DEPARTMENT OF ECOLOGY State of Washington

State of Washington
REPORT OF EXAMINATION
FOR WATER RIGHT APPLICATION

PRIORITY DATE	WATER RIGHT NUMBER
3/5/2012	G4-35551

MAILING ADDRESS	SITE ADDRESS (IF DIFFERENT)
R&R HEIGHTS LAND COMPANY INC C/O ANNE WATANABE PO BOX 687 ROSLYN WA 98941-0687	SR 903 and MOUNTAIN RIDGE ROAD RONALD, WA 98940

Quantity Authorized for Withdrawal or Diversion

WITHDRAWAL OR DIVERSION RATE	UNITS	ANNUAL QUANTITY (AF/YR)
49.28	GPM	6.199

Purpose

	WITHDRAWAL OR DIVERSION RATE			ANNUAL QUANTITY (AF/YR)		
PURPOSE	ADDITIVE	NON-ADDITIVE	UNITS	ADDITIVE	NON-ADDITIVE	PERIOD OF USE (mm/dd)
Domestic Multiple	49.28		GPM	4.313		01/01 - 12/31
Irrigation		49.28	GPM	1.886		06/01 - 09/30

REMARKS

For the 11 connections under this approval, the combined instantaneous quantity from the well identified by Ecology's unique well tag #AFH-678 shall not exceed 49.28 gallons per minute (gpm).

IRRIGATED ACRES		PUBLIC WATER SYSTEM INFORMATION	
ADDITIVE	NON-ADDITIVE	WATER SYSTEM ID	APPROVED CONNECTIONS
1.0	0	AB326D (Mountain Ridge)	14

Source Location

COUNTY	WATERBODY	TRIBUTARY TO	WATER RESOURCE INVENTORY AREA
KITTITAS	GROUNDWATER		39-UPPER YAKIMA

SOURCE FACILITY/DEVICE	PARCEL	WELL TAG	TWP	RNG	SEC	QQ Q	LATITUDE	LONGITUDE
1 Well	146134	AFH-678	20N	15E	18	SW NE	47.22961	-121.01276

Datum: NAD83/WGS84

Place of Use (See Attached Map)

PARCELS (NOT LISTED FOR SERVICE AREAS)

949603, 18398, 18399, 18404, 18407, 18408, 18409, 949598, 949599, 949601, & 18402

LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE

Lots 11, 12, and 13 as delineated on that certain survey recorded in Book 30 of Surveys at pages 35 and 36 on April 20, 2004, under Kittitas County Auditor's File number 200404200022; AND Lots A, D, E, J, K, 27, 28, and 29 as delineated on that certain survey as recorded in Book 30 of Surveys at page 140 on September 16, 2004, under Kittitas County Auditor's File number 200409160035, all being in a portion of Section 18, T. 20 N., R. 15 E.W.M., Kittitas County, state of Washington.

Proposed Works

The subject well was drilled in 2001 (Ecology unique well ID #AFH-678) to a depth of 412 feet with a 6-inch casing. Water is delivered by a single phase, 1 HP submersible pump and a single phase, 3 HP submersible booster pump, which use two 120-gallon pressure tanks to deliver water through a 2-inch distribution line, splitting off to a 2-inch and an 8-inch line, which then feeds water to a 65,000 gallon-capacity water storage tank.

Mountain Ridge is a Department of Health (DOH) approved Group B community, private water system and will be regulated by DOH. There are 8 existing connections on the system, which do not need mitigation and there are lots, which need mitigation and which must be connected to the Group B water system by April 1, 2014. This application proposes to add 11 more connections to the existing, DOH-approved Mountain Ridge water system, although at the time of this writing, DOH has not yet approved this expansion to a Group A water system. With the approval of this new water permit, Parcel Nos. 18400, 18403, 18405, 18417, 12613, and 306134 will still require mitigation to use water and must be connected to service by April 1, 2014.

Domestic wastewater will be discharged to an individual or group on-site septic system, pursuant to the *Declaration of Covenant.*

Development Schedule

BEGIN PROJECT	COMPLETE PROJECT	PUT WATER TO FULL USE
Begun	December 31, 2030	December 31, 2032

Measurement of Water Use

How often must water use be measured?	Weekly
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)

- 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.

D. Department of Health Requirements

1. Prior to any new construction or alterations of a public water supply system, the State Board of Health rules require public water supply owners to obtain written approval from the Office of Drinking Water of the Washington State Department of Health. Please contact the Office of Drinking Water prior to beginning (or modifying) your project at DOH/Division of Environmental Health, 16201 E. Indiana Avenue, Suite 1500, Spokane Valley, WA 99216, (509) 329-2100.

E. Water Use Efficiency

1. The water right holder is required to maintain efficient water delivery systems and use of up-to-date water conservation practices consistent with RCW 90.03.005.

F. Proof of Appropriation

1. 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. 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.

G. Schedule and Inspections

1. 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.

H. General Conditions

1. This authorization shall in no way excuse the permittee from compliance with any federal, state, or local statutes, ordinances, permits, or regulations including those required and administered by other programs of the Department of Ecology.
2. You (applicant) will pay the sum of $852.98, which represents a proportionate amount of the payment due and owing to the United States for storage and delivery of water under Paragraph 15(a) of Water Storage and Exchange Contract No. 09XX101700, between the United States Bureau of Reclamation and the State of Washington Department of Ecology, Yakima Project, Washington, dated January 29, 2009.[2] The consumptive use of 1.077 acre-feet from September 1 through March 1 is subject to the terms and conditions in the Water Storage and Exchange Contract No. 09XX101700.

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[2] *Long-Term Water Storage and Exchange Agreement between the U.S. and the State of Washington, Department of Ecology,* (Contract No. 09XX101700), http://www.ecy.wa.gov/programs/wr/cro/images/pdfs/exchangecontract_012909.pdf, accessed on January 23, 2013.

Provisions

A. Wells, Well Logs and Well Construction Standards

1. The subject well and the right to use water from it are restricted to and authorized for the Roslyn Formation abandoned coal Seam 1 Reservoir 2, (Packard, 1981), per the recommendation presented by Anna Hoselton, Ecology licensed hydrogeologist.[1]
2. 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 its 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.
3. 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.
4. Installation and maintenance of an access port as described in WAC 173-160-291(3) is required.
5. Any replacement well(s) allowed under RCW 90.44.100 shall require construction oversight by a hydrogeologist licensed in the state of Washington.

B. Measurements, Monitoring, Metering, and Reporting

1. 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.
2. Water use data shall be recorded weekly and maintained by the property owner for a minimum of five years. The maximum rate of withdrawal and the annual total volume shall be submitted to the Department of Ecology by January 31st of each calendar year.
3. Recorded water use data shall be submitted via the Internet. To set up an Internet reporting account, contact the Central Regional Office. If you do not have Internet access, you can still submit hard copies by contacting the Central Regional Office for forms to submit your water use data.
4. 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.

C. Water Level Measurements

1. In order to maintain a sustainable supply of water and ensure that your water source is not impaired by future withdrawals, static water levels **shall** 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 **shall** 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.).

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[1]Anna Hoselton, *Technical* Memorandum, dated April 26, 2013, p. 17.

3. You (applicant) will record with the Kittitas County Auditor a property covenant as required under WAC 173-539A-050 that restricts or prohibits trees or shrubs over a septic drain field on Parcel Nos. 949603, 18398, 18399, 18404, 18407, 18408, 18409, 949598, 949599, 949601, and 18402.
4. You (applicant) will record with the Kittitas County Auditor an appropriate conveyance instrument under which the applicant obtains an interest in Trust Water Right No. CS4-01279sb5c to offset consumptive use.
5. Any valid priority calls against the source Trust Water Right No. CS4-01279sb5c, based on local limitations in water availability, will result in temporary curtailment of the use of water under the Permit until the priority call for water ends.

