STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

July 5, 2012

Washington Water Service
PO Box 336
Gig Harbor WA 98335-0336

Re: Water Right Application No. G2-29819

Dear Sir or Madam:

Enclosed is a copy of the Department of Ecology's *Report of Examination.* This report contains our decision regarding your application.

Your application has been approved.

A Permit will be issued consistent with the enclosed *Report of Examination* after the appeal period has expired, if no appeals have been filed.

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 this Order:

File your appeal and a copy of this decision 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.

If you have any questions, please call (360) 407-6300.

Sincerely,

Michael J. Gallagher
Section Manager
Water Resources Program

Enclosures: Report of Examination
Your Right To Be Heard

By Certified Mail: 7011 1150 0000 7881 9043

File NR G2-29819
WR Doc ID 2147317

DEPARTMENT OF
ECOLOGY
State of Washington

State of Washington
REPORT OF EXAMINATION
FOR WATER RIGHT APPLICATION

PRIORITY DATE	WATER RIGHT NUMBER
11/18/1998	G2-29819

MAILING ADDRESS	SITE ADDRESS (IF DIFFERENT)
WASHINGTON WATER SERVICE P.O. BOX 336 GIG HARBOR WA 98335-0336	3630 108th ST NW GIG HARBOR, WA 98332

Quantity Authorized for Withdrawal or Diversion

WITHDRAWAL OR DIVERSION RATE	UNITS	ANNUAL QUANTITY (AF/YR)
500	GPM	352

Total withdrawals from both wells in this authorization must not exceed the total quantity authorized listed above.

Purpose

PURPOSE	WITHDRAWAL OR DIVERSION RATE			ANNUAL QUANTITY (AF/YR)		PERIOD OF USE (mm/dd)
	ADDITIVE	NON-ADDITIVE	UNITS	ADDITIVE	NON-ADDITIVE	
Municipal	500		GPM	352		01/01 - 12/31

IRRIGATED ACRES		PUBLIC WATER SYSTEM INFORMATION	
ADDITIVE	NON-ADDITIVE	WATER SYSTEM ID	CONNECTIONS
0	0	66637	

Source Location

COUNTY	WATERBODY	TRIBUTARY TO	WATER RESOURCE INVENTORY AREA
PIERCE	GROUNDWATER		15-KITSAP

SOURCE FACILITY/DEVICE	PARCEL	WELL TAG	TWP	RNG	SEC	QQ Q	LATITUDE	LONGITUDE
Peacock Hill Well 12	0222314027	BAT429	22N	02E	31	NE SE	47.351989	-122.591211
Peacock Hill Well 13	4784400331	BCA358	22N	02E	32	NW NW	47.356344	-122.588914

Datum: NAD83/WGS84

Place of Use (See Attached Map)

LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE

The place of use (POU) of this water right is the service area described in the most recent Water System Plan/Small Water System Management Program approved by the Washington State Department of Health, so long as the water system is and remains in compliance with the criteria in RCW 90.03.386(2). RCW 90.03.386 may have the effect of revising the place of use of this water right.

Proposed Works
Well 12: 10 inches in diameter and 474 feet deep, screened in Unit E
Well 13: 12 inches in diameter and 482 feet deep, screened in Units C and E

Development Schedule		
BEGIN PROJECT	COMPLETE PROJECT	PUT WATER TO FULL USE
Started	September 1, 2013	September 1, 2022

Measurement of Water Use	
How often must water use be measured?	monthly
How often must water use data be reported to Ecology?	Annually (Jan 31)
What volume should be reported?	Total Annual Volume
What rate should be reported?	Annual Peak Rate of Withdrawal (gpm)

Provisions

Mitigation
WWS will relinquish 2.0 ac-ft and 2 gpm of G2-25903 to offset surface water impacts to North Creek caused by pumping Wells 12 and 13. WWS will file a partial relinquishment form once G2-29819 is approved. Ecology will issue a superseding certificate for 48 gpm and 38 ac-ft to reflect the reduction in annual quantity.

WWS will relinquish 4.2 ac-ft and 2.6 gpm of G2-21940 to offset surface water impacts to Crescent Creek caused by pumping Wells 12 and 13. WWS will file a partial relinquishment form once G2-29819 is approved. Ecology will issue a superseding certificate for 97.4 gpm and 18.5 ac-ft to reflect the reduction in annual quantity.

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.

Recorded water use data shall be submitted via the Internet. To set up an Internet reporting account, contact the Southwest Regional Office. If you do not have Internet access, you can still submit hard copies by contacting the Southwest Regional Office for forms to submit your water use data.

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.

Department of Health Requirements
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 at Southwest Drinking Water Operations, 243 Israel Road S.E., PO Box 47823, Tumwater, WA 98504-7823, (360) 236-3030.

Water Use Efficiency
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.

Proof of Appropriation
The water right holder shall file the notice of Proof of Appropriation of water (under which the certificate of water right is issued) when the permanent distribution system has been constructed and the quantity of water required by the project has been put to full beneficial use. 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. G2-29819, 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).

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Pollution Control Hearings Board 1111 Israel RD SW Ste 301 Tumwater, WA 98501	**Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

Signed at Olympia, Washington, this 5th day of July 2012.

