

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date March 21, 2017

FROM: Groundwater Section Michael J. Thoma
Reviewer's Name

SUBJECT: Application G- 18225 Supersedes review of February 29, 2016
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: D & B Farms LLC County: Lane

A1. Applicant(s) seek(s) 0.475 cfs from 2 well(s) in the Willamette Basin,
Long Tom River subbasin

A2. Proposed use Nursery and Irrigation (19 ac primary) 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	LANE 72874	1	Alluvium	0.475	16S/05W-35 NESW	297'S, 910'W of SW cor DLC 40 ^A
2	PROP	2	Alluvium	0.475	16S/05W-35 SWSW	369'S, 1490'W of SW cor DLC 40 ^A
3						

* 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	365	46	17.5	11/21/2013	97	0-18	+1.5-97		None	20		
2	365		17.5 ^B		97							

Use data from application for proposed wells.

A4. **Comments:** ^AWell locations on the revised Application Map (revised May 15, 2016) reference the incorrect DLC; the map well location descriptions reference the SW corner of DLC 39 but the map points to the SW corner of DLC 40. Based on the map it is clear the correct reference is to the SW corner of DLC 40.

^BThe application does not provide a "proposed/existing" designation for Well #2 so the reviewer assumes it is proposed. Well #2 will likely produce from the same aquifer as Well #1 and so will likely encounter similar hydrogeologic conditions (e.g., First Water, SWL)

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) 7J (7-year SWL); Medium 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 existing and proposed wells will be producing from alluvial sediments of the Willamette Aquifer / Willamette Confining Unit (Woodward et al., 1998). These units constitute a total thickness of approx. 100-150 ft in the area and are underlain by older, consolidated marine sedimentary rocks likely of the Spencer Fm (McCloughry et al., 2010). The alluvial aquifer system is made up of layers of fine to coarse sediments representing changes in the depositional environment. These layers may be of limited aerial extent, likely inter-finger with adjacent units, and likely consist of gradational boundaries (i.e., typical mixed sediment basin stratigraphy). Well logs in the area report low to moderate yields (10-50 gpm).

There are no recent OWRD water-level data in the area so aquifer over-appropriation cannot be determined. However water-level data from the Southern Willamette Valley in general show stable long-term trends.

There are a few existing groundwater POAs, and likely more domestic wells, within 1 mile of the proposed POAs. Given the geology, it is unlikely that substantial interference will result from the proposed use, but standard interference and injury conditions shall apply.

Special Conditions:

In the event that either well on this review is for uses in addition to this specific permitted use (e.g., domestic, commercial, other existing permitted uses), a flow meter shall be installed such that only the use identified by this permit is being measured.

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 of Willamette Aquifer	☒	☐
2	Alluvium of Willamette Aquifer	☒	☐
		☐	☐

Basis for aquifer confinement evaluation: many well logs for the area report SWL several feet above reported 'first water' and the applicant's well log (LANE 72874) reports brown clay in the top 46 ft. However, the clay layer is likely not extensive and confinement may be local and increase with depth due to successive layers of fine-grained sediments.

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	Coyote Cr.	~350	330-345	5870	☒	☐	☐	☐	☒
2	1	Coyote Cr	~350	330-345	5300	☒	☐	☐	☐	☒
1	2	Amazon Cr	~350	345-355	6550	☒	☐	☐	☐	☒
2	2	Amazon Cr	~350	345-355	7150	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: coincident GW and SW elevations; alluvial nature of aquifer with no obvious, laterally-extensive confining layer to restrict vertical groundwater movement.