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. G4-35551, subject to existing rights and the provisions specified above.

Your Right To Appeal

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

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

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

- Serve a copy of your appeal and this Order on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

- You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.
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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 Yakima, Washington, this 19 day of JUNE 2013.

Mark Kemner, LHG, Section Manager
Water Resources Program

BACKGROUND

This report serves as the written findings of fact concerning Water Right Application No. G4-35551.

Priority Processing

This application is being priority processed because it qualifies under the criteria under which an application may be processed prior to competing applications (WAC 173-152).

On March 5, 2012, R&R Heights Land Company, Inc. submitted an application to the Department of Ecology (Ecology) requesting a new water right with the following parameters:

Table 1: Summary of "Originally-Requested" Water Right

Applicant Name	R&R Heights Land Company Inc.
Date of Application	3/5/2012
Place of Use	Lots 11, 12, and 13 as delineated on the certain survey recorded in Book 30 of Surveys at pages 35 and 36 on April 20, 2004, under Kittitas County Auditor's File number 200404200022; AND Lots A, D, E, K, 27, and 29 as delineated on that certain survey as recorded in Book 30 of Surveys at page 140 on September 16, 2004, under Kittitas County Auditor's File number 200409160035; AND Lot 1 as delineated on that certain survey as recorded in Book 34 of Surveys at page 242 on March 28, 2008, under Kittitas County Auditor's File number 200803280062; all being in a portion of Section 18, T. 20 N., R. 15 E.W.M., Kittitas County, state of Washington. (Parcel Nos. 949603, 18398, 18399, 18404, 18407, 18408, 18409, 949598, 949599, and 949601.)

County	Waterbody	Tributary To	WRIA
Kittitas	Groundwater		39-Upper Yakima

Purpose	Rate	Unit	Ac-ft/yr	Begin Season	End Season
Domestic Multiple	100	GPM	3.921	01/01	12/31
Irrigation	100	GPM	1.886	06/01	09/30

Source Name	Parcel	Well Tag	Twp	Rng	Sec	QQ Q	Latitude	Longitude
1 Well	146134	AFH678	20N	15E	18	SW NE	N/A	N/A

CFS = Cubic Feet per Second; Ac-ft/yr = Acre-feet per year; Sec. = Section; QQ Q = Quarter-quarter of a section; WRIA = Water Resource Inventory Area; E.W.M. = East of the Willamette Meridian; Datum: NAD83/WGS84.

On July 19, 2012, the applicant amended the original application to add one parcel to the place-of-use and to increase the annual water duty. The corrected parameters follow:

Table 2: Summary of "Amended-Requested" Water Right

Date of Amendment	7/19/2012
Amended Place of Use to Add Parcel	Lots 11, 12, and 13 as delineated on the certain survey recorded in Book 30 of Surveys at pages 35 and 36 on April 20, 2004, under Kittitas County Auditor's File number 200404200022; AND Lots A, D, E, J, K, 27, and 29 as delineated on that certain survey as recorded in Book 30 of Surveys at page 140 on September 16, 2004, under Kittitas County Auditor's File number 200409160035, all being in a portion of Section 18, T. 20 N., R. 15 E.W.M., Kittitas County, state of Washington. (Parcel Nos. 949603, 18398, 18399, 18404, 18407, 18408, 18409, 949598, 949599, 949601, and 18402.)

Purpose	Rate	Unit	Ac-ft/yr	Begin Season	End Season
Domestic Multiple	100	GPM	4.313 from 3.921	01/01	12/31
Irrigation	100	GPM	1.886 (no change)	06/01	09/30

Legal Requirements for Approval of Appropriation of Water

RCWs 90.03 and 90.44 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.

Public Notice

RCW 90.03.280 requires that notice of a water right application be published once a week, for two consecutive weeks, in a newspaper of general circulation in the county or counties where the water is to be stored, diverted, and used. Notice of this application was published in the Daily Record of Ellensburg, Washington on July 28 and August 4, 2012. No comments or protests were received by Ecology during the 30-day comment period.

Consultation with the Department of Fish and Wildlife

The Long-Term water Storage and Exchange Agreement Between the United States and the State Department of Ecology and the Yakima River Mitigation Water Services LLC Trust Water Agreement require that Ecology must give notice to the Department of Fish and Wildlife of applications to divert, withdraw, or store water. Notice was officially provided on March 5, 2012 by Anne Watanabe on behalf of the applicant, during a Yakima Water Transfer Working Group (WTWG) meeting. A positive reaction was communicated in response to this proposal.

On December 3, 2012, Ecology gave subsequent notice of this proposal to the WTWG due to the amendment of the original application to add one domestic connection and increase the annual water quantity. A positive response was communicated.

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 is met:

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

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

INVESTIGATION

Site Visit

A site visit was performed by Ecology employees, Candis Graff and Anna Hoselton, on November 13, 2012. Vernon Swesey, water system project technician for co-applicant, Nathan Weis, was also present. Global Positioning Satellite (GPS) coordinates were taken of the location of the well head. Area geology was also noted.

Proposed Use and Basis of Water Demand

The DOH-approved Group B water system, Mountain Ridge, became effective on February 2, 2006, and is approved for 14 connections, of which 8 connections pre-exist. The 11 connections associated with this proposal intend to expand the current water system into a Group A water system and approval from DOH is pending. The source is metered.

The December 2009 Water System Design Manual[3] (WSDM) by DOH contains guidance for establishing water demands. The suggested methods, in order of preference, include:

1. Metered water production and use records.
2. Comparable metered water production and use data from analogous water systems. See WAC 246-290-221(3)(a) and Section 5.2.3.
3. The criteria presented in Chapter 5.

According to the WSDM, new systems or existing water system that have no source meter records, information can be obtained from analogous water systems or from information presented in Appendix D in order to estimate the Average Daily Demand (ADD) and Maximum Daily Demand (MDD)

[3] Department of Health, "Water System Design Manual," Olympia, Wa., 2009, pp. 27-32, www.doh.wa.gov/chp/dw/Publications/331-123.pdf, accessed on May 30, 2012.

for residential connections (WAC 246-290-221(3)).[4] Analogous water systems are defined in Section 5.2.3 of the WSDM as systems with similar characteristics, such as, but not limited to: demographics, housing size, lot sizes, climate, conservation practices, use restrictions, soils and landscaping, and maintenance practices. As such, a reasonable level for a MDD for internal uses can be established at 350 gallons per day (GPD)/Equivalent Residential Unit (ERU).

The MDD values are set at 350 gpd/ERU, which is consistent with the WSDM. Under WAC 173-539A, 30% domestic in-house use on a septic system is assumed to be consumptively used and 90% of outdoor domestic use is assumed to be consumptive.

Monthly and annual use at full build out of the project were calculated based on the proposed 11 ERUs, DOH's MDD, Ecology's Guidance Document 1210 entitled, Determining Irrigation Efficiency and Consumptive Use, the Washington Irrigation Guide (WIG) for outdoor water use, and the assumptions found in WAC 173-539A. A crop irrigation requirement (CIR) for grass in the Cle Elum area of 18.11 inches was estimated using the WIG. Assuming the outdoor use is 90% consumptive, consistent with WAC 173-539A, and applying the WIGs CIR, the outdoor water requirement for 43,560 square feet (1 acre) of grass is 1.697 ac-ft/yr. The calculated consumptive use and total calculation considered factors specified in WAC 173-539A and are summarized in **Table 3** and **Table 4** below.

Table 3: *Estimated Total and Consumptive Use

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total Use (ac-ft)	.366	.331	.366	.355	.366	.703	1.043	.865	.716	.366	.355	.366	**6.199**
Total Consumptive (ac-ft)	.110	.099	.110	.106	.110	.420	.719	.559	.432	.110	.106	.110	**2.991**

*Quantities are rounded.