Michael J. Gallagher

Michael J. Gallagher, Section Manager

For additional information visit the Environmental Hearings Office Website: http://www.eho.wa.gov. To find laws and agency rules visit the Washington State Legislature Website: http://www1.leg.wa.gov/CodeReviser.

INVESTIGATOR'S REPORT
Application for Water Right -- Washington Water Service
Water Right Control Number G2-29819
Tammy Hall, Department of Ecology

BACKGROUND

On November 18, 1998, Washington Water Service (formerly Harbor Water Company) filed application G2-29819 for a permit to pump 625 gallons per minute (gpm) and 800 acre-feet (ac-ft) per year from six wells at various locations in their service area.

This application was amended to reduce the request to 500 gpm and 352 ac-ft per year from a well in NE ¼ SE ¼, Section 31, T. 22 N., R.2 E.W.M. The project site is located on the Gig Harbor Peninsula in Water Resource Inventory Area 15 – The Kitsap Peninsula.

Table 1 Application Summary.

Name	*Washington Water Services*
Priority Date	11/18/1998
Instantaneous Rate	500 gpm
Annual Quantity	352 ac-ft per yr
Purpose(s) of Use	Municipal Supply Purposes
Period of Use	Continuous use
Place(s) of Use	The place of use (POU) of this water right is the service area described in the most recent Water System Plan/Small Water System Management Program approved by the Washington State Department of Health, so long as the water system is and remains in compliance with the criteria in RCW 90.03.386(2). RCW 90.03.386 may have the effect of revising the place of use of this water right

Table 2 Proposed Point of Withdrawal.

Source Name	*Parcel*	*WellTag*	*Twp*	*Rng*	*Sec*	*QQ Q*	*Latitude*	*Longitude*
Well 12	0222314027	BAT429	22N	02E	31	NE SE	47.351989	-122.591211
Well 13	4784400331	BCA358	22N	02E	32	NW NW	47.356344	-122.588914

Legal Requirements for Approval of Appropriation of Water

RCWs 90.03 and 90.44 authorizes the appropriation of public water for beneficial use and describes the process for obtaining water rights. Laws governing the water right permitting process are addressed in RCW 90.03.250 through 90.03.340 and RCW 90.44.050. In accordance with RCW 90.03.290, Ecology must make determinations on these four criteria in order to approve an application for water rights:

- Water must be available for appropriation.

- There must be no impairment of existing rights.
- The water use must be a beneficial use.
- Approving the application 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 G2-29819.

Public Notice

Notice of the application was published in the *Peninsula Gateway* on February 10 and February 17, 1999. No protests were received.

State Environmental Policy Act (SEPA)

A SEPA determination evaluates if a proposed withdrawal will cause significant adverse environmental impacts. A SEPA threshold determination is required for:

1) Surface water applications for more than 1 cubic feet per second (cfs). For agricultural irrigation, the threshold increases to 50 cfs, if the project isn't receiving public subsidies.
2) Groundwater applications requesting more than 2,250 gpm.
3) Projects with several water right applications where the combined withdrawals meet the conditions listed above.
4) Projects subject to SEPA for other reasons (e.g., the need to obtain other permits that are not exempt from SEPA).
5) Applications that are part of several exempt actions that collectively trigger SEPA under WAC 197-11-305.

This application does not meet any of these conditions and is categorically exempt from SEPA.

INVESTIGATION

The material reviewed in support of this application included the following:

- The State Surface Water Codes, administrative rules, and policies.
- Department of Ecology's Water Right Tracking System (WRTS) database.
- Topographic and local area maps.
- Notes from a site visit on August 23, 2011.
- Hydrogeologic memorandum written by Tammy Hall, licensed hydrogeologist, with Water Resources Southwest Regional Office, dated May 17, 2012.
- Preliminary Permit report for Peacock Hill Well 12 prepared by Pacific Groundwater Group dated April 2009.
- Addendum to report for Preliminary Permit for Peacock Hill Well 12, prepared by Pacific Groundwater Group, dated November 11, 2009.
- Report summarizing construction and testing of Peacock Hill Well 13, prepared by Pacific Groundwater Group, dated October 2011.
- Supplement to Pacific Groundwater Group's report Peacock Hill Well 13 Construction and Testing, prepared by Pacific Groundwater Group, dated February 13, 2012.

- Summary of Peacock Hill Mitigation Proposal prepared by Pacific Groundwater Group, dated April 24, 2012.

Area Description

The project area is on the Gig Harbor Peninsula, located in northwestern Pierce County, at the southern end of the Puget Lowland. The Gig Harbor Peninsula is surrounded on three sides by marine embayments and connects to the larger Kitsap Peninsula.

Peacock Hill Wells 12 and 13 are situated along a ridge about halfway between North Creek to the west and Crescent Creek to the east. Both creeks empty into Gig Harbor.

Application History

In 1998 and 1999, WWS filed two applications for new appropriations to add both instantaneous and annual withdrawal rates to their Peacock Hill Water System (ID #66637).

Application G2-29819, the subject application, was filed in 1998.

