

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date August 31, 2017
 FROM: Groundwater Section Aurora C Bouchier
 SUBJECT: Application G- 18321 Supersedes review of October 21, 2016
 Reviewer's Name
 Date of Review(s)

PUBLIC INTEREST PRESUMPTION; GROUNDWATER

OAR 690-310-130 (1) *The Department shall presume that a proposed groundwater use will ensure the preservation of the public welfare, safety and health as described in ORS 537.525. Department staff review groundwater applications under OAR 690-310-140 to determine whether the presumption is established. OAR 690-310-140 allows the proposed use be modified or conditioned to meet the presumption criteria. This review is based upon available information and agency policies in place at the time of evaluation.*

A. GENERAL INFORMATION: Applicant's Name: Jan H. Enterprises County: Marion

A1. Applicant(s) seek(s) 0.27 cfs from 1 well(s) in the Willamette Basin,
Molalla-Pudding subbasin

A2. Proposed use Nursery (150.15 acres) Seasonality: year round

A3. Well and aquifer data (attach and number logs for existing wells; mark proposed wells as such under logid):

Well	Logid	Applicant's Well #	Proposed Aquifer*	Proposed Rate(cfs)	Location (T/R-S QQ-Q)	Location, metes and bounds, e.g. 2250' N, 1200' E fr NW cor S 36
1	MARI 66235	Leo's West Well	CRB	0.27	T7S/R1E-21 NE-NW	1095' S, 1815' E fr NW cor S 21
2						
3						
4						
5						

* Alluvium, CRB, Bedrock

Well	Well Elev ft msl	First Water ft bls	SWL ft bls	SWL Date	Well Depth (ft)	Seal Interval (ft)	Casing Intervals (ft)	Liner Intervals (ft)	Perforations Or Screens (ft)	Well Yield (gpm)	Draw Down (ft)	Test Type
1	1345	480	360	4/28/2016	670	0-35, 35-458	+1.5-458	Na	Na	80	Na	Air

Use data from application for proposed wells.

A4. **Comments:** The applicant is requesting a maximum rate of 0.27 cfs (~121 gpm), or a well specific rate of 80-120 gpm.

A5. ☒ **Provisions of the** Willamette Basin rules relative to the development, classification and/or management of groundwater hydraulically connected to surface water ☐ are, or ☒ are not, activated by this application. (Not all basin rules contain such provisions.)

Comments: The well produces from a confined basalt aquifer, so the pertinent basin rules (OAR 690-502-0240) do not apply.

A6. ☐ **Well(s) #** _____, _____, _____, _____, _____, tap(s) an aquifer limited by an administrative restriction.
 Name of administrative area: _____
 Comments: _____

B. GROUNDWATER AVAILABILITY CONSIDERATIONS, OAR 690-310-130, 400-010, 410-0070

B1. **Based upon available data**, I have determined that groundwater* for the proposed use:

- a. ☐ is over appropriated, ☐ is not over appropriated, or ☒ **cannot be determined to be** over appropriated during any period of the proposed use. * This finding is limited to the groundwater portion of the over-appropriation determination as prescribed in OAR 690-310-130;
- b. ☐ **will not** or ☐ **will** likely be available in the amounts requested without injury to prior water rights. * This finding is limited to the groundwater portion of the injury determination as prescribed in OAR 690-310-130;
- c. ☐ **will not** or ☐ **will** likely to be available within the capacity of the groundwater resource; or
- d. ☒ **will, if properly conditioned**, avoid injury to existing groundwater rights or to the groundwater resource:
 - i. ☒ The permit should contain condition #(s) 7I, large water use reporting;
 - ii. ☐ The permit should be conditioned as indicated in item 2 below.
 - iii. ☐ The permit should contain special condition(s) as indicated in item 3 below;

- B2.
- a. ☐ **Condition** to allow groundwater production from no deeper than _____ ft. below land surface;
 - b. ☐ **Condition** to allow groundwater production from no shallower than _____ ft. below land surface;
 - c. ☐ **Condition** to allow groundwater production only from the _____ groundwater reservoir between approximately _____ ft. and _____ ft. below land surface;
 - d. ☐ **Well reconstruction** is necessary to accomplish one or more of the above conditions. The problems that are likely to occur with this use and without reconstructing are cited below. Without reconstruction, I recommend withholding issuance of the permit until evidence of well reconstruction is filed with the Department and approved by the Groundwater Section.

Describe injury –as related to water availability– that is likely to occur without well reconstruction (interference w/ senior water rights, not within the capacity of the resource, etc): _____

B3. **Groundwater availability remarks:** _____

In the vicinity of the well, the basalt aquifers are truncated by local stream drainages which have eroded through the basalt layers. Because the aquifer is confined (storativity is estimated to be 0.0001 for the CRBG), pumping impacts will propagate outward at rapid rates and will likely to reach aquifer boundaries (streams, faults, and truncated basalt flow margins) within a few hours. The presence of local aquifer boundaries will increase the degree of interference with nearby wells that are completed in the same water-bearing zones.

It appears there are three additional wells (MARI 56488, MARI 8428, and MARI 62772 in addition to the applicant's MARI 66235) which are producing from the deeper basalt aquifer in this area (see Lithologic Comparison below). Based on the limited data available, namely the static water-levels listed on the logs for MARI 56488, MARI 62772, and MARI 66235, the head in the deeper basalt aquifer may have declined approximately 9 feet between 2002 and 2016.

It is uncertain the well can produce at the maximum requested rate of 0.27 cfs (~121 gpm). The well log lists a rate of 80 gpm estimated from an air test. The drillers' yields listed on the logs for the comparable wells range from 8 gpm to 23 gpm.

C. GROUNDWATER/SURFACE WATER CONSIDERATIONS, OAR 690-09-040**C1. 690-09-040 (1): Evaluation of aquifer confinement:**

Well	Aquifer or Proposed Aquifer	Confined	Unconfined
1	CRB	☒	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: In general, the Columbia River Basalt aquifers are confined by the dense interflow zones which restrict vertical movement of groundwater. The well log for MARI 66235 lists a static water level of 360 feet below land surface, some 120 feet above the zone at which it was encountered, corroborating the confined nature of the water-bearing zone of the CRBG at this location.

C2. 690-09-040 (2) (3): Evaluation of distance to, and hydraulic connection with, surface water sources. All wells located a horizontal distance less than ¼ mile from a surface water source that produce water from an unconfined aquifer shall be assumed to be hydraulically connected to the surface water source. Include in this table any streams located beyond one mile that are evaluated for PSI.