Table 4: *Estimated Indoor/Outdoor Water Use per ERU

	Jan	Feb	Mar	Apr	Jun	Jul	Aug	Sep	Nov	Dec
Indoor (gpd/ERU)	350	350	350	350	350	350	350	350	350	350
Outdoor (gpd/ERU)	0	0	0	0	344	647	477	357	0	0
Total (gpd/ERU)	350	350	350	350	694	997	827	707	350	350

*Quantities are rounded.

Proposed Mitigation

The applicant intends to mitigate for consumptive use under the requested appropriation through the purchase of Upper Kittitas mitigation credits from the Yakima River Mitigation Water Services LLC (YRM) Water Exchange. The YRM Water Exchange was established by transferring Court Claim No. 01279 into the Trust Water Right Program (TWRP). Consumptive loss resulting from the applicant's proposed use will be offset with Trust Water Right No. CS4-01279sb5c.

[4] Ibid., p. 28.

Other Rights Appurtenant to the Place of Use

See **Attachment 2.**

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).

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 water rights, including federal or tribal reserved rights or claims.
- Water Right Claims registered under RCW 90.14.
- Ground water uses established in accordance with RCW 90.44, 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.

Based on the hydrogeologic setting described below, groundwater is physically available for the project due to the in-basin mitigation offered and the use of the "storage" contract.

Hydrologic/Hydrogeologic Evaluation

The following hydrologic/hydrogeologic technical excerpts were prepared by Anna Hoselton, licensed hydrogeologist, and reviewed by Stuart Luttrell, supervisor and licensed hydrogeologist, and seeks to

address by way of discussion, analysis, and evaluation, physical water availability and the potential for impairment to existing water users. The entire Technical Memorandum may be reviewed upon request.

Study Area General Geology/Hydrogeology

The project area is located within the historic Roslyn Coal Field where the Eocene aged Roslyn Formation was mined extensively for coal between the late 1800s through to the early 1960s. The Roslyn Formation was deposited in a fluvial environment and consists of white/grey thick-bedded feldspathic sandstones with minor conglomerates, carbonaceous shales, and coal beds. Total thickness of the entire Roslyn Formation is estimated to be about 8,500 ft (Brownfield, 2008). Extent of the Roslyn Formation, as identified by coal mining and gas exploration wells, reaches from just west of the southern end of Cle Elum Lake, eastward beyond the Columbia River at least as far north as the town of Quincy and southward to beyond Yakima (Walker, 1980; Wilson, et. al., 2008). Cheney (2007) argues the Chumstick Formation sandstones and shales that span from west of Leavenworth to east of Wenatchee within the boundaries of the Chiwaukum structural low should be reclassified as part of the Roslyn Formation. If this is correct, then the full extent of the Roslyn Formation is more widespread than previously understood.

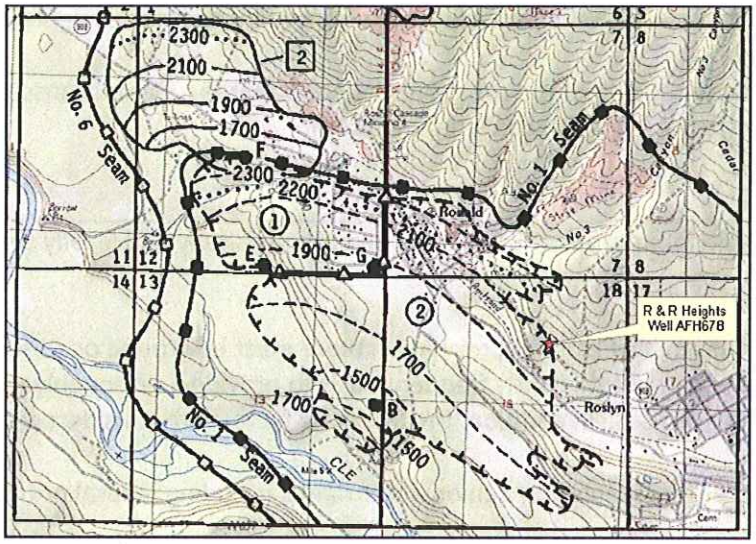

Figure 1: (Hoselton Figure 2) Adapted from Packard's (1981) Figure 3 map overlain on the USGS digital elevation model (DEM) and the area digital USGS topographical map with the R&R Heights well shown as a red star.

The Roslyn Formation, as described by Bressler (1951), was divided into three members generally based on variation in grain size and the presence of coal. The lower member contains interbedded rhyolitic flows and tuffs, tuffaceous to arkosic sandstones, conglomerate, siltstone, claystone and carbonaceous shales. Bressler's middle member is composed of mostly medium-grained, often poorly indurated sandstone, minor pebbly sandstone, siltstone, and carbonaceous shale and coal. The upper member consists mostly of thick bedded, non-marine, mostly medium grained sandstone that is interbedded with thin siltstones, shales, carbonaceous shales and thin coal seams (Wilson, et al., 2008). The upper member of the Roslyn Formation constitutes only about 1,500 ft (Bressler, 1951) to possibly 2,400 ft (Walker, 1980). It is the upper member of the Roslyn Formation that was extensively mined for coal in and around the cities of Cle Elum, Roslyn, and Ronald and which is the focus of the remaining discussion.

The saturated portion of the un-mined upper Roslyn Formation (URF) can be characterized as a low to very low yield aquifer generally suitable only for small domestic uses and having a low range hydraulic conductivity. Where URF wells encounter only primary permeabilities, development of a well may be unsuccessful (dry hole) or commonly yield as little as ¼ gpm to 2-3 gpm. Well yields in the range of 5 gpm to 20 gpm, from the URF, are less common and likely reflect higher yields related to secondary permeabilities resulting from fracturing of the Formation during folding and faulting. Where even higher well yields[5] are reported (and in some cases temporal or fluctuating flowing conditions) at wells located within the boundaries of historical mining activities, it is reasonable to suspect a well has encountered or is influenced by abandoned mine workings now filled with groundwater. In such cases pumping yields may be better characterized as withdrawals from an 'underground storage tank, reservoir, or pool,' in which standard hydrogeologic evaluation tools cannot be used to estimate aquifer properties.

Groundwater flow within the URF will be influenced by Formation characteristics and structural attitude. Additionally, secondary permeabilities will encourage preferential flow through the more brittle coal and shale units that are commonly fractured during deformation. Where the URF has been mined for coal, groundwater behavior is likely to mimic Karst[6]-like conditions. For example, a little less than a mile northwest of the subject well, a private water system well drilled in 1971 was developed into the abandoned Roslyn Seam 5 workings of the Patrick Mine. The Patrick Mine well is reported to have pumped 1,800,000 gallons of water in a 30 hour period, or about 1,000 gallons per minute. The well was eventually authorized for a maximum of 200 gpm and 322 af/yr. Records from a hydrogeologic analysis of the well's water levels from 1992 to 1994 show that:

> "Although pumping affects water levels, no direct correlation between water levels and pumpage is apparent because of the influence of recharge. If pumpage were the only strong influence, water levels would decrease as pumpage increased. However, in 1993, both water levels and pumpage increased between April and July. In August and September of 1993, water levels decreased while pumpage increased. It is not known whether this is due to natural water level decline or the high rates of pumpage (WDOE (Ecology) Water Resources file CG3-21798C)."

Additional Karst-like behavior is recorded in Ecology water right application No. G4-32488 which describes groundwater discharge from a mine adit or fan house ventilation structure about 0.70 miles southwest of the subject well that was estimated at 1500 gpm in April of 1996 and measured at 100 gpm in November of 1996. This phenomenon is also discussed in the Volume II of the Mountain Star Draft EIS, section 7.2.2 (Kittitas Co., 1999).