Application G2-29864, for the Nordal well, was filed in 1999. It was denied on December 30, 2004. Chapter 173-515-040 WAC closes Crescent Creek and its tributaries to further consumptive withdrawals. WWS subsequently appealed the decision and entered into settlement discussions with Ecology.

Through settlement, WWS proposed the following mitigation to gain approval of both G2-29864 and G2-29819:

- Relinquishing G2-26144 for Peacock Hill Well 9 while retaining it for an observation well.
- Resting (not pumping) Peacock Hill Well 1 while retaining it for an observation well.
- Adding a new well, Well 12 under Application G2-29819, at the site of Peacock Hill Well 4.
- Reducing the request in G2-29819 to 500 gpm and 352 ac-ft per year.
- Providing information in support of G2-29819 under a Preliminary Permit to drill and test Well 12, the proposed new well.

Application G2-29864 was approved and an Amended ROE was issued in 2008.

Preliminary Permit

Ecology issued a Preliminary Permit on December 4, 2007, allowing WWS to drill and test a new well, Peacock Hill Well 12. It also required WWS to address other concerns about potential effects of the proposed withdrawal. More specifically, surface water capture from North and Crescent Creek, both closed to further withdrawals Chapter 173-515-040 WAC, and the potential to induce seawater intrusion in the area. Finally, WWS needed to evaluate the proposed mitigation offered in settlement, to determine if it could be used to off-set stream capture from Well 12.

This Preliminary Permit was to expire on December 31, 2009. Ecology approved a one-year extension, through December 31, 2010.

WWS needed a well that produced 500 gpm to satisfy their needs. Testing of Well 12 determined the maximum sustainable yield was only 200 gpm, less than half the rate WWS needed.

Because of this unexpected reduced capacity of Well 12, WWS needed more time to drill a second well. Ecology issued WWS a second Preliminary Permit on December 12, 2010 allowing them to continue their work. Peacock Hill Well 13 was drilled in 2011, a short distance from Well 12.

Proposed Use

Although the application requested water for multiple domestic supply purposes, WWS is a municipal water supplier in RCW 90.03.015. Therefore, the proposed use for this project is municipal supply purposes.

Water Demand

The average daily demand is calculated using Washington Department of Health (WDOH) guidelines according to the following mathematical equation:

$$ADD = \left(\frac{8000}{AAR}\right) + 200$$

Where: ***ADD*** = *Average Day Demand, (gallons-per-day/ERU)*

AAR = *Average Annual Rainfall, (inches-per-year)*

Using climatic information for the Gig Harbor area, the average daily demand per residence should not exceed 360 gallons per day per residence. The annual usage per connection is 0.4 ac-ft per year. Adding 352 ac-ft will allow the Peacock Hill Water System to serve 885 more ERUs.

Other Rights Appurtenant to the Place of Use

The Peacock Hill Water System is identified in Washington Department of Health's database, Sentry, as a Group A system (ID66637) which provides water to customers in a service area encompassing several sections. The system is served by ten wells. Adding 500 gpm and 352 ac-ft per year will increase the total water rights for the Peacock Hill System to 1,780 gpm and 1080.5 ac-ft per year. WWS anticipates the expanded system can serve 2,700 Equivalent Residential Units (ERU) projected by 2030. The Water Right Certificates and Permit that cover the Peacock Hill Water System are summarized below in Table 3.

Table 3 Water Right assessment for the Peacock Hill Water System.

Water Right Certificate/Permit #	*Priority Date*	*Source*	*Instantaneous (Qi)gpm*		*Annual Quantity (Qa)ac-ft*	
			additive	*Non additive*	*additive*	*Non additive*
G2-21100	May 30, 1973	Well 6	26		13.5	
G2-21940[1]	February 11, 1974	Well 1	100		22.7	
G2-24263	August 11, 1976	Wells 3 & 4	125		75	
G2-25213	April 18, 1979	Well 5	100		112.3	
G2-25467	January 17, 1980	Wells 1-6	274	351	112.5	223.5
G2-25903[2]	April 27, 1981	Well 8	50		40	
G2-26985	September 20, 1986	Well 11	300		240	
G2-27315	March 30, 1988	Well 7	100		60	
G2-27766P	May 24, 1990	Well 10	230		52.5	
Total			***1305***	***351***	***728.5***	***223.5***

[1]4.2 ac-ft of this water right will be offered as mitigation to offset surface water impact from this application. Following the approval of this application, Ecology will issue a superseding certificate to reflect the reduction in annual quantity.
[2]2.0 ac-ft of this water right will be offered as mitigation to offset surface water impacts from this application. Following the approval of this application, Ecology will issue a superseding certificate to reflect the reduction in annual quantity.

Hydrologic/Hydrogeologic Evaluation

General area geology

The Gig Harbor Peninsula is in northwestern Pierce County, at the southern end of the Puget Lowland, in WRIA 15 (Kitsap Basin). The subsurface in the Gig Harbor Peninsula consists of unconsolidated and semi-consolidated sediments between 1,200 to 2,000 feet thick (Jones, 1996). These sediments are underlain by Miocene volcanic and sedimentary bedrock (Garling, 1965).

The unconsolidated sediments consist mostly of glacially derived deposits left behind by at least six glaciations that took place during the last two million years. The most recent glaciation, the Vashon, occurred around 10,000 years ago.

