

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date March 21, 2016
 FROM: Groundwater Section Michael J Thoma
 SUBJECT: Application G- 18190 Reviewer's Name
 Supersedes review of _____ 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: Paul Kuehne County: Linn

A1. Applicant(s) seek(s) 2.07 cfs from 1 well(s) in the Willamette Basin,
 _____ subbasin

A2. Proposed use Irrigation (165.2 ac) Seasonality: Mar 1 – Oct 31 (244 d)

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	PROP	1	Alluvium	2.07	10S/03W-20 SWSW	210°N, 545°E of SW cor S 20 ^A
2						

* 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	200		10-30 ^B		50-150	0-18 ^C	0-18					

Use data from application for proposed wells.

A4. Comments:

^AThe application map references the incorrect section corner. Based on the map, the correct reference corner is the **SW** corner of Section 20 and not the **SE** corner as the map states.

^BSWL provided is estimated from range of SWLs reported on driller's logs for nearby wells. This range likely represents seasonal variations as well as differences in elevations (+/- 50 ft in area of interest)

^CNo well construction information was provided so the reviewer assumes minimum case and seal depths

A5. **Provisions of the Willamette (OAR 690-502)** 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: _____

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) 7C (7-yr SWL); 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:** The proposed POA will be producing from a layer of alluvium where the Willamette River passes between large outcrops of older marine sediment bedrock to the east and west (Scravel Hill and Spring Hill, respectively). In the area of the proposed POA there is likely only a few 10s of feet (possibly up to 100) of alluvial material overlying bedrock, according to driller’s logs and maps of bedrock elevation by Woodward et al., (1998). OWRD has SWL data from an observation well nearby (BENT 1558) which is on the other side of the river. These data show generally stable trends over the past three decades but lack of sufficient SWL data on the applicant’s side of the river make it difficult to establish groundwater over-appropriation.

There are only a few other permitted groundwater POAs within 1 mile of the proposed POA and the proximity of the proposed POA to the Willamette River (1480 ft) would significantly reduce the potential for interference with nearby groundwater users (i.e., the river would act as a source / constant-head boundary to groundwater)

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	Alluvium	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer confinement evaluation: There is no well log for the proposed POA and the proposed depth is listed as "50-150 ft". A well drilled to only 50 ft would likely encounter unconfined aquifer conditions. Driller's logs for nearby wells generally show more confined conditions for wells drilled > 50 ft bls.

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	Willamette River	170-190	165	1480	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer hydraulic connection evaluation: similar GW and SW elevations; unconfined aquifer; proximity to the river

Water Availability Basin the well(s) are located within: Willamette R > Columbia R – AB Mill Cr at Gage 14191000

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?
1	1	<input type="checkbox"/>	<input type="checkbox"/>	none ^A	NA	<input type="checkbox"/>	3620	<input type="checkbox"/>	<< 25%	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

Comments: Interference @ 30 d was estimated using the Hunt (1999) analytical stream-depletion model. Results are shown below. Values for hydraulic parameters were taken from Herrera et al., (2005).

^AThere is an instream application on this stretch of the river but it is not a valid right (no certificate/permit)

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													
(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: _____

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:
 i. The permit should contain condition #(s) _____;
 ii. The permit should contain special condition(s) as indicated in "Remarks" below;

C6. **SW / GW Remarks and Conditions:** The applicant's proposed rate and estimated impacts to surface water fall below the threshold where PSI must be assumed.

References Used:

Herrera, N. B., Burns, E. R., and T. D. Conlon. 2014. *Simulation of Groundwater Flow and the Interaction of Groundwater and Surface Water in the Willamette Basin and Central Willamette Subbasin, Oregon*. USGS Scientific Investigations Report 2014-5136.

Hunt, B. 1999. *Unsteady Stream Depletion from Ground Water Pumping*. Journal of Hydrologic Engineering, Vol 8(1), pp 12-19

Woodward, D. G., M. W. Gannett, and J. J. Vaccaro. 1998. *Hydrogeologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington*. USGS Professional Paper 1424-B.