Contrasting such accounts are records of wells drilled within the abandoned mining district that have encountered un-mined in-place remnants of the Formation called pillars and barrier pillars. Records of wells that are suspected to have encountered pillars or other un-mined Formation rock tend to show dry wells (at the time of drilling) or wells that may only produce a few gpm. For example, records from an 801 foot well drilled a few hundred feet south of the Patrick Mine well, discussed above, show that it

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[5] Sustainable well yields from the URF greater than 20-25 gpm at wells located inside the boundaries of the historic mining district should be generally suspect as potentially mine-affected-wells.

[6] Topography formed primarily by dissolution and characterized by sinkholes, caves, enlarged fractures, underground pools and drainage systems, and non-cavernous springs and seeps (Neuendorf, et al., 2005).

was likely drilled and cased through the mine workings and into the in-place Formation below. Constructed this way, the well's total yield was estimated to be only about 12 gpm with an uncertain sustainability.

Similar to the above contrasted examples, the subject well, unique number AFH678, appears to be withdrawing stored groundwater associated with S1R2. A four hour pump test at the well demonstrated a yield in the range of 30 gpm while the earlier driller's estimate suggested that a higher yield may be possible. However, development efforts at nearby well, unique number AGB076, resulted in a dry hole. Although AGB076 was drilled to a depth of 920 feet, the failed well appears to have either been cased through the mine workings or encountered only in-place Formation.

Recharge to the URF is by precipitation where the Formation outcrops at or near the land surface, by diffuse infiltration, and where precipitation may enter the Formation via abandoned coal mine workings and fracture systems by focused infiltration. Recharge may also occur where the Formation is in contact with surface water and Formation permeabilities and head relationships facilitate infiltration. Groundwater discharge from the URF is to wells, into and out of abandoned underground coal mine workings, to streams and springs, to the mainstem valley alluvial flood plain sediments of the lower Cle Elum and Yakima Rivers and ultimately to the lower Cle Elum and Yakima Rivers. (Packard, 1981; Hoselton-Packard personal communication, 2013).

Physical Water Availability Discussion

While the intentional or targeted development of groundwater stored in abandoned coal mines is relatively uncommon in the state of Washington, it is a more common practice in regions of the United States where coal reserves were large and active and abandoned mine workings extensive. Experiences from these areas offer caution and insight with regard to issues such as water availability. For example, USGS Water Resources Investigation Report 92-4073, Hydrologic Characteristics of Abandoned Coal Mines Used as Sources of Public Water Supply in McDowell County, West Virginia by Ferrell (1992) cautions and advises that:

> "Although large quantities of water are available from underground mines, many public water suppliers have experienced difficulties in obtaining dependable water supplies from coal mines because of erratic fluctuations in the quantity and chemical quality of the water. Because coal mines respond differently to pumping and recharge than do natural ground-water systems, an improved understanding of the hydrologic characteristics of underground mines is needed.
>
> The availability of water from flooded underground coal mines is determined by the presence and movement of ground water in the overburden and surrounding rock, nearby mining activities, the amount of precipitation and other sources of recharge, and characteristics of the mine. Underground mining can alter the hydrologic characteristics of overlying and surrounding areas. Removal of coal creates large voids and can weaken overlying strata. This removal could result in fracturing of overlying strata and increased vertical permeability. During active mining, dewatering of mines also can dewater the overlying strata and deplete ground-water supplies in these strata. After abandonment and flooding of mines, openings to the mines, such as shafts and tunnels, can become outflow points for ground water."

Specific to the Roslyn area, USGS geologist, Frank A. Packard (1981) estimated the volume of water held in storage within abandoned coal mine systems based on the amount of coal removed. The volume of water was calculated separately for coal Seams 1, 5, and 6 by (1) planimetering the mine area down dip from an assumed water level; (2) multiplying this area by the estimated average tunnel (slope, drift) height to get the volume (man-made pore space) within mine and water-level boundaries; (3) multiplying this volume by the estimated percentage recovery figure to get the net water-saturated pore space; and (4) multiplying this net saturated pore space by an estimate of the porosity-effectiveness fraction to get the volume of water that will drain within a reasonable time (weeks) to wells drilled into this zone.

Packard (1981) estimated 'maximum' water levels in the mines from the elevations of a combination of spill points such as up-dip limits to barrier pillars, drift and slope entries, fan house shafts and core holes. Reservoir 1 of Seam 6 (S6R1) was excluded from his estimates because at the elevation of the tunnel spill point, if it were ever cleared of debris, the entire reservoir could be completely drained.

As stated earlier, the subject well is interpreted to withdraw groundwater associated with Packard's Seam 1, Reservoir 2 (S1R2). Packard (1981) presented his reservoir estimates as "liberal, conservative, and probable" volumes explaining that liberal estimates were based on higher elevation spill points and conservative estimates were based on lower elevation spill points. High elevation spill points were used with maximum porosity (mine void) estimates to derive liberal estimates and low elevation spill points were used with minimum porosity (mine void) estimates to derive conservative estimates. He then assumed that the probable volume "is most likely in between these two figures" and that water levels were likely closer to the low than to the high estimates due to a number of unknowns to derive the report's probable volumes.

Packard's 1981 work was published eighteen years after the last active Roslyn area mine closed in 1963 (Kittitas Co, 1999). It is now 50 years since the closure of the last active mine and more than 100 years since mining first began in this area. Over time, it is likely that additional collapse (Ash, 1953; Goode, 2010) of the old mine workings has occurred and that conservative porosity or void estimates are now more probable. It can also be argued that infiltration rate estimates made from mine dewatering likely reflect a cool and wet climate cycle (USGS, 2009; Hidalgo, 2004) and that they are an over-estimate for sustainable groundwater withdrawals from the reservoirs (Packard, 1981; WDOH, 2011; WDOE, CG3-21798C) because they were derived from pumping rates to completely dewater the mines. Further, scant data from the Patrick Mine well discussed above suggests, as do many studies, that the abandoned mine groundwater systems are not well understood. Consequently, this evaluation will only consider Packard's conservative estimates of stored water volumes in further discussion.

Packard's conservative estimate for the volume of groundwater stored in S1R2 is 500 acre feet (af). Packard also states that if emptied by pumping, the time to refill all of the reservoirs would take 6 to 7 years under normal precipitation conditions. Generally then, an annual refilling rate for S1R2 may be in the range of 71 to 83 af/yr. If evaluated individually, however, by dividing the calculated reservoir volumes by the average of Packard's estimated infiltration rates[7], then refilling times for individual reservoirs roughly correlate with the reservoir's assigned porosity values and acres of reservoir (which, for simplicity, can be thought of interchangeably as acres of recharge area). In other words, if a

[7] Packard estimated the highest infiltration rate into the mines at 7.66×10^{-4} (ft^3/s)/acre or 0.55 af/yr/acre of reservoir and the lowest rate to be half of that or 0.28 af/yr/acre of reservoir. The average of the two rates is 0.42 af/yr/acre of reservoir.

reservoir theoretically has a low porosity and small recharge area it has less pore space to fill and therefore should refill in a shorter period than a reservoir of higher porosity and larger recharge area when the infiltration rate is held constant. Variations[8] of this pattern will occur with various combinations of recharge area size and assigned porosity and as a result of the difference between an estimated assigned porosity and actual porosity.

