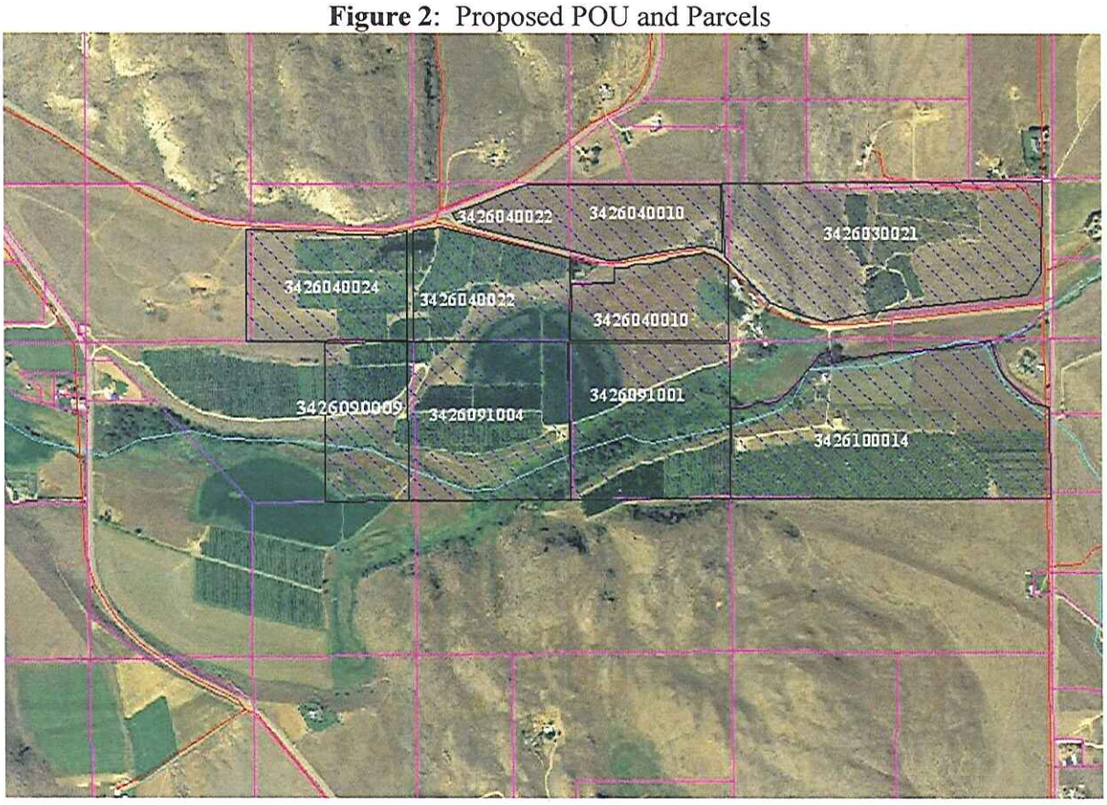


Figure 2: Proposed POU and Parcels



Previous to this current change application, on December 14, 1989, Harry Baker of Riverside, Washington, filed two applications with Ecology to change a portion of the POU and change the points of diversion (POD) for Certificate Nos. 64 and 65 of the Johnson Creek Adjudication Decree, No. 6126. During the 30-day protest period, letters of protest were received from Joseph T. Curry, Alfred Hilton, and David Brown. The change application requested to change the PODs from an authorized gravity-flow ditch that diverted water from Johnson Creek about a mile from the POU to a pumped diversion from Johnson Creek adjacent to the authorized POU. The following is excerpted from Ecology's 1990 Findings of Fact and Decision Docket No. DE 90-C238 approving the change:

> At the time of the adjudication, the Baker property received its irrigation water via a gravity flow ditch that diverted water from the creek at the authorized point of diversion and transported it downstream to the place of use. Many years ago the ditch was abandoned and pumps installed in the creek adjacent to the place of use authorized by the certificate (Johnson 1990).

The change application also requested to change the POU to add additional lands (7-8 acres), which were claimed to have been historically irrigated. Both requests for change were approved in 1990 and superseding certificates were issued February 6, 1995 to the previous property owner, Mr. Harry Baker, and now Gregg Baker of Hi-Lo Orchards is the owner/applicant.

On December 5, 2003, Notice of Violation No. DE 03WRCR-5903 was issued to Gregg Baker of Hi-Lo Orchards, which asserted that Mr. Baker exceeded the number of irrigated acres authorized or claimed for irrigation and irrigated an area outside the places of use described in Certificate Nos. 64 and 65.

On March 15, 2004, Gregg Baker of Hi-Lo Orchards submitted two new water right change applications to Ecology requesting a change in the POU, under Certificate Nos. 64 and 65. The two files originated with the Okanogan County Water Conservancy Board but were rejected and returned to Ecology for processing when the applicant did not submit a private impairment analysis per the Board's request. The applications were accepted by Ecology and assigned Surface Water Change Application Nos. CS4-ADJ24P64 and CS4-ADJ24P65. The applicant seeks to exercise a long-term crop patterning in order to rotate crops over a larger range of acres. The proposed change will not increase the number of authorized irrigable acres. The change application seeks also to more accurately reflect that the entire developed lands are adequately described in the certificate and is seeking the flexibility to move the highest priority water to irrigate the most valuable crop(s) in a system of crop patterning with planting new orchards and cutting down others.

A site visit was conducted on March 8, 2007, by Ecology employees Candis Graff and Ingrid Ekstrom. Susan Burgdorff-Beery, water master for Ecology, and Gregg Baker, applicant, were also present. Based upon this site visit and upon measurements of irrigated acreage shown on aerial photos from past years, it appears that actual irrigated acreage exceeds authorized irrigated acreage. The legal spokesman for the applicant contends that ". . . roads, bin storage and loading, and unplanted areas" were not considered in Ecology's aerial analysis of irrigated acres; however, Ecology received no quantification of these unirrigated areas. Anything that exceeds the number of authorized irrigated acres must cease being irrigated to comply with the order of the adjudicated and superseding certificates. According to Okanogan County's Assessor's web site, the applicant has historically grown and irrigated the fruit and alfalfa. The site visit confirmed that alfalfa, apples, cherries, and pears are currently being grown.

During this same site visit, a Global Positioning System (GPS) unit was used to determine the exact location of the PODs, which are not proposed for change. While the adjudicated certificate provides an approximate location for these authorized PODs, through the GPS and the digitization tool in ArcView 3.3, it was determined that the location of each surface diversion is more accurately described as being approximately 120 feet south and 1150 feet west of the north quarter corner of Section 10 and approximately 680 feet south and 790 feet west of the northeast corner of Section 9, T. 34 N., R. 26 E.W.M.

In addition to owning Certificate Nos. 64 and 65, the applicant also owns the following water right and claims:

- Duck Lake Adjudicated Certificate No. 117, for continuous domestic supply for the N½NW¼NW¼ of Section 10, T. 34 N., R. 26 E.W.M. and withdraws water from a different source.
- Water Right Claim No. 117287, ground water for the irrigation of 10 acres. The well was not located and the applicant knew nothing of its existence.
- Water Right Claim No. 117288, ground water for continuous domestic supply for the SE¼SE¼ of Section 4, T. 34 N., R. 26 E.W.M., therefore, no relationship to Certificate No. 64.
- Water Right Claim No. 117289, ground water for continuous domestic and irrigation of 5 acres for the SW¼SW¼ of Section 3, T. 34 N., R. 26 E.W.M.
- Water Right Claim No. 117290, ground water for irrigation of 40 acres for the N½NE¼ of Section 9, T. 34 N., R. 26 E.W.M., and is being used to irrigate acres outside of POU as described on said claim.
- Water Right Claim No. 117291, ground water for irrigation of 80 acres for the NW¼NW¼ of Section 9, T. 34 N., R. 26 E.W.M.