Wiley, T. J. 2006. *Geologic Map of the Albany Quadrangle Linn, Marion, and Benton Counties, Oregon*. Dept. of Geology and Mineral Industries. Open-file Report O-06-26.

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) _____

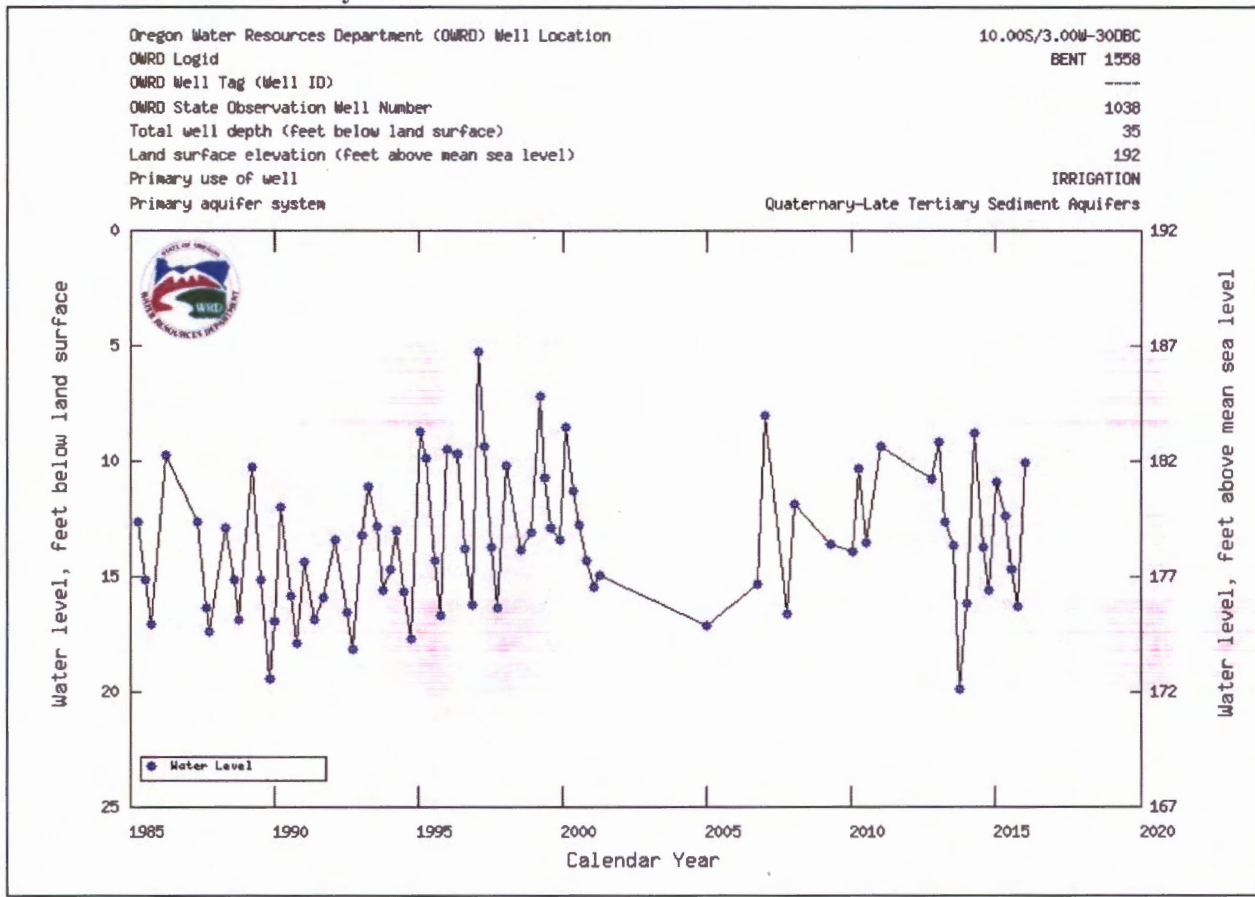
D3. **THE WELL construction deficiency or other comment is described as follows:** _____