Water Availability Basin the well(s) are located within: Long Tom R > Willamette R – AB Mouth (ID# 114)

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?
There are no surface water sources within 1 mile										

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?
There are no surface water sources within 1 mile										

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
2	1	%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS		0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0	0
Interference CFS		<0.01	<0.01	<0.01	0.01	0.012	0.013	0.014	0.015	0.016	0.017	0.018	0.019
Distributed Wells													
appropriation is not distributed													
Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
(A) = Total Interf.		<0.01	<0.01	<0.01	0.01	0.012	0.013	0.014	0.015	0.016	0.017	0.018	0.019
(B) = 80 % Nat. Q		568	697	596	373	215	105	50.6	35.4	32.1	35.3	82.5	364
(C) = 1 % Nat. Q		5.68	6.97	5.96	3.73	2.15	1.05	0.51	0.35	0.32	0.35	0.83	3.64
(D) = (A) > (C)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(E) = (A / B) x 100		<1 %	<1 %	<1 %	<1 %	<1 %	<1 %	<1 %	<1 %	<1 %	<1 %	<1 %	<1 %

(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: Despite the finding that the wells produce from a confined aquifer in Section C1, the Hunt 1999 analytical model was used because there is not likely a continuous, thick confining layer within the sediments – which would advocate the use of the Hunt 2003 Model. The Hunt 1999 Model is a better representation of the aquifer as a thick sequence of layered strata with bulk hydrologic properties. The Hunt 1999 Model was used to estimate stream depletion for the well-stream pair from table C2 with the smallest distance (see results below). The hydrogeology will be similar for all other well-stream pairs so evaluating against the shortest distance provides an estimate of the maximum interference from the proposed use. Hydrogeologic material parameter values were taken from Herrera et al. (2014)

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:** The proposed use will likely have little impact to nearby surface water sources. Furthermore, the impacts will be distributed between Amazon Cr and Coyote Cr so impacts to either creek will likely be less than what was estimated in table C4a.

References Used:

Gannet, M. W. and R. R. Caldwell. 1998. *Geologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington*. USGS Professional Paper 1424-A.

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. 2003. *Unsteady Stream Depletion when Pumping from a Semiconfined Aquifer*. Journal of Hydrologic Engineering. Vol 8(1), pp 12-19

McCloughry, J. D., T. J. Wiley, M. L. Ferns, and I. P. Madin. 2010. *Digital Geologic Map of the Southern Willamette Valley, Benton, Lane, Linn, Marion, and Polk Counties, Oregon*. Oregon Dept. of Geology and Mineral Industries. Open File Report O-10-13.

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.