During the March 8, 2007, site visit, it was ascertained from the applicant, Gregg Baker, that Claim Nos. 117289, 117290, and 117291 have historically and are currently being used outside of their documented POUs. Mr. Baker has indicated that all three claims are being used in the NW¼ of Section 9, T. 34 N., R. 26 E.W.M. and his attorney, Mr. Scott De Tro states that a "...Scribner's error on the original claims exists, and thus, the use is outside of the documented POU". Since the POU is not accurate as documented on these claims, Mr. Baker should apply for changes to them through the Okanogan County Conservancy Board or pursue a claim amendment with Ecology.

Another site visit was conducted on February 13, 2008, by Ecology employees Candis Graff and Ingrid Ekstrom. Gregg Baker was also present. Data from three nearby wells and other pertinent datum were gathered for the purpose of return flow analysis.

Other Water Rights Appurtenant To and In the Vicinity of Proposed Place of Use (POU)

A review of Ecology records was conducted for existing water right documents, permits, and claims[1]. Table 2 identifies existing water rights appurtenant to the proposed POU and Table 3 identifies water rights in the vicinity of the POU.

Table 2: Water Rights and Claims Appurtenant to Proposed POU

Water Right No.	Document Type	Purpose(s)	Priority Date Date of First Use	Qi (gpm or cfs)	Qa (ac-ft/yr)	Source
*Johnson Creek Adjudicated Certificate No. 65	Adjudicated Certificate	IR	1886/Class 2/4	0.71 cfs	230.8	Johnson Creek
*117287	Claim	IR	unspecified	100 gpm	3	Well
*117288	Claim	DS	November, 1956	unspecified	2.5	Well
*117289	Claim	DS/IR	unspecified	100 gpm	3	Well
*117290	Claim	IR	1900s	500 gpm	4	Well
302334	Claim	DS/IR/MU/ ST/Other	May, 1888	8 cfs	2920	Salmon Creek
088354	Claim	IR	1910	90 cfs	13000	Salmon Creek
6233	Certificate	IR	December 17, 1954	0.79 cfs	Unspecified	Johnson Creek
055822	Claim	ST	January 1, 1910	1.0 cfs	1.0	Spring #16

*Owned by applicant. Relationship to Certificate No. 64 stated on previous page.
Note: IR=Irrigation, DS-Domestic Single, MU=Municipal, ST=Stockwater

Table 3: Water Rights in the Vicinity of POU

Water Right No.	Document Type	Purpose	Priority Date Date of First Use	Qi (gpm or cfs)	Qa (ac-ft/year)	Source
Johnson Creek Adjudicated Certificate No. 75	Adjudicated Certificate	IR	1919/Class 8	15.0 cfs	Unspecified	Johnson Creek
CS4-ADJ24VOL1P58	Cert of Change	IR	1886/Class 1	0.13 cfs	Unspecified	Johnson Creek
CS4-ADJ24VOL1P59	Cert of Change	IR	1886/Class 1	0.20 cfs	Unspecified	Johnson Creek
Johnson Creek Adjudicated Certificate No. 71	Adjudicated Certificate	IR/DS/ST	1902/Class 5	0.27 cfs	Unspecified	Johnson Creek
Johnson Creek Adjudicated Certificate No. 72	Adjudicated Certificate	IR/DS/ST	1905/Class 6	0.02 cfs	Unspecified	Johnson Creek

Note: These lists do not necessarily address validity of each documented certificate or claim.

Proposed Use

One of the legal tests to consider for changes in POU to enable irrigation of additional acreage is no increase in annual consumptive quantity (RCW 90.03.380). While this change application seeks to increase the acreage of the proposed POU from 81 acres to approximately 320 acres, only 81 acres are authorized for irrigation under Certificate No. 64 and this cannot be exceeded. This application does not propose to increase that limit of irrigated acres.

[1] The above referenced claims were filed under Claims Registration Act, RCW 90.14. The intent of this act was to document those uses of surface water in existence prior to the adoption of the State Surface Water Code, RCW 90.03, which was adopted in 1917, and those uses of ground water in existence prior to the adoption of the State Ground Water Code, RCW 90.44, which was adopted in 1945. Since each code adoption, the only means of acquiring a water right within the state is by filing for, and receiving, a permit from Ecology or one of its predecessors or by establishing a right under the "exemption" under the Ground Water Code RCW 90.44.050. Ecology recognizes that the final determination of the validity and extent associated with a claim registered in accordance with RCW 90.14 ultimately lies with the Superior Court through the general adjudication process provided for by RCWs 90.03.110 through 90.03.240. Ecology does, however, recognize that water use may be occurring under these claims.

Certificate No. 64, a Class 1 water right, authorizes the diversion of 0.85 cfs and 324 acre-feet per year (ac-ft/yr) to irrigate 81 acres (a water duty of 4 ac-ft/yr per acre) from April 15 to September 15. According to Department of Ecology v. Grimes, 121 Wn2d 459, 852 P.2d 1044 (1993), "*Water duty* is the amount of water that, by careful management and use and without wastage, is reasonably required to be applied to a parcel of land for the period of time that is adequate to produce a maximum amount of such crops as ordinarily are grown on the land." To arrive at reasonable use under the present conditions, crop irrigation publications were examined in order to verify whether the allotted water duty is reasonable for the area. Therefore, to meet legal test for changes in POU, Ecology will recalculate water quantities by using acreage being beneficially irrigated with present and conservative future efficiencies. No water quantities will be recognized beyond the amount necessary to accomplish the beneficial use employing reasonable efficient practices.

The applicant uses a variety of irrigation delivery systems for a variety of crops. With this change application, Ecology was able to secure enough detailed data for each delivery system specific to each crop, along with the associated watering practices, allowing Ecology to determine delivery efficiencies with greater specificity. Ecology typically uses various estimation methods, such as the Washington Irrigation Guide (WIG) and the Bureau of Reclamation's AgriMet web site to estimate the CIR needed annually for each crop. The total of this calculation is then multiplied by the number of irrigated acres for a total water duty in ac-ft/yr. Ecology also typically relies on the Water Resources Program Guidance: *Determining Irrigation Efficiency and Consumptive Use* (GUID 1210) in reaching its tentative determination estimates and to determine the amount of water that can be reasonably used for the proposed use. Given the range of efficiencies provided by GUID 1210 and the information supplied by the applicant with regards to irrigation practices and delivery system specifications, Ecology determined that the applicant's current practices strongly suggest calculations within the higher range of efficiencies. This represents a 91 ac-ft/yr savings. This new total, with the inclusion of higher efficiencies, was then multiplied by the number of irrigated acres for a total water duty in ac-ft/yr. (See Table 4 below.)

Table 4: Summary of Total Irrigation Requirement (TIR) at the Omak Climatic Data Station

Sprinkler Type	Efficiencies	Crop Type	Approximate # of Acres	CIR (inch/year)	CIR (ac-ft/yr w/o efficiencies)	TIR (ac-ft/yr w/efficiencies)
Mini-Micro	95%	Apples w/cover	4.95	31.8	2.65	13.81
Impact	85%	Cherries w/cover	14.95	32.90	2.74	48.19
Impact	85%	Apples w/cover	29.95	31.80	2.65	93.37
Impact	85%	Pears w/cover	6.31	29.53	2.46	18.26
Impact	85%	Alfalfa	24.80	33.3	2.78	81.11
TIR	---	--	--	--	--	254.74

*Note: The above approximation of historically irrigated acres is based upon the applicant's own account and while the total number is slightly less than the authorized number of acres and less than the author's aerial review of irrigated acres, it still falls within the margin of error.