Well	SW #	Surface Water Name	GW Elev ft msl	SW Elev ft msl	Distance (ft)	Hydraulically Connected?			Potential for Subst. Interfer. Assumed?	
						YES	NO	ASSUMED	YES	NO
1	1	Trib. To Silver Creek	985	~715-726	5412-5544	☒	☐	☐	☐	☒
1	2	Davis Creek	985	1095-1160	4100	☐	☒	☐	☐	☒
1	3	Powers Creek	985	1135-1390	4115	☐	☒	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: Additional investigation was conducted by the applicant's consultant and provided to the Department. This work indicate that the point along the tributary to Silver Creek which is in hydraulic connection with the water-bearing zone which MARI 66235 produces from is located a distance greater than 1-mile from the well. The logic appears sound given the assumptions made. Using the same method, it appears the point at which Silver Creek is hydraulically connected to the water-bearing zone in question may be located at a distance of approximately 1.05 miles from the well (see Lidar image below showing various distances from the well which were assessed for hydraulic connection based upon apparent dip as described in the "Follow-up response to Ground Water Review and subsequent related communications concerning Application G-18321" memo dated May 26, 2017 from Greg Kupillas).

Water Availability Basin the well(s) are located within: 169: SILVER CR> PUDDING R- AT MOUTH

C3a. 690-09-040 (4): Evaluation of stream impacts for each well that has been determined or assumed to be hydraulically connected and less than 1 mile from a surface water source. Limit evaluation to instream rights and minimum stream flows that are pertinent to that surface water source, and not lower SW sources to which the stream under evaluation is tributary. Compare the requested rate against the 1% of 80% natural flow for the pertinent Water Availability Basin (WAB). If Q is not distributed by well, use full rate for each well. Any checked ☒ box indicates the well is assumed to have the potential to cause PSI.

Well	SW #	Well < ¼ mile?	Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

C3b. **690-09-040 (4):** Evaluation of stream impacts by total appropriation for all wells determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water source. **Complete only if Q is distributed among wells.** Otherwise same evaluation and limitations apply as in C3a above.

	SW #		Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
			☐			☐		☐		☐
			☐			☐		☐		☐
			☐			☐		☐		☐
			☐			☐		☐		☐

Comments: _____

C4a. **690-09-040 (5):** Estimated impacts on **hydraulically connected surface water sources greater than one mile** as a percentage of the proposed pumping rate. Limit evaluation to the effects that will occur up to one year after pumping begins. This table encompasses the considerations required by 09-040 (5)(a), (b), (c) and (d), which are not included on this form. Use additional sheets if calculated flows from more than one WAB are required.

Non-Distributed Wells													
Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
Distributed Wells													
Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
(A) = Total Interf.													
(B) = 80 % Nat. Q													
(C) = 1 % Nat. Q													
(D) = (A) > (C)													
(E) = (A / B) x 100		%	%	%	%	%	%	%	%	%	%	%	%

(A) = total interference as CFS; (B) = WAB calculated natural flow at 80% exceed. as CFS; (C) = 1 % of calculated natural flow at 80% exceed. as CFS; (D) = highlight the checkmark for each month where (A) is greater than (C); (E) = total interference divided by 80% flow as percentage.

Basis for impact evaluation:

An appropriate model for calculating stream interference is not readily available for basalt aquifer systems. Therefore, no estimate of stream interference at 30 days was included in table C4a.

C4b. **690-09-040 (5) (b)** The potential to impair or detrimentally affect the public interest is to be determined by the Water Rights Section.

- C5. ☐ **If properly conditioned**, the surface water source(s) can be adequately protected from interference, and/or groundwater use under this permit can be regulated if it is found to substantially interfere with surface water:
- ☐ The permit should contain condition #(s) _____;
 - ☐ The permit should contain special condition(s) as indicated in "Remarks" below;

C6. SW / GW Remarks and Conditions:

In the vicinity of the well, the basalt aquifers are truncated by local stream drainages which have eroded through the basalt layers. The unnamed tributary to Silver Creek is shown on USGS 7.5-minute topographic maps as perennial which is generally an indication of groundwater contribution. The tributary and Silver Creek are likely hydraulically connected with the basalt aquifers. Once the cone of depression reaches nearby streams, ground water discharge to the streams, whether it occurs via spring discharge or diffuse seepage, will decrease. Also, the rate of decrease in discharge to streams will increase over time.

Joel Plahn, the Watermaster for this region, indicates that Silver Creek has an In Stream Water Right (ISWR) which is not met most years. Further, Silver Creek is a tributary to the Pudding River which also has an ISWR which was regulated back to during the last two years.

References Used:

Application file: G-18321, and nearby G-16080 and G-16090

Conlon and Others, 2005, Ground-Water Hydrology of the Willamette Basin, Oregon, Scientific Report 2005-5168, USGS.

Gannett and Caldwell, 1998, Geologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington, USGS Professional Paper 1424-A

Woodward, Gannett and Vaccaro, 1998, Hydrogeologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington, USGS Professional Paper 1424-B.

"Follow-up response to Ground Water Review and subsequent related communications concerning Application G-18321" memo dated May 26, 2017 from Greg Kupillas and attached figures.

Email from Joel Plahn, Watermaster, dated January 13, 2017 regarding regulation on Silver Creek and the Pudding River.