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) _____

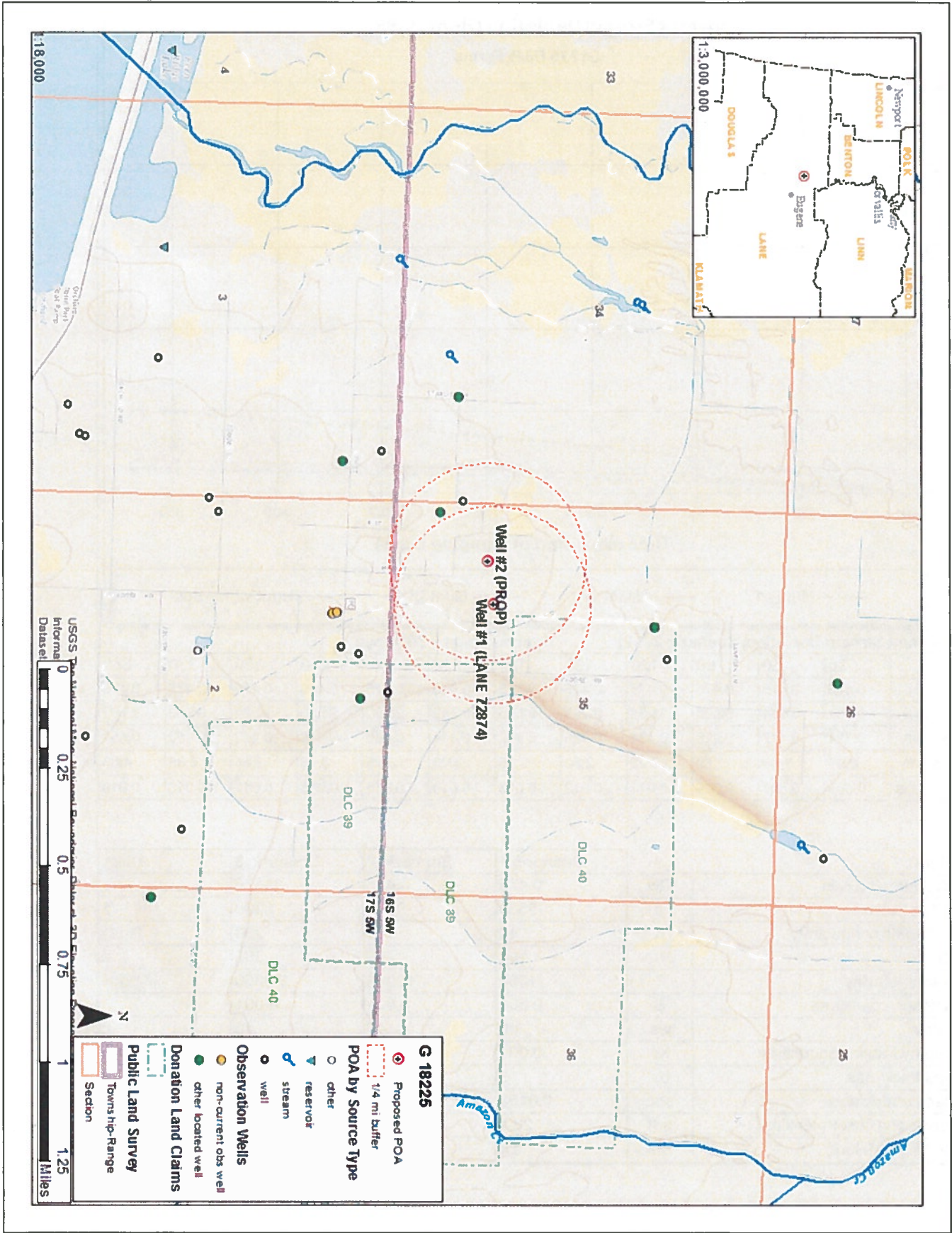
D3. **THE WELL construction deficiency or other comment is described as follows:** _____

