File NR G1-28625
WR Doc ID 4628966

DEPARTMENT OF ECOLOGY
State of Washington

State of Washington
REPORT OF EXAMINATION
FOR WATER RIGHT APPLICATION

PRIORITY DATE	WATER RIGHT NUMBER
May 27, 2010	G1-28625

MAILING ADDRESS	SITE ADDRESS (IF DIFFERENT)
SNOQUALMIE VALLEY SCHOOL DISTRICT #410 8001 SILVA AVENUE SE P.O. BOX 400 SNOQUALMIE WA 98065	MT. SI HIGH SCHOOL 8651 MEADOWBROOK WAY SE SNOQUALMIE WA 98065

Quantity Authorized for Withdrawal or Diversion

WITHDRAWAL OR DIVERSION RATE	UNITS	ANNUAL QUANTITY (AF/YR)
600	GPM	500

Purpose

	WITHDRAWAL OR DIVERSION RATE			ANNUAL QUANTITY (AF/YR)		
PURPOSE	ADDITIVE	NON-ADDITIVE	UNITS	ADDITIVE	NON-ADDITIVE	PERIOD OF USE (mm/dd)
Industrial	600		GPM	500		01/01 - 12/31

REMARKS

The proposal is for non-consumptive use of ground water to supply an open-loop heat pump system for heating and cooling Mt. Si High School.

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

Source Location

COUNTY	WATERBODY	TRIBUTARY TO	WATER RESOURCE INVENTORY AREA
King			7-Snohomish

SOURCE FACILITY/DEVICE	PARCEL	WELL TAG	TWN	RNG	SEC	QQ Q	LATITUDE	LONGITUDE
Extraction Well	3224089060	BAL 870	24N	8E	32	SE NW	47.521679	-121.817627
							Datum: NAD83/WGS84	

Place of Use (See Attached Map)

PARCELS (NOT LISTED FOR SERVICE AREAS)

3224089060

LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE

Beginning at the NE corner of the NW ¼ of the SW ¼ of sect 32, Township 24 N R08 E, thence N1° 1′ E 1479.6 ft, thence N89° 50′ 28″ E 784.2 ft, thence S2° 9′ 1″ E 776.5 ft, thence S24° 47′ 47″ W 1425.5 ft, thence N88° 19′ 17″ W 63.8 ft, thence N0° 19′ 55″ E 558.2 ft, thence S88° 41′ 29″E 8.9 ft, thence N0° 23′ 59″ E 22.3 ft, thence N88° 45′ 7″ W 183.8 ft to the Point of Beginning.

Proposed Works

A production well, 595 feet deep with a 12-inch casing and a 30 HP pump, supplying water to a groundwater heat pump system, and an injection well, 540 feet deep with a 12-inch casing, re-introducing the pumped water back into the aquifer.

Development Schedule

BEGIN PROJECT	COMPLETE PROJECT	PUT WATER TO FULL USE
Begun	November 23, 2013	November 23, 2015

Measurement of Water Use

How often must water use be measured?	Monthly
How often must water use data be reported to Ecology?	Upon Request by Ecology
What volume should be reported?	Total Annual Volume
What rate should be reported?	Annual Peak Rate of Withdrawal (gpm)

Provisions

Wells, Well Logs and Well Construction Standards

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

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

Measurements, Monitoring, Metering and Reporting

An approved measuring device shall be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", WAC 173-173.

WAC 173-173 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.

Water Level Measurements
In order to maintain a sustainable supply of water and ensure that your water source is not impaired by future withdrawals, static water levels should be measured and recorded monthly using a consistent methodology. Static water level is defined as the water level in a well when no pumping is occurring and the water level has fully recovered from previous pumping. Static water level data should include the following elements:

Unique Well ID Number
Measurement date and time
Measurement method (air line, electric tape, pressure transducer, etc.)
Measurement accuracy (to nearest foot, tenth of foot, etc.)
Description of the measuring point (top of casing, sounding tube, etc.)
Measuring point elevation above or below land surface to the nearest 0.1 foot
Land surface elevation at the well head to the nearest foot.
Static water level below measuring point to the nearest 0.1 foot.

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 system has been constructed and the quantity of water required by the project has been put to full beneficial use. 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.