D. WELL CONSTRUCTION, OAR 690-200

D1. Well #: _____ Logid: _____

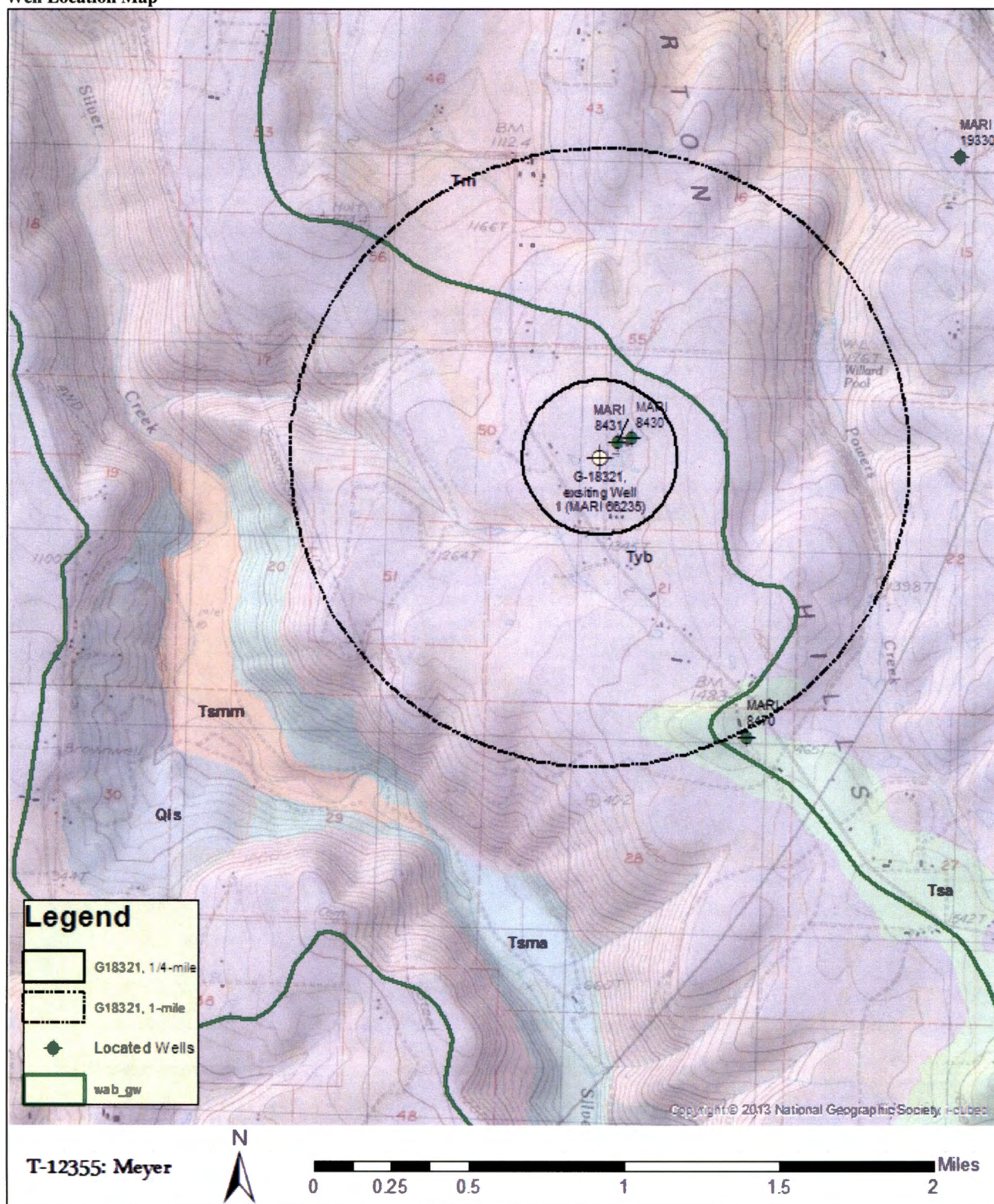
D2. **THE WELL does not appear to meet current well construction standards based upon:**

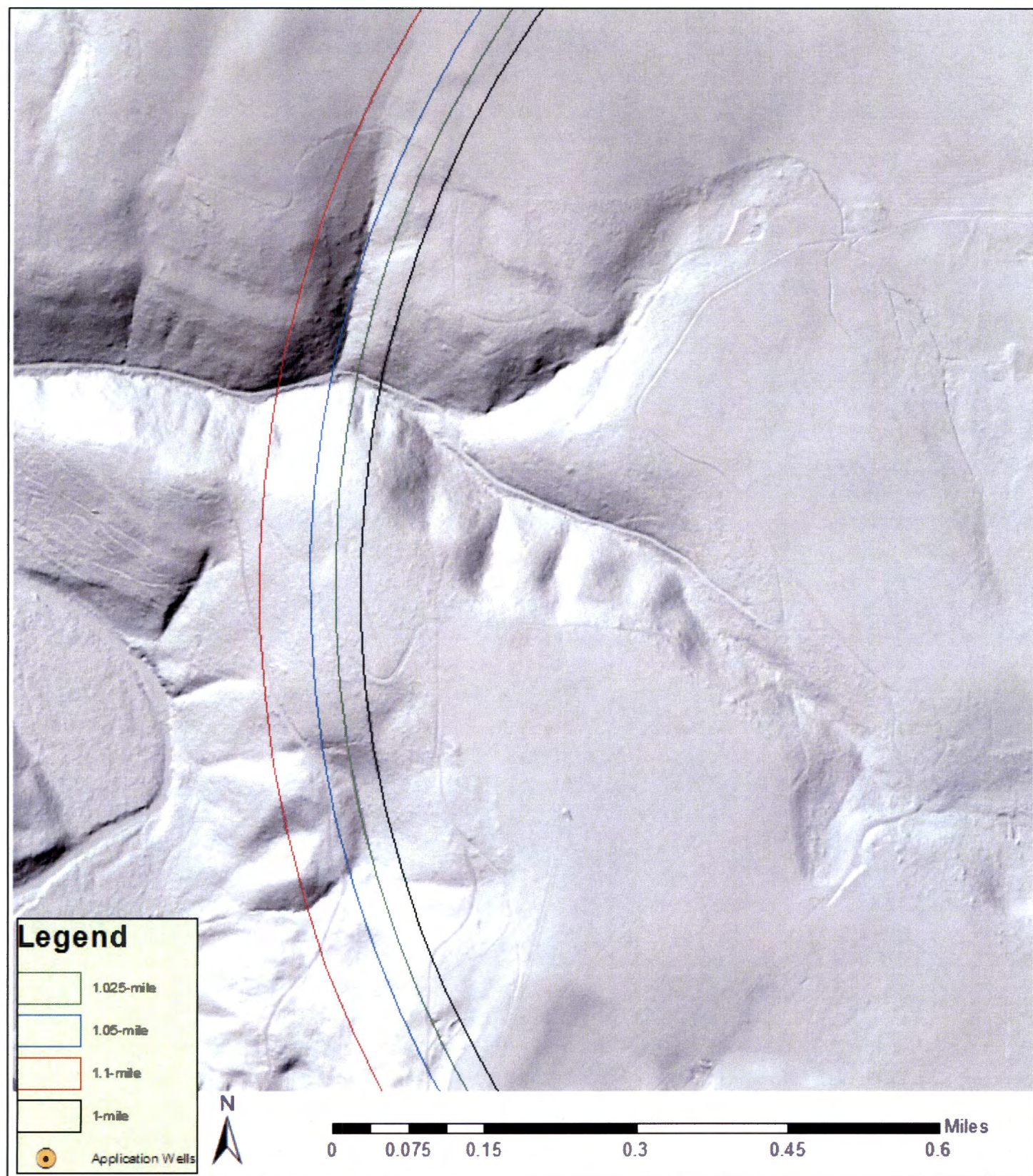
- a. ☐ review of the well log;
 b. ☐ field inspection by _____;
 c. ☐ report of CWRE _____;
 d. ☐ other: (specify) _____

D3. **THE WELL construction deficiency or other comment is described as follows:** _____D4. ☐ **Route to the Well Construction and Compliance Section for a review of existing well construction.****Water Availability Tables**

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION						
Watershed ID #: 169		SILVER CR > PUDDING R - AT MOUTH			Exceedance Level: 80	
Time: 2:35 PM		Basin: WILLAMETTE			Date: 10/21/2016	
Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net water Available
Monthly values are in cfs. Storage is the annual amount at 50% exceedance in ac-ft.						
JAN	179.00	7.58	171.00	0.00	60.00	111.00
FEB	173.00	7.42	166.00	0.00	60.00	106.00
MAR	173.00	1.28	172.00	0.00	60.00	112.00
APR	135.00	1.39	134.00	0.00	60.00	73.60
MAY	75.90	2.46	73.40	0.00	60.00	13.40
JUN	36.70	5.28	31.40	0.00	50.00	-18.60
JUL	16.60	7.27	9.33	0.00	23.00	-13.70
AUG	8.47	6.31	2.16	0.00	23.00	-20.80
SEP	10.80	4.42	6.38	0.00	23.00	-16.60
OCT	13.60	1.24	12.40	0.00	60.00	-47.60
NOV	71.10	4.86	66.20	0.00	60.00	6.24
DEC	176.00	8.27	168.00	0.00	60.00	108.00
ANN	120,000	3,480	117,000	0	36,100	83,900