Garling (1965) describes a typical glacial sequence of glacial deposits as consisting of the following units, listed from youngest (top) to oldest (bottom):

- Recessional outwash. In the project area, recessional outwash consists of a discontinuous mantle of sand and gravel that overlies the till. It is often found on hilltops.
- Till. Glacial till is a compact and unsorted mixture of cobbles and pebbles in a binder of sandy silt and clay. Vashon till is typically gray to bluish-gray.
- Advance outwash. This type of glacial deposit is left at the front of an advancing glacier and primarily consists of gravels and coarse sands. Advance outwash is capped by till.

Water-producing aquifers

Groundwater is produced from three aquifers. All three are confined where fully saturated and overlain by a low permeable unit. Shallow, perched groundwater zones exist in several locations on the peninsula where lenses of sand and gravel occur within lower permeable material. Water levels in the perched groundwater zones are slightly higher than those in the upper aquifer

The hydrostratigraphic units on the Gig Harbor Peninsula are described as follows (EMCON, 1992) (Borden and Troost, 2001):

- Vashon Aquifer: Vashon recessional outwash (Qvr), till (Qvt), advance outwash/glaciolacustrine silt/clay (Lawton Clay)/Olympia beds/Pre-Olympia drift (Qva). Water table conditions exist in much of the Qva. The water level in the advance outwash generally mimics surface topography. This unit is identified as hydrostratigraphic layers A_r, A_a, and A_t in EMCON (1992).
- Interglacial deposits, Kitsap Formation (Qf). The composition of the Qf ranges from sand to clay, although it is generally fine grained. The Qf behaves as a confining unit and retards groundwater flow between the Qva and Qc. It is as thick as 100 feet in some areas or is thin to non-existent in other areas. The Qf is found at elevations of approximately 200 feet above mean sea level (msl) to 100 feet below msl. This unit is identified as hydrostratigraphic layer B in EMCON (1992).
- Sea Level Aquifer (Qc): Salmon Springs Drift/Double Bluff Drift. The Qc is characterized by a low elevation potentiometric surface (up to 135 feet above msl). The Qc is identified as hydrostratigraphic layer C in EMCON (1992).
- Deep Aquifer (TQu): Permeable layers within the pre-Salmon Springs deposits. The TQu has at least two productive zones separated by aquitards. EMCON (1992) identifies fine grained deposits (aquitards) as hydrostratigraphic layers D and F and the water producing deposits (aquifers) as hydrostratigraphic layers E and G. Water level data for the TQu is sparse, but several water level measurements indicate that the potentiometric surface is generally less than 100 feet above msl. The extent and configuration of the TQu is poorly understood.

The Gig Harbor Peninsula is drained by multiple small streams that discharge directly to marine water. Annual precipitation on the peninsula ranges from 40 to 52 inches/year (in/yr) (Golder 2002). Precipitation infiltrates into the ground, runs off to streams, or is lost to evapo-transpiration. Between 13% (Drost 1982) and 17% (Golder 2003) of precipitation is available for groundwater recharge after contribution to baseflow is made.

Precipitation infiltrating the ground flows vertically downward to recharge the three aquifers on the Peninsula. Drost (1982) cites a downward component to groundwater flow, with flow toward marine water bodies and surface drainage channels. Within aquifers, groundwater flows mostly horizontal, from areas of higher head to areas of lower head (Drost, 1982).

Peacock Hill Wells 12 and 13

Wells 12 and 13 are about 1,950 feet apart. The wells are roughly ½ mile west of Crescent Creek and ½ mile north of where Crescent Creek empties into Gig Harbor. Well 12 is screened in Unit E (Deep Aquifer). Well 13 is screened across Units C and E (Sea Level/Deep Aquifer), which are separated by a thin silty interbed (Unit D). Static water levels in both aquifer units are about the same, indicating that both aquifers are hydraulically connected. (PGG, 2011)

Construction details of Well 12 and Well 13 are summarized below in Table 4.

See Attachment #1

Table 4. Construction details of Peacock Hill Wells 12 and 13.

Well Id	***Well 12***[3]	***Well 13***[4]
Well Tag	BAT429	BCA358
Date Drilled	10/17/2007	4/22/2011
Well elevation (ft above mean sea level, msl)	285	325
Well diameter (inches, in)	10	12
Completed depth (ft below ground surface, bgs)	474	480
Approximate elevation, ft below msl	189 ft below msl	157 ft below msl
Screened interval, ft bgs	445-471	380-475
ft below msl	160-186 ft below msl	55-150 ft below msl
Static water level, ft bgs	186	198.5
ft above msl	99 ft above msl	126.5 ft above msl
Date measured	10/17/2007	4/22/2011
Water bearing formation	Deep Aquifer Unit E	Sea Level Aquifer/Deep Aquifer Units C and E

[3] PGG, 2009a
[4]PGG, 2011

Pump tests

Pump tests were performed on Wells 12 and 13 on May 2008 and May 2011, respectively, as required in each preliminary permit.