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, diversions, measuring devices and associated distribution systems for compliance with water law.

Findings of Facts
Upon reviewing the investigator's report, I find all facts, relevant and material to the subject application, have been thoroughly investigated. Furthermore, I concur with the investigator that water is available from the source in question; that there will be no impairment of existing rights; that the purpose(s) of use are beneficial; and that there will be no detriment to the public interest.

Therefore, I ORDER approval of Application No. G1-28625, 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.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Address and Location Information

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

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 Bellevue, Washington, this 13th day of January, 2011.

Jacqueline Klug
Section Manager
Water Resources - Ecology
Northwest Regional Office

INVESTIGATOR'S REPORT
Application for Water Right -- Snoqualmie Valley School District No. 410
Water Right Control Number G1-28625
Northwest Region, Department of Ecology

Contents

BACKGROUND

Priority Processing

This application is being priority processed because it qualified under the criteria for which an application may be processed prior to competing applications (WAC 173-152-050(2)(b)):

The proposed water use is nonconsumptive and if approved would substantially enhance or protect the quality of the natural environment.

Description and Purpose of Proposed Application

Snoqualmie Valley School District No. 410 has applied for a new water right to supply water for a groundwater heat pump for heating and cooling of the Mount Si High School. Water use will be completely non-consumptive with all pumped water being returned to the aquifer via an injection well.

Table 1 Application Summary

Attributes	Summary
Name	Snoqualmie Valley School District No. 410
Priority Date	May 27, 2009
Instantaneous Quantity	600 gallons per minute (gpm)
Annual Quantity	500 acre-feet per year (af/yr)
Purpose of Use	Industrial (geothermal heat pump)
Period of Use	Continuous – year round
Place of Use	Mt. Si High School – see legal description on Page 2

Table 2 Proposed Sources of Withdrawal or Diversion

Source Name	Parcel	WellTag	Twn	Rng	Sec	QQ	Q	Latitude	Longitude
EW1 (extraction well)	3224089060	BAL 870	24N	08E	32	SE	NW	47.521679	-121.817627

Legal Requirements for Approval of Appropriation of Water

Chapters 90.03 and 90.44 RCW authorize the appropriation of public water for beneficial use and describe the process for obtaining water rights. Laws governing the water right permitting process are contained in RCW 90.03.250 through 90.03.340 and RCW 90.44.050. In accordance with RCW 90.03.290, determinations must be made on the following four criteria in order for an application for water rights to be approved:

- Water must be available
- There must be no impairment of existing rights
- The water use must be beneficial
- The water use must not be detrimental to the public interest

This report serves as the written findings of fact concerning all things investigated regarding Water Right Application Number G1-28625.

Public Notice

RCW 90.03.280 requires that notice of a water right application be published once a week, for two consecutive weeks, in a newspaper of general circulation in the area where the water is to be withdrawn/diverted and used. Notice of this application was published in the Snoqualmie Valley Record on July 1, 2009 and July 8, 2009.

State Environmental Policy Act (SEPA)

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

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

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

INVESTIGATION

Proposed Use and Basis of Water Demand

Mount Si High School proposes to install a geothermal heat pump system for heating and cooling. Water will be pumped from the extraction well (EW1), through the system, and will be discharged back into the aquifer via an injection well (IW1).

The application requests 1,000 gpm in instantaneous quantity and does not request a specific annual quantity. The pumping test report submitted in support of this application (PGG, 2010) suggests the extraction well can reliably produce 690 gpm. However, due to aquifer heterogeneity the injection well is only capable of injecting 275 gpm, thus limiting the system to 275 gpm.

The system capacity with the injection well's limitations was discussed during the site meeting on August 30, 2010. According to the project engineer, Mr. Dana Thomas of Engineering Economics Incorporated, the current system at 275 gpm is likely capable of heating and cooling the school in most years and in most extremes, however some uncertainty exists regarding the adequacy of this rate. As a result, a possibility exists that a second injection well will be constructed to accommodate a higher instantaneous rate.

According to Mr. Thomas, the maximum design rate for the system is 600 gpm. Since the extraction well can produce at this rate and a second injection well would likely make the rate achievable, the permit should issue for 600 gpm.

