DEPARTMENT OF ECOLOGY
State of Washington

State of Washington
PROTESTED
REPORT OF EXAMINATION
FOR WATER RIGHT APPLICATION

File No. G1-28723
WAC Doc ID: 5241100

PRIORITY DATE
4/23/2012

APPLICATION NUMBER
G1-28723

MAILING ADDRESS
Jagmohan Sandhu
PO Box 1770
Sumas, WA 98295

SITE ADDRESS (IF DIFFERENT)
15860 Colony Road
Bow, Washington 98232

Quantity Authorized for Withdrawal

WITHDRAWAL RATE	UNITS	ANNUAL QUANTITY (AF/YR)
400	GPM	177

Purpose

PURPOSE	WITHDRAWAL RATE ADDITIVE	WITHDRAWAL RATE NON-ADDITIVE	UNITS	ANNUAL QUANTITY (AF/YR) ADDITIVE	ANNUAL QUANTITY (AF/YR) NON-ADDITIVE	PERIOD OF USE (mm/dd)
Irrigation	400		GPM	164.62		04/15 – 10/01
Mitigation (non-consumptive) (preservation of environmental and aesthetic values)*		400	GPM	12.38		

*The pond will be full at the end of the irrigation season. Post-season mitigation water will be pumped solely from the pond.

Source Location

WATERBODY	TRIBUTARY TO	COUNTY	WATER RESOURCE INVENTORY AREA
Well		Skagit	01

SOURCE FACILITY/DEVICE	PARCEL	TWN	RNG	SEC	QQ Q	LATITUDE	LONGITUDE
Well IW-1 (APL617)	P48437	36N	3E	27	NE SE	N48.579270	W122.401883

Datum: WGS84

Place of Use (See Map, Attachment 1)

PARCEL

Skagit County tax parcels P48400, P48404, P48422, P48437, P48442, P48443, and P48445 as they existed on January 16, 2013.

LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE

P48400 SW ¼ NE ¼ S & W of Colony Road and E of GNRLY
P48404 SE ¼ NE ¼ S & W of Colony Rd
P48422 NE ¼ SE ¼ NW ¼ E of RLY
P48437 NE ¼ SE ¼ W of Colony Rd
P48442 NW ¼ SE ¼ E of RLY exc S 2 RDS
P48443 S 2RDS OF NW1/4 SE1/4 E OF RLY
P48445 THAT PORTION OF THE S1/2 SE1/4 LYING WESTERLY OF KALLSTROM & COLONY ROADS & EASTERLY OF RAILROAD RIGHT OF WAY

Proposed Works

Well IW-1 is an 8-inch diameter well that has a 5 horsepower (hp) submersible pump (Berkeley 6T-225) installed and will be used to supply irrigation water. Well IW-1 pumps water to a 100-foot by 150-foot water treatment pond via a 4-inch diameter pipeline. The pond is approximately 9 feet deep and stores approximately 2.9 acre-feet of water and is lined to prevent water loss. The water is sprayed via six nozzles through the air into the first cell of the treatment pond to aerate the water and oxidize iron. This water seeps through a wall of ecology blocks into the second cell of the treatment pond. The water is pumped out of the second cell of the pond using a 10 hp booster pump (Berkeley 2-1/2TPMS). Chemicals are added to the water via a metering pump to further precipitate the iron. The water is then routed through one of two parallel sand filters to catch the precipitated iron particles and prevent them from clogging the drip irrigation emitters. After filtering, the water enters Sandhu Farm's mainlines for distribution. The sand filters automatically backwash once every hour. Mr. Sandhu's treatment system is able to lower the iron concentration from 6 milligrams per liter (mg/L) to approximately 1 mg/L, which is a reduction of more than 80 percent. After the water is filtered in the sand filters, it is pumped to the ten irrigation zones at a pressure of approximately 50 pounds per square inch (psi) and then reduced in pressure to approximately 20 psi in the driplines. The blueberries are irrigated with ¾-inch diameter drip tape with 1.5 feet between emitters that is hung approximately 1.5 feet off of the ground along each row.

The mitigation system will consist of a pump withdrawing water from the second cell of the treatment pond and piping it under Colony Road to discharge into Colony Creek.

Well IW-2 is also located within the proposed place of use in the S ½ SE ¼, Section 27, Township 36 North, Range 3 East W.M. Because of the poor water quality in this well, Mr. Sandhu will not use this well for irrigation but uses water from this well for other uses such as dust suppression and chemical mixing. The quantity of water for such uses is less than 5,000 gallons per day and this well will be retained under the industrial exemption allowed by RCW 90.44.050.

Development Schedule

BEGIN PROJECT	COMPLETE PROJECT	PUT WATER TO FULL USE
Started	January 1, 2016	January 1, 2021

Measurement of Water Use

Well Source Meter (Irrigation and Mitigation Combined)	
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)
Mitigation Source Meter	
How often must water use be measured?	Immediately after changing the mitigation rate, then weekly thereafter
How often must water use data be reported to Ecology?	Annually (Jan 31) and upon request by Ecology to verify compliance with the mitigation plan
What volume should be reported?	Volume discharged during each mitigation period and total annual volume
What rate should be reported?	Peak rate of discharge (gpm) during each mitigation period

Provisions

Measurements, Monitoring, Metering, and Reporting

Approved measuring devices shall be installed and maintained for the well source and mitigation source 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.

Colony Creek -- Mitigation Plan

As a condition on the use of water under this water right, the applicant is required to implement and maintain the mitigation measures identified in the Report of Examination (ROE), consistent with the proponent's mitigation plan (Associated Earth Sciences *Revised Technical Report, Sandhu Farm*, dated November 18, 2013, and subsequent clarifications made prior to issuance of this ROE), and shall do so for as long as water is put to beneficial use pursuant to this water right. Specifically, prior to the 2014 irrigation season, the applicant is responsible for:

- Installing a pump capable of pumping water from the second cell of the treatment pond through a pipe under Colony Road and into Colony Creek. Approvals from the local jurisdiction for undercrossing the road may be required and are the sole responsibility of the applicant.
- Installing a water flow meter on the mitigation discharge line to be able to measure the instantaneous and annual volume of water discharged for mitigation.
- Obtaining a Hydraulic Project Approval (HPA) permit from the Washington Department of Fish and Wildlife (WDFW) for work related to and the method of discharge of water to Colony Creek, if necessary.
- Ensuring that all water discharged meets the surface water quality standards per WAC 173-201A.
- Discharging into the creek at the rates and times shown in **Table 1.**