The WIG estimates the CIR in the Omak Climatic Data Station for apples, pears, and cherries to be 31.67, 29.53, and 32.90 inches respectively, annually. The Bureau of Reclamation's AgriMet web site estimates the CIR at the Omak Climatic Data Station for apples is 31.8 and pears is 26.9 inches annually. Ecology used the highest numbers for apples from the estimates provided by AgriMet and the highest number for pears from the estimates provided by the WIG. Estimates for cherries were only given in the WIG; therefore, Ecology used that estimate.

During the February 13, 2008, site visit, the terms of the Development Schedule were discussed with the applicant. The irrigation systems are already in place for the current farm plan and both PODs are currently metered and screened, so the applicant should easily meet the timeframe of the schedule.

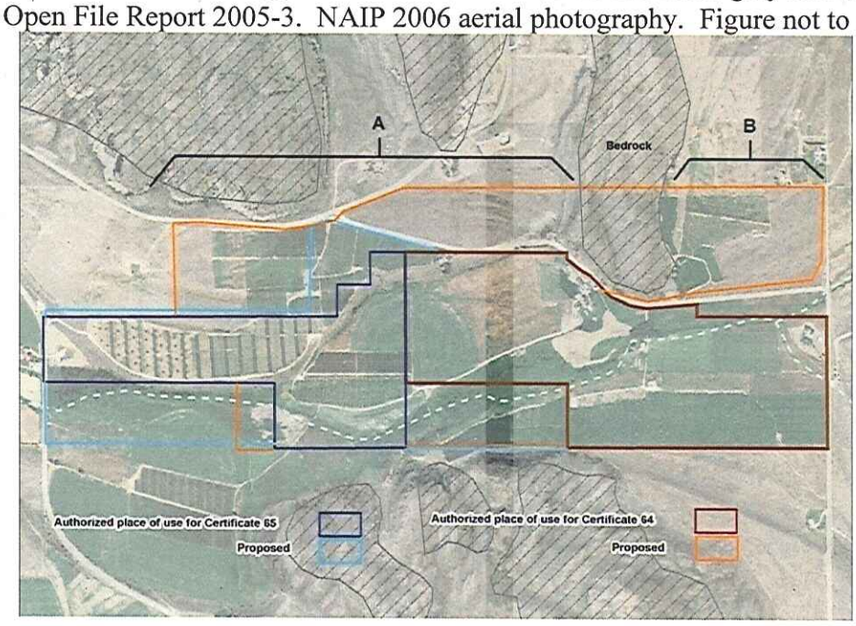
Geologic and Hydrogeologic Analysis

Two basic principles of western water law are touched when a change is made in POU. First, a water right consists of the amount of water reasonably needed to beneficially irrigate the crop. Second, water right holders have the reasonable expectation that conditions will remain as they were when their right was established, subject to the vagaries of climatic, and therefore hydrologic, variation. RCW 90.03.380 provides that a perfected water right may be changed in several ways, provided that the change will not impair other water rights. To meet the "no impairment" expectations of other water right holders competing for the same source of water, it is necessary to consider the hydrologic effects between the old system and the new system. This analysis must focus on the fate of the water diverted, the amount of water used consumptively by the crop and associated on-field evaporative losses, and the water returned to the stream via surface or subsurface return flows.

The following technical report was prepared by Ingrid Ekstrom, licensed hydrogeologist and reviewed by Thomas Mackie, supervisor and licensed hydrogeologist, and

> ...seeks to address the issue of return flows and whether changing the place of use to include land at higher elevation and at a greater distance from Johnson Creek has the potential to cause impairment. More specifically, the report attempts to determine whether the proposed change could result in 1) a reduction in the amount of return flows within the authorized season of use, or 2) a change in location of any portion of return flows to a more distant downstream reach of Johnson Creek and beyond any existing diversion (Ekstrom 2009).

Figure 3: Authorized places of use under Surface Water Certificate Nos. S4-ADJ24P64 and S4-ADJ24P65 are outlined in brown and navy, respectively. Additional proposed places of use are outlined in light blue (CS4-ADJ24P65) and orange (CS4-ADJ24P64). Areas labeled A and B are referenced in the text. Johnson Creek is delineated with a dashed line. Approximate bedrock areas are shown as gray hatch marks and are based on WDGER Open File Report 2005-3. NAIP 2006 aerial photography. Figure not to scale.



Johnson Creek has its head waters from springs in Section 25, T. 35 N., R. 25 E.W.M. at an elevation of approximately 1380 feet mean sea level (ft msl), southeast of Hess Lake. Johnson Creek emerges from its spring fed source and then flows southeast through a narrow alluvial valley, carved into the surrounding bedrock by glaciers and an older drainage that once occupied the area (Dawson, 1898, and Willis, 1887, in Laudon, 1983). The upper reaches of Johnson Creek are largely spring fed (USGS Topographic Quadrangles; Smith vs Bartholet, 1934). In the vicinity of the applicant's property in Sections 3, 4, and 5 of T. 34 N., R. 26. E.W.M., the alluvial valley widens and Johnson Creek skirts the northwestern edge of the Duck Lake Aquifer, near Bide-A-Wee Flat and Pogue Flat, northwest of Omak, WA. Johnson Creek flows along the northwest border of the Flats and through the applicant's property, following a large bend from southeast to northeast. Farther downstream, Johnson Creek enters a bedrock valley and flows northeast and east before finally discharging to the Okanogan River at Riverside, WA. Downstream of the applicant's property, some reaches of Johnson Creek reportedly went dry at times during years in the late 1980s prior to channel work along the creek (Monroe, personal communication, 2008). More recently in the early 2000s, flows were observed to persist in the creek to within approximately ½ mile of the confluence with the Okanogan River, where they temporarily infiltrated, leaving a short reach of dry channel during late summer in some low flow years (Burgdorff-Beery, personal communication 2008).

The general geology in the vicinity of the subject area includes metamorphic and igneous bedrock overlain in areas by unconsolidated glacial and fluvial sediments. The bedrock near Johnson Creek and north of Duck Lake Aquifer is composed of Eocene, Cretaceous, and Triassic igneous and metamorphic rocks. Triassic metacarbonates, metasedimentary, and metavolcanics of the Cave Mountain Formation are present as bedrock highs in the vicinity of the applicant's property on both sides of Johnson Creek. Cretaceous granodiorites and quartz monzonites of the Evans Lake Pluton form the uplands north and northwest of the subject property. To the south and southwest of Johnson Creek and the subject area, the Cretaceous Pogue Mountain quartz monzonite pluton forms Pogue Mountain and some of the bedrock highs exposed on Pogue Flat. During the Eocene period, dacite flowed out onto the older bedrock northwest of Omak. The Eocene dacite flows are exposed on both sides of Johnson Creek to the northeast of the subject property. The dacite flows also form Coleman Butte and nearby bedrock highs exposed in the flats directly north of Omak (Gulick and Korosec, 1990).

During the Pleistocene, glacial processes carved out and eroded the land surface and unconsolidated glacial and alluvial sediments were subsequently laid down over the irregular bedrock surface. In some places in the subject area bedrock highs remain at ground surface and protrude out of the glacial deposits, while in other locations thick sediments fill-in old drainage channels and depressions. During the most recent glaciation, the Okanogan Lobe of the Cordilleran ice sheet moved south into the region between the Cascade and the Nespelem Ranges (Flint, 1935 in Laudon, 1983). At the end of the glacial period, the ice sheet stagnated and down-wasted in the Okanogan Valley and adjacent areas. Ice-marginal lakes formed and tributary glacial melt water channels deposited abundant sediments in the lakes. As the ice continued to melt and the lakes drained, large flat-topped terraces persisted along the main Okanogan Valley as well as along the margin of tributary channels. The terraces are composed of stratified gravel, sand, silt, and clay (Waters, 1933 in Laudon, 1983). Pogue Flat and Bide-A-Wee Flat are local examples of terraces formed by a large ice marginal lake in the vicinity of Omak (Laudon, 1983). Other flat-topped glacial terraces are visible along the Johnson Creek Valley and on the applicant's property. In addition, the down-wasting ice sheet left behind blocks of ice buried in the terrace and outwash deposits that later melted to form the kettle lakes, south of the applicant's property, including Duck Lake (Wallace, 1958).