For example, the low assigned porosity (0.18) and moderately large recharge area (545 acres) of the subject S1R2 in Packard's conservative model suggests a refilling time for S1R2 of about 2½ years when evaluated using an averaged refilling rate of 0.42 af/yr/acre of reservoir (approximately 229 acre-feet per year), assuming average precipitation conditions and no withdrawals of groundwater by water wells. This estimate, however, is dependent on and sensitive to the actual porosity of the reservoir, which is an unknown. If, however, Packard's infiltration rate is viewed as an over estimate because it represents the discharge of groundwater required to dewater the mines, it may be appropriate to only consider Packard's low end infiltration rate of 0.28 af/yr/acre of reservoir (approximately 153 acre-feet per year). At this lower infiltration rate, refilling of S1R2 may take in the range of 3½ years, again assuming average precipitation conditions and no withdrawals of groundwater by wells

The estimated low and average annual refilling volume for S1R2 were considered along with the PRISM (Parameter-elevation Regressions on Independent Slopes Model) 1981-2010 precipitation data normal for the area of S1R2. Four PRISM cells overlay the S1R2 reservoir area. Calculating the average of the precipitation values from the four cells result in an average annual precipitation input value of 37.35 inches (3.11 feet). If the average annual precipitation is then distributed over the 545 acre area of S1R2, it calculates to approximately 1696 acre-feet of precipitation annually.

Of the 1696 acre-feet of annual precipitation, Packard's low end infiltration rate (153 af/yr) and the average of the high and low infiltration rates (229 af/yr) equate to 9 and 13 percent of the average precipitation over the surface area of S1R2, respectively. This suggests that up to approximately 9 to 13 percent of average annual precipitation may enter S1R2 as recharge if the reservoir is drawn down. These results compare reasonably with the mid to high end percent of annual precipitation infiltration values[9] cited by Heilweil (2007) for various sandstones by both focused (on outcrop) and direct (beneath coarse surficial soils) infiltration.

Groundwater may also enter S1R2 by leakage from the adjacent S1R1 located in the southeast corner of Section 12, T. 20 N., R. 14 E.W.M., assuming a higher hydraulic head in S1R1.

Only one log for a well (ACT612) interpreted to be withdrawing water from Roslyn Seam 1 could be located[10] to the County parcel level in the south half of Section 12. When adjusted for elevation, the static water level (swl) at ACT612 may be in the range of 65 feet (depending on actual well location and

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[8] One such variation is seen in S5R1 which was assigned a higher porosity (0.35) but has a very small recharge area (63 acres). This combination suggests a refilling time of approximately 6 years which appears to be more sensitive to the small recharge area.

[9] Heilweil (2007) in previous investigations cites sandstone infiltration rates using various methods from Zhu's (2000) as 4 to 8% of precipitation; Heilweil and others (2000) as 0.5 to 15% and Flint and others (2002) as 2 to 7% giving a range of 7 to 15% alluded to above. Perhaps an outlier, Danielson and Hood's 1984 study resulted in a range of 1 to 25% using shallow borehole methods.

[10] "Located" in this case means that the owner's name on the well log was matched to the owner name of Kittitas County Parcel No. 12319.

elevation error) higher than the swl recorded on the log of the subject well. The two reservoirs and the two wells are separated by a barrier pillar that parallels the southeast boundary of Section 12 as shown in Packard's (1981) Figure 3. If this head relationship is correct, then groundwater withdrawals associated with S1R2 are likely to affect the rate of leakage from S1R1 into S1R2. There are about 6 existing domestic wells directly dependent on S1R1 and about 12 existing wells constructed into the overlying alluvial sediments and/or the upper portion of the URF within the horizontal boundaries of S1R1. Because of uncertainties regarding the relationship between S1R1 and S1R2, additional work to characterize groundwater exchange between them should be considered.

Additional sources of recharge to S1R2 likely include run off from Cle Elum Ridge, groundwater discharge from the up-dip URF and from surface water sources of higher head which are in contact with the URF and mine workings. Quantification of contributions from these sources is beyond the scope of this report for the following reasons including but not limited to (1) lack of data regarding surface water inflow and outflow to and from the mines, (2) lack of data regarding groundwater inflow and outflow to and from the mines from up-dip regions and (3) lack of data regarding seasonal and annual variations in mine volumes and when there may be reservoir capacity to capture precipitation run off from Cle Elum Ridge.

Offsetting water that enters and recharges the abandoned coal mine system and specifically S1R2 is water that may discharge from mine spill points when groundwater elevations exceed spill point elevations, typically during spring freshet, rapid snow melt, or extreme precipitation events. Water lost from the abandoned coal mine system in this way can occur only when the reservoirs are already full and have no capacity for the excess water. Groundwater discharge from S1R2 to down gradient, lower head URF will also occur. Groundwater can also be discharged from S1R2, or the volume of recharge to S1R2 can be reduced by wells pumping from S1R2, by wells that capture groundwater from the alluvial sediments overlying S1R2 and by wells withdrawing groundwater from the URF overlying S1R2. Presently, however, the subject well appears to be the only existing well located within the boundaries of S1R2 that is held in Ecology's well database. Logs for one domestic well and one dry well are included in the database for Section 18, however, the coordinates for both would locate them to the east of the subject well and east of the S1R2 boundary.

Groundwater Claim No. 98-001626, for which no well log was found, is located just south of the southeast boundary of S1R2 but will be treated as if it withdraws groundwater from and is dependent on S1R2 because (1) Kittitas Co. Parcel No. 372834, on which the Claim is identified, extends inside the boundary of S1R2 and (2) air photos show that structures (and electrical sources for a pump) on the parcel are located close to or within the boundary of S1R2 (Figure 3). Claim No. 98-001626 claims an annual quantity of 10 af/yr from a well for the irrigation of 50 acres and cites 1930 as the date of first use.

Another existing application, No. G4-32488, cites a proposed Point of Withdrawal (POW) that is located within the boundaries of S1R2 (Figure 2). The application seeks a maximum of 600 af/yr for irrigation, landscaping, and potable water purposes. No mitigation has been proposed for the existing application. The application proposes up to a 600 foot well that targets groundwater from the abandoned coal mine system but does not identify a specific target seam. Under WAC 173-539(A), the use, if approved, would require mitigation. However, any mitigation which only addresses the mainstem Yakima River will not address effects of the proposed withdrawal on the abandoned coal mine system.

If the proposed 600 af/yr withdrawal were taken from S1R2, it would exceed the entire conservative estimated S1R2 volume of 500 af in one irrigation season. If the withdrawal were taken from S5R3, then the estimated conservative stored volume of the reservoir is larger than the proposed withdrawal, however, the proposed withdrawal is still larger than an 'annual refilling volume' for S5R3 and could cause the reservoir to go into decline. Additionally, any large withdrawal from S5R3 would increase leakage from S5R2 on which the primary source for the No. G4-00462C is dependent. No. G4-00462C is the water right associated with the Pineloch Sun Beach Club, Class A Public Water System ID #67640E. Review of No. G4-00462C suggests the original request may have been unintentionally[11]