Table 1. Mitigation Timing and Rates		
Timing and Duration	**Mitigation Rate**	**Volume**
First 16 days after pumping begins for the irrigation season [1]	6 gpm continuously	0.42 acre-feet
Next 31 days	10 gpm continuously	1.37 acre-feet
Next 30 days	12 gpm continuously	1.59 acre-feet
Next 31 days	14 gpm continuously	1.92 acre-feet
Next 45 days	16 gpm continuously	3.18 acre-feet
Next 16 days	16.5 gpm continuously	1.17 acre-feet
First 14 days after pumping concludes for the irrigation season [2]	16.5 gpm continuously	1.02 acre-feet
Next 16 days	12 gpm continuously	0.85 acre-feet
Next 15 days	8 gpm continuously	0.53 acre-feet
Next 15 days	4 gpm continuously	0.27 acre-feet
Next 15 days	1 gpm continuously	0.07 acre-feet
	Total	12.38 acre-feet
	Post irrigation season total	2.73 acre-feet

[1] The period of use of this water right allows irrigation to begin April 15th, but the actual start date can be any day after that identified by the first use of the irrigation well for the season.
[2] The period of use of this water right allows irrigation through October 1st, but the end of the irrigation season can be any day prior to that identified by the last use of the irrigation well for the season.

Department of Fish and Wildlife Requirement(s)
An HPA permit may be required for construction related to any outfall of water to Colony Creek as part of the applicant's proposed mitigation for impacts on Colony Creek.

Easement and Right-of-Way
The water source and/or water transmission facilities are not wholly located upon land owned by the applicant. Issuance of a water right authorization by this department does not convey a right of access to, or other right to use, land which the applicant does not legally possess. Obtaining such a right is a private matter between applicant and owner of that land.

Well Construction Standard
All wells constructed in the state shall 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 shall be decommissioned.

All wells constructed in the state shall meet the "Minimum Standards for the Construction and Maintenance of Wells" (WAC 173-160) and "Water Well Construction" (RCW 18.104). In general, wells shall be located at least 100 feet from sources of contamination and at least 1,000 feet of the boundary of a solid waste landfill. Any well which is unusable, abandoned, or is an environmental, safety, or public health hazard shall be decommissioned.

Proof of Appropriation

The water right holder shall file the notice of Proof of Appropriation of water (under which the 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 licensed 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 the permit. Elements of a proof inspection may include, as appropriate, the source(s), system instantaneous capacity, beneficial use(s), annual quantity, place of use, and satisfaction of provisions. Information on hiring a CWRE is available on Ecology's website at: http://www.ecy.wa.gov/programs/wr/rights/cwrep.html or by calling the appropriate Ecology regional office.

Schedule and Inspections

Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the project location, and to inspect at reasonable times, records of water use, wells, measuring devices, and associated mitigation and 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 purposes of use are beneficial; and that there will be no detriment to the public interest.

Therefore, I ORDER approval of Application No. G1-28723, 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 Hearing 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.) Email 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** 111 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 13 day of February, .

Jacqueline Klug, Section Manager
Water Resources Program/NWRO
Department of Ecology

BACKGROUND

Project Description

The applicant proposes to withdraw water from one well (IW-1) for the irrigation of blueberries on 103 acres of the total of 111 acres comprising the farm. There were two 8-inch irrigation wells drilled on the property for this project (IW-1 and IW-2). Well IW-1 has a 5 hp submersible pump (Berkeley 6T-225) installed and only IW-1 will be used to supply irrigation water. The water from well IW-2 has high iron content and is not suitable for drip irrigation. Even though well IW-2 is no longer desired to be used for irrigation under this water right, it will be maintained for use under the groundwater permit exemption for industrial uses. Well IW-1 pumps water to a 100-foot by 150-foot water treatment pond via a 4-inch diameter pipeline. The lined pond is approximately 9 feet deep and can store up to approximately 2.9 acre-feet of water.

The water pumped from Well IW-1 is sprayed through the air via six nozzles into the first cell of the treatment pond to aerate the water and oxidize iron. Water then seeps through a wall of ecology blocks into the second cell of the treatment pond. The water is pumped out of the second cell of the pond using a 10 hp booster pump (Berkeley 2-1/2TPMS) and chemicals are added via a metering pump to further precipitate the iron. The water is then routed through one of two sand filters to catch the precipitated iron particles and prevent them from clogging the emitters. After filtering, the water enters

the farm's mainlines for distribution. The mainline pressure is maintained around 50 psi as water is delivered to the farm's 10 irrigation zones. At each zone the water pressure is reduced to approximately 20 psi in the driplines. The blueberries are irrigated with ¾-inch diameter drip tape with 1.5 feet between emitters that is hung approximately 1.5 feet off of the ground along each row.

The sand filters automatically backwash every hour. Mr. Sandhu's treatment system is able to lower the iron concentration from 6 mg/L to approximately 1 mg/L, which is a reduction of more than 80 percent. The filter backwash water is discharged via a PVC pipe to a ditch running generally to the northwest along the west side of Colony Road to a culvert near the northwest corner of the property where it crosses under Colony Road and flows north along the east side of the railroad tracks to join Colony Creek.

Colony Creek – Mitigation Plan

Based on the numerical groundwater model developed by the applicant's consultant, Associated Earth Sciences, Inc. (AESI) (November 18, 2013), impacts to Colony Creek will increase over the duration of the irrigation season from 0 to 16 gallons per minute (gpm). After pumping from the well ceases, the impacts will continue for approximately 60 days until they become zero. Over those 60 days the impact on Colony Creek will decrease with time. The water right holder has proposed to install a pump that will be capable of pumping water from the second cell of the treatment pond through a pipe laid under Colony Road (yet to be permitted) and discharged into Colony Creek as specified in the WDFW Hydraulic Project Approval permit.

Mitigation will occur consistent with the dates and rates identified in **Table 1** and shown graphically on **Figure 1** located in the Hydrology section of this ROE. **Table 2** summarizes the attributes of this water right application.