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

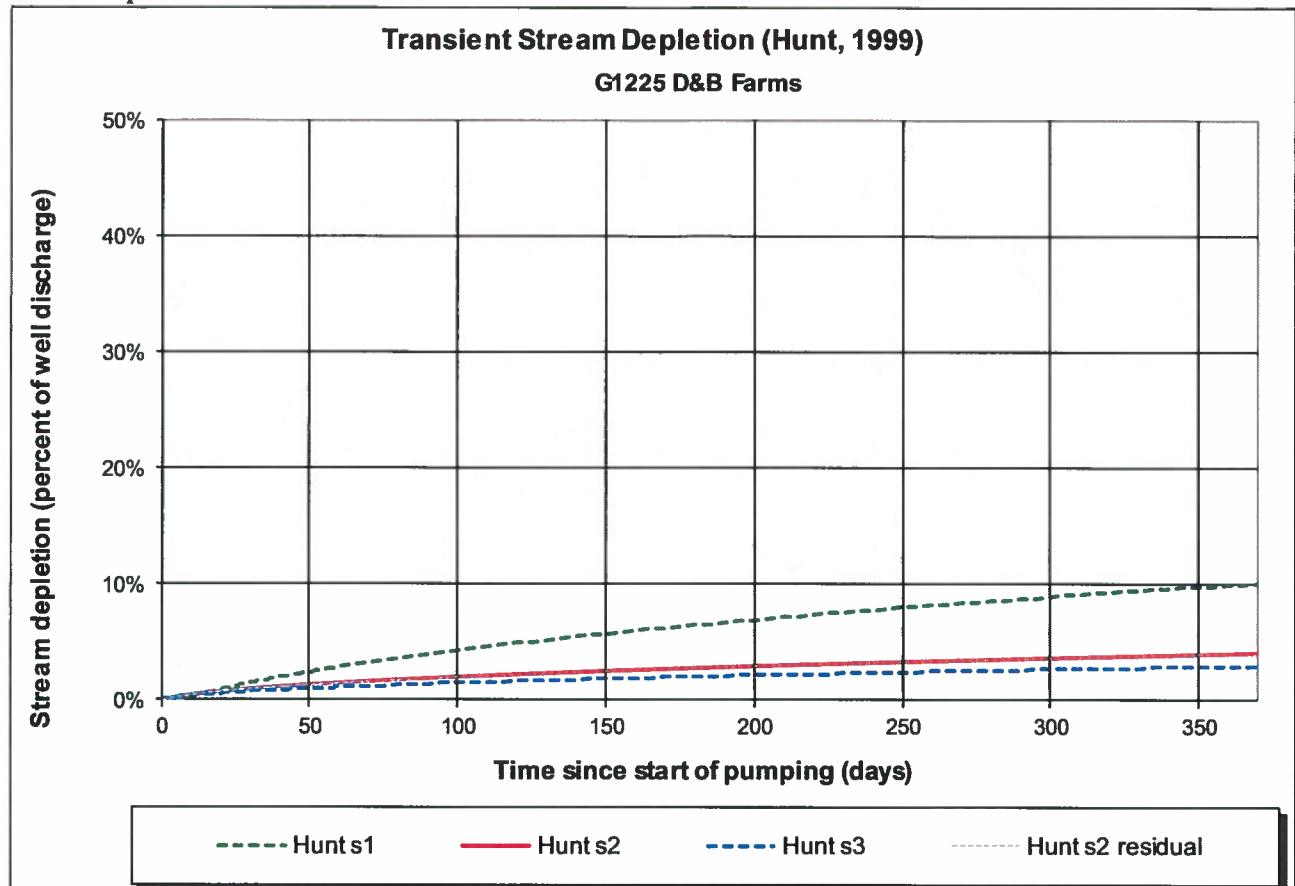
Water Availability Tables

LONG TOM R > WILLAMETTE R - AB MOUTH WILLAMETTE BASIN																																																																																																								
Water Availability as of 2/29/2016																																																																																																								
Watershed ID #: 114 (Map)				Exceedance Level: 80% -																																																																																																				
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Water Availability Calculation Monthly Streamflow in Cubic Feet per Second Annual Volume at 50% Exceedance in Acre-Feet <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr style="background-color: #4f81bd; color: white;"> <th>Month</th> <th>Natural Stream Flow</th> <th>Consumptive Uses and Storages</th> <th>Expected Stream Flow</th> <th>Reserved Stream Flow</th> <th>Instream Flow Requirement</th> <th>Net Water Available</th> </tr> </thead> <tbody> <tr><td>JAN</td><td>568.00</td><td>149.00</td><td>419.00</td><td>0.00</td><td>0.00</td><td>419.00</td></tr> <tr><td>FEB</td><td>697.00</td><td>389.00</td><td>308.00</td><td>0.00</td><td>0.00</td><td>308.00</td></tr> <tr><td>MAR</td><td>596.00</td><td>556.00</td><td>40.30</td><td>0.00</td><td>0.00</td><td>40.30</td></tr> <tr><td>APR</td><td>373.00</td><td>250.00</td><td>123.00</td><td>0.00</td><td>0.00</td><td>123.00</td></tr> <tr><td>MAY</td><td>215.00</td><td>64.70</td><td>150.00</td><td>0.00</td><td>0.00</td><td>150.00</td></tr> <tr><td>JUN</td><td>105.00</td><td>30.30</td><td>74.70</td><td>0.00</td><td>0.00</td><td>74.70</td></tr> <tr><td>JUL</td><td>50.60</td><td>47.60</td><td>2.99</td><td>0.00</td><td>0.00</td><td>2.99</td></tr> <tr><td>AUG</td><td>35.40</td><td>38.40</td><td>-2.97</td><td>0.00</td><td>0.00</td><td>-2.97</td></tr> <tr><td>SEP</td><td>32.10</td><td>22.20</td><td>9.93</td><td>0.00</td><td>0.00</td><td>9.93</td></tr> <tr><td>OCT</td><td>35.30</td><td>6.49</td><td>28.80</td><td>0.00</td><td>0.00</td><td>28.80</td></tr> <tr><td>NOV</td