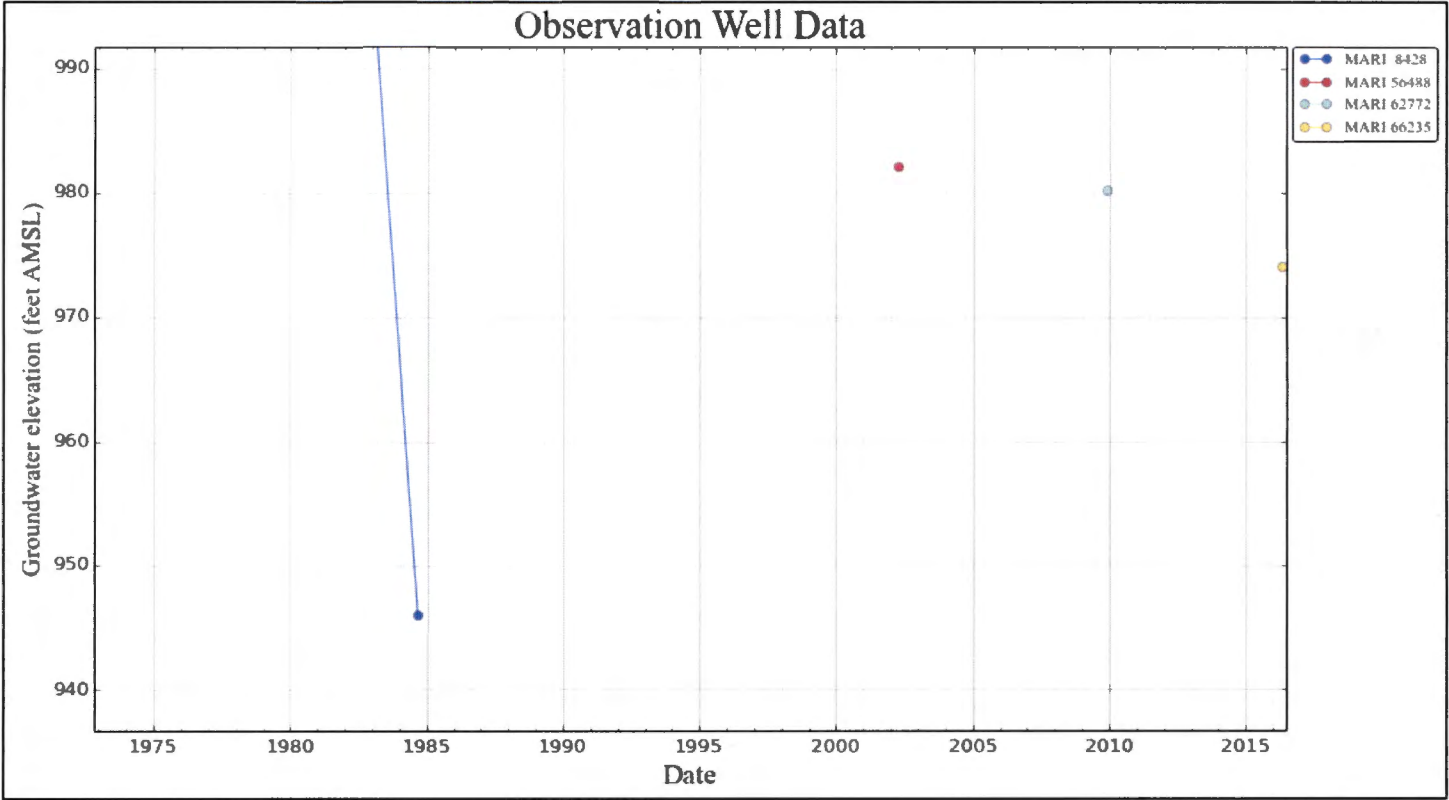
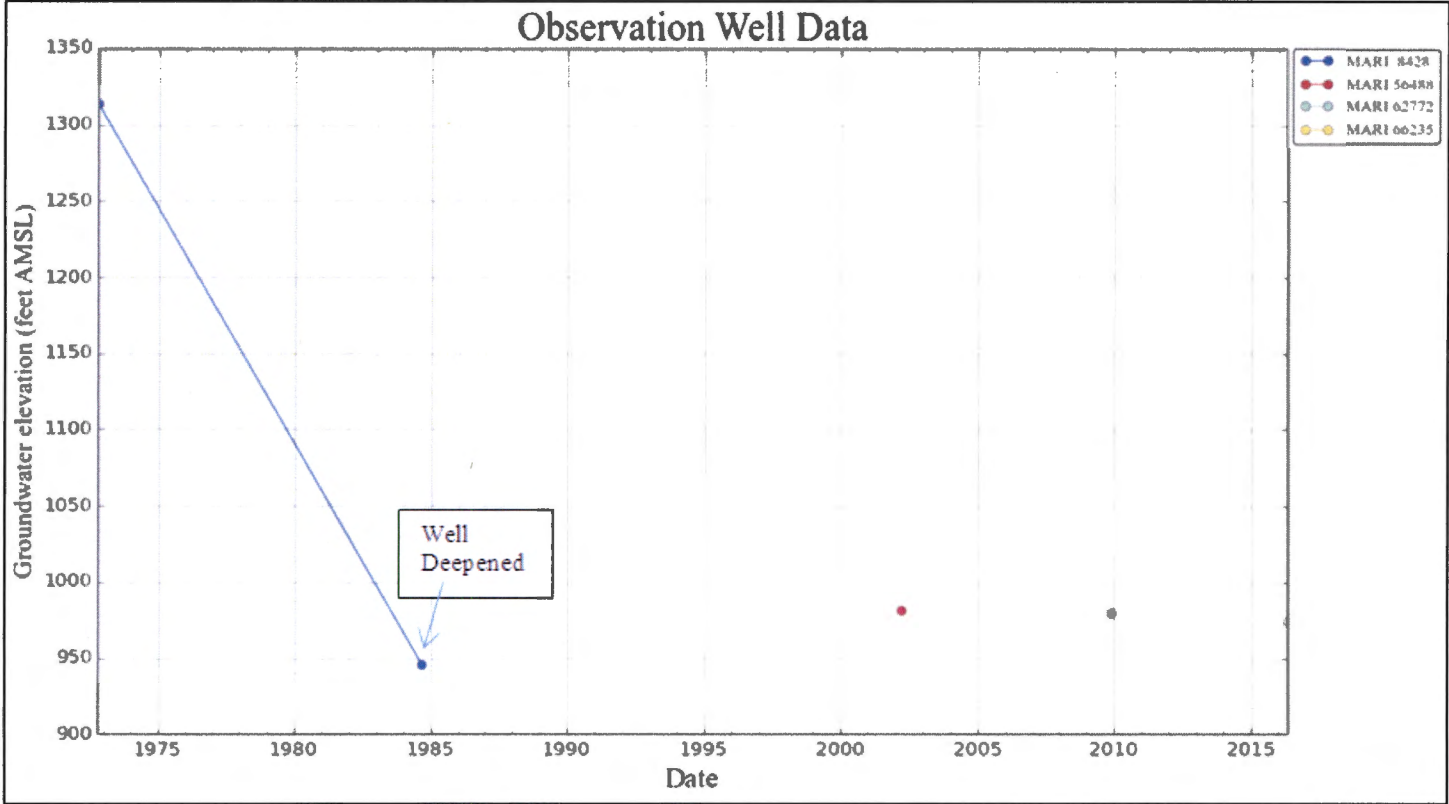
Well Location Map