Table 2
Summary of Application No. G1-28723

Attributes	*Proposed*
Applicant	Mr. Jagmohan Sandhu
Application Received	4/23/2012
Instantaneous Quantity	400 gpm
Source	2 wells*
Point of Withdrawal	NE ¼ SE ¼ (IW-1) and SE ¼ SE ¼ (IW-2), Section 27, Township 36 North, Range 3 East W.M.
Purpose of Use	Irrigation
Period of Use	April 15 through October 1
Place of Use	Skagit County tax parcels P48400, P48404, P48422, P48437, P48442, P48443, and P48445 as they existed on January 16, 2013.

*Although included in the water right application, the applicant will not use well IW-2 for irrigation under this water right.

Legal Requirements for Application Processing

The following requirements must be met prior to processing a water right application:

- **Public Notice**
  Legal notice of this application was published in the *Skagit Valley Herald* on January 26 and February 2, 2013.

  This water right application was protested by the Lummi Indian Nation in a letter dated May 3, 2012. The Lummi Nation opposes approval of this water right because "Ecology has notified the Lummi Nation that further withdrawals in the area of WRIA-1 will not be approved", and that "all withdrawals within WRIA-1 have the capacity to adversely impact the rights of the Lummi Nation." The proposed withdrawal will impact a closed stream (Colony Creek) but the approval of the application is conditioned upon the inclusion and implementation of mitigation measures to offset any consumptive use impacts and, therefore, any adverse impacts of the claimed rights of the Lummi Indian Nation. Therefore, this protest does not justify denial of this application.

- **Consultation with the Washington State Department of Fish and Wildlife**
  Ecology must give notice to the WDFW of applications to divert, withdraw or store water (RCW 77.57.020).

  On November 12, 2013, an email was sent to Mr. Steve Boessow, Water Rights Biologist, at WDFW to solicit his comments. This email included a copy of the water right application and an area map as an attachment. A follow-up email was sent on November 21, 2013, containing the same information as the original.

  Mr. Boessow did not respond to these specific solicitations while we were processing the application. However, in a 2011 comment letter regarding an unrelated water right application (G1-28669) also located in the Colony Creek watershed, Mr. Boessow indicated that Colony Creek is utilized by Fall Chinook, Coho, and Fall Chum in addition to Cutthroat Trout. That applicant was also proposing to mitigate by adding water to the creek. Mr. Boessow suggested in that case that the water right be provisioned on obtaining an HPA permit to construct the mitigation discharge structure near/in the creek.

  RH2 Engineering, Inc., (RH2) has provisioned this ROE accordingly due to the similarity of the projects.

- **State Environmental Policy Act (SEPA)**
  This water right application is categorically exempt from the requirements of SEPA under WAC 197-11-800(4).

- **Expedited Processing**
  Based on the provisions of RCW 43.21A.690 and RCW 90.03.265, this application has been processed by RH2 under Ecology Cost-Reimbursement Agreement No. C1000190; Work Assignment Number RH2007. The applicant has proposed a mitigation plan to offset all impacts to Colony Creek due to the project's withdrawal. The subject application will not diminish the water available to earlier pending applications from the same source of supply. Therefore, this application meets the criterion for expedited review under RCW 90.03.265(1)(b).

INVESTIGATION

Site Description

The project site is located in the southeast quarter of Section 27, Township 36 North, Range 3 East in Skagit County, WA. It is located in the northwestern portion of Skagit County southwest of Blanchard Mountain, which is the southern end of the Chuckanut Mountains which extend northward into Whatcom County. It is bounded on the west by the Burlington Northern railroad tracks on an elevated berm.

The property is located approximately ¾ miles east of Samish Bay on a broad alluvial floodplain, often referred to as the Skagit Flats. The site is generally flat with an elevation of 10 to 20 feet above sea level. The project site is owned by Mr. Sandhu and is used for agricultural purposes for growing blueberries. The site is comprised of approximately 111 acres. Irrigation water is withdrawn from a single on-site irrigation well. The blueberries are irrigated using micro-drip irrigation and approximately 103 acres of the 111 total acres are planted in blueberries. The approximately 8 acres of non-irrigation area includes interior farm roads, ditches, the water treatment pond, structures, and setbacks from the property lines.

Three surface water bodies, Colony, Edison, and Harrison creeks, are located within approximately 1 mile of the project site. Colony Creek flows along the northeastern border of the property and Harrison Creek, a tributary of Colony Creek, is located approximately 1,000 feet northeast of the project site. Edison Creek is located approximately 1 mile south of the property and is not a tributary of Colony Creek. Both Colony and Edison creeks discharge into Samish Bay.

Site Visit

On November 14, 2013, Mr. Andrew B. Dunn and Mr. Jim Bucknell from RH2 and Mr. Tom Buroker and Ms. Kasey Cykler from Ecology met with the applicant, Mr. Sandhu, and Mr. Chuck Lindsay, his consultant from Associated Earth Sciences, to perform the site visit.

Mr. Sandhu indicated that blueberries will be the highest water duty crop grown on the property and that he has no plans to further expand the number of irrigated acres. The rows are spaced 11 feet apart and there are 10 irrigation zones on the farm. Four-inch diameter PVC mainlines run from the treatment system to each zone at a pressure of approximately 50 psi. At each zone pressure is reduced to approximately 20 psi in the driplines. The blueberries are irrigated with ¾-inch diameter drip tape with 1.5 feet between emitters that is hung approximately 1.5 feet off of the ground along each row. Mr. Sandhu said that the month of August is the peak irrigation period and water is pumped continuously on a 24-hour cycle with 2.4 hours per irrigation zone. He said that irrigation occurs on an as-needed basis depending on weather, soil moisture, and stage of crop growth and that the field man from the Elenbaas Company visits the farm and provides advice on plant health, soil conditions, the need for fertilizer, and other factors.

Mr. Sandhu plans to use only Well IW-1 (5 to 6 mg/L of iron) because the water produced from Well IW-2 has higher iron concentration (40 to 60 mg/L) that would require more treatment. Well IW-2 is not connected to the irrigation system and Mr. Sandhu has no plans to connect it to the rest of the system because of the high iron content of the water.