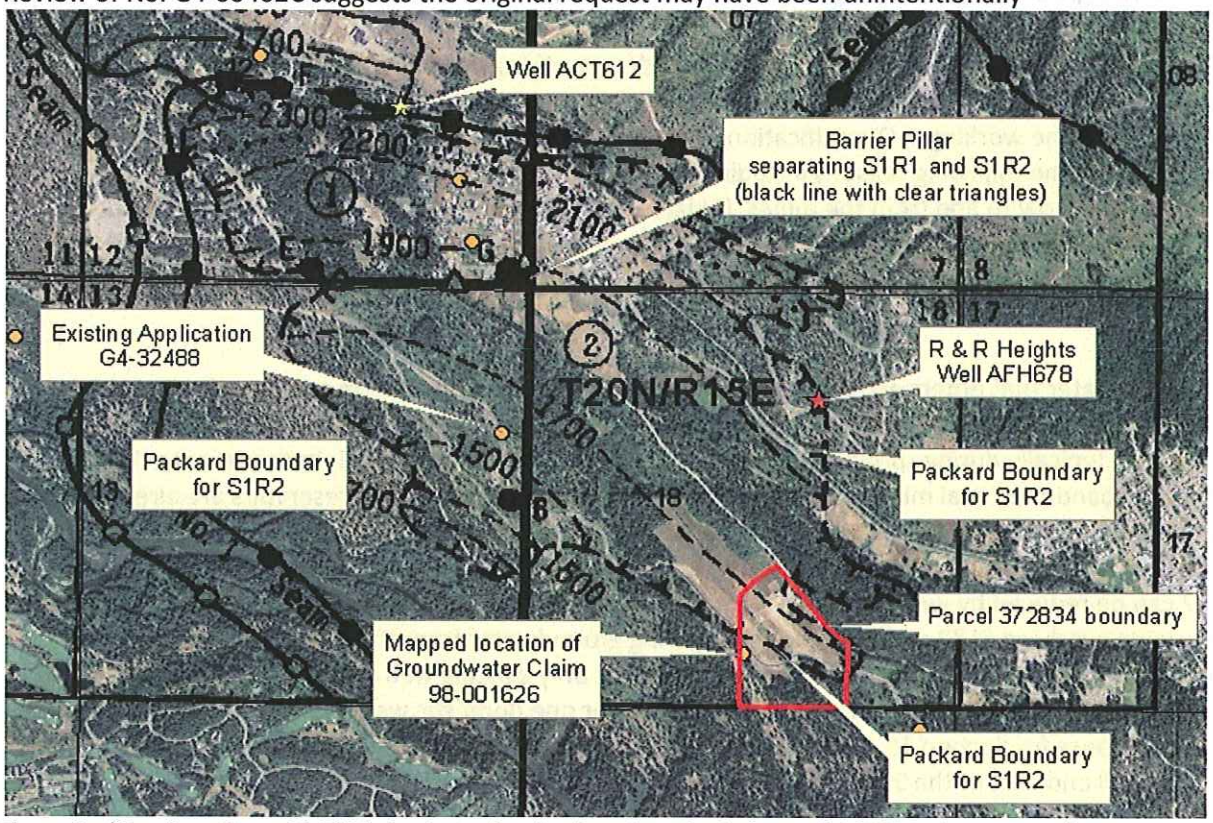

Figure 2: (Hoselton Figure 3) 2011 air photo showing location of existing well ACT612, the proposed location for a well under application No. G4-32488, and the mapped location of groundwater withdrawal under Claim No. 98-001626 relative to its parcel, to reservoir boundaries and to the subject well.

authorized for more than the entire estimated conservative volume stored in S5R2 of 300 acre-feet.

Further, the Water System Plan for Pineloch Sun indicates the system historically has not used more than approximately 0.37% of the original authorization which may explain, in part, why the system has operated relatively successfully in spite of occasionally reported indicators of possible persistent groundwater declines (WDOE (Ecology) Water Resources file No. CG3-21798C; personal communications Hoselton-Ellingson and Hoselton-Pineloch Sun representatives, 1995 and 2003). Ellingson (1995)

[11] The priority date for No. G4-00462C is March 30, 1971. Although it is likely that Mr. Patrick, doing business as the Roslyn Cascade Coal Company, knew the well penetrated the coal workings, it is uncertain, however, that anyone at that time had attempted to calculate the stored volumes of groundwater in the abandoned workings. It was not until 1981 that Packard's report was published and stored volumes of water were estimated. As a result, the Packard work was not available to permit writers at the time the authorization for application No. G4-00462 issued for 322 acre-feet per year.

believes the system may be exceeding an estimated average annual refilling volume of approximately 18 to 40 af/yr and believes the difference between the refilling rate plus an annual overdraft of stored water and the annual water system's actual use is likely made up by leakage from adjacent reservoirs. Ellingson cautioned that if the water system must continually rely on overdrafting storage, the effective life of the water supply may only be 20 years[12] at the current rate of consumption. While it presently (2013) may be that Pineloch Sun's water supply from R5S2 will exceed Ellingson's estimate of depletion, cautious concern remains for the system's vulnerability and the possibility that a large withdrawal such as proposed under No. G4-32488 from S5R3 could increase leakage from S5R2 and potentially impair No. G4-00462C.

Last, the request for 500 gpm and 600 af/yr, made in application No. G4-32488, would not be physically possible from the un-mined portion of Roslyn Formation and would be unrealistic to consider as a possible alternative groundwater source.

The subject application, No. G4-35551, proposing to use subject well AFH678, requests a total of 6.199 af/yr for group domestic use[13] Mitigation currently proposed for No. G4-35551 will only address effects to the Yakima main stem from about where it passes the City of Cle Elum and downstream and will not, in any capacity, relieve consumptive use impacts to S1R2.

There may be in the range of 500 af of stored water in S1R2. The unknowns and uncertainties of this system are many and large while the Formation's yield is generally small. If new uses of groundwater are to be withdrawn from S1R2 and other mine reservoirs within the abandoned coal mine system, then it is likely desirable to limit withdrawals to less than the volume that can be recharged by precipitation each year for the individual reservoirs. General to reservoir specific estimates of an annual refilling volume for S1R2 range between 71 af/yr to perhaps 153 af/yr.

Given the discussion above, physical water appears to be available from S1R2. S1R2 may also be able to safely tolerate the proposed withdrawal of 6.199 af/yr under the subject application, No. G4-35551, in addition to the current withdrawals under existing Ground Water Claim No. 98-001626.

In any case, however, there is not enough physical water available from S1R2 to satisfy the existing Claim No. 98-01626 plus the subject application, No. G4-35551, and the unprocessed existing application, No. G4-32488.

General Impairment Discussion

The concepts discussed above must be evaluated when impairment is being considered. For example, to claim impairment, a senior groundwater right holder must have a qualifying groundwater withdrawal facility and be able to demonstrate that withdrawals by a junior water user are causing an interruption or interference in the availability of water. The Claim must also show that there is a right to protect, and possibly other pertinent factors. Consequently when a proposed withdrawal is evaluated, consideration is given to how the withdrawal may affect other existing groundwater and surface water rights.

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[12] Ellingson's estimate was made in 1995. In 2003, Ecology received notice from the water system that they intended to perforate the well into Seam 1 in attempt to assure the reliability of their water supply. The system's 2011 water system plan and DOH records, however, show no indication the well has ever been modified.

[13] A related and junior application, No. G4-35604, requests an additional 11.72 af/yr from the same well (AFH678), also for group domestic use. The combined requests, if authorized, would total 17.919 af/yr from well AFH678.

The proposed withdrawal under No. G4-35551 will capture groundwater that would otherwise discharge to the lower Cle Elum River and to the Yakima River. The captured water will not be restored by mitigation water until approximately downstream of the City of Cle Elum.

Groundwater leakage from S1R1 to S1R2 will likely be increased as a result of the proposed withdrawal. The request under No. G4-35551, plus the existing rights within S1R2, are presently less than a conservative annual refilling volume. Consequently, if cumulative withdrawals from S1R2 are restricted to no more than a conservative annual refilling volume, then impairment to existing wells in S1R1 are not anticipated.

Existing application, No. G4-32488, has a priority date of November 25, 1996, and requests 600 af/yr to be withdrawn at a rate of 500 gpm. The request exceeds the normal capacity of the Roslyn Formation. The request also exceeds the conservative estimated volume of S1R2. The request under application No. G4-32488 would, at minimum, fail the test of water availability for S1R2. An alternative for the prior request may be to construct a well into S5R3.

Because of the existing application No. G4-32488 and the subject application No. G4-35551, careful attention was given to the existing Archie S. Patrick right, No. G4-00462C, that withdraws groundwater from S5R2 for a Class A public water system. The subject application, No. G4-35551 proposes to withdraw groundwater associated with S1R2. In the subject area, coal Seam 1 occurs approximately 160 feet above coal Seam 5. Because the two water systems withdraw groundwater from two vertically separated coal seams and are also separated horizontally by barrier pillars that parallel the southeast corner of Section 12, T. 20 N., R. 14 E.W.M., impairment to the Patrick right due to the request under No. G4-35551 is not anticipated. A groundwater withdrawal under existing application No. G4-32488 from S5R3 could, however, adversely affect the Patrick right by exceeding an annual refilling volume in S5R3 and increasing leakage from S5R2.