[illegible]

Water-Level Trends in Comparable Wells



18487 S. Valley Vista Rd.
Mulino, Oregon 97042
(503) 632-5016 Phone
(503) 632-5983 Fax

Pacific Hydro-Geology Inc.

Memo

To: Aurora Bouchier
From: Greg Kupillas
CC: Justin Iverson
Date: May 26, 2017
Re: Follow-up response to Ground Water Review and subsequent related communications concerning Application G-18321



Expiration Date: 1/1/2018

In the Ground Water Review for Application G-18321 and subsequent related communications, you have taken the position that the proposed well (MARI 66235) is hydraulically connected to the nearby unnamed stream, tributary to Silver Creek. Your determination is based on the finding that the aquifer developed by the well, when projected horizontally, intercepts the stream at a distance slightly less than one mile from the well.

We have done some additional research and found some information we think supports the argument that the basalt flows in the area dip slightly to the northwest. The component of westward slope in the direction of the unnamed stream is great enough to result in the proposed basalt aquifer intercepting the stream more than 1 mile from the well. Our argument rests on the following points: 1. The orientation of the basalt flows (i.e., strike and dip) can be determined based on the elevations of the uppermost water-bearing zones in the basalts (for which there are more data); 2. The basalt flows are uniformly layered in the area, based on the surface expressions of the basalt flows in the drainage of the unnamed stream as shown on Lidar mapping; and 3. The surface traces of the basalt flows in the drainage for the unnamed stream intercept the topographic contour lines, indicating a westward apparent dip in the basalt layers. Each of these points is discussed in further detail below.

Orientation of Basalt Flows Based on Uppermost Water Bearing Zone

A review of the well log database for the area reveals that there are more shallow than deep wells, and better information available about the depth to the uppermost water-bearing zone than the depth to the deep aquifer developed by the proposed well (MARI 66235). We identified 7 wells in the area with logs indicating the depth to the first water bearing zone in basalt. We plotted those wells on the USGS topographic map, and created a map showing the contours of the elevation of the top of the upper water bearing zone. Based on this map, the upper basalt water-bearing zone in the vicinity of the proposed well is dipping to the northwest, as shown on Figure 1. The apparent dip of the upper basalt flow in the direction of the point where a line from the proposed well intercepts the unnamed stream at a distance of one mile is about 0.02 ft/ft, resulting in a drop of about 116 feet over that one-mile distance. Assuming the basalt flows are uniformly layered (see following section), then the aquifer developed by the proposed well (ground surface elevation of about 1,340 feet; depth to top of water-bearing zone 860 feet) would intersect the unnamed stream at an elevation of 744 feet (860 feet minus 116 feet), which is deeper than the elevation of the stream in that location (about 780 feet).

Basalt Flows are Uniformly Layered

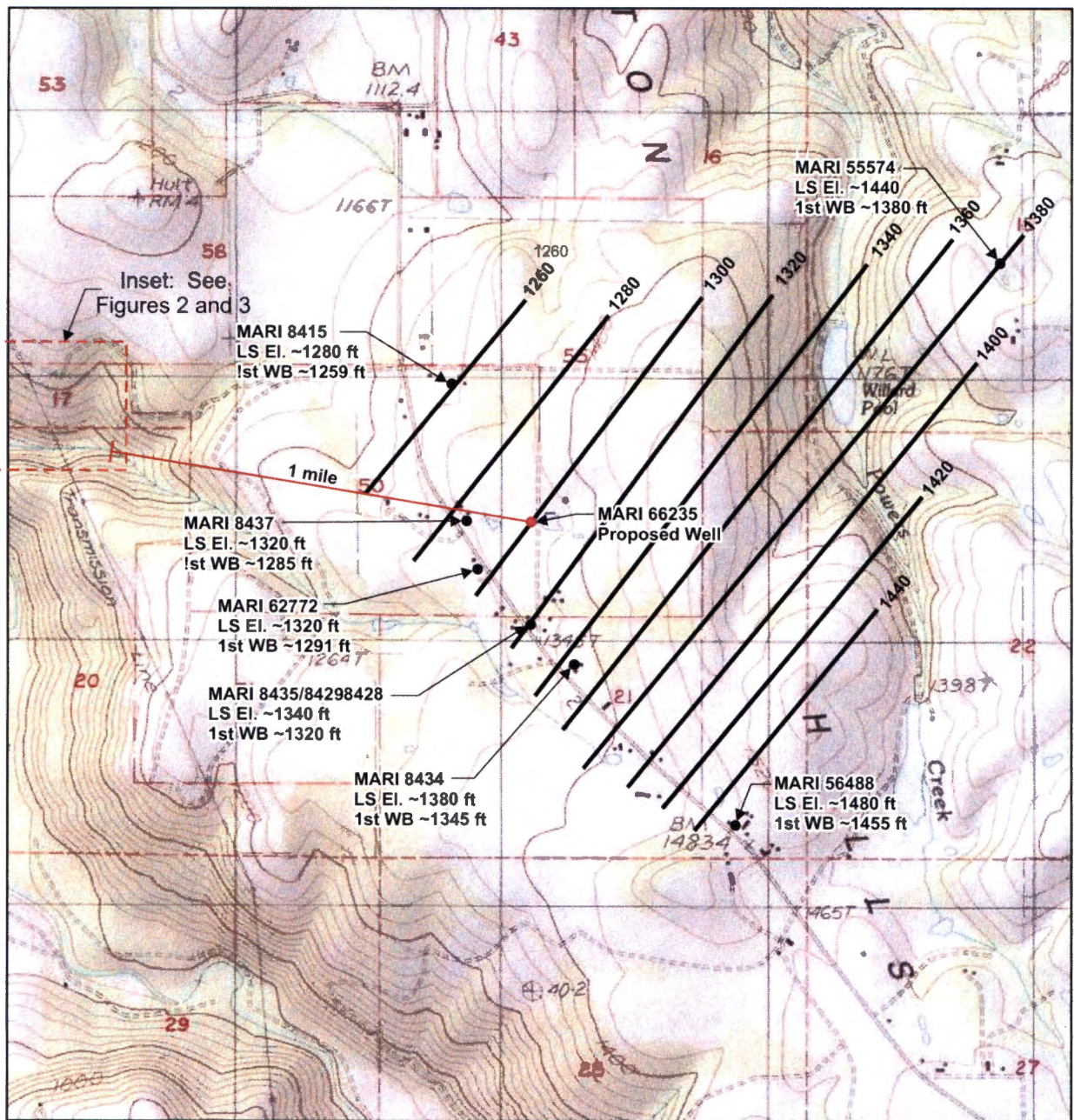
The Lidar map of the area (<http://www.oregongeology.org/lidar/dataviewer/index.html>) clearly shows the surface expression of the basalt flows in the northern slope of the draw for the unnamed stream drainage as shown on Figure 2 (see also Inset on Figure 1). The traces of these weathered outcrops show that the basalt flows in this area are uniformly layered. This information supports the assumption that the deeper basalt aquifer developed by the proposed well should be expected to have the same orientation as the uppermost aquifer.