The extraction well is equipped with a variable-speed pump that will operate as needed throughout the year (e.g. lower use during evenings and summer vacation). Due to the unpredictability of the operation of the system, an annual quantity must be assigned that considers the possibility of a second injection well and is large enough to ensure that the system can function properly. During the site visit, all agreed that an average of 300 gpm continuously would be sufficient. This equals 484 af/yr. An annual quantity of 500 af/yr is recommended.

Other Rights Appurtenant to the Place of Use

There are no other water rights appurtenant to the Mt. Si High School property. The School is served potable water by the City of Snoqualmie, which holds 5 water rights – 1 surface and 4 groundwater rights. The primary point of withdrawal (Well 1R) for Snoqualmie's Certificate G1-20316C is located on Mt. Si School property and is approximately 900 feet north of the proposed injection well.

Geology

Most of the following was taken from the pumping test report by PGG (2010). The geology of the site presented in the PGG report was interpreted primarily from a recent geologic map by Dragovich (2009) and by geophysical work performed by Lee (2009), references found in PGG (2010).

The two school wells are about 450 feet apart and encountered similar stratigraphy. Due to the distance between the wells and system heterogeneity, the major geologic units were encountered at slightly different depths below ground surface. The geology of the two wells will be combined for this report.

Both wells encountered recent alluvium (Qa) to a depth of about 40 feet. This unit acts as an unconfined aquifer at the site. Directly below the recent alluvium to a depth of about 475 feet is aquitard material known as Ancient Snoqualmie River alluvium (Qc_o). Both wells are completed in a confined aquifer underlying Qc_o that is composed of glacial and non-glacial sediments from Pre-Fraser glaciations (Qgn_{pf}). This unit is present to a depth of about 610 feet where andesitic bedrock (Mva_s) is found.

It is noted that the Qgn_{pf} aquifer at the location of the injection well consisted of significant amounts of very fine sands, silts and clays, limiting its screened interval and consequently its ability to receive water.

Hydrogeology

The 12-inch diameter extraction well was completed to a total depth of 595 feet on January 6, 2010 with seventy-eight feet of screen installed between 495 feet and 595 feet below ground surface. At completion, static water level in the well was found to be near 45 feet below ground surface. Two step tests were performed. The second being necessary after fine grained materials clogged the sand pack during the first. After additional development of the well, the second step test was performed for a

total duration of 2 hours and 15 minutes at rates of 196 gpm, 305 gpm, 517 gpm, and 715 gpm. The specific capacity at the end of the test was determined to be 123 gpm/ft of drawdown.

A constant-rate test was performed on March 18, 2010. Water levels were monitored during the pumping and recovery period in the pumping well and in the City of Snoqualmie Well 1R. The extraction well was pumped between 683 and 697 gpm for 8.25 hours and experienced 7.95 feet of drawdown, resulting in a calculated specific capacity of 87 gpm/ft of drawdown. Transmissivity near the extraction well was found to be 18,700 ft^2/day. Transmissivity calculated from monitoring Snoqualmie Well 1R was significantly lower at 4,900 ft^2/day. Storativity was found to be 0.0004.

Snoqualmie Well 1R exhibited less than 4 feet of interference drawdown during the 8.25 hours of the constant-rate test. A theoretical curve matching the drawdown in Well 1R suggests that after about 1,000 minutes, approximately 5 feet of drawdown would be expected.

The injection well is also 12 inches in diameter. It was completed to a total depth of 540 feet in April 2010 with 15 feet of screen between 525 and 540 feet. At completion, static water level was approximately 57 feet below ground surface. A combined step-rate and constant-rate pumping test was performed on April 23, 2010. Water levels were monitored in the injection well, the extraction well, and in the City of Snoqualmie Well 1R during the pumping test. During the 350-minute test, the well was pumped at 145 gpm, 195 gpm, 243 gpm, 288 gpm, and 295 gpm. The calculated specific capacity was found to be 2.3 gpm/ft of drawdown, considerably lower than the extraction well. Aquifer transmissivity values from the three wells ranged from 8,300 ft^2/day to 2,100 ft^2/day with storativity calculated to be 0.0025 and 0.020 from the two monitoring wells. Very little drawdown, less than 1 foot, was observed in Snoqualmie Well 1R during the 350-minute pumping test.