Mr. Sandhu's water supply infrastructure system includes his production well (IW-1) that contains a submersible 5 hp pump (Berkeley 6T-225) that, according to the pump curve, can pump approximately

220 gpm at peak efficiency. Mr. Sandhu indicated that he originally installed a water flow meter, but it fouled and has since been removed. The water is aerated when it is sprayed through six nozzles into the first cell of the treatment pond to aerate the water and oxidize iron. Water is then allowed to seep through a wall of ecology blocks into the second cell of the treatment pond. The treatment pond has a maximum total volume of approximately 2.9 acre-feet and it is lined to prevent water loss. From the second cell, the water is pumped by a 10 hp centrifugal pump (Berkeley 2-1/2TPMS) that, according to the pump curve, can pump approximately 275 gpm at peak efficiency (48 psi) and chemicals are added via a metering pump to further precipitate the iron. The water is then routed through one of two sand filters to catch the precipitated iron particles and any other solids to prevent them from clogging the emitters, then the water enters the farm's mainlines for distribution. The sand filters automatically backwash every hour. Mr. Sandhu's treatment system is able to lower the iron concentration to approximately 1 mg/L, which is a reduction of more than 80 percent. The filter backwash water is discharged via a PVC pipe to a ditch running generally to the northwest along the west side of Colony Road to a culvert near the northwest corner of the property where it crosses under Colony Road and flows north along the east side of the railroad tracks to join Colony Creek.

No irrigation was taking place during the site visit since it occurred outside of the irrigation season.

Wells IW-1 and IW-2 were visited to confirm the location and take static depth to water measurements using a water level probe. The measurements obtained are discussed in the hydrogeology section of this investigation. The calculated water level elevations support that groundwater flow is generally from the east to the west across the site.

The distance from Well IW-1 to Colony Creek was measured at 105 feet. In the on-farm ditches, water flowed from east to west and then from south to north in a ditch adjacent to the railroad track toward a culvert that crossed under Colony Road at the north end of the farm. Flow in the ditch eventually enters Colony Creek approximately 2,500 feet downstream of the property. Mr. Sandhu indicated that all on-farm ditches are dry during the irrigation season.

Domestic water used on the farm is provided by Well DW-1, which is a stand-alone, permit-exempt well and is not a part of this water right evaluation.

Other Water Rights Appurtenant to Proposed Place of Use

There are three entities that hold water rights with places of use that include at least part of the proposed place of use, as identified using Ecology's Water Resources Explorer (November 11, 2013). The entities include Skagit County PUD No. 1, the Blanchard-Edison Water Association, and water right claims originally filed by Florence M. Peterson.

The Skagit County PUD No. 1 has identified much of Skagit County as its place of use under its Judy Reservoir System water rights, including a the portion of the proposed place of use located in the SE ¼ NW ¼, Section 27, Township 36 North, Range 3 East, W.M. However, the PUD currently does not have any waterlines in this portion of the county that could provide agricultural irrigation water to the proposed place of use.

The Blanchard-Edison Water Association is a regional purveyor of municipal water. Its service area includes the entire proposed place of use. Its water rights (G1-25802C, G1-26577C, and G1-26578C) total 455 gpm and 216 acre-feet per year (af/yr). Based on language from the ROEs, these rights are primarily being used for potable uses for homes, a school, fire station, and commercial enterprises. In

that same report, metering data from 1991 was provided that suggested that they had withdrawn 204 acre-feet, leaving just 12 af/yr for future growth. Source metering data obtained from the Washington State Department of Health indicates that in 2012 the system pumped 139.4 af/yr, which is 76.6 af/yr less than its water right limit. Based on this data, it is reasonable for Mr. Sandhu to apply for his own water right since the Blanchard-Edison Water Association does not have sufficient water rights to support Mr. Sandu's project.

Two water right claims were submitted by Florence M. Peterson (G1-085011CL and G1-094657CL) claiming a right to divert water from one or two springs for domestic and lawn and garden irrigation. The place of use identified under this claim is the NE ¼ NE ¼ SE ¼, Section 27, Township 36 North, Range 3 East, W.M. The identified 10-acre place of use overlaps onto the proposed place of use. On the water right claims, the address identified for the claimant is 1391 Colony Road. The parcel associated with this address is located within the more general legal description provided above, but completely east of Colony Road. Therefore, it appears that water under these claims was never utilized on the proposed place of use.

Basis of Water Demand

Instantaneous Rate

A pump curve provided for the 5 hp submersible pump installed in Well IW-1 suggests that the pump can operate over a range of 100 to 300 gpm depending on the total dynamic head with the peak efficiency of the pump occurring at a total dynamic head of 72 feet (31 psi) and a pumping rate of 220 gpm. The currently installed capacity of Well IW-1 is below the 400 gpm requested on the water right application. When asked about this, AESI indicated that Mr. Sandhu will need the requested instantaneous rate when he makes some system modifications planned for the next couple of years.

The requested instantaneous rate is 400 gpm for 103 acres of irrigation. Subtracting for the anticipated peak irrigation season mitigation demand of 16 gpm, the total rate available for irrigation is 384 gpm, which is equal to 3.7 gpm per acre. At this rate the water right holder can irrigate at a monthly peak rate of 6.08 inches in July. There are three Washington Irrigation Guide (WIG) stations that are in similar proximity to the farm. The inverse-distance weighted method using the Anacortes (11 miles away), Bellingham (13 miles away), and Sedro Woolley (9 miles away) stations, and the WIG July crop irrigation requirement for raspberries (assumed to be a good surrogate for blueberries) is 5.67 inches which, when taking into consideration irrigation efficiency (estimated to be 95 percent), equals 5.97 inches. The requested rate is higher than the highest monthly rate; however, that is necessary to account for meeting the weekly and daily peak and meeting the water needs in dry years with higher overall irrigation demand. The instantaneous rate of 400 gpm requested for irrigation and mitigation is reasonable for the irrigation and mitigation planned.

Annual Volume

The applicant has requested 177 af/yr to irrigate 103 acres of blueberries using drip irrigation and also to mitigate for pumping impacts. To determine if the requested annual volume is reasonable, RH2 relied on the 1985 WIG, 1982 EB1513 (Irrigation Requirements for Washington, Estimates and Methodology, 1982, reprinted 2001), and Water Resources Guidance GUID-1210 (Determining Irrigation Efficiency and Consumptive Use) to estimate the annual volume of water needed under this water right for the proposed use.

The installed irrigation method is micro-irrigation trickle/drip. In GUID-1210 the range of application efficiency for this method is from 70 to 95 percent with an average of 88 percent. Since this system has

only been in place for a couple of years and the surficial soils are fine-grained, which will reduce the potential for deep percolation, RH2 has estimated that the application efficiency for this system is at the highest end of the range (95 percent).

The WIG does not specifically contain crop irrigation requirements for blueberries. However, the raspberry crop irrigation requirement is assumed to be a suitable surrogate. Therefore, for calculations using the WIG and EB1513, the crop irrigation requirement for raspberries was used.