D4. **Route to the Well Construction and Compliance Section for a review of existing well construction.**

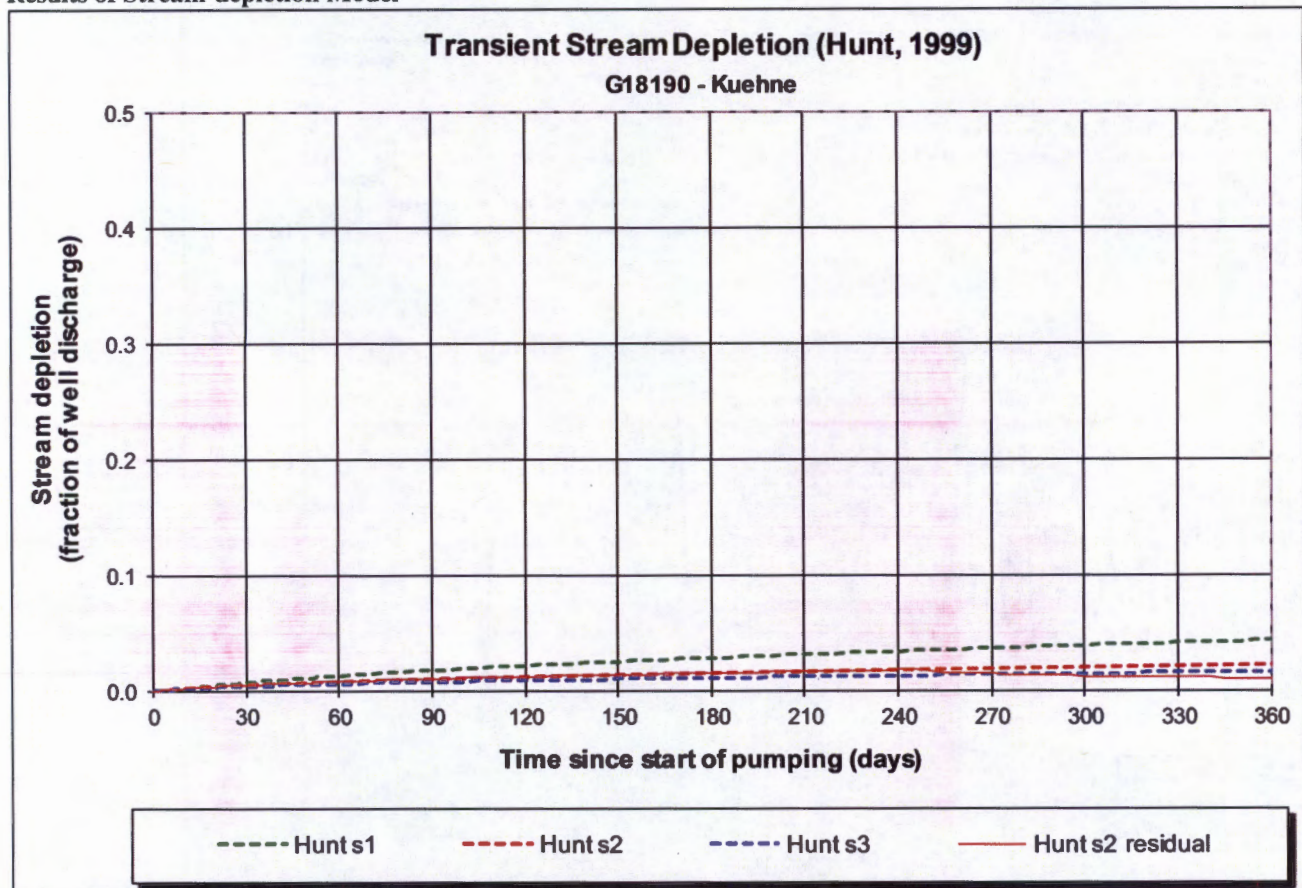
Water Availability Tables

WILLAMETTE R > COLUMBIA R - AB MILL CR AT GAGE 14191000						
WILLAMETTE BASIN						
Water Availability as of 3/21/2016						
Watershed ID #: 183 (Map)			Exceedance Level: 80% -			
Date: 3/21/2016			Time: 12:34 PM			
Water Availability Calculation		Consumptive Uses and Storages		Instream Flow Requirements		Reservations
Water Rights			Watershed Characteristics			
Water Availability Calculation						
Monthly Streamflow in Cubic Feet per Second						
Annual Volume at 50% Exceedance in Acre-Feet						
Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	18,400.00	2,230.00	16,200.00	0.00	1,300.00	14,900.00
FEB	20,100.00	7,420.00	12,700.00	0.00	1,300.00	11,400.00
MAR	19,600.00	7,210.00	12,400.00	0.00	1,300.00	11,100.00
APR	18,000.00	6,870.00	11,100.00	0.00	1,300.00	9,830.00
MAY	15,500.00	4,160.00	11,300.00	0.00	1,300.00	10,000.00
JUN	8,310.00	1,690.00	6,620.00	0.00	1,300.00	5,320.00
JUL	4,710.00	1,450.00	3,260.00	0.00	1,300.00	1,960.00
AUG	3,620.00	1,330.00	2,290.00	0.00	1,300.00	991.00
SEP	3,680.00	1,150.00	2,530.00	0.00	1,300.00	1,230.00
OCT	4,650.00	744.00	3,910.00	0.00	1,300.00	2,610.00
NOV	9,400.00	850.00	8,550.00	0.00	1,300.00	7,250.00