An injection test was additionally performed on the injection well on April 29, 2010 and found a specific capacity of 2.3 gpm/ft, very similar to the pumping test.

The pumping and injection tests suggest that the injection well will be the limiting factor for the open-loop heat pump system. Recommendations from the PGG (2010) report are that the extraction well can produce 690 gpm while the injection well should only receive 278 gpm until further testing can be performed.

Impairment Considerations

Impairment is an adverse impact on the physical availability of water for a beneficial use that is entitled to protection. A water right application may not be approved if it would:

- Interrupt or interfere with the availability of water to an adequately constructed groundwater withdrawal facility of an existing right. An adequately constructed groundwater withdrawal facility is one that (a) is constructed in compliance with well construction requirements and (b) fully penetrates the saturated zone of an aquifer or withdraws water from a reasonable and feasible pumping lift.
- Interrupt or interfere with the availability of water at the authorized point of diversion of a surface water right. A surface water right conditioned with instream flows may be impaired if a proposed use or change would cause the flow of the stream to fall to or below the instream flow more frequently or for a longer duration than was previously the case.

- Interrupt or interfere with the flow of water allocated by rule, water rights, or court decree to instream flows. Degrade the water quality of the source to the point that the water is unsuitable for beneficial use by existing users (e.g., via sea water intrusion).

The Department of Ecology's well log database shows 8 water wells within ½ mile of the proposed extraction well. One half mile was chosen as a distance beyond which impairment is unlikely. Of the 8 nearby water wells, 6 were found to be less than 40 feet deep and tapping a different, shallower aquifer than the proposed extraction well. Two of the wells do tap the same aquifer as the extraction well and are owned by the City of Snoqualmie. The two City of Snoqualmie wells are less than 100 feet apart and are located on Mt Si High School property. One of the City of Snoqualmie wells, Well 1R, was monitored during the extraction well pumping test. Well 1R is approximately 1,350 feet from the extraction well and 900 feet from the injection well. See Figure 1.