The closest stations that contain crop irrigation requirements for raspberries include the Anacortes (11 miles away), Bellingham (13 miles away), and Sedro Woolley (9 miles away) stations. The inverse-distance weighted method was used to estimate the crop irrigation requirements at the farm.

Since the WIG calculates the water needed in an average year (2-year return interval), an irrigator will actually need additional water in order to meet the total irrigation requirement during drier-than-normal years. Blueberries are high-value perennial crops that need to be watered sufficiently each year or the plant could be damaged. EB1513 identifies that for both Sedro Woolley and Bellingham (closest stations to the site), the crop irrigation requirement for raspberries (surrogate for blueberries) increased by 1 inch going from the 2-year to the 5-year return interval and increased by 2 inches going from the 2-year to the 20-year return interval. Based on this information, it is reasonable to increase the crop irrigation requirement number provided in the WIG to reflect longer return intervals. **Table 3** shows the calculated irrigation demand in these drier years.

Table 3. Calculated Irrigation Demand

	2-year return interval	5-year return interval	20-year return interval
Crop Irrigation Requirement (inches)	17.60	18.60	19.60
Estimated Irrigation Efficiency	95%	95%	95%
Total Irrigation Requirement (inches)	18.53	19.58	20.63
Total Irrigation Requirement (feet)	1.54	1.63	1.72
Irrigated acres	103	103	103
Annual Volume (af/yr)	159	168	177

Based on the calculations contained in **Table 3**, the requested 177 af/yr, 164.62 af/yr of which can be used for irrigation with the remainder being used for mitigation, is determined to be reasonable for irrigation of 103 acres of blueberries using highly efficient drip irrigation and accounting for some increased demand caused by drought years. In these drought years, the amount requested may not be sufficient to fully satisfy the crop demand and provide the required mitigation of 12.38 acre-feet of water. In those years, the applicant will need to practice deficit irrigation by reducing the irrigation quantity while maintaining the full 12.38 acre-feet of mitigation water.

Hydrogeology

Much of the information contained within this section was taken from AESI (2013), which was provided as a supporting document with the application.

Well Construction

Well IW-1 is a relatively shallow (55 feet deep), 8-inch diameter well, with 0.060-inch slot screen at a depth of 45 to 55 feet below ground surface. The well is naturally developed with no gravel or sand pack. The well taps the northeastern edge of the regional alluvial aquifer that can be found below the geographic area referred to as the Skagit Flats (AESI, 2013). The sediment in the upper 43 feet of the well is fine-grained clay, silty clay, gravel sand and clay, and clay and gravel. These sediments form the aquitard that confines the water in the underlying aquifer. Over the past 7 years, the static water level elevation in the on-farm wells (IW-1, IW-2, and DW-1) has fluctuated over a range of approximately 3 to 4 feet (**Table 4**). This fluctuation appears to be seasonal in nature and no evidence of declining water levels in the alluvial aquifer can be identified in the data.

Table 4. Water Levels over Time (from AESI, 2013)

Well	Date	Surface Elevation (feet)	Casing Stickup (feet)	Casing Elevation (feet)	Depth to Water[1] (feet)	Groundwater Elevation (feet)
IW-1	Oct 10, 2006	23.70	2.89	26.59	20.00	6.59
	Sep 27, 2011				20.50	6.09
	Nov 15, 2011				18.24	8.35
	Nov 14, 2013				16.65	9.94
IW-2	Jul 30, 2003	11.10	0.85	11.95	8.00	3.95
	Sep 27, 2011				8.13	3.82
	Nov 15, 2011				6.37	5.58
	Nov 14, 2013				5.15	6.80
DW-1	Sep 19, 2008	21.83	1.65	23.48	17.00	6.48
	Sep 27, 2011				16.90	6.58
	Nov 15, 2011				14.86	8.62

Groundwater Flow

Groundwater flow has been interpreted to be generally to the west across the site from the upland toward the marine shoreline of Samish Bay (GeoEngineers, 2001 and AESI, 2013). The groundwater level measurements made during the site visit confirm this flow direction (**Table 4**). Based on the flow direction and proximity to Samish Bay, much of the groundwater captured by Well IW-1 would have ultimately discharged from the aquifer directly to marine water. Groundwater discharging to marine water is available for appropriation.

Groundwater Recharge

Groundwater recharge into the alluvial aquifer tapped by Well IW-1 occurs from vertical infiltration of precipitation landing in the vicinity and also from lateral inflow from other aquifers, such as the Vashon advance outwash aquifer, found under the uplands to the east, from losing reaches of streams such as Colony Creek, and also from lateral inflow moving in the alluvial aquifer toward ultimate discharge at the marine shoreline.

Aquifer Testing

On September 27, 2011, AESI performed a 7.8-hour aquifer test on Well IW-1 (AESI, 2013). The well was pumped at an average rate of 260 gpm, which led to 16.26 feet of drawdown in the pumping well, 1.35 feet of drawdown in the on-site domestic Well DW-1 (distance of 205 feet), and no drawdown in Well IW-2 (distance of 1,235 feet). This testing allowed for estimation of the aquifer transmissivity and storage coefficient at 4,725 square feet per day and 0.0092, respectively.

Hydrology

Colony Creek flows down from the upland to the east of the site and flows northwest along the east side of Colony Road. On-farm ditches flow to the west and then to the north before leaving the property through a culvert under Colony Road at the north end of the farm. The water in this ditch then flows for another $^1/_2$ mile before entering Colony Creek in Section 22. Mr. Sandhu indicated that there is no water in the on-farm ditches during the irrigation season.