Prior application No. G4-32488 appears to conflict with priority processing of mitigated application No. G4-35551 because the earlier request creates a water availability issue for S1R2, a water availability issue for S5R3, and a potential impairment issue for S5R2. Consequently, existing application No. G4-32488 must be withdrawn, denied, or otherwise resolved before withdrawals proposed in No. G4-35551 may be considered. If application No. G4-32488 is withdrawn, denied, or otherwise resolved, then impairment of existing rights by the groundwater withdrawals proposed in No. G4-35551 is unlikely.

Legal Availability

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

- Regional water management plans – which may specifically 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 a 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.

When evaluating legal availability regarding applications for new groundwater permits, Ecology must statutorily limit appropriations of groundwater to:

1. Uses for a structure for which a building permit is granted and the building permit application vested prior to July 16, 2009.
2. Uses determined to be water-budget-neutral pursuant to WAC 173-539A-050.

Given that this proposal has acquired a portion of trust water under Trust Water Right No. CS4-01279sb5c in the amount of 3.350 acre-feet, this directive will be met. This Trust Water Right is dedicated to instream flow for water-banking-mitigation purposes for as long as the right remains in the TWRP. Such Trust Water Right has an equal or greater contribution to flow during irrigation season as measured on the Yakima River at Parker that would serve to mitigate the proposed use for impacts to the total water supply available.

Water Duty

In planning a community development, source capacity must be recognized. The total daily source capacity, in conjunction with storage designed to accommodate peak use periods, must be able to reliably provide sufficient water to meet the MDD for the water system. Reliability and sustainability must also be considered when planning for a water system. Lacking metered water use records, Ecology referred to the Yakima River Basin Water Rights Adjudication: Report of Referee, Subbasin No. 5 to obtain water duty that was relied upon by the Referee. The maximum duty of water calculated in Subbasin No. 5 for the purpose of a single domestic use with a small lawn and garden was set at 0.01 cfs or 4.48 gallons per minute (gpm).

Beneficial Use

The proposed uses of water for irrigation and multiple domestic are defined in statute as beneficial uses (RCW 90.54.020(1)).

Public Interest Considerations

When investigating a water right application, Ecology is required to consider whether the proposal is detrimental to the public interest. Ecology must consider how the proposal will affect an array of factors such as wildlife habitat, recreation, water quality, and human health. The environmental resources and other natural values associated with the area were taken into account during the consideration of this application. Public interest comments from Ms. Hoselton's Technical Memorandum follow:

Public Interest Comments

Avoidance of additional subsidence and reduction of reservoir porosity as a result of continuing mine collapse: Hawkins and Dunn (2007) explained the actual porosity of the flooded, abandoned mine workings could be much smaller than initial estimates of coal removed because of post-mining subsidence and provided an example where a known 63% of coal had been removed, however, post-mining subsidence had reduced the effective porosity to a mean of 11%. Conversely, Ferrell (1992) suggests that removal of coal results in fracturing of overlying strata and increases vertical permeability

of the abandoned mine workings. Packard (1981) speculates that "the possibility of subsidence as a result of dewatering the mines should be considered a serious problem" and that if considered probable that preventative or precautionary measures may be required. Booth (1986), states that "Mine-induced changes in hydraulic properties are dynamic" and that "porosities decline due to resettlement and compaction, and by consolidation as pore-water pressures fall and effective stress rises, during drainage."

These and other studies point out the uncertainties of how the abandoned mine system rock mechanics may respond to the physical stresses of increased groundwater withdrawals and whether such may trigger additional subsidence. It is likewise not known how additional subsidence may affect the overall porosity of the mine reservoirs/pools.

Consequently every effort should be made to collectively account for current groundwater withdrawals from the abandoned mine system and determine what, if any, impact that groundwater withdrawals by wells may have on the integrity of the rock skeleton of the abandoned mine system. Additionally, whether or not or to what degree the system may have additional carrying capacity for new wells should be a priority for investigation.

Use of stored water from the abandoned coal mines may impact water quality: For example the Town of Welch, West Virginia, observed that about 1 year after Welch began using the Exeter Mines to supply water, the ionic type of water in the coal shaft changed from sodium bicarbonate to sodium sulfate. Water hardness values and calcium, sulfate, iron, and manganese concentrations increased with the additional pumping. Alkalinity, pH, and the concentration of sodium decreased (Ferrell, 1992).

Increase Awareness of potential for water related abandoned coal mine hazards: Kohli and Block (2007) point out that a sudden failure of barrier pillars, known as a 'blowout', can unexpectedly and rapidly release mine pool water to the land surface where it may cause flooding, landslides, erosion, and contamination. They continue on to say that historical blowouts indicate that most failures occur in the immediate overburden of the flooded area. Among factors affecting barrier blowout, hydrostatic lift tends to be the most common. Hydrostatic lift is caused by the "forceable ejection of mine water through a weak joint system originating within the mine void and traversing immediately atop of the coal barrier (Kohli and Block, 2007)." Additional understanding of this phenomena may be necessary to understand how it may apply to or be affected by groundwater withdrawals from the abandoned coal mine system.

Consideration of Protests and Comments
No protests were filed against this application.

Conclusions

In conclusion,

- Water is physically available at the quantities sufficient to meet project demand. When combined with the proposed mitigation measures, water is legally available under the provisions of WAC 173-539A.
- RCW 90.54.020 recognizes domestic and irrigation uses as beneficial uses of water.
- Approval of the proposed appropriation will not result in impairment of existing water rights.

- Approval of the proposed appropriation is not detrimental to the public interest.

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:

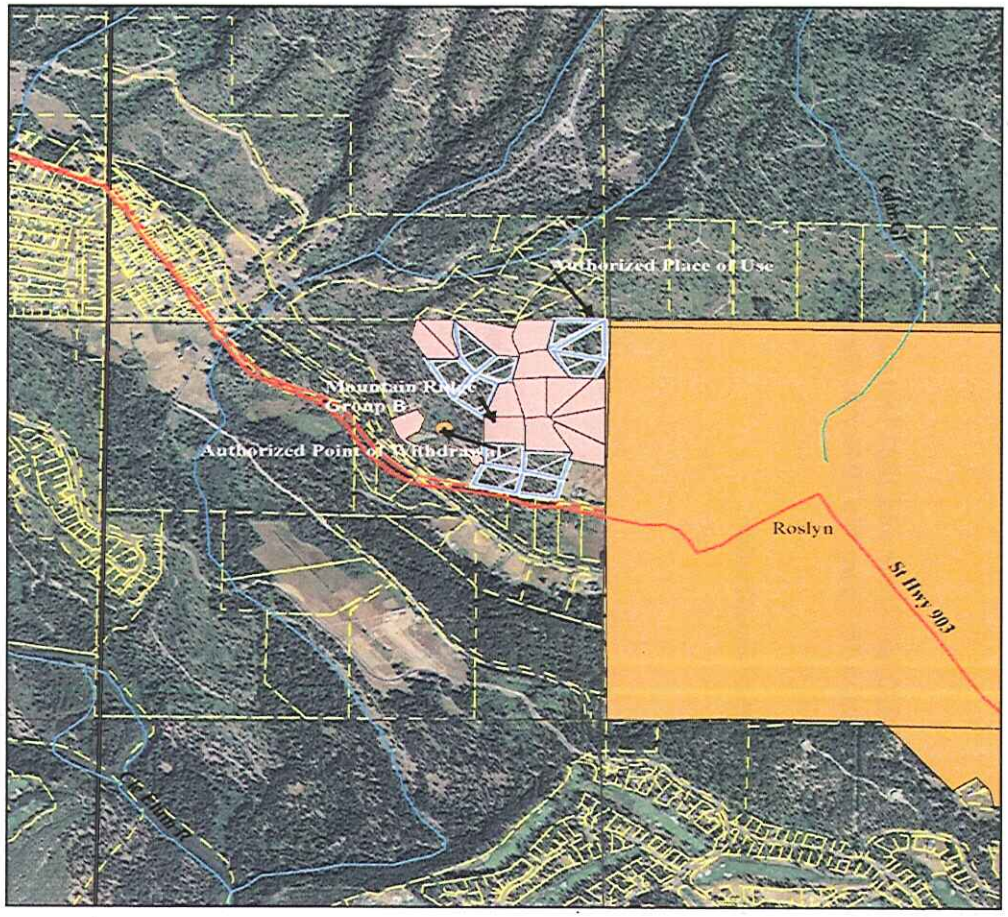
- 49.28 gallons per minute.
- 6.199 acre-feet per year (4.313 ac-ft/yr for multiple domestic of up to 11 connections and 1.886 ac-ft/yr for irrigation of lawn and garden).
- Continuous indoor multiple domestic for up to 11 residences.
- Seasonal irrigation of up to 1 acre of lawn and garden from June 1 through September 30 annually.