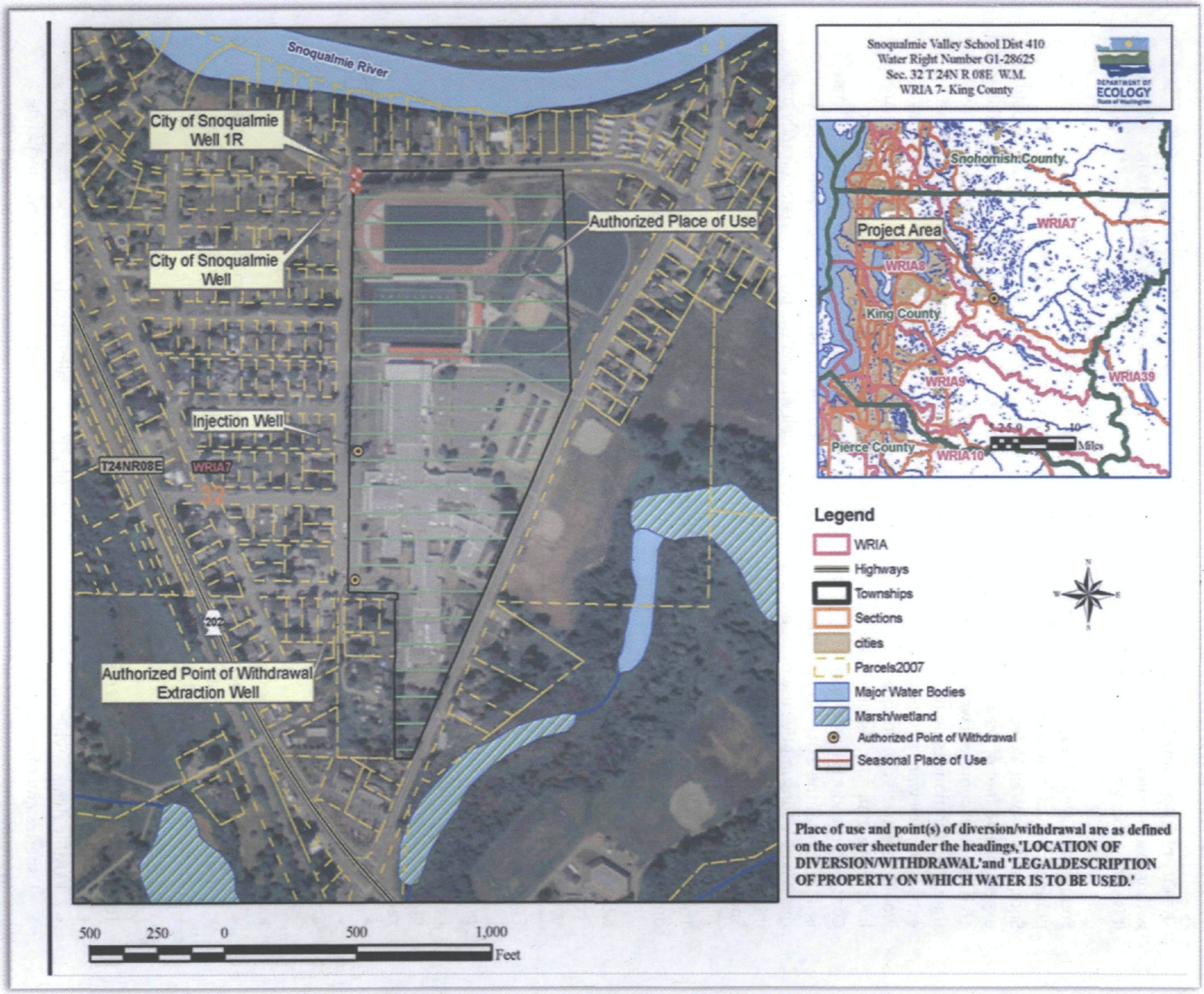


Figure 1 Aerial Map of Vicinity

The City of Snoqualmie's wells are the nearest wells that tap the same aquifer as the proposed withdrawal and injection. Hydrogeologic principles suggest that if Snoqualmie's wells are not impaired, it is very unlikely any more-distant wells will be impaired.

Snoqualmie Well 1R experienced about 4 feet of drawdown during the 8.25 hour extraction well pumping test at near 700 gpm. PGG in the 2010 well testing report estimates that if the City of Snoqualmie's Well 1R were pumped continuously for 90 days at 500 gpm, the extraction well would experience 46 feet of drawdown. This should approximate the interference drawdown expected in Well 1R if the extraction well were pumped at the same rate for the same duration. Higher pumping rates for the same duration result in proportional increases in drawdown at a constant distance, thus if the extraction well were pumped at 600 gpm continuously for 90 days, approximately 55 feet of drawdown would be expected in Snoqualmie Well 1R. Wells tapping the confined aquifer in the immediate area have more than 400 feet of available drawdown and would likely not be impaired in this scenario. Considering reduced evening heating/cooling needs at the school and the generally moderate climate, it is unlikely that the extraction well will ever pump at this rate for this length of time. More importantly, this is a non-consumptive use of water and the injection well will add the pumped water directly back into the aquifer at a location closer to the City of Snoqualmie Wells. It is more likely that the City of Snoqualmie Wells will actually experience slightly higher water levels.

The proposal to non-consumptively use water from a deep confined aquifer will have little to no impact on surface water bodies.

No impairment of any wells or water rights is anticipated.

Water Availability

For water to be available for appropriation, it must be both physically and legally available.

Physical availability

For water to be physically available for appropriation there must be ground or surface water present in quantities and quality and on a sufficiently frequent basis to provide a reasonably reliable source for the requested beneficial use or uses. In addition, the following factors are considered:

- Volume of water represented by senior rights, including federal or tribal reserved rights or claims
- Water right claims registered under Chapter 90.14 RCW
- Ground water uses established in accordance with Chapter 90.44 RCW, including those that are exempt from the requirement to obtain a permit
- Potential riparian water rights, including non-diversionary stock water
- Lack of data indicating water usage can also be a consideration in determining water availability, if the department cannot ascertain the extent to which existing rights are consistently utilized and cannot affirmatively find that water is available for further appropriation.