><td>82.50</td><td>6.20</td><td>76.30</td><td>0.00</td><td>0.00</td><td>76.30</td></tr> <tr><td>DEC</td><td>364.00</td><td>106.00</td><td>258.00</td><td>0.00</td><td>0.00</td><td>258.00</td></tr> <tr><td>ANN</td><td>362,000.00</td><td>99,700.00</td><td>262,000.00</td><td>0.00</td><td>0.00</td><td>262,000.00</td></tr> </tbody> </table>							Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available	JAN	568.00	149.00	419.00	0.00	0.00	419.00	FEB	697.00	389.00	308.00	0.00	0.00	308.00	MAR	596.00	556.00	40.30	0.00	0.00	40.30	APR	373.00	250.00	123.00	0.00	0.00	123.00	MAY	215.00	64.70	150.00	0.00	0.00	150.00	JUN	105.00	30.30	74.70	0.00	0.00	74.70	JUL	50.60	47.60	2.99	0.00	0.00	2.99	AUG	35.40	38.40	-2.97	0.00	0.00	-2.97	SEP	32.10	22.20	9.93	0.00	0.00	9.93	OCT	35.30	6.49	28.80	0.00	0.00	28.80	NOV	82.50	6.20	76.30	0.00	0.00	76.30	DEC	364.00	106.00	258.00	0.00	0.00	258.00	ANN	362,000.00	99,700.00	262,000.00	0.00	0.00	262,000.00
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Well Location Map



Stream-depletion Model Results



Output for Hunt Stream Depletion, Scenerio 2 (s2): Time pump on = 365 days

Days	30	60	90	120	150	180	210	240	270	300	330	360
Qw, cfs	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475	0.475
Jenk SD s2 %	82.87	87.84	90.06	91.38	92.29	92.96	93.48	93.90	94.25	94.54	94.80	95.02
Jen SD s2 cfs	0.394	0.417	0.428	0.434	0.438	0.442	0.444	0.446	0.448	0.449	0.450	0.451
Hunt SD s2 %	0.97	1.49	1.89	2.22	2.52	2.78	3.03	3.25	3.46	3.66	3.85	4.03
Hunt SD s2 cfs	0.005	0.007	0.009	0.011	0.012	0.013	0.014	0.015	0.016	0.017	0.018	0.019

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate	Qw	0.475	0.475	0.475	cfs
Distance to stream	a	5300	5300	5300	ft
Aquifer hydraulic conductivity	K	10	100	200	ft/day
Aquifer thickness	b	100	100	100	ft
Aquifer transmissivity	T	1000	10000	20000	ft ² /day
Aquifer storage coefficient	S	0.001	0.001	0.001	
Stream width	ws	40	40	40	ft
Streambed hydraulic conductivity	Ks	0.001	0.001	0.001	ft/day
Streambed thickness	bs	3	3	3	ft
Streambed conductance	sbc	0.0133	0.0133	0.0133	ft/day
Stream depletion factor (Jenkins)	sdf	28.1	2.8	1.4	days
Streambed factor (Hunt)	sbf	0.1	0.0	0.0	