Groundwater/Surface Water Interaction

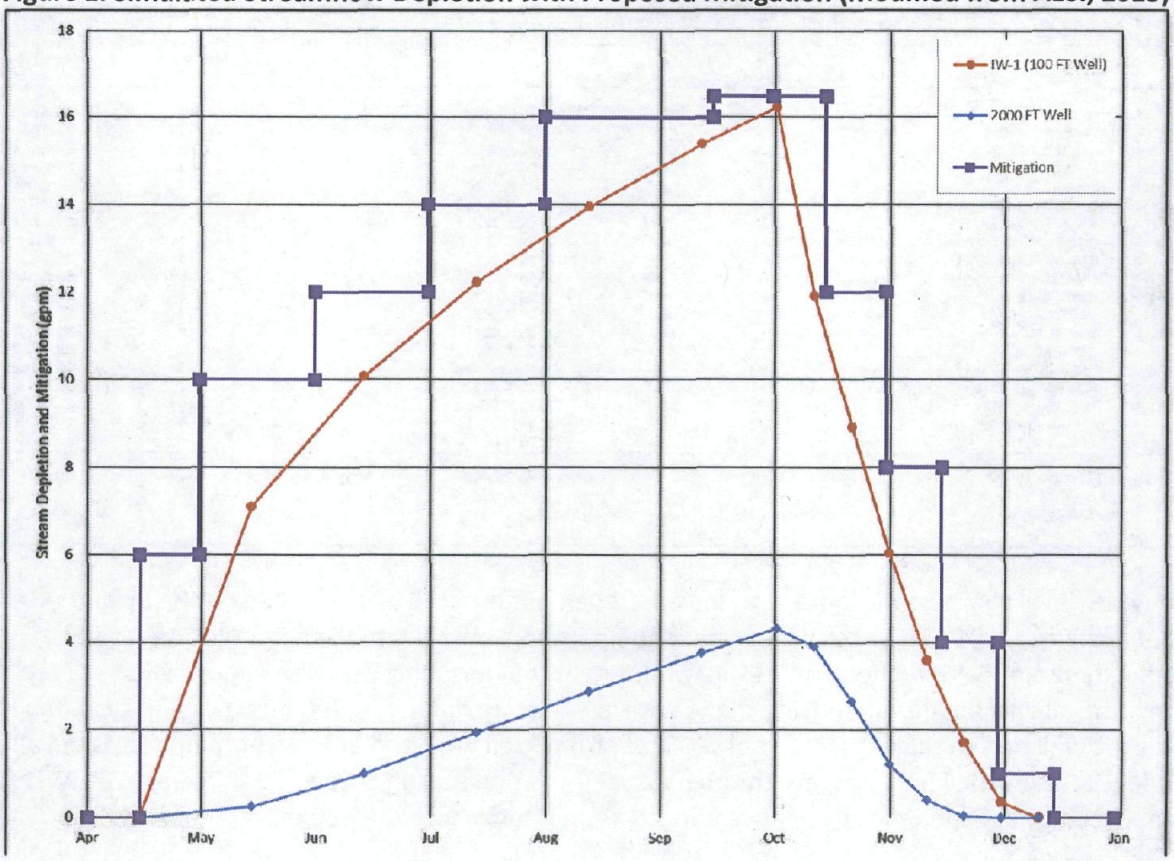
Well IW-1 is located approximately 105 feet from the point where Colony Creek turns to the northwest along the east side of Colony Road. At this location field measurements and elevation obtained from light detection and ranging (LiDAR) suggest that the bottom of the creek is approximately 9 feet higher than the static water level measured in Well IW-1. This, combined with the fine-grain sediments penetrated at the ground surface, suggests that Colony Creek is actually perched above the regional groundwater level at this location. There is likely some loss from the creek to the alluvial aquifer when it is perched and as the creek flows downstream toward Samish Bay, it likely intersects the regional water table and becomes a gaining reach of the creek. While there is evidence of limited connection in the immediate vicinity of Well IW-1, RH2 believes that some connection does exist and that groundwater withdrawal will lead to streamflow depletion and it is this connection that necessitated the applicant's development of a mitigation plan.

Groundwater Model

AESI developed a single-layer numerical groundwater flow model using Modflow (AESI, 2013). The purpose of developing this model was to quantify the impacts of pumping Well IW-1 and analyze the impact of pumping a more distant well during the irrigation season as well as the residual impacts after pumping has stopped for the season. Colony Creek was modeled as river cells with seepage to and from the river controlled by the fine-grained surficial sediments observed in the site water well reports. Conservative assumptions (toward showing impact on the creek) were used in the model when there was uncertainty, such as not representing the creek as perched, elevating the constant head boundary at the shoreline, assuming continuous pumping for the entire irrigation season to reach the annual volume, choosing a higher range for the vertical hydraulic conductivity of the sediments beneath the creek, and assuming the streambed seepage layer was on the thin side of the range observed in area water well reports.

The model results reported show that streamflow depletion in Colony Creek increases over the course of the irrigation season and then drops off once irrigation ceases and recharge begins in the fall (**Figure 1**). The results were similar with respect to timing for both well locations except that the closer the well to the stream, the greater the impact to flow (**Figure 1**). **Figure 1** depicts the pumping regime of the applicant's mitigation plan to offset the streamflow depletions associated with his groundwater pumping.

Figure 1. Simulated Streamflow Depletion with Proposed Mitigation (Modified from AESI, 2013)



Nearby Water Rights

Ecology's Water Resources Explorer was accessed on November 12, 2013, to identify nearby water right points of diversion and withdrawal. **Table 5** contains a list of the water rights (including claims) found within approximately 1 mile of the proposed point of withdrawal under this request. Twenty water rights were identified with 19 being water right claims and 1 a certificate. The majority of nearby water rights are located to the southeast on the edge of the upland adjacent to the Skagit Flats. This area is also outside of the place of use for the Blanchard-Edison Water Association, which could explain the density in this area and lack of water rights in other locations.

Table 5. Water Right Withdrawals or Diversions Within a 1-mile Radius of the Proposed Point of Withdrawal