Reports for the Duck Lake Subbarea (Laudon, 1983; Grimstad and Wallace, 1971) suggest that present day Johnson Creek follows an ancestral drainage, possibly of the Similkameen River. During the Pleistocene, glacial outwash streams occupied and further eroded the older drainage before discharging out of the constricted bedrock valley at the applicant's property and entering the wide area now occupied by Pogue Flat and Duck Lake Aquifer. A seismic refraction study, conducted along the southeastern boundary of the applicant's property, supports the presence of a large ancestral glacial-deposit filled channel entering the Duck Lake area from the Johnson Creek Valley (Laudon, 1983).

The unconsolidated glacial deposits form the primary aquifers in the area. The Duck Lake Aquifer, one of the larger area aquifers, has been delineated as a Ground Water Management Subarea under WAC 173-132. The Duck Lake Aquifer is located to the southeast of the applicant's property and is composed of unconsolidated and unsorted sands, gravels, and silts (Laudon, 1983). Studies that were part of the Subarea delineation indicate a general ground water flow direction from northwest to southeast from Johnson Creek toward Omak (Wallace, ~1958). A primary source of recharge to the Duck Lake Aquifer is ground water flow that emerges from the Johnson Creek Valley through the glacial deposit filled channel and discharges to the Duck Lake Aquifer at the applicant's property (Laudon, 1983). Where the unconsolidated deposits are thin or absent, bedrock hosts minor and low yield fracture flow systems that may receive recharge from the unconsolidated deposits and produce relatively small quantities of water.

Site Geology

The topography and geomorphology on the applicant's property are important in describing the local geology. The applicant's property is located in Sections 3, 4, 9, and 10, T. 34 N., R. 26 E.W.M. along both sides of Johnson Creek. The bedrock valley walls to the northwest of the site funnel Johnson Creek toward the applicant's property. The creek emerges from the bedrock valley, skirts the northwest boundary of the Duck Lake Aquifer and then flows northeast toward Riverside, WA. At the applicant's property, the valley opens up and bedrock knobs are exposed on either side of Johnson Creek. To the south of the Creek, bedrock is present at the boundary between Section 9 and 10 and appears to be a resistant remnant that survived glacial and fluvial scouring. To the north of Johnson Creek, a series of north-south oriented elongate bedrock ridges jut out of the glacial drift and form the northern edge of the applicant's property.

The site can be divided into two topographic areas: 1) the valley floor composed of the land adjacent to Johnson Creek at elevations ranging from about 1280 to 1300 ft msl, and 2) the upland area predominantly composed of terraces including one large terrace that flanks the southern edge of the bedrock ridges in Section 4 (Area A on Figure 3) and a more gradual hill slope or remnant terrace to the east of the bedrock ridge in Section 3 (Area B on Figure 3). Glacial lake and fluvial outwash deposits form the large flat topped terraces within the alluvial valley, adjacent to the bedrock uplands. The terraced land's surface is some 60 to 80 feet above the relatively flat present day Johnson Creek valley floor. The majority of the land described in the pre-change authorized places of use for both certificates lies on the valley floor, and the proposed additional places of use incorporate Areas A and B in the upland area (Figure 3).

Most wells along the valley floor are only drilled into the unconsolidated sediments deep enough to satisfy water needs and encounter sand, gravel, silt, and clay. Based on available well logs, lenses of silt and clay appear to be more abundant in the glacial and fluvial deposits on the valley floor and occur at shallower depths than for wells drilled in the upland area. No wells with logs penetrate the full thickness of the unconsolidated valley floor deposits on the applicant's property; however, neighboring area well logs suggest that depth to bedrock along Johnson Creek is greater than 100 feet thick.

The terrace and hill slope of the upland region are primarily composed of sands, gravels, and large cobbles with lenses of clay up to 12 feet thick. The thickness of the unconsolidated glacial sediments on the terrace in Section 3 (Area A) is documented in two well logs to range from 93 to 116 ft. Depth to bedrock appears to decrease closer to the bedrock ridges. On the hill slope east of the bedrock ridge in Section 3 (Area B), well logs record similar deposits of sands and gravels with discontinuous lenses of clays and silts at depth. Depth to bedrock in this eastern area ranges from approximately 20 ft near bedrock walls to greater than 100 ft closer to the eastern property boundary.

Site Hydrogeology

In order to discuss irrigation return flows from the applicant's fields in context of the area hydrogeology it is important to consider the ground water flow system, thickness of the unsaturated and saturated zones, and the potential for ground water – surface water interaction. The following section summarizes available information about the hydrogeology for the valley floor and the upland area.

The water table elevation was estimated based on well logs, USGS topographic maps, Duck Lake Aquifer studies, and water levels in kettle lakes to the south (Duck, Fry, and Proctor Lakes). Water table elevations and Duck Lake Subarea studies (Laudon, 1983, Wallace, ~1958) suggest the general ground water flow direction in the site area is likely in a southerly and southeasterly direction from the upland terraces on the north side of the applicant's property and from the bedrock controlled ancestral drainage now occupied by Johnson Creek into the more expansive Duck Lake Aquifer.

Depth to ground water ranges from approximately ground surface to 90 feet below ground surface (ft bgs) depending on location (well log database, water right files, and site visit notes). In general, depth to water is greatest in the uplands and closest to land surface along the Johnson Creek Valley floor. In the upland area, well logs suggest depth to water on the terraces near Area A (Figure 3) ranges from approximately 60 to 90 ft bgs. On the hill slope east of the bedrock ridge in Area B (Figure 3), depth to water ranges from 40 to 80 ft bgs depending on location and elevation.

The United States Department of Agriculture Soil Survey of Okanogan County Area, Washington (USDA, 1980, 2005, 2006) was reviewed in characterizing soil types and the shallow unsaturated zone. Over most of the property, soil types are generally fine sandy loams with areas of silt loam adjacent to Johnson Creek. Specifically, in the upland area and parts of the valley floor, soils include Pogue extremely stony fine sandy loam and fine sandy loam, both underlain by very gravelly sand. The Pogue series is excessively drained with moderate available water capacity and a permeability ranging from moderately rapid near ground surface to very rapid below approximately 2.5 ft bgs (USDA, 1980). Closer to Johnson Creek on a portion of the valley floor, the dominant soil type is Colville silt loam, becoming silt clay loam at depth. Colville silt loam is somewhat poorly drained and typically has a moderately slow permeability, a high available water capacity, a seasonal high water table near or at ground surface, and a tendency to flood during large spring runoff events (USDA, 1980).