DEC	16,700.00	907.00	15,800.00	0.00	1,300.00	14,500.00
ANN	13,500,000.00	2,150,000.00	11,300,000.00	0.00	942,000.00	10,400,000.00

Water-Level Trends in Nearby Wells



Results of Stream-depletion Model



Output for Hunt Stream Depletion, Scenorio 2 (s2):												Time pump on = 244 days		
Days	30	60	90	120	150	180	210	240	270	300	330	360		
Qw, cfs	2.070	2.070	2.070	2.070	2.070	2.070	2.070	2.070	2.070	2.070	2.070	2.070		
Hunt SD s2 %	0.52	0.80	1.02	1.21	1.38	1.53	1.66	1.79	1.44	1.25	1.13	1.04		
Hunt SD s2 cfs	0.011	0.017	0.021	0.025	0.028	0.032	0.034	0.037	0.030	0.026	0.023	0.022		
80% Exc. Q	568.00	697.00	596.00	373.00	215.00	105.00	50.60	35.40	32.10	35.30	82.50	364.00		
% Impact	0.00%	0.00%	0.00%	0.01%	0.01%	0.03%	0.07%	0.10%	0.09%	0.07%	0.03%	0.01%		

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate	Qw	2.07	2.07	2.07	cfs
Distance to stream	a	1480	1480	1480	ft
Aquifer hydraulic conductivity	K	60	300	600	ft/day
Aquifer thickness	b	100	100	100	ft
Aquifer transmissivity	T	6000	30000	60000	ft*ft/day
Aquifer storage coefficient	S	0.05	0.05	0.05	
Stream width	ws	450	450	450	ft
Streambed hydraulic conductivity	Ks	0.001	0.001	0.001	ft/day
Streambed thickness	bs	5	5	5	ft
Streambed conductance	sbc	0.09	0.09	0.09	ft/day
Stream depletion factor (Jenkins)	sdf	18.25	3.65	1.83	days
Streambed factor (Hunt)	sbf	0.02	0.00	0.00	