File #	Person	Doc	Priority Dt	Purpose	Qi	UOM	Qa	Ir Acres	TRS	QQ/Q	1stSrc	Distance to Proposed Well (ft)	Direction to Water Right from Proposed Well
G1-094657CL	PETERSON FLORENCE M	Claim L		DG		GPM			36.0N 03.0E 26		SPRING	530	East
G1-085011CL	PETERSON FLORENCE M.	Claim S		DG		GPM			36.0N 03.0E 26			1,150	Southeast
G1-051667CL	WAHLGREN FRED E.	Claim S		DG		GPM			36.0N 03.0E 26			1,280	Southeast
G1-008855CL	MILLER DONOVAN W.	Claim L		DG		GPM			36.0N 03.0E 26			1,380	Southeast
G1-059234CL	HERZ CHARLES	Claim S		DG		GPM			36.0N 03.0E 26			1,640	Southeast
G1-125679CL	HOUSER JACK	Claim S		DG		GPM			36.0N 03.0E 26			1,970	Southeast
G1-162431CL	STAFFANSON JOHN JR	Claim S		DG		GPM			36.0N 03.0E 26			2,280	Southeast
S1-073873CL	WADKENTIN ALBERT H.	Claim L		ST, IR		CFS		20	36.0N 03.0E 35		UNNAMED SPRING	2,530	Southeast
G1-20650C	Colony Mountain Community Club	Cert	5/25/1973	DM	70	GPM	83		36.0N 03.0E 26	SE/NW	WELL	2,630	Northeast
S1-162432CL	STAFFANSON JOHN JR	Claim S		DG		CFS			36.0N 03.0E 35		SPRING	2,790	Southeast
G1-162430CL	STAFFANSON JOHN JR	Claim S		DG		GPM			36.0N 03.0E 35			2,825	Southeast
G1-091801CL	HICKS JAMES E	Claim S		ST, IR		GPM			36.0N 03.0E 35			3,180	Southeast
G1-164520CL	MARTIN GARY W	Claim S		ST, IR		GPM			36.0N 03.0E 27			3,700	Northw est
S1-164519CL	MARTIN GARY W	Claim S		ST, IR		CFS			36.0N 03.0E 27		COLONY CREEK	3,700	Northw est
G1-036043CL	SPAHE NOAH	Claim S		DG		GPM			36.0N 03.0E 34			4,000	Southw est
G1-147559CL	KIRKMAN BERNARD A	Claim L		DG		GPM			36.0N 03.0E 34		WELL	4,135	Southw est
G1-010992CL	PERKINS GERALD O.	Claim L		ST, IR		GPM		2	36.0N 03.0E 34			4,150	Southw est
G1-001893CL	MARKUS VICTOR A.	Claim L		IR, DG		GPM		3	36.0N 03.0E 35			4,500	Southeast
G1-020544CL	SHERMAN GEORGE	Claim L		DG		GPM			36.0N 03.0E 35			4,900	Southeast
G1-089119CL	ABEL JAMES	Claim S		ST, DG		GPM			36.0N 03.0E 34			5,000	Southw est

UOM = Unit of Measure; Dt = Date; Ir Acres = Irrigated Acres; ST = Stockw atering
GPM = Gallons Per Minute; Qi = Instantaneous Rate; Claim L = Long Form Claim; IR = Irrigation
CFS = Cubic Feet Per Second; Qa = Annual Volume; Claim S = Short Form Claim; DM = Domestic, Multiple
Doc = Document Type; QQ/Q = Quarter Quarter and Quarter Section; DG = Domestic General; Cert = Certificate

The water level contours rise quickly to the east when out of the Skagit Flats and on the upland (GeoEngineers, 2001). This rise suggests that pumping impacts from the Sandhu Well IW-1 will not propagate far in that direction. The closest water right (not including permit-exempt rights) located within the alluvial aquifer underlying the Skagit Flats is approximately 3,700 feet away. Mr. Sandhu has a domestic well on site that is located only 205 feet from Well IW-1 and adequately penetrates the alluvial aquifer. It has been able to operate throughout the irrigation season at the same time as Well IW-1 is pumping without experiencing negative impacts from interference drawdown.

Using the values for transmissivity and storage coefficient determined from the aquifer testing, in conjunction with the Theis equation, the maximum drawdown at a well located 3,700 feet away was calculated to be between 2.2 and 2.8 feet, depending on how Well IW-1 was operated (pumping continuously at 235 gpm over the entire irrigation season until reaching the annual volume and pumping continuously at 400 gpm until reaching the annual volume, respectively). Interference drawdown of less than 3 feet will not draw the static water level in any neighboring well below sea level, and only minimally reduces the available drawdown in the alluvial aquifer.

On November 13, 2013, the Department of Ecology was asked if it had received any complaints from well owners near Colony Creek related to declining water levels, excessive seasonal drawdowns, and wells pumping air. On November 14, 2013, Ms. Kasey Cykler, Ecology Watermaster, and Mr. Tom Buroker, Water Resource Specialist, both responded that Ecology had not received any complaints of impairment in that area that could be attributed to Mr. Sandhu's pumping.

Four Statutory Tests

This ROE evaluates the application based on the information presented above. To approve the application, Ecology must issue written findings of fact and determine that each of the following four requirements of RCW 90.03.290 has been satisfied:

1. The proposed appropriation would be put to a beneficial use;
2. Water is available for appropriation;
3. The proposed appropriation would not impair existing water rights; and
4. The proposed appropriation would not be detrimental to the public welfare.

Beneficial Use

RCW 90.54.020(1) declares irrigation as one of a number of beneficial uses of water under Washington State law.

The use of water for mitigation (preservation of environmental and aesthetic values) is defined in statute as a beneficial use (RCW 90.54.020(1)).

Availability

Based on information provided by AESI (the applicant's consultant), data from the water well report associated with Well IW-1, information from various reports on the local hydrogeology, and the applicant's experience with pumping Well IW-1 for the irrigation of the existing farm, water is physically available within the project area at the rates requested.

The mitigation plan developed by the applicant and refined through this investigation has calculated the anticipated impacts to Colony Creek and identified how those impacts will be offset, such that Colony Creek will experience no reduction in flow. Because of the mitigation proposed by the applicant, water is legally available for the proposed beneficial use.

Potential for Impairment

Based on calculations of potential maximum interference drawdown, there are no water rights in the vicinity of the Sandhu Farm that will be impaired by this proposed new withdrawal. Since the mitigation plan offsets impacts to Colony Creek, there will be no impairment of downstream surface water right holders.

Public Welfare

No detriment to the public welfare was identified during the subject investigation.

CONCLUSIONS

The conclusions based on the above investigation are as follows:

1. The proposed appropriation for irrigation is a beneficial use of water;
2. The requested 400 gpm and 177 af/yr (includes 164.62 af/yr for irrigation and 12.38 af/yr for mitigation) is available for appropriation;
3. The new appropriation will not impair senior water rights; and
4. The new appropriation will not be detrimental to the public welfare.

RECOMMENDATION

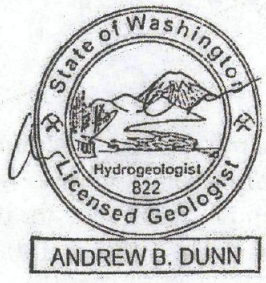
Based on the information presented in this ROE, the author recommends that the request to appropriate 400 gpm, 177 af/yr of water for irrigation (164.62 af/yr) and mitigation (12.38 af/yr) be approved in the amounts described, limited, and provisioned on page 1 through 6 of this report.