Depth to water in wells completed in the unconsolidated deposits on the valley floor typically ranges from ground surface to approximately 35 ft bgs with a few water levels as deep as 60 ft bgs. The range of valley floor water levels is likely due to seasonal water level variability, topography, and the uncertainty of well log locations, sometimes recorded to only the nearest quarter-quarter section. In the central portion of the property south of Area A most valley floor water levels appear to be near ground surface and at similar elevations to Johnson Creek. During a site visit on February 13, 2008, Ecology staff measured water levels in two wells near Johnson Creek, both within SW¼SW¼ of Section 3. Depth to water in both wells (10 ft bgs and near land surface) corresponded to the approximate elevation of Johnson Creek (USGS topographic quadrangle). Logs for these wells record similar depths to water (within 3 ft) in late summer of 1970 and fall of 2000. Most other ground water levels on the valley floor in Section 9 are within 14 ft of ground surface. On the eastern side of the property south of Area B on the valley floor, the elevation of ground water near Johnson Creek is uncertain. One domestic well in the N½NW¼ of Section 10 was not measured during the February 2008 site visit because the well was pumping. Water levels from well logs in this eastern area of the valley floor range from elevations similar to that of Johnson Creek to as much as approximately 50 ft below creek level. The deeper water levels along the valley floor may reflect the buried ancestral drainage and the opening of the bedrock valley into the Duck Lake Aquifer from the northwest to the southeast. However, observations during the February 13, 2008, site visit of ponded water along the creek at the applicant's property and records of shallow ground water levels (6 ft bgs) in excavations during the 1981 seismic refraction study to the east of the applicant's property (Laudon, 1983) could indicate a shallow water table or perched ground water due to low permeability soils and deposits near Johnson Creek.

The limited valley floor ground water level information leaves uncertainty as to the relationship between the ground water system and Johnson Creek across the applicant's property. The ground water – surface water relationship may vary seasonally as the water table elevation fluctuates, and may vary laterally along Johnson Creek from east to west across the applicant's property. One possibility is that ground water north of the creek discharges to Johnson Creek on site. Another possibility is that ground water flows under Johnson Creek to Duck Lake Aquifer with minimal ground water – surface water interaction. Another possibility is that ground water flows parallel to and down valley along Johnson Creek before exchanging water with the creek. Because of the several possibilities, site-specific analysis and data collection are necessary to determine whether any return flows discharge to Johnson Creek within the applicant's property boundary. For the purposes of a conservative analysis, it will be assumed that at least a portion of the assumed return flows under pre-change conditions return to the Creek.

The phrase "assumed return flows under pre-change conditions" refers to the potential return flow components of the total water duties calculated by Graff (2009; Table 4 ROEs) as part of the tentative determination of the extent and validity of the water rights in the Reports of Examination (ROEs). Refer to Discussion Section (1) below for details on how the quantities of "assumed return flows" were calculated from the total irrigation requirements under pre-change conditions. "Pre-change conditions" refers to the authorized characteristics of Surface Water Certificate Nos. S4-ADJ24P64 and S4-ADJ24P65, prior to the subject change proposals, including the places of use, points of diversion, seasons of use, etc., and to the quantities of water put to beneficial use as tentatively determined by the extent and validity analyses.

Hydrogeologic Analysis of the Site

The applicant proposes to change the places of use to include additional land within the upland area (Figure 3). This section of the report addresses whether the proposed change in place of use would allow for a change in the quantity, location, and/or timing of irrigation return flows to Johnson Creek. More specifically, to assess return flows and the potential for impairment, the series of questions below need to be addressed:

1) Quantity: What quantities of return flow are allowed for in the total water duties that were calculated for the tentative determinations of extent and validity of Surface Water Certificate Nos. S4-ADJ24P64 and S4-ADJ24P65 (Graff, 2009)?
2) Location: Would any of the return flows determined in Question 1 reach Johnson Creek (the source of the water right) under pre-change conditions? If yes, do other water rights rely on these return flows?
3) Location: Could the proposal cause return flows to enter Johnson Creek farther downstream than under pre-change conditions? If yes, could the potential change in discharge location decrease water in the creek for any downstream points of diversion?
4) Timing: Could the proposal result in a decrease in the total amount of return flow water discharging to Johnson Creek within the authorized season of use under Surface Water Certificate Nos. S4-ADJ24P64 and S4-ADJ24P65?

Comprehensive answers to these questions will require further information and studies to determine the timing and location of return flows under pre-change and proposed conditions. The applicant may choose to conduct site specific studies to more fully characterize the quantity, location, and timing of irrigation return flows under pre-change and proposed conditions. Within the scope of this review and without additional information, it is reasonable to discuss potential return flow changes that may occur as a result of the proposal and whether such changes may result in impairment of other rights.

Discussion:

1) Quantity: What quantities of return flow are allowed for in the total water duties that were calculated for the tentative determinations of extent and validity of Surface Water Certificate Nos. S4-ADJ24P64 and S4-ADJ24P65 (Graff, 2009)?

A conservative estimate of deep percolation (applied water that infiltrates below the root zone), for the pre-change place of use, can be constrained by considering both the extent and validity analyses of the two water rights (Graff, 2009), along with the applicant's own description of current irrigation practices within the pre-change places of use. Written and verbal communications with the applicant via letters, phone calls, and site visits indicate that Hi Lo Orchards has been progressively moving to more efficient irrigation practices. Qualitative descriptions of current irrigation system infrastructure and design, crop irrigation requirements, and irrigation scheduling suggest that deep percolation currently is likely minimal. Tentative determinations of extent and validity of each water right were conducted by Graff (2009) and indicate total irrigation requirements (TIRs) of 233.11 ac-ft/yr under Certificate No. S4-ADJ24P64 and 183.03 ac-ft/yr under Certificate No. S4-ADJ24P65. Out of these TIR quantities, in accordance with Table 1 of Ecology's Water Resources Program Guidance 1210, and with irrigation efficiencies specified by Graff (2009), the total water duties

presented in Table 4 of the two ROEs assume approximately 4.5 ac-ft/yr and 7.0 ac-ft/yr of return flow under Surface Water Certificate Nos. S4-ADJ24P64 and S4-ADJ24P65 respectively, or 11.5 ac-ft/yr total.

More specifically, Guidance 1210 provides the following methodology for calculating return flow quantities. First, the percent consumptive use (%CU) is determined by summing the application efficiency (Ea) and the total percent evaporation (%Evap) for each irrigation method listed in Table 4 of the ROEs (Graff, 2009), or %CU = Ea + %Evap. The percent return flow (%RF) is then calculated by %RF = 100 - %CU. Finally, the return flow annual quantity (RF) in acre-ft/yr is calculated as RF = TIR x %RF, where TIR is the total irrigation requirement. The following tables (Tables 5 and 6) provide the information from Table 4 included in each ROE (Graff, 2009) as well as the return flows assumed under Guidance 1210.

Table 5: Guidance 1210 return flows assumed under Certificate No. 64.

Sprinkler Type[1]	Application Efficiency[1]	Approximate # of acres[1]	TIR[1] (ac-ft/yr)	%Evap	%CU	Guidance 1210 %RF	Guidance 1210 RF (ac-ft/yr)
Mini-micro	95%	29.5	82.31	5%	100%	0	0
Mini-micro	95%	10.5	27.20	5%	100%	0	0
Mini-micro	95%	12.0	34.56	5%	100%	0	0
Impact	85%	22.75	70.98	10%	95%	5%	3.6
Impact	85%	6.25	18.06	10%	95%	5%	0.9
		Total	**233.11**			**Total**	**4.5**

1. The shaded columns are taken from the Table 4 of the ROE for CS4-ADJ24P64 (Graff, 2009) including information on how sprinkler type, application efficiency, number of acres, and TIR were calculated.

Table 6: Guidance 1210 return flows assumed under Certificate No. 65.

Sprinkler Type[1]	Application Efficiency[1]	Approximate # of acres[1]	TIR[1] (ac-ft/yr)	%Evap	%CU	Guidance 1210 %RF	Guidance 1210 RF (ac-ft/yr)
Mini-micro	95%	15.7	43.80	5%	100%	0	0
Center pivot with gun	80%	19.0	65.91	15%	95%	5%	3.3
Impact	85%	11.0	35.91	10%	95%	5%	1.8
Impact	85%	12.0	37.41	10%	95%	5%	1.9
		Total	**183.03**			**Total**	**7.0**

1. The shaded columns are taken from the Table 4 of the ROE for CS4-ADJ24P65 (Graff, 2009) including information on how sprinkler type, application efficiency, number of acres, and TIR were calculated.