Pump testing of Well 12 showed productivity is limited by low transmissivity and well depth, since it only partially penetrates the full thickness of Unit E. The pumping response indicated that the overlying aquitard, Unit D, provided most of the water to the well during the test. Based on the specific capacity of the well, the maximum yield is only about 240 gpm. (PGG, 2009a)

Well 13 is screened across Units C and E and shows much higher yields. The estimated transmissivity at Well 13 is about 1,600 ft^2/day, about eight times greater than Well 12. (PGG, 2011)

Following each pump test, recovery in the pumping well and all wells monitored was slow, likely from limited horizontal aquifer extent and slow replenishment by vertical leakage (PGG, 2009a, 2011).

Aquifer properties at Wells 12 and 13 are summarized below in Table 5.

Table 5 Aquifer properties at Wells 12 and 13.

Parameter	*Well 12*[5]	*Well 13*[6]
Date of Pump Test	May 2008	May 2011
Aquifer Transmissivity	192 ft^2/day	1,600 ft^2/day
Maximum drawdown during test (ft)	188	43.7
Specific capacity (gpm/ft of drawdown)	1.7	10.3
Pumping capacity (gpm)	240	500

[5]PGG, 2009a
[6]PGG, 2011

Model Efforts

Predicted streamflow capture from pumping was evaluated three times. First, Robinson & Noble (R&N) (2006) took a simple approach, focusing on leakage induced by pumping from the Sea Level Aquifer (Unit C). R&N predicted pumping 800 ac-ft at 500 gpm would cause roughly 15.1 ac-ft of leakage from the upper aquifer, or about 2% of the amount of water being pumped. R&N did not differentiate how much of the water captured from pumping would be from surface water streams or marine discharge (R&N, 2006).

After Well 12 was installed in 2009, PGG (2009b) took a second look at potential impacts of pumping on surface water. Well 12 is completed in hydrogeologic Unit E, the Deep Aquifer. PGG addressed streamflow capture by developing a 3-D numerical groundwater flow model. This model took considered influences of at least five hydrogeologic units, three saltwater bodies, and two surface streams. The pumping rates selected for this model were smaller; 352 ac-ft and 218 gpm. PGG predicted pumping would capture about 8.2 ac-ft from the upper aquifer, or roughly 2.3% of the total amount pumped (PGG, 2009b).

Because Well 12 did not produce the instantaneous amount needed, Well 13 was drilled in 2011. PGG (2012) re-ran the model, using Well 13 as a point of withdrawal. The model was refined to more accurately represent marine water boundaries and better define impacts pumping would have on surface water. The modeling results estimated that about 2.1 ac ft of water would be captured from Crescent Creek and 1.1 ac-ft would be captured from North Creek. The remaining roughly 5 ac-ft of leakage would be marine discharge (PGG, 2012a).

The results of each modeling effort is summarized in Table 6.

Table 6. Summary of estimated streamflow capture.

Report	*Ac-ft/yr*	*Average GPM*	*Well*	*Predicted streamflow capture*
R&N (2006)	800	500	12	15.1 ac-ft from upper aquifer, 2% of total pumped
PGG (2009)	352	218	12	8.2 ac-ft from upper aquifer (2.3% of total pumped) and marine water.
PGG (2012a)	352	218	13	8.2 ac-ft from the upper aquifer; 2.1 ac-ft from Crescent Creek and 1.1 ac-ft from North Creek, with balance from marine water.

Mitigation Proposal

Impacts to North Creek

To mitigate predicted impacts of 1.1 ac-ft on North Creek, WWS proposes to relinquish 2 gpm and 2.0 ac-ft of G2-25903. G2-25903 is a municipal supply water right in good standing. Well 8 is in the eastern boundary of the North Creek watershed and completed in the shallow unconfined (A2) aquifer. Reducing withdrawals from Well 8 is expected to result in increased flows in North Creek.

The attributes of G2-25903 are summarized in Table 7.

Table 7. Attributes of Groundwater Certificate G2-25903

Priority Date	April 27, 1981
Name	Harbor Water Company
Purpose of Use	Municipal supply
Sources	Peacock Well 8, 6-inch diameter x 107 feet deep
Well Location	NE ¼ NE ¼ Section 6, T.21N., R.2E.W.M.
Place of Use	Area served by Harbor Water Company
Period of Use	Continuous
Instantaneous Quantity	50 gpm
Annual Quantity	40 ac-ft

Impacts to Crescent Creek

To mitigate surface water capture in Crescent Creek, WWS proposes to relinquish 4.2 ac-ft and 2.6 gpm from G2-21940. This certificate authorizes withdrawals from Peacock Hill Well 1. Well 1 is in the upper Crescent Creek watershed and completed in the shallow (A2) aquifer. Reducing the amount of water being pumped from Well 1 is expected to have direct flow benefits to Crescent Creek.

Withdrawals from Well 1 are authorized by two water right certificates; G2-21940 and G2-25467. G2-21940 authorizes 22.7 ac-ft (equivalent to 14.1 gpm continuous pumping) from Well 1. The attributes of Certificate G2-21940 are listed in Table 8.

Table 8. Attributes of Groundwater Certificate G2-21940.