Legal availability

To determine whether water is legally available for appropriation, the following factors are considered:

- Regional water management plans – which may close certain water bodies to further appropriation
- Existing rights – which may already appropriate physically available water
- Fisheries and other instream uses (e.g., recreation and navigation). Instream needs, including instream and base flows set by regulation. Water is not available for out of stream uses where further reducing the flow level of surface water would be detrimental to existing fishery resources.

- The Department may deny an application for a new appropriation in drainage where adjudicated rights exceed the average low flow supply, even if the prior rights are not presently being exercised Water would not become available for appropriation until existing rights are relinquished for non-use by state proceedings.

Information supplied in the PGG (2010) well report suggests the extraction well can readily produce 690 gpm on a long-term basis. This interpretation is reasonable, and, therefore, water is physically available. As a non-consumptive water right, legal availability of water is not a consideration.

Beneficial Use

The use of water for industrial purposes is defined in statute as a beneficial use (RCW 90.54.020(1)).

Public Interest Considerations

The proposal to use a non-consumptive, open-loop groundwater heat pump system for heating and cooling a public school, increasing efficiency and providing savings to the school, is in the public interest.

Consideration of Protests and Comments

No protests were filed against this application.

Conclusions

In conclusion, the proposed water right satisfies the four-part test (RCW 90.03.290 (3)).

RECOMMENDATIONS

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

Purpose of Use and Authorized Quantities

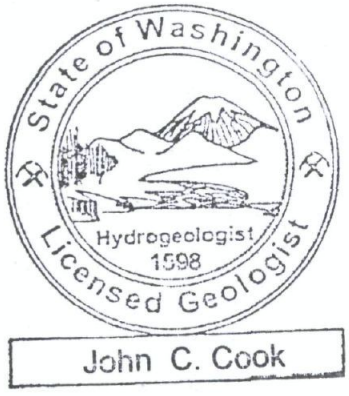
The amount of water recommended is a maximum limit and the water user may only use that amount of water within the specified limit that is reasonable and beneficial:

600 gpm
500 acre-feet per year
Purpose of Use - industrial, non-consumptive supply for groundwater heat pump
Point of Withdrawal - SE¼, NW¼, Section 32, Township 24 North, Range 8 East W.M.
Place of Use - as described on Page 2 of this Report of Examination.

1-12-2011

Jay Cook, LHG
Water Resources Program

Date



Licensed Geologist/Hydrogeologist No. 1598

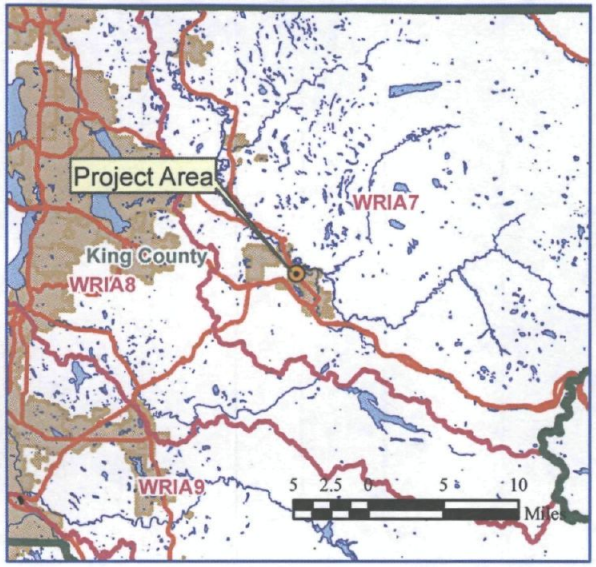
If you need this publication in an alternate format, please call Water Resources Program at (360) 407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