Basalt Flows Dip Cross Topographic Lines Indicating Westward Apparent Dip

Figure 2 shows two maps of the same area covering the drainage of the unnamed stream (see also Inset on Figure 1). The upper map shows the Lidar imaging, and the lower map shows the topographic contours. Figure 3 combines these two images by superimposing the topographic map on the Lidar map using the Lidar mapping program (<http://www.oregongeology.org/lidar/dataviewer/index.html>) and adjusting the level of transparency. For clarity, we have highlighted some of the topographic contours in black, and highlighted the traces of the basalt flows in dashed red lines. This figure clearly shows that the basalt flow lines converge with and cross the topographic contours, indicating an apparent westward dip in the basalt flows. This map provides additional evidence supporting our findings that the basalt flows have an apparent westward dip in the direction from the proposed well to the unnamed stream.

Summary and Conclusions

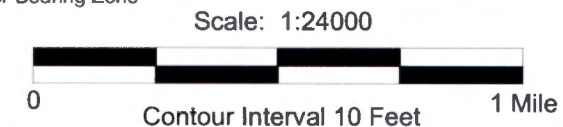
Mapping the available well log information for the elevation of the uppermost basalt water-bearing zone indicates that the upper flows in the area are dipping to the northwest. The Lidar imaging of the area shows that the basalt flows are uniformly layered, suggesting that the deeper water-bearing zone developed by the proposed well should have the same orientation. Calculating the apparent dip in the upper water-bearing zone along the line between the proposed well and the unnamed stream shows that the aquifer developed by the proposed well would intercept the unnamed stream at an elevation below the stream channel at a distance of one mile from the well. The Lidar imaging combined with the topographic map shows that the basalt flows cross the topographic contours, providing additional evidence of an apparent westward dip in the basalt flows. All of this information, taken together, provides a preponderance-of-evidence argument to demonstrate that the aquifer developed by the proposed well is not hydraulically connected to the unnamed stream within a mile of the well.



Key:

MARI 56488 Well Identification with Land Surface Elevation and Approximate
LS El. ~1480 Elevation of the Top of Upper Water Bearing Zone in Basalt
1st WB ~1455

1300 Elevation Contour of Top of Upper Water Bearing Zone



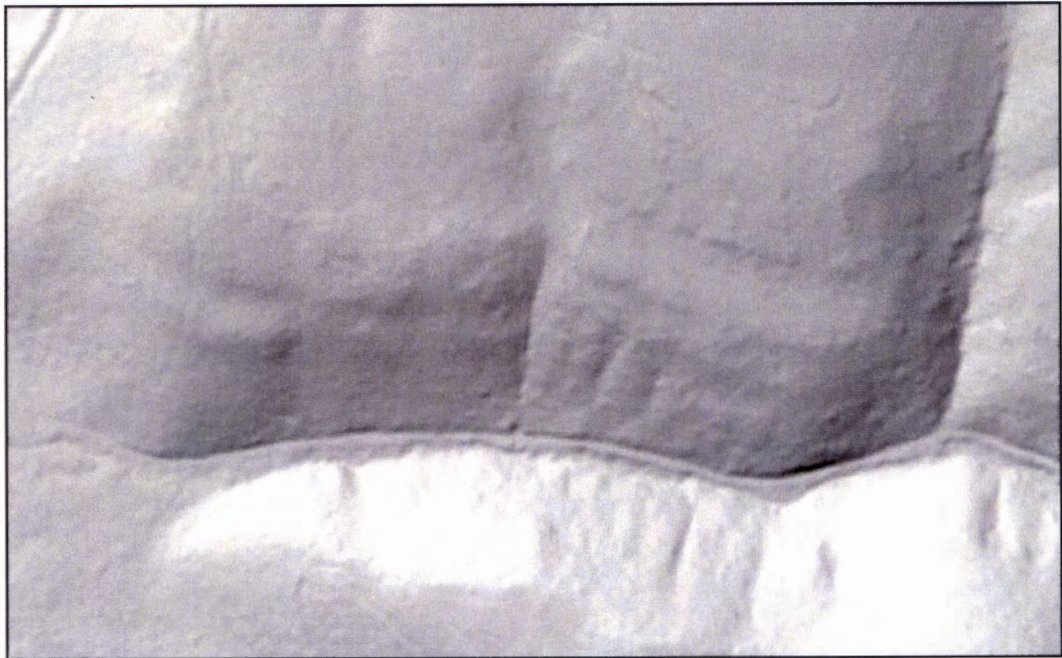
Source: National Geographic Oregon Seamless Topographic Maps on CD-Rom