Priority Date	February 11, 1974
Name	Harbor Water Company
Purpose of Use	Community domestic supply
Source	Peacock Well 1, 6-inch diameter x 142 feet deep
Well Location	SW ¼ SW ¼ Section 20, T.22N., R.2E.W.M.
Place of Use	Area served by Harbor Water Company
Period of Use	Continuous
Instantaneous Quantity	100 gpm
Annual Quantity	22.7 ac-ft

G2-25467 is WWS's main water right for the Peacock Hill Water System. G2-25467 authorizes withdrawals from six wells in the service area. It was intended to consolidate water rights issued to smaller water systems into a larger "umbrella" certificate, but does not increase specific withdrawals from Well 1.

All other wells in the Peacock Hill Water System are completed in deeper aquifers. By reducing the amount of water pumped from Well 1, WWS will be drawing more water from deeper wells not in hydraulic communication with Crescent Creek.

Evaluation of Proposed Mitigation

North Creek mitigation

Relinquishing a portion of G2-25903 (Peacock Hill Well 8) will provide sufficient water to offset impacts of pumping Wells 12 and 13.

WWS will file a partial relinquishment form once G2-29819 is approved. Ecology will issue a superseding certificate for 48 gpm and 38 ac-ft to reflect the reduction in annual quantity.

Crescent Creek mitigation

Through settlement of G2-29864, WWS proposed mitigation to gain approval of both G2-29864 and G2-29819. The proposal contained two parts. The first part involved "resting" Well 1. The second part was to add a new well to G2-25467 through a Showing of Compliance to replace Well 4. This well would be completed in the Sea Level aquifer.

When WWS proposed the settlement, relinquishing part of G2-21940 was not considered because of the relationship between G2-21940 and G2-25467. WWS's overall goal is to discontinue using wells completed in shallow aquifers but recognizes "resting" a water right is administratively challenging. Therefore, WWS proposes instead to relinquish 4.2 ac-ft and 2.6 gpm of G2-21940.

After the approval of G2-29819, Ecology will issue a superseding certificate for 197.4 gpm and 18.5 ac-ft.

Impairment Considerations

Effects to Area Water Users

Water right changes have greatest potential to affect wells completed in the same aquifer near the new point of withdrawal.

WAC 173-150-060 specifies impacts to "qualifying withdrawal facilities" fit the legal definition of impairment. This allows wells to be affected but impacts are not considered impairment. Qualifying withdrawal facilities are wells completed in the same aquifer as the new point of withdrawal. The well must span the aquifer's entire saturated thickness and the pump elevation must allow variation in seasonal water levels.

This authorization will allow withdrawals of 500 gpm and 352 ac-ft from two wells completed in the Sea Level and Deep aquifers.

A query of Ecology's water right (WRTS) database identified two water right certificates within one mile of Wells 12 and 13 completed in the Qc. A north-south trending ridge and a corresponding groundwater divide will likely limit major impacts to the east beyond 1 mile. Major impacts to the west will likely be limited by another topographic ridge and groundwater divide. The closest certificate, G2-22573 issued to Scandia Gaard, Inc, is about 1,300 feet south. The second certificate, 03663 issued to Harbor Springs Water Service is roughly 4,500 feet southeast. Estimated interference drawdown would be about five feet for the Scandia well and from one to two feet for the Harbor Springs well (PGG,2011). Water level drops of this range are easy for properly equipped wells to accommodate.

The attributes of these certificates are summarized in Table 9.

Table 9. Water right certificates nearest to Wells 12 and 13 completed in Unit C (Qc aquifer).

Certificate #	*Name*	*Priority date*	*Qi GPM*	*Qa Ac-ft/yr*	*Well depth ft*	*Distance from Wells 12 & 13 ft*
G2-22573	Scandia Gaard Inc	6/5/1974	40	5	275	1,300
03663	Harbor Springs Water Co	1/27/1960	80	36	156	4,500

Eleven certificates were identified for wells completed in the Qva, the aquifer above the Qc. Wells in the shallower aquifers will be affected by leakage induced by pumping, but effects are expected to be minor. Area users should still be able to fully exercise their respective water rights. The nearest well is about 800 feet away.

The attributes of these certificates are summarized in Table 10.

Table 10. Water right certificates in one mile of Wells 12 and 13 completed in Unit A (Qva aquifer).

Certificate #	*Name*	*Priority Date*	*Qi GPM*	*Qa Ac-ft/yr)*	*Well depth ft*	*Distance from Wells 12 & 13 ft*
G2-00484	Conrad E Gropper	6/3/1971	150	18.5	200	800
G2-00816	J O & S E K Stevens	12/2/1970	18	4	165	1,000
G2-00035	Wesley A Wright	11/27/1970	36	2.5	135	2,500
G2-25903	Washington Water Service	4/27/1981	50	40	107	2,600
G2-00522	Gig Harbor City	4/5/1971	330	320	121	3,500
G2-*11020	J D Dobler	7/3/1970	30	5	130	3,800
G2-*05962	D N/C P Harper	5/23/1961	50	15.6	6	4,000
G2-*02426	F D Metzger	4/2/1952	35	7.5	60	4,500
G2-26149	Northwest Water Systems	5/7/1982	210	52	58-74	4,500
G2-22410	Richard E Johnson	5/9/1974	80	8	112	4,800
G2-21667	Walter G Northey	11/27/1973	25	3	92	5,000

In addition, the following are on file with Ecology's databases:

- 22 groundwater certificates between 1 ½ to 2 miles authorizing 3,619 gpm and 2,184 ac-ft per year. Water is used for irrigation, industrial use, and domestic purposes.