Verbal and written communications with the applicant (Baker, November 7, 2007; Baker, November 15, 2007) indicate the new orchards, which are already planted on higher ground within the proposed place of use, are irrigated with high end efficiency range systems. Although the applicant has expressed the intent to continue to irrigate with highly efficient systems in the upland area (Baker, personal communication, 2007), the proposal in the change applications does not include an intent to reduce the pre-change authorized quantities of water. As calculated above, the total irrigation requirements (Graff, 2009) assume a total of 11.5 ac-ft/yr of return flow. As a result, in assessing the potential for impairment, the entire pre-change quantities presented in the tentative determination of extent and validity of the rights including the 11.5 ac-ft/yr of estimated return flow must be considered.

The amount of return flow assumed under pre-change conditions, up to 11.5 ac-ft/yr, represents a small portion of the total irrigation requirement. For the purposes of the analysis and to be conservative, it is assumed that the quantity, although small, comprises a meaningful amount of water within the water budget for the Johnson Creek water source.

2) Location: Would any of the return flows determined in Question 1 reach Johnson Creek (the source of the water right) under pre-change conditions? If yes, do other water rights rely on these return flows?

Irrigation return flows that infiltrate into the soil can be broken down into three phases or components including, 1) deep percolation, or water that is able to migrate below the crop's root zone; 2) unsaturated flow, or water that flows from the root zone to the water table; and 3) saturated flow, the water that enters the water table and migrates through the aquifer before discharging to a surface water body. For the subject applications and depending on ground water – surface water interactions, return flows may discharge to Johnson Creek, may flow under the creek into Duck Lake Aquifer, or flow to both the creek and the aquifer depending on season and location. Consequently, to simplify and be conservative, it will be assumed that return flows originating within the pre-change authorized places of use discharge to Johnson Creek. Additional study and data collection would be necessary, however, to further characterize the actual return flow path.

Whether other water rights rely on return flows to the creek requires knowledge of the location of downstream diversions and the characteristics of Johnson Creek along the intervening reaches. The closest downstream POD is the Anderson POD, located in the NE¼SE¼ of Section 3, T. 34 N., R. 26 E.W.M., approximately

0.46 river miles downstream of the applicant's eastern property boundary. Other water rights have authorized PODs further downstream with the most distant downstream adjudicated POD, the Paslay POD, located at Greenacres Rd. approximately 2.5 river miles downstream of the applicant's eastern property boundary. Information in Ecology's files and conversation with Ecology staff indicate that Johnson Creek has gone dry periodically at Greenacres road during the late 1980s. In more recent years after creek channel work was done locally, creek flows typically reach the Paslay diversion, but at reduced quantities such that at times the Paslay right does not receive its full allocation (Burdorff-Beery, personal communication, 2008).

Based on the above information, surface water appears to persist in Johnson Creek through the most distant downstream diversion, and downstream water users rely on the water in the creek for appropriation. Any return flows that discharge to Johnson Creek under pre-change conditions are part of the creek's available water supply. However, ground water - surface water interactions downstream of Hi Lo Orchard may include losing reaches and discharge of creek flow to the underlying aquifer.

3) Location: Could the proposal cause return flows to enter Johnson Creek farther downstream than under pre-change conditions? If yes, could the potential change in the discharge location decrease water in the creek for any downstream points of diversion?

Based on topography, geology, and locations of existing diversions, it is possible that deep percolation originating from fields planted on the eastern part of Area B (Figure 3) could result in return flow to Johnson Creek farther downstream than under pre-change conditions. However, under pre-change and proposed conditions, a component of ground water flow may be parallel to Johnson Creek rather than strictly perpendicular to the creek. Parallel down valley flow adds additional uncertainty in assessing whether there may be an actual change in return flow location under the change proposal. The closest authorized downstream POD (Anderson) is approximately 1800 ft to the northeast of the Hi-Lo property boundary at Area B; any downstream migration of return flow paths within the season of use and originating from irrigation of Area B would likely occur upstream of the Anderson diversion.

4) Timing: Could the proposal result in a decrease in the total amount of return flow water discharging to Johnson Creek within the authorized season of use under Surface Water Certificate Nos. S4-ADJ24P64 and S4-ADJ24P65?

The final question addresses a change in the amount of potential return flows that make it back to Johnson Creek within the season of use during pre-change and proposed conditions. The majority of land in the pre-change authorized place of use is located on the valley floor, and the total water duty allows for as much as approximately 11.5 ac-ft/yr of return flows that may originate from irrigated land within this place of use. The proposed additional place of use includes land in the upland areas on the terrace in sections 4 and 5 (Area A) and the hill slope in section 3 (Area B). The proposed change would increase the place of use under each certificate, but would not increase the irrigated acreage. The change allows the applicant flexibility to move an orchard plot or field but at no time could the irrigated acreage be increased. As a result, the proposal would allow the applicant to irrigate land in the upland area with up to approximately 11.5 ac-ft/yr of return flows. In order to address the question of timing, it is necessary to consider the difference in return flow paths from the pre-change place of use predominantly on the valley floor to the proposed place of use including the upland area at a greater distance from the creek and overlying a thicker unsaturated zone. The travel time along the return flow path can be divided between flow through the unsaturated zone and flow through the saturated zone.

Unsaturated Zone

A more detailed discussion of potential return flow movement through the unsaturated zone in the upland area and along the valley floor is presented in Appendix A. Based on the description in the appendix and the greater thickness of the unsaturated zone in the upland area, it is reasonable to conclude that it would take a greater quantity of water and a longer time to fill a column of the unsaturated zone to field capacity in the upland area than along the valley floor. In addition, if field capacity is achieved in both areas, then deep percolation in the upland area has to move farther in its downward migration to the water table (~40 to 90 ft) than it would on the valley floor (~0 to 35 ft). Both of these processes, achieving field capacity and downward migration, would likely result in longer unsaturated zone travel times for return flow water generated for fields in the upland area than for fields on the valley floor. Depending on the actual antecedent moisture content of the unsaturated zone, there is the possibility that a large portion or all of the return flow water generated in the upland area could go to filling the soil to field capacity, rather than to downward migration toward the water table, resulting in deep percolation water failing to reach the water table during the irrigation season. Other factors and processes, for example preferential water movement or local clay lenses, could lead to accelerated or delayed ground water recharge on site. It appears reasonable to assume that a portion of the 11.5 ac-ft/yr of return flow allowances reach the water table within the season of use under pre-change conditions, and a conservative approach will assume this. Site investigations, data collection, and analysis would be necessary to determine estimates of timing and amount of return flow water moving through the unsaturated zone.

Saturated Zone

Any return flow water that is able to move through the unsaturated zone over the course of the irrigation season and reach the water table would then travel as ground water flow through the saturated zone before returning to its source, Johnson Creek. As discussed above, without additional information regarding the relationship between Johnson Creek and the ground water system, it is assumed that ground water in the unconsolidated deposits of the valley floor area north of Johnson Creek discharges to the creek in order to formulate a conservative return flow analysis.

The horizontal distance from the irrigated fields to Johnson Creek is greater in the upland area than on the valley floor. In general, ground water that flows through the saturated zone takes a longer time to flow greater distances, if all other factors are comparable such as hydraulic conductivity, geologic materials, gradients, etc. In the subject case, any return flows generated from fields in the upland area that percolate to the water table would have an additional distance to travel in the saturated zone of the upland area prior to flowing through the saturated zone underlying the valley floor area and discharging to Johnson Creek. As a result, the additional upland ground water path would likely add time to the total travel time for potential return flows originating in the upland area.