Jim Bucknell

February 12, 2014

Report by: _____

Jim Bucknell, RH2 Engineering, Inc. Date

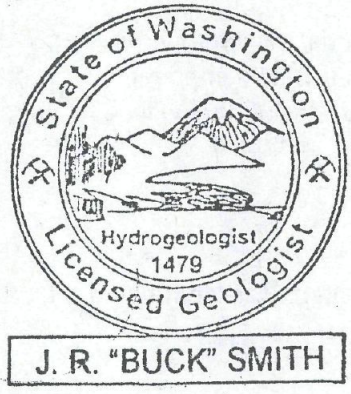


A B Dunn

February 12, 2014

Report by: _____

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



Reviewed by: Buck Smith 2/13/2014

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

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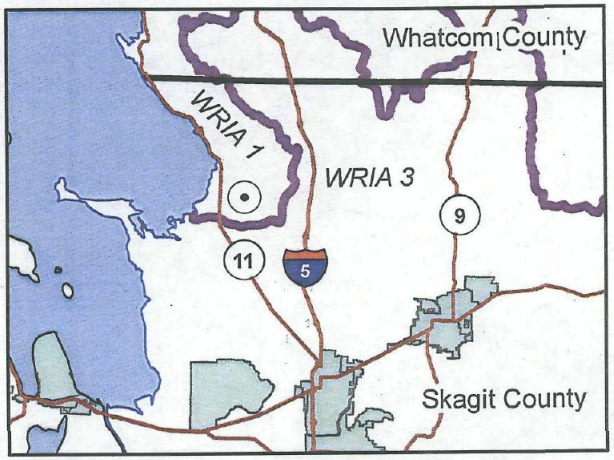
SELECTED REFERENCES

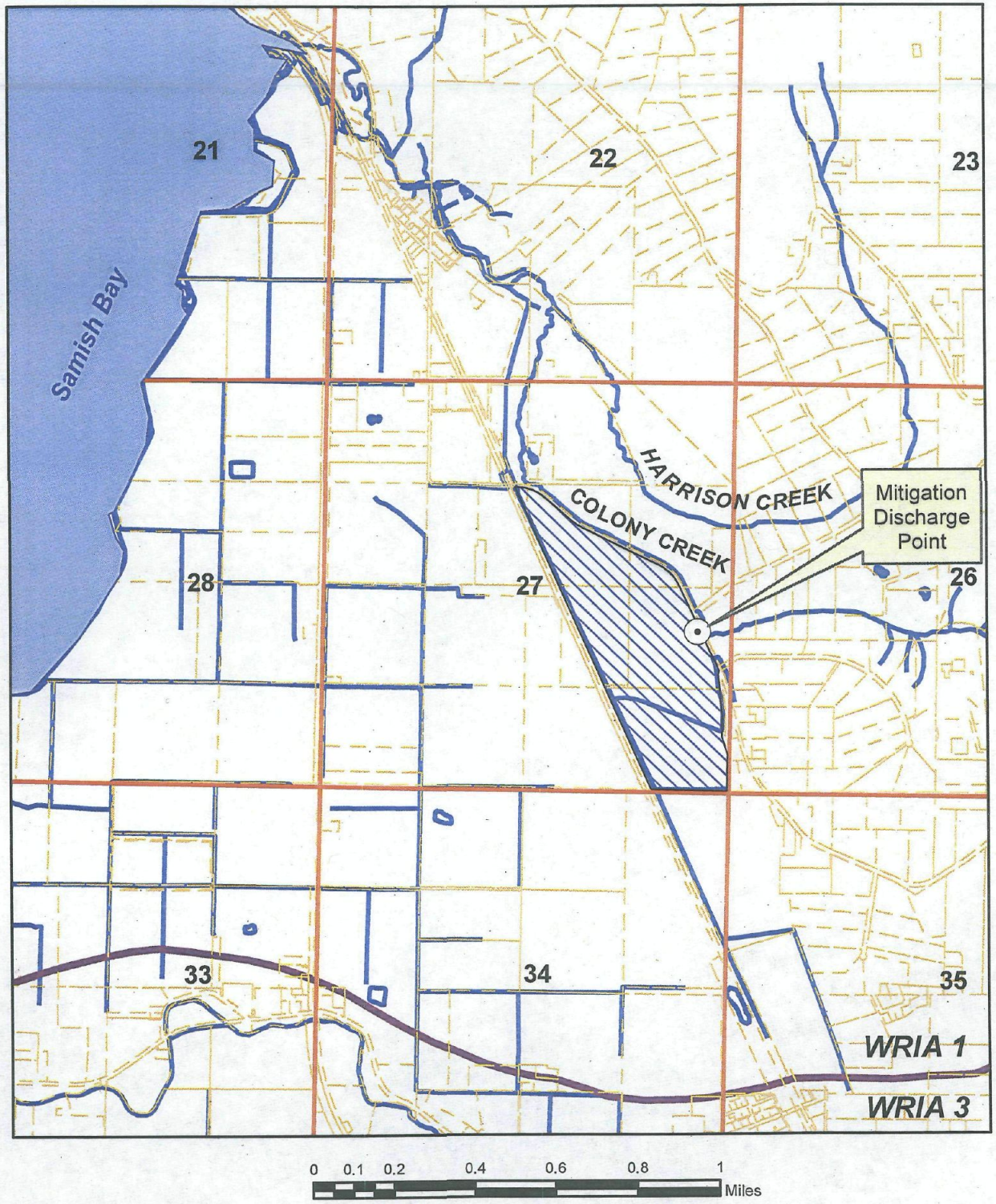
Associated Earth Sciences, Inc., November 18, 2013, Revised Technical Report Sandhu Farm.

GeoEngineers, November 7, 2001, Lower and Upper Skagit Watershed Plan, Skagit River Sub-Basin, Ground Water Hydrology Evaluation.

Jagmohan Sandhu
Water Right Number G1-28723
Section 27 Township 36N Range 03E W.M.
WRIA 1- Skagit County



Site Map



Legend

- Point of Withdrawal
- Place of Use
- Sections
- Parcels
- County
- WRIA Boundary
- Streams

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RH2 ENGINEERS PLANNERS SCIENTISTS

Place of use and point(s) of diversion/withdrawal are as defined on the cover sheet under the headings,'SOURCE LOCATION' and 'PLACE OF USE.'

Attachment 1