- 3 groundwater permits between 1 ½ to 2 miles authorizing 390 gpm and 444 ac-ft per year. Water is used for domestic supply.

- 12 surface water certificates from streams (North Creek and Crescent Creek, unnamed spring) diverting 1.245 cubic feet per second (cfs) and 77.6 ac-ft per year. Water is used for irrigation and domestic supply.

- 156 claims for groundwater and surface water withdrawals are registered for domestic supply, stockwater, and irrigation. The exact location of these claims is not known.

- 138 wells ranging from 28 to 479 feet deep and are completed in Units A, C, and E. Because water purveyors serve the area, few private domestic wells will be impacted. Private wells are likely screened in the A2 aquifer.

Impacts to Surface Water

WAC 173-515-040, the Instream Resources Protection Program for the Kitsap Water Resource Inventory Area (WRIA) 15, established minimum instream flows for some streams and closed others to consumptive withdrawals. Flows established in this WAC are considered an appropriation and senior to all permits approved after 1988 and subsequent water right applications. Groundwater withdrawals are not affected "unless the withdrawal would clearly have an adverse impact upon the surface water system contrary to the intent and objectives of this chapter."

Crescent Creek is closed from June 1 to October 15. North Creek is closed year-round.

Although withdrawals will likely capture groundwater that would otherwise contribute baseflow to Crescent Creek and North Creek, WWS has offered to mitigate impacts so surface water will not be affected.

Seawater Intrusion

Wells 12 and 13 are roughly one-half mile from marine water and completed in Units C and E, aquifers below sea level.

Wells close to marine water can be at risk for seawater intrusion, especially if water levels are near or below sea level. Although Wells 12 and 13 have static water levels roughly 100 feet above msl, pumping water levels are near sea level.

Currently Well 4, completed in Unit C, is being monitored regularly for chlorides. Well 4 is about 20 ft from Well 12. Chloride levels were measured at 3 milligrams per liter (mg/l) in 2004. The Maximum Contaminant Level (MCL) allowed according to Federal standards for chloride is 250 mg/l.

Aside from Peacock Hill Well 4, WWS is also conducting regular chloride monitoring of the Nordal well. The Nordal well (G2-29864) draws water from the upper 87 ft of Unit C. Water quality sampling conducted on June 29, 1998 indicated chloride concentrations of 4 mg/L.

Based on well construction and location, both the Nordal and Well 4 are more susceptible to seawater intrusion than either Wells 12 or 13. Therefore, chloride monitoring of Wells 12 and 13 will not be required as a provision of this approval, however, WWS will be required to continue routine chloride monitoring of the Nordal well and Well 4. In the event that chloride levels in the Nordal or Well 4 begin to increase, WWS may need to adjust pumping rates in Wells 12 and 13 accordingly.

If chloride levels begin to increase, WWS will need to take mitigative measures to reduce the potential of capturing seawater, such as keeping pumping rates low so a pronounced cone of depression does not develop.

Fisheries Considerations

Available information from Washington Department of Fish and Wildlife (WDFW) shows that Crescent Creek has a fairly flat gradient and the creek channel is mostly confined. There are two known partial barriers to fish passage that are found just below the outlet for Crescent Lake. As a result, Crescent Creek supports Fall Chinook, Fall Chum, and Winter Steelhead populations throughout its entire length. Crescent Creek also provides spawning habitat for Coho and Fall Chum.

Washington Department of Fisheries and Wildlife (WDFW) information indicates the presence of fall chinook, fall chum and coho salmon, winter steelhead, and cutthroat trout in both Crescent Creek and North (Donkey) Creek. In addition, both creeks provide spawning habitat for chum and coho salmon and likely cutthroat trout. In correspondence dated August 23, 2007, WDFW evaluated the application and determined, at worst case, the application would be impact neutral. The potential for increased flows in Crescent Creek could improve habitat for salmonoids and other fish (WDFW, 2007).

Washington Department of Fisheries and Wildlife provided additional comments to updated water right proposals on February 13, 2012. Concerns were raised that the proposed mitigation would only partially mitigate for impacts to Crescent Creek and provide little protection to North (Donkey) Creek. Those concerns have been addressed through partial relinquishment of two water rights associated with shallow wells in the vicinity of the two creeks.

Public Interest Considerations

Approving this application is not detrimental to the public interest and consistent with Chapter 173-515 WAC and RCW 90.54.

Consideration of Protests and Comments

No protests were filed against this application.

FINDINGS AND CONCLUSIONS

This application requests water for municipal supply. Based on my evaluation, I find that:

- The use of water for municipal supply is defined in statute as a beneficial use (RCW 90.54.020(1)).
- Water is available in sufficient quantities to provide a reliable source, based on well and pump information.