Because of heterogeneity, subsurface flow through the saturated and unsaturated zones is more complex than flow through ideal homogeneous and isotropic deposits. For example, near the creek, fine-grained lenses may create local perched zones of ground water that facilitate more shallow and rapid return flow paths. Alternatively, more extensive fine grained and lower hydraulic conductivity lenses could serve to increase travel times of infiltrated deep percolation water.

One field currently irrigated within the pre-change place of use is located on the terrace at the western edge of the applicant's property. This field is located in the upland area and likely has a similar unsaturated zone thickness to other areas in the upland proposed place of use. Although return flow travel times through the unsaturated zone for this field may be comparable to other upland fields, the field is closer to the creek and, as a result of its proximity, ground water flow through the saturated zone would likely be shorter than for other potential return flow paths in the upland area, if all other factors are constant.

Return Flow Considerations

Based on the above conservative analysis and without additional information, it is reasonable to assume that any irrigation return flows will take a longer path back to Johnson Creek from the portion of the proposed additional places of use located in the upland area than from the pre-change places of use on the valley floor. As a result, if approved, the change proposal as described in the change applications would allow for irrigation return flows to arrive at the creek later than under pre-change conditions. Assuming a full irrigation season, a portion of the assumed return flows occurring at the end of the season within the pre-change places of use likely returns to Johnson Creek after the irrigation season. Additional delay of return flows by irrigating farther away from the creek and/or above a thicker unsaturated zone may result in longer travel times and a larger portion of return flows returning out of season. Under the change proposals as described in the applications and given the results of the tentative determination of extent and validity of the rights, the applicant could choose to use less efficient irrigation practices and cause increased deep percolation on upland areas farther from the creek (refer to Appendix A of Technical Memorandum). Without provisions, the proposal could allow less return flow to reach the creek within the season of use than under pre-change conditions.

Consideration of Protests and Impairment Issues

Protestant parties, James Anderson, Mary Anderson, John Plakos, Terry Paslay, and Carol Paslay from the Johnson Creek Water Users' group are owners of water rights and property downstream of the applicant's property. They jointly submitted a letter protesting the two applications for change. The letter points out limitations and characteristics of Mr. Baker's water right. It goes on to state that Mr. Baker is irrigating lands which are not described in the authorized POU and that some of these lands are located high above the creek basin, which is too far away to allow any significant return flow to recharge Johnson Creek, thereby impairing their downstream water rights. The letter concludes by requesting that if more acres are to be irrigated then Mr. Baker should prove there is more water available for additional appropriation. The crux of the letter seems to express uncertainty over whether the proposed change would require additional water to be diverted from Johnson Creek and expresses opposition to approval of the changes if more water would be diverted from the creek, resulting in impairment to downstream users.

In accordance with Policy for the Evaluation of Changes or Transfers to Water Rights (POL 1200) "A change to a water right may not generally cause a reduction in return flow without a balancing reduction in the diverted or withdrawn water quantity. Any reduction in return flow may not impair another water right dependent upon that return flow or have an adverse effect to the receiving water source."

To address the protestants' concern about return flows, one must understand that several general irrigating factors may ultimately reduce return flow. With regards to a specific crop's water requirement, the WIG and AgriMet present historically accurate characterizations of the amount of water consumed by each grown crop to satisfy evapotranspiration, leaching, and miscellaneous water requirements that are not provided by precipitation and water stored in the soil. They provide estimates of irrigation requirements that will maximize crop yield.

To irrigate one rotated crop that may require less water to mature than the previously grown crop could decrease the original return flow. Similarly, by changing from an inefficient irrigation water system to a more efficient one, return flow may be reduced, but since less water would be diverted, more water would be left in the creek. Additionally, a change in POU to a higher elevation could result in longer return flow paths and in seasonal changes to the flow of the creek. Moreover, lack of downstream flow could also be the result of stream conditions, where pools or swamps accumulate and flow is stymied due to stream maintenance issues.

Johnson Creek has a history of low-flow issues. When surface water rights were adjudicated in 1926, the Decree recognized the creek's potential low-flow issues and apportioned the flow amount of the various riparian water users and provided guidance as to maintenance of the creek channel. While ". . . water rights holders have a vested right to the continuation of stream conditions as they existed at the time of their initial appropriation," Beck, Waters & Water Rights § 16.02(b), p. 278, citing *Big Creek Water Users v. Ecology &* Trendwest, Pollution Control Bd. (PCHB) No. 02-113 (July 19, 2002), Ecology can neither protect the timing of return flows nor do they have any way to force maintenance of the stream channel on their property. Despite historical low-flow issues, "The flow rate of the creek could be sufficient to satisfy downstream rights if the channel was maintained" (Burgdorff-Beery 2000).

The applicant requests only to enlarge the POU to a broader area while maintaining the originally authorized number of acres irrigated. He does not propose to use more water to accomplish this; no additional acres will be irrigated. In fact, if the application for change is approved per the recommendations of this ROE, high-end efficiencies associated with irrigation on terraced and terrace/upland lands will be required. Return flows calculate to zero under Ecology's GUID1210 and total consumptive use will remain unchanged.

Efficient irrigation methods that Ecology recognizes are as follows:

1. Center pivot using spray heads or Low Energy Precision Application (LEPA) and without end gun.
2. Lateral move using spray heads with hose feed or canal feed.
3. Micro-irrigation using either a trickle or subsurface drip or micro spray.

References

Natural Resources Conservation Service. 1997. *Washington Irrigation Guide. Appendix B: Climatic Station for Consumptive Use (WA 210-VI-WAIG).*

AgriMet. *The Pacific Northwest Cooperative Agricultural Weather Network.* http://www.usbr.gov/pn/agrimet/ETtotals.html (accessed May 8, 2007).

Johnson, Becky. 1990. Findings of Fact and Decision Docket No. DE 90-0238.

Ekstrom, Ingrid. 2009. Technical Memorandum.

Letter from Susan Burgdorff-Beery, Water Master, Department of Ecology, to Greg Baker, applicant (May 17, 2000).

CONCLUSIONS

Based on the information and observations discussed above, I conclude the following:

- The author makes a tentative determination that Johnson Creek Superseding Certificate of Adjudicated Water Right No. 64 is a valid water right and is eligible for change.
- Changing the POU will not enlarge the existing right.
- Changing the POU will not impair existing right holders on Johnson Creek.

RECOMMENDATIONS

I recommend the request for change of POU under Certificate No. 64 be authorized in the amounts and within the limitations listed below and subject to the provisions beginning on Page 2, et seq. and a Superseding Certificate issue as follows:

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.

Total maximum:

- 0.85cfs.
- 254.74 ac-ft/yr.
- For irrigation of 81 acres between April 15 and September 15.

Points of Diversion

1. Approximately 120 feet south and 1150 feet west of the north quarter corner of Section 10, T. 34 N., R. 26 E.W.M.
2. Approximately 680 feet south and 790 feet west of the northeast corner of Section 9, T. 34 N., R. 26 E.W.M.