Figure 1. Top of Upper Basalt Water Bearing Zone

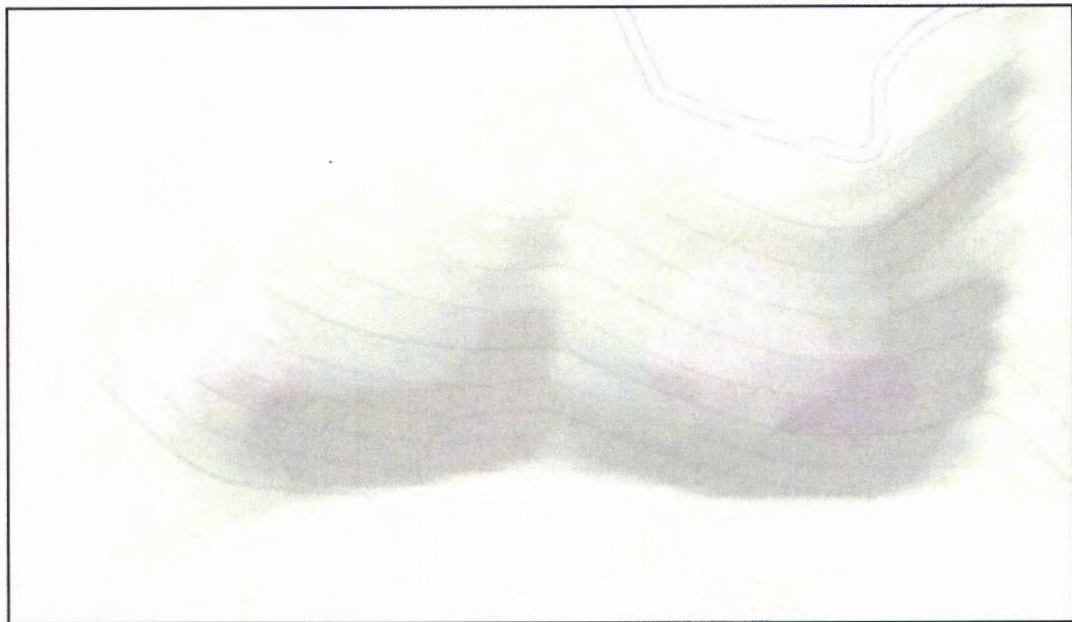
Pacific Hydro-Geology Inc.

Application G-18321
Jan H. Enterprises

05/2017



Lidar Map Showing Surface Traces of Basalt Flows



Same Location as in the Top Figure Showing Topographic Contour Lines

Source: State of Oregon Department of Geology and
Mineral Industries On Line Lidar Data Viewer:
<http://www.oregongeology.org/lidar/index.htm>

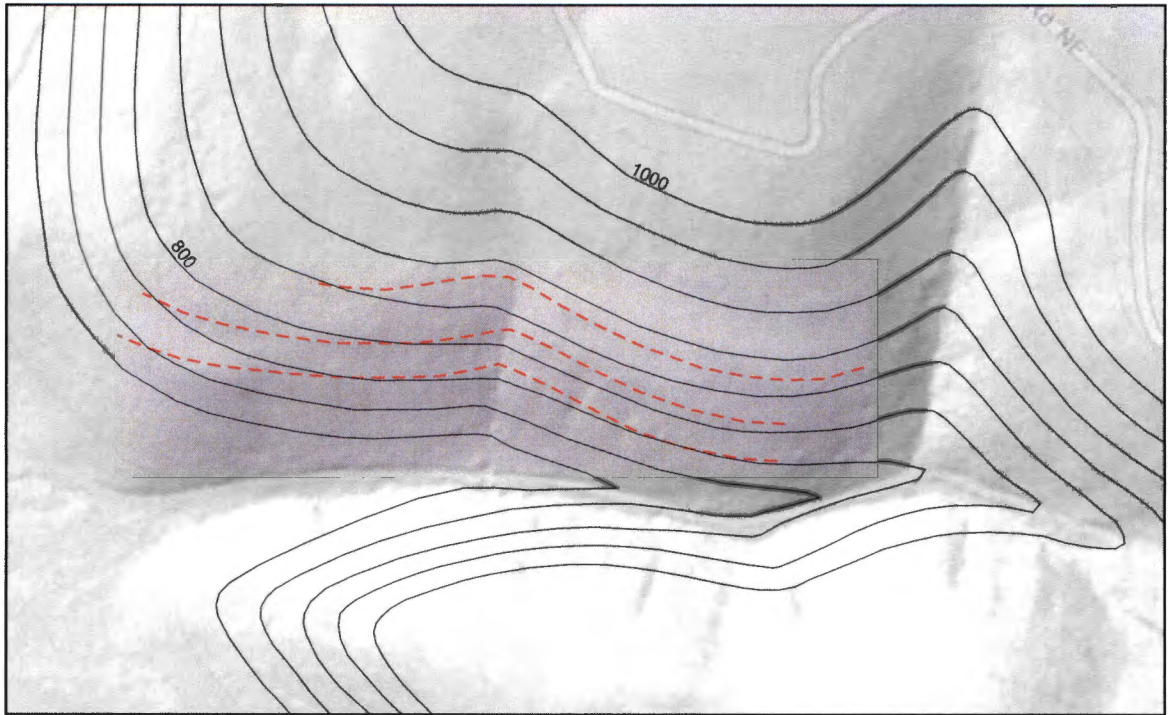


**Figure 2. Maps of Stream Area Showing Lidar
and Topographic Countours**

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Application G-18321
Jan H. Enterprises



Key:

--- Trace of Basalt Flow Outcropping in Draw of Stream Drainage

800 Topographic Contour Line and Elevation (feet, msl)



Source: State of Oregon Department of Geology and
Mineral Industries On Line Lidar Data Viewer:
<http://www.oregongeology.org/lidar/index.htm>

**Figure 3. Map Showing Basalt Flow Traces Super-
imposed Over Topographic Contour Lines**

Pacific Hydro-Geology Inc.

Application G-18321
Jan H. Enterprises

05/2017

BOUCHIER Aurora C * WRD

From: PLAHN Joel M * WRD
Sent: Friday, January 13, 2017 11:58 AM
To: BOUCHIER Aurora C * WRD
Cc: PLAHN Joel M * WRD
Subject: RE: Application G-18321

Silver Creek has an ISWR 59455, priority date 11/3/1983, which is not met most every year. Further, Silver is a trib to Pudding River which also has an ISWR. When ISWR on the Pudding is not met we cut back on the Pudding and tributaries. The priority date for the ISWR on the Pudding is 6/22/1964. The last two years we have regulated back to 6/22/1964. Is this the information you wanted?

Thanks, Joel Plahn

From: BOUCHIER Aurora C * WRD
Sent: Thursday, January 12, 2017 2:35 PM
To: PLAHN Joel M * WRD
Subject: FW: Application G-18321

Hi Joel,

What can you tell me about the status of Silver Creek as far as regulating it goes? I am re-addressing a review I did which I have determined to be connected to a tributary to Silver Creek above the reservoir.

Cheers.

Aurora

From: Greg Kupillas [<mailto:phggek@bctonline.com>]
Sent: Wednesday, January 11, 2017 6:14 PM
To: BOUCHIER Aurora C * WRD; ORLOWSKI Dennis R * WRD
Cc: 'IVERSON Justin T'; FRENCH Kim R * WRD; FRENCH Dwight W * WRD
Subject: RE: Application G-18321

Aurora,

I guess it never occurred to me that a negative finding of ground water availability would be based on the capacity of the well as estimated from an air test. I guess I always assumed the ground water availability determination was based more on whether there is sufficient storage in, and annual recovery of, the aquifer to sustain the additional use. I understand this determination is usually based on historic water level data which can often provide a pretty good idea of whether the aquifer is stable, or overdrafted. I can see, however, that the ground water availability question could also depend, in part, on the rate at which ground water could reasonably be expected to be withdrawn.