- When withdrawals are mitigated by relinquishing portions of G2-21940 and G2-25903, the issuance of this water right will not impair regulated surface water.
- Approving this appropriation will not impair any senior water right holders.
- Approving this appropriation, as recommended, 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:

- 500 gpm
- 352 ac-ft per year
- Municipal supply

Points of Withdrawal:

- Well 12
  - NE ¼ SE ¼ Section 31, T. 22 N., R. 2 E.W.M.
- Well 13
  - NW ¼ NW ¼ Section 32, T. 22 N., R. 2 E.W.M.

Place of Use:
As described on Page 1 of this Report of Examination

Tammy Hall 7/5/2012
Tammy Hall *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.

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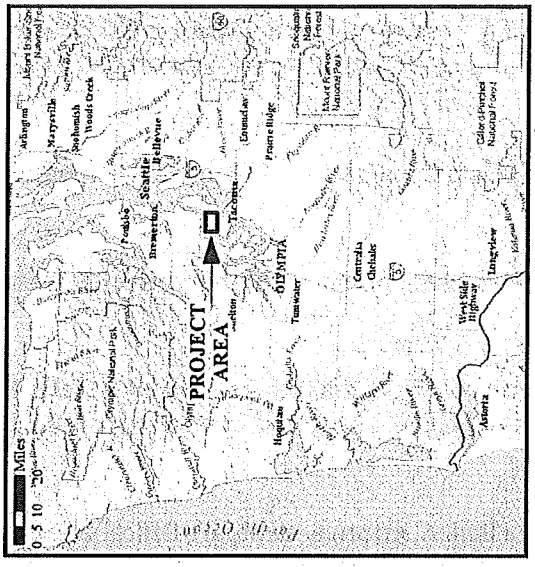
ATTACHMENT 1

Washington Water Service
Water Right Application Number G2-29819,
T22N/R01E, T22N/R02E
WRIA 15 - Pierce County



Basemap - ESRI Terrain

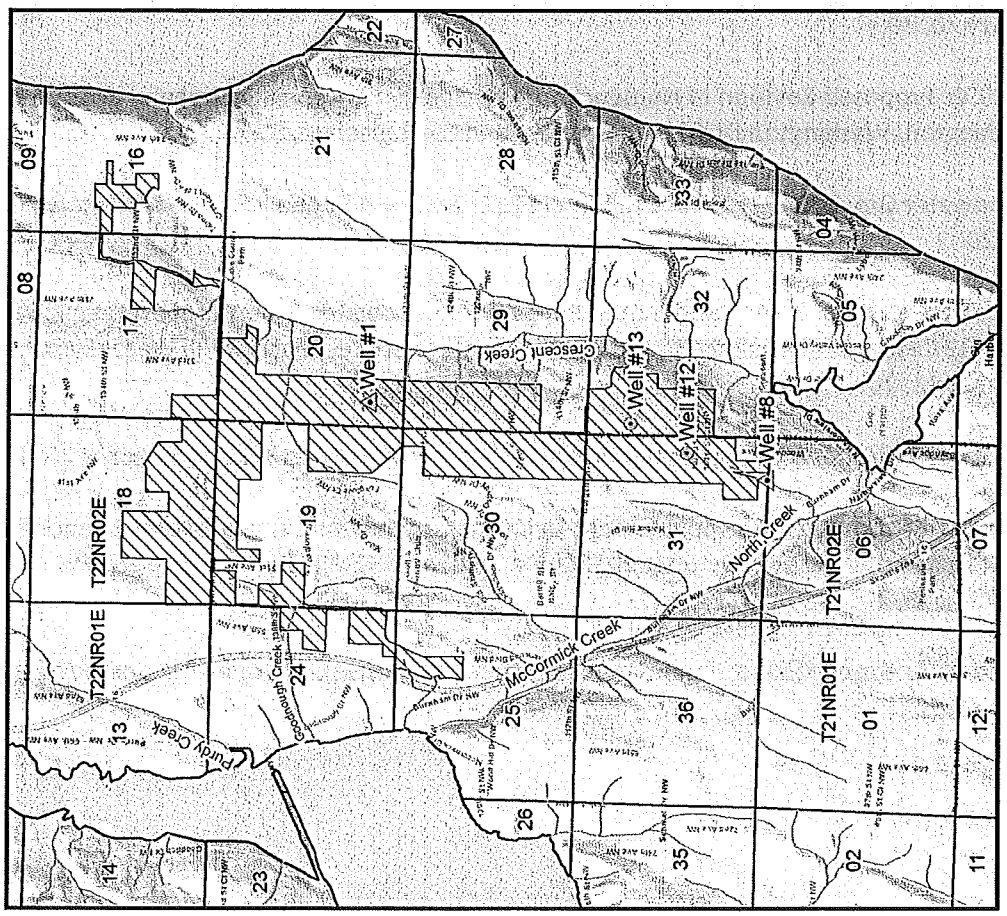
Legend

- POINT OF WITHDRAWAL (POW)
- POW MITIGATION WELL
- PLACE OF USE (POU)
- SECTION LINES

Comments:

Place of use, points of withdrawal/diversion are as defined on the cover sheet under the heading, 'LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED.'

Map Created 5/8/2012



Basemap - ESRI World Street Map

DEPARTMENT OF ECOLOGY State of Washington