WATER RESOURCES DEPARTMENT

MEMO August 25, 2016

TO: **Application G-** 18297

FROM: **GW:** Aurora Boucher
(Reviewer's Name)

SUBJECT: Scenic Waterway Interference Evaluation

☐ YES
The source of appropriation is within or above a Scenic Waterway
☒ NO

☐ YES
Use the Scenic Waterway condition (Condition 7J)
☒ NO

☐ Per ORS 390.835, the Groundwater Section is **able** to calculate ground water interference with surface water that contributes to a Scenic Waterway. The calculated interference is distributed below.

☐ Per ORS 390.835, the Groundwater Section is **unable** to calculate ground water interference with surface water that contributes to a scenic waterway; **therefore, the Department is unable to find that there is a preponderance of evidence that the proposed use will measurably reduce the surface water flows necessary to maintain the free-flowing character of a scenic waterway.**

DISTRIBUTION OF INTERFERENCE

Calculate the percentage of consumptive use by month and fill in the table below. If interference cannot be calculated, per criteria in 390.835, do not fill in the table but check the "unable" option above, thus informing Water Rights that the Department is *unable to make a Preponderance of Evidence finding.*

Exercise of this permit is calculated to reduce monthly flows in _____ Scenic Waterway by the following amounts expressed as a proportion of the consumptive use by which surface water flow is reduced.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date **August 24, 2016**

FROM: Groundwater Section **Aurora C Bouchier**
Reviewer's Name

SUBJECT: Application G- **18297** Supersedes review of **na**
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: **J & J Farming LLC/Jacob Kropf** County: **Linn**

A1. Applicant(s) seek(s) **0.1337** cfs from **1** well(s) in the **Willamette** Basin, **Upper Willamette** subbasin

A2. Proposed use **irrigation (20 acres)** Seasonality: **May - September**

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	LINN 225	1	Alluvium	0.1337	13S/3W-34 NE-SE	**
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	297	29	6	11/27/1990	83	0-18	+1-82		74-82	60	18	Bailer

Use data from application for proposed wells.

A4. **Comments:** The application provides a legal description of 1910' N, and 1151' E from the SW cor S 35. However, based on the Google imagery with the well clearly marked and visible, this is not correct. A more accurate (although still not completely correct) location might be: 1910' N, 118' W fr SW cor S 35.

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 aquifer, so the pertinent rules (OAR 690502-0240) 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) **7N**;
   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 area around the well is underlain by less than 10 feet of low permeability sediment (Willamette Silt), which is underlain by a series of sand and gravel beds interbedded with silts and clays (Gannett and Caldwell, 1998). Well logs for nearby wells (LINN 11981 and LINN 13545) and the applicant's well (LINN 225) suggest that there are no continuous confining layers in the area. The gravely nature of the Calapooia River bed west of the town of Brownsville (personal communication with Watermaster Michael Mattick, 4/28/2015) also suggests that there is no extensive confining layer between the bed of the stream and the aquifer.

The nearest observation well (Obs Well 509, LINN 13576) completed into the alluvial aquifer is located approximately 3.8 miles to the southwest. The hydrograph for Obs Well 509 indicates that groundwater levels are reasonably stable at that location. The sparsity of groundwater monitoring locally indicates a need for static water level condition 7N.

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**	☒	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: The static water level listed on the well log for LINN 225 is above the depth at which it was encountered, indicating the aquifer is at least locally confined.

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? YES	NO	ASSUMED	Potential for Subst. Interfer. Assumed? YES	NO
1	**1**	**Unnamed, intermittent tributary to Courtney Ck**	**~290**	**286-305**	**3,350**	☒	☐	☐	☐	☒
1	**2**	**Calapooia River**	**~290**	**282-300**	**5,120**	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: The unnamed tributary to Courtney Creek is intermittent within a mile of the applicant's well. Water table maps and the well log for LINN 225 indicate that the water table is at an elevation of about 290 feet in this area (Woodward et al., 1998, and Conlon et al., 2005), which is below the elevation of the intermittent stream at its adjacent reach. The distance listed above is where the tributary is at an elevation of 290 feet.

The groundwater elevation is above the elevation of the Calapooia River, suggesting that groundwater is contributing to the surface water.