I think the requested rate was based on what the applicant believes the well is actually capable of pumping. The rate of 80 gpm is based on an estimate from an air test done by the driller. These are fairly crude estimates and I've been told by at least one driller that an air test often underestimates the actual sustainable capacity of the well. It is not unusual to request a higher rate than we suspect the aquifer is capable of producing, with the understanding that, ultimately, the water right will be limited to the actual capacity of the system when proven up. This is done to make sure we don't start with the permit that unnecessarily limits the rate. Also, it is worth mentioning that if a permit can be issued, regardless of whether it allows 80 or 120 gpm, the full duty (for irrigation) of 2 ½ acre feet per acre per year will still be allowed.

In any case, I could circle back with the applicant and see if they have some basis for the estimated 120 gpm rate for the well. If, for example, they say they know the well can pump steadily at 100 gpm (for example) based on a meter or other flow measurement, would a reduction in our request to 100 gpm resolve the water availability issue?

If you think we can address the ground water availability issue by adjusting the requested rate to a figure we can be comfortable the well is capable of delivering, then it seems the next step would be address the PSI issue. In that case, I would be glad to meet with you to discuss it. Please let me know what you think.

Regards,

Greg

From: BOUCHIER Aurora C * WRD [<mailto:Aurora.C.Bouchier@oregon.gov>]
Sent: Wednesday, January 11, 2017 4:03 PM
To: Greg Kupillas; ORLOWSKI Dennis R * WRD
Cc: IVERSON Justin T; FRENCH Kim R * WRD; FRENCH Dwight W * WRD
Subject: RE: Application G-18321

Hello Greg,

My finding that the requested rate (~121 gpm) would not be within the capacity of the resource was based on the estimated yield listed on the well log (80 gpm) and the median yield (10 gpm) of the 12 wells in the section. Unfortunately, your explanation that the decline seen in the cluster of wells some 2.6 miles to the southeast is caused by comingling of basalt aquifers does not assuage this concern.

As for the question of PSI, I grant there is merit in the explanation you provided and would be willing to sit down to discuss this further. However, this does not address my first concern regarding the capacity of the resource.

Let me know if you would like to discuss this further.

Cheers.

Aurora Bouchier, R.G.

Hydrogeologist

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"All the water that will ever be is, right now." –National Geographic, October 1993

"When the well is dry, we know the worth of water." –Benjamin Franklin, Poor Richard's Almanack, 1746

From: Greg Kupillas [<mailto:phggek@bctonline.com>]
Sent: Thursday, January 05, 2017 10:37 AM
To: aurora.c.bouchier@state.or.us
Cc: IVERSON Justin T
Subject: Application G-18321

Aurora:

Application G-18321 has received an unfavorable initial review based on two findings: 1. Ground water will not be available within the capacity of the resource; and 2. The potential for substantial interference (PSI) with a tributary to Silver Creek. These unfavorable findings appear to be based on the findings regarding ground water availability and hydraulic connection with the tributary to Silver Creek in your ground water review dated October 21, 2016. I have comments concerning both of these findings which I address in detail below.

Ground Water Availability: In Section B1.a, you checked the box indicating that ground water cannot be determined to be over appropriated. Yet, in a seemingly contradictory determination, in Section B1.c., you checked the box indicating that ground water **will not** be available within the capacity of the groundwater resource. Your narrative in Section B3 was presumably provided to give the justification for your determination in Section B1.c. In the second paragraph of your narrative, you state that "In general, water levels in nearby basalt irrigation wells show stable water levels over the last twenty years..." which by itself suggests that the basalt aquifers in the vicinity of the proposed new use are not over appropriated.

You also indicate that there is a cluster of wells located 2.6 miles to the southeast of the proposed well that apparently show a record of declining water levels and you refer to the hydrograph you provided with the report. The hydrograph seems to show a notable decline in only one well, MARI 56129. The water levels in this well appear to have declined for 7 or 8 years, but have been stable since 2009. We have been measuring the water levels in this well for the duration of the available record. We believe the initial decline was probably caused by commingling of basalt aquifers in the area, either in MARI 56129, or another, nearby well, and the stable water levels measured since 2009 reflect the new water level equilibrium for all commingled aquifers. In any case, it seems that the stable water levels seen in nearby wells provide the preponderance of evidence needed to demonstrate that ground water is available in the capacity of the resource.

Potential for Substantial Interference (PSI): The finding of PSI with the tributary of Silver Creek is dependent on your determination of a hydraulic connection between the proposed well and that tributary. Your determination of hydraulic connection appears to be based on projecting the driller's reported static water level in the well horizontally to intercept with the stream channel of the unnamed tributary. Because this elevation intersects with the stream bed within a distance of less than one mile, it appears you have made the determination of hydraulic connection. However, you have also made the determination that the basalt aquifer developed by the proposed well is confined.

Given that the basalt aquifer is confined, the ground water in that aquifer is isolated from the geologic materials above it. Therefore, it seems that it would be more appropriate to project the elevation of the **aquifer** to the stream, instead of the static water level. Based on my evaluation, the top of the aquifer occurs at an elevation of about 860 feet amsl at the well. Projected horizontally, I estimate that this elevation intersects with the

stream bed of the unnamed stream about 4900 feet from the proposed well – still less than one mile. However, the geologic map in Hampton (1972; full reference provided at the end of this message) shows that the Columbia River Basalts beneath the subject property are dipping westward. Based on elevations of the base of the Columbia River Basalt where it is in contact with the underlying marine sediments both east and west of the proposed well, I calculate an east-to-west slope in the basalts of about 0.025 ft/ft (base of basalts at about 1280 feet amsl east of the proposed well, and about 800 feet west of the proposed well, over a distance of about 19,500 feet). This slope, projected west of the proposed well, would result in the elevation of the basalt aquifer being about 130 feet deeper one mile west of the well than it is at the well. This means the elevation of the top of the aquifer one mile west of the proposed well would be about 730 feet amsl (860 feet – 130 feet = 730 feet), which is about 50 feet lower than the elevation of the stream bed at that location (about 780 feet amsl). Thus, by making a somewhat more rigorous argument than projecting the aquifer horizontally, we can show that it appears the basalt aquifer developed by MARI 56129 is not hydraulically connected to the unnamed tributary of Silver Creek within a mile.

Please let us know if you can consider changing any of your determinations based on the information we've provided here, or if you would like some additional information to support our arguments.

The applicant would like to have the opportunity to get their refund if it becomes necessary to withdraw the application. The deadline for withdrawing the application and receiving the refund, as stated in the initial review determination letter, is January 13, 2017. Therefore, please give us your response before that date, or let us know if the applicant can still get their refund after that date if your response is delayed.

Reference:

Hampton, E.R., 1972, Geology and Ground Water of the Molalla-Salem Slope Area, Northern Willamette Valley, Oregon, U.S. Geological Survey Water-Supply Paper 1997.

Regards,

Gregory E. Kupillas, R.G., C.W.R.E.
Pacific Hydro-Geology Inc.
503.939.3167