Place of Use

1. Within that portion of the S½SW¼ lying north of Johnson Creek Road, Section 3, T. 34 N., R. 26 E.W.M. (Parcel No. 342603-0021.)
2. Within that portion of the S½SE¼ lying south of Riverside Cutoff Road, Section 4, T. 34 N., R. 26 E.W.M. (Parcel Nos. 342604-0010 and 342604-0022 but excluding Parcel No. 342604-0009.)
3. Within that portion of the SE¼SW¼ lying south of Riverside Cutoff Road, Section 4, T. 34 N., R. 26 E.W.M. (Parcel No. 342604-0024.)
4. Within the NE¼NE¼ of Section 9, T. 34 N., R. 26 E.W.M. (Parcel No. 342609-1001.)
5. Within the NW¼NE¼ of Section 9, T. 34 N., R. 26 E.W.M. (Parcel No. 342609-1004.)
6. Within the E½NE¼NW¼ of Section 9, T. 34 N., R. 26 E.W.M. (Parcel No. 342609-0009.)
7. Within the N½NW¼ of Section 10, T. 34 N., R. 26 E.W.M. (Parcel No. 342610-0014 but excluding Parcel Nos. 342610-0012 and 342610-0015.)

Report by: Candis L. Graff, Water Resources Program — June 30, 2009 (Date)

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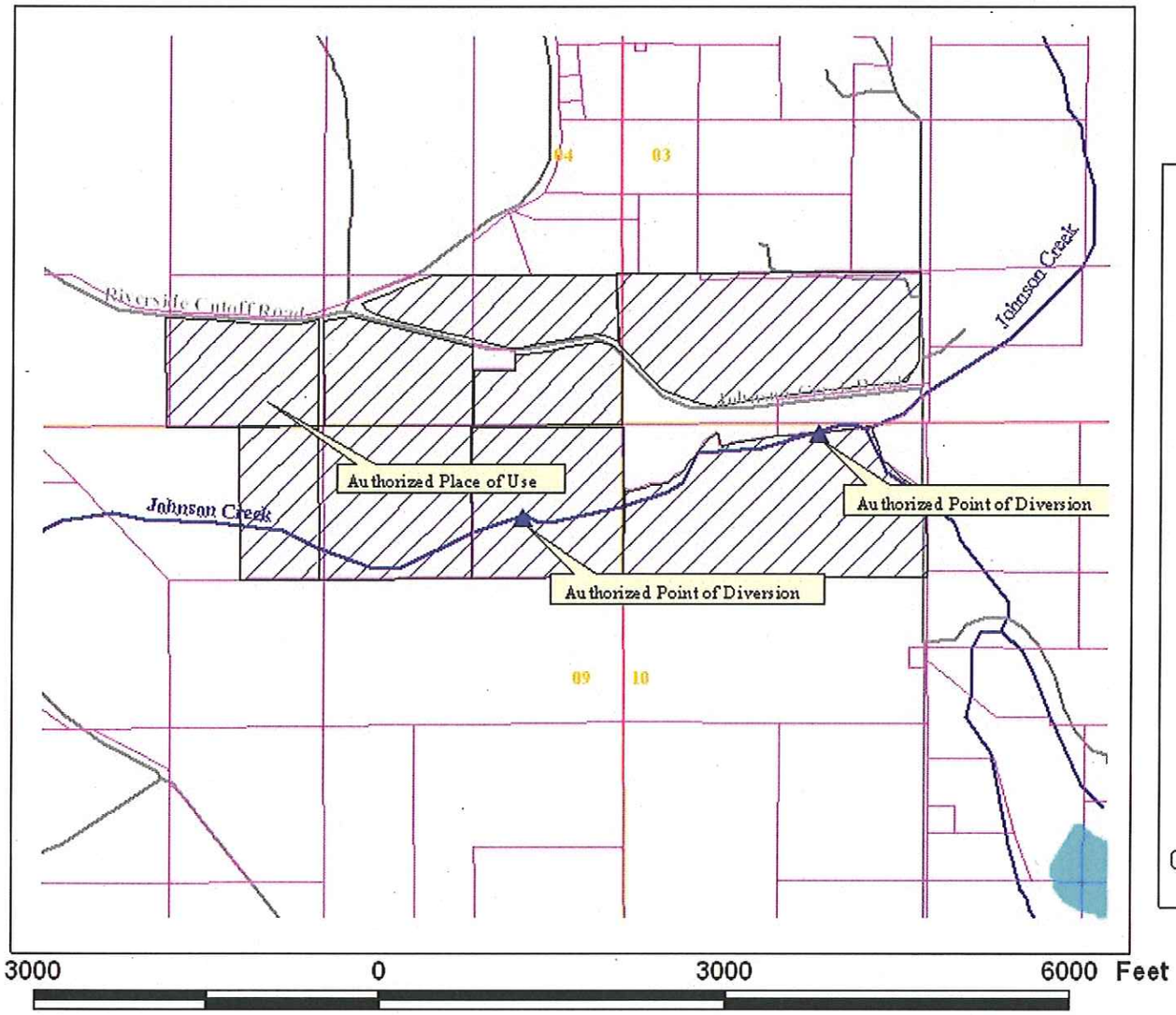

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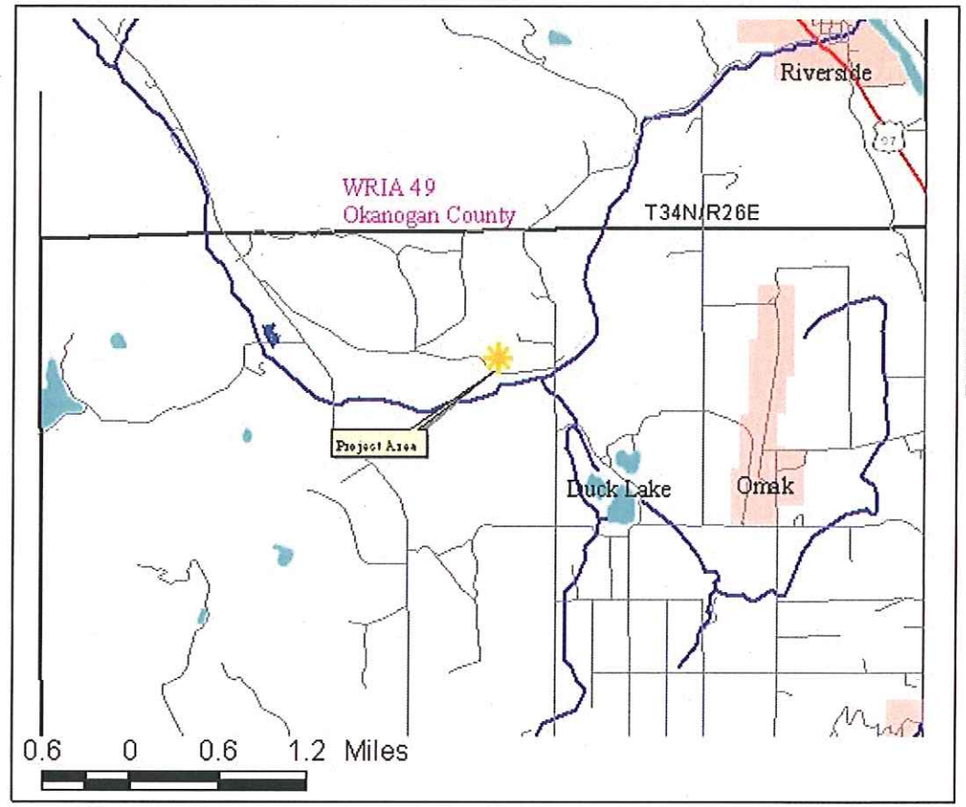
Hi-Lo Orchards LP
CS4-ADJ24P64
Sec 3, 4, 9, 10, T 34N, R 26 E.W.M.
WRIA 49 - Okanogan County

DEPARTMENT OF ECOLOGY



Attachment 1

Legend

- Authorized Place of Use
- Authorized Point of Diversion
- Sections
- Township
- Creeks
- State Highway
- Local Roads
- Cities
- Parcels

Commnets:
Place of Use and points of diversions are as defined on the cover sheet under the heading, 'LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED.'