Point of Withdrawal
One well (AFH678) approximately 1350 feet south and 1637 feet west from the northeast corner of Section 18, within the SW¼NE¼, Section 18, Township 20 North, Range 15 E.W.M.

Place of Use
As described on Page 2 of this Report of Examination.

Candis L. Graff *Date*

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.



0 700 1,400 2,800 4,200 5,600 Feet

Basemap - NAIP 2011 Aerial Photo

DEPARTMENT OF ECOLOGY State of Washington

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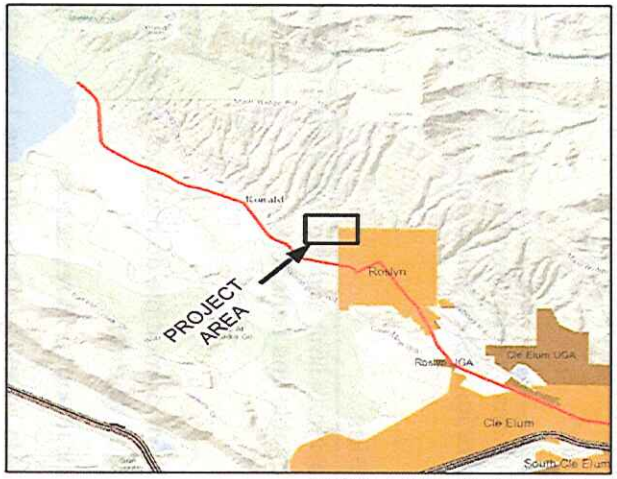
R & R Heights Land Company, Inc.
G4-35551
Sec. 18, T. 20 N., R. 15 E.W.M.
WRIA 39 - Kittitas County



Basemap - ESRI US Topographic Maps

Legend

- Authorized Place of Use
- Authorized Point of Withdrawal
- ECY City
- Mountain Ridge Group B
- Townships
- Sections
- Parcels
- ECY WaRivers
- ECY Highways

Comment:

Place of use and source locations are as defined within the Report of Examination cover sheet for the document identified in the header above.

ATTACHMENT 1

ATTACHMENT 2

Table 5: Other Right Appurtenant to POU

Control Number	Doc. Type	Purpose	Qa	Source
CS4-YRB7CC01724@4	Change/ROE	MU	1,005.98	*6 Wells + Yakima, Cle Elum River
CS4-YRB7CC01724@5	Change/ROE	MU	536.3	*6 Wells + Yakima, Cle Elum River
CS4-YRB7CC01724@6	Change/ROE	MU	929.62	*6 Wells + Yakima, Cle Elum River
CG3-21798C@1	Change/ROE	MU	169	1 Well
CS4-01724(A)CTCL@1	Change/App	MU	283.92	Yakima, (3) Cle Elum River
CS4-01724(B)CTCL@1	Change/App	MU	88.94	Yakima, (3) Cle Elum River
CS4-01724(C)CTCL@1	Change/App	MU	94.83	Yakima, (3) Cle Elum River
G4-32487	New App	HW	9	1 Well
G4-32488	New App	IR, ST	600	1 Well
CS4-00262CTCL	Chang/App	IR, ST	120	(3) N. Fork Cowiche Creek
CS4-00908CTCL@1	Change/AppE	MU	868	Yakima, (3) Cle Elum River
CS4-05259CTCL	Change/App	MU	195	Yakima, (3) Cle Elum River
S4-30430	New App	MU	110	Domerie Creek
S4-84638-J	CFO	SR	166,846	Yakima River
S4-84639-J	CFO	SR	250,261	Kachees River
S4-84640-J	CFO	SR	446,610	Yakima River
S4-84641-J	CFO	SR	38,768	Bumping River
S4-84642-J	CFO	SR	216,850	Tieton River
S4-84643-J	CFO	SR	5,300	Tieton River
S4-84644-J	CFO	SR	472	Yakima River
S4-84645-J	CFO	SR	2	Tieton River
S4-84646-J	CFO	SR	56	Yakima River
S4-84647-J	CFO	SR	60	Yakima River
S4-84648-J	CFO	SR	408	Yakima River
S4-84649-J	CFO	SR	1,265	Tieton River
S4-84650-J	CFO	SR	5,120	Yakima River

*The same two well fields with 3 wells on each field in addition to diversions from the Yakima and Cle Elum Rivers are authorized.

DG=Domestic General, IR=Irrigation, RE=Recreation/Beautification, MU=Municipal, ST=Stockwater, HW=Highway, SR=Storage

Although Nos. CS4-YRB7CC01724@4, CS4-YRB7CC01724@5, and CS4-YRB7CC01724@6 are for municipal use and cover the same place of use (POU) as this subject application's proposal, they are meant to service the Suncadia Resort specifically.

A portion of the place of use authorized under No. CG3-21798C@1 (Evergreen Valley Water System) covers the same proposed place of use as this subject proposal; however, when approached by the applicant with a request to connect to the Evergreen Valley Water System, they were denied their request.

Nos. CS4-01724(A)CTCL@1, CS4-01724(B)CTCL@1, and CS4-01724(C)CTCL@1 are applications to change the place-of-use and to add points of diversion for rights owned by Suncadia. Ecology has not processed either of these applications.

No. G4-32487 requests water for the construction of a new highway (dust control on screening plant). This application was submitted in 1996 but has not been processed.

No. G4-32488 requests water for irrigation of a golf course and landscaping, and stockwater for 100 horses. This application was submitted in 1996 but has not been processed and has since been withdrawn thereby eliminating any conflict for impairment between the subject ROE proposal and this application.

No. CS4-00262CTCL requests irrigation and stockwater use from 3 diversions on Cowiche Creek. The application of change was submitted in 2004 but has not been processed.

No. CS4-00908CTCL@1 requests municipal use, but the application of change was filed in 2004 and has not been processed.

No. CS4-05259CTCL requested a change to municipal and flow augmentation purposes and was filed in 2004, but the application of change has not been processed.

The City of Roslyn submitted an application for municipal use from Domerie Creek in 1990, but the application has not been processed.

Surface Water Right Nos. S4-84638-J through S4-84650-J, which are owned by the United States Bureau of Reclamation, authorize water to be stored for flood control purposes.

Selected References

1. Packard, Frank A., 1981, *Reconnaissance of Water Availability and Quality in Abandoned Coal Mines Near Roslyn, Kittitas County, Washington, U. S.* Geological Survey Water Resources Investigations Open File Report 80-955. Prepared in cooperation with the State of Washington Department of Ecology by the USGS in Tacoma, WA. p. 20.