Water Availability Basin the well(s) are located within: 76: CALAPOOIA R > WILLAMETTE R – AB 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?
1	**1**	☐	☐	**na**	**na**	☐	**22.70**	☐	**<<25%**	☐
1	**2**	☐	☐	**MF 76A**	**20.0**	☐	**22.70**	☐	**<<25%**	☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

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: The stream depletion from the unnamed tributary was estimated using the Hunt 2003 model. The presence of low permeability Willamette Silt below the stream bed results in an inefficient hydraulic connection between the aquifer and the stream. Therefore the stream depletion at 30 days is modeled to be <<25% (see results below).

The stream depletion from the Calapooia River was estimated using the Hunt 1999 model. The large distance to the River likely results in stream depletion at 30 days being <<25% (see results below).

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:

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 large distance between the well and the hydraulically connected surface water bodies will likely result in an inefficient connection between the well and the surface water bodies. However, stream depletion will increase over time until all of the pumped water is balanced by reduced stream flow.

References Used:

Application files: G-18297, and nearby G-17956.

Conlon, T. D., Wozniak, K. C., Woodcock, D., Herrera, N.B., Fischer, B.J. Morgan, D.S., Lee, K.K., and Hinkle, S.R., 2005, Ground-Water Hydrology of the Willamette Basin, Oregon: U. S. Geological Survey Scientific Investigations Report 2005-5168.

Gannett, Marshall W., and Caldwell, Rodney R., 1998, Geologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington: U. S. Geological Survey Professional Paper 1424-A.

Herra, N. B., Burns, E. R., and Conlon, T. D, 2014, Simulation of groundwater flow and the interaction of groundwater and surface water in the Willamette Basin and Central Willamette subbasin, Oregon: U.S. Geologcal Survey Scientific Investigations Report 2014-5136, 152 p., http//dx.doi.org/10.3133/sir20155136.

Hunt, B., 2003, Unsteady stream depletion when pumping from semiconfined aquifer: Journal of Hydrologic Engineering, January/February, 2003.

Hunt, B., 1999, Unsteady stream depletion from ground water pumping: Ground Water, v. 37, no. 1, p. 98-102.

Woodward, Dennis G., Gannett, Marshall W., and Vaccaro, John J., 1998 Hydrogeologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington: U. S. Geological Survey Professional Paper 1424-B.

Nearby well logs and water level data, especially LINN 225, and LINN 13576.

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

WATER AVAILABILITY TABLE

CALAPOOIA R > WILLAMETTE R - AB MOUTH

Watershed ID #: 76 Basin: WILLAMETTE Exceedance Level: 80
Time: 4:16 PM Date: 08/24/2016

Nest	# Watershed ID Number	Stream Name	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	STOR
1	181	WILLAMETTE R > COLUMBIA R - AT MOUTH	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
2	182	WILLAMETTE R > COLUMBIA R - AB MOLALLA R	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
3	183	WILLAMETTE R > COLUMBIA R - AB MILL CR AT GAGE 14191	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
4	30200321	WILLAMETTE R > COLUMBIA R - AB PERIWINKLE CR AT GAGE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
5	76	CALAPOOIA R > WILLAMETTE R - AB MOUTH	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION

CALAPOOIA R > WILLAMETTE R - AB MOUTH

Watershed ID #: 76 Basin: WILLAMETTE Exceedance Level: 80
Time: 4:17 PM Date: 08/24/2016

Monthly values are in cfs.
Storage is the annual amount at 50% exceedance in ac-ft.

Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net Water Available
JAN	592.00	2.87	589.00	0.00	20.00	569.00
FEB	650.00	2.82	647.00	0.00	20.00	627.00
MAR	575.00	2.13	573.00	0.00	20.00	553.00
APR	423.00	1.82	421.00	0.00	20.00	401.00
MAY	234.00	6.83	227.00	0.00	20.00	207.00
JUN	111.00	12.50	98.50	0.00	20.00	78.50
JUL	49.00	19.30	29.70	0.00	20.00	9.69
AUG	26.00	13.80	12.20	0.00	20.00	-7.82
SEP	22.70	7.25	15.40	0.00	20.00	-4.55
OCT	29.60	1.38	28.20	0.00	20.00	8.22
NOV	133.00	1.88	131.00	0.00	20.00	111.00
DEC	499.00	2.83	496.00	0.00	20.00	476.00
ANN	404,000	4,570	399,000	0	14,500	385,000

DETAILED REPORT OF INSTREAM REQUIREMENTS