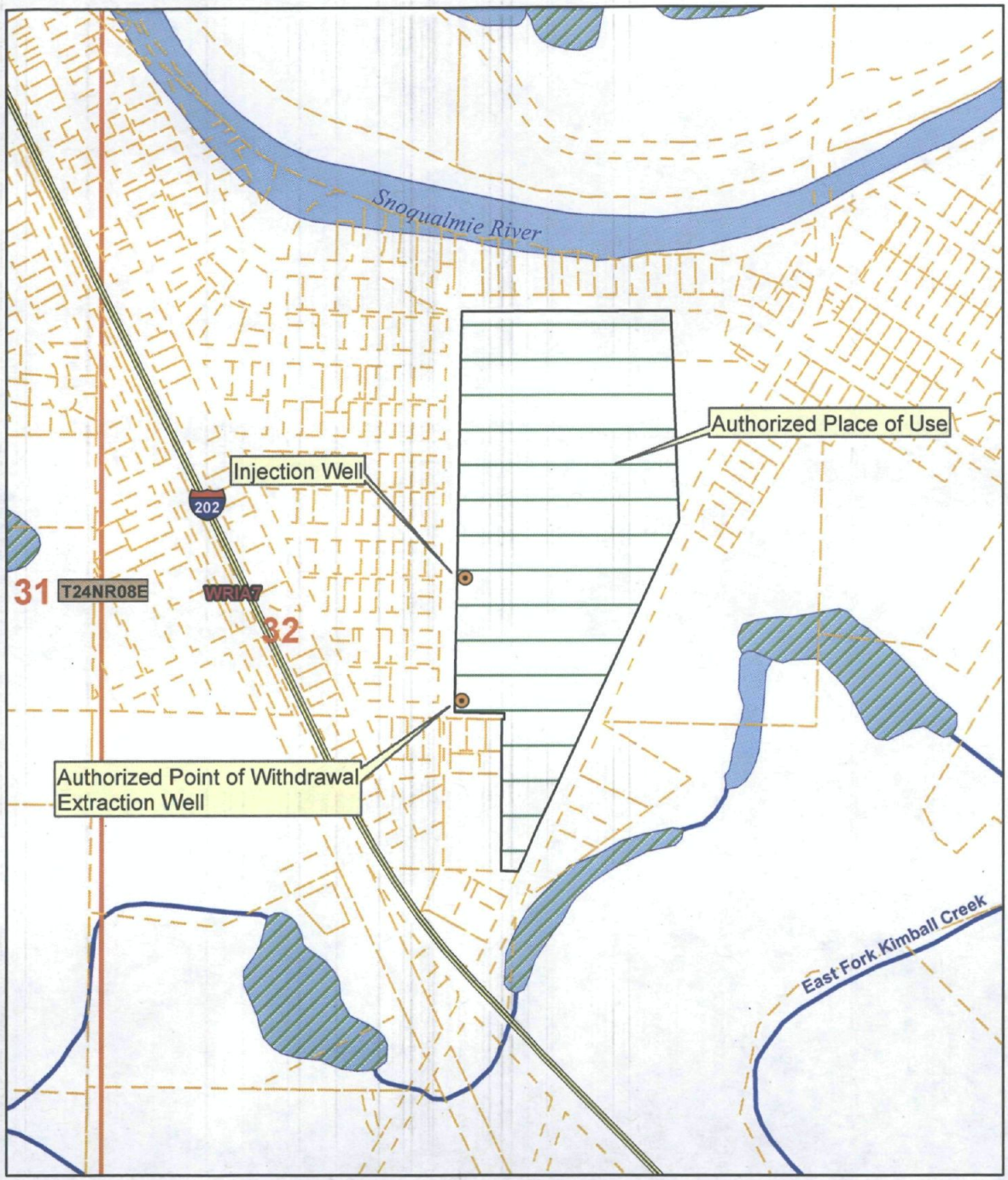
References

Pacific Groundwater Group, 2010. *Installation and Testing of Two Wells for a Groundwater Heat-Pump System, Mount Si High School, Snoqualmie Valley School District #410, Snoqualmie, Washington.* Technical Memorandum to Snoqualmie Valley School District #410.

Snoqualmie Valley School Dist 410
Water Right Number G1-28625
Sec. 32 T 24N R 08E W.M.
WRIA 7- King County

DEPARTMENT OF ECOLOGY
State of Washington





1,000 500 0 1,000 2,000 Feet

Legend

- Authorized Point of Withdrawal
- Highways
- Townships
- Sections
- Parcels
- Cities
- Major Water Bodies
- Marsh/wetland
- Major Streams
- Authorized Place of Use

N W E S

Place of use and point(s) of diversion/withdrawal are as defined on the cover sheetunder the headings,'LOCATION OF DIVERSION/WITHDRAWAL'and 'LEGALDESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED.'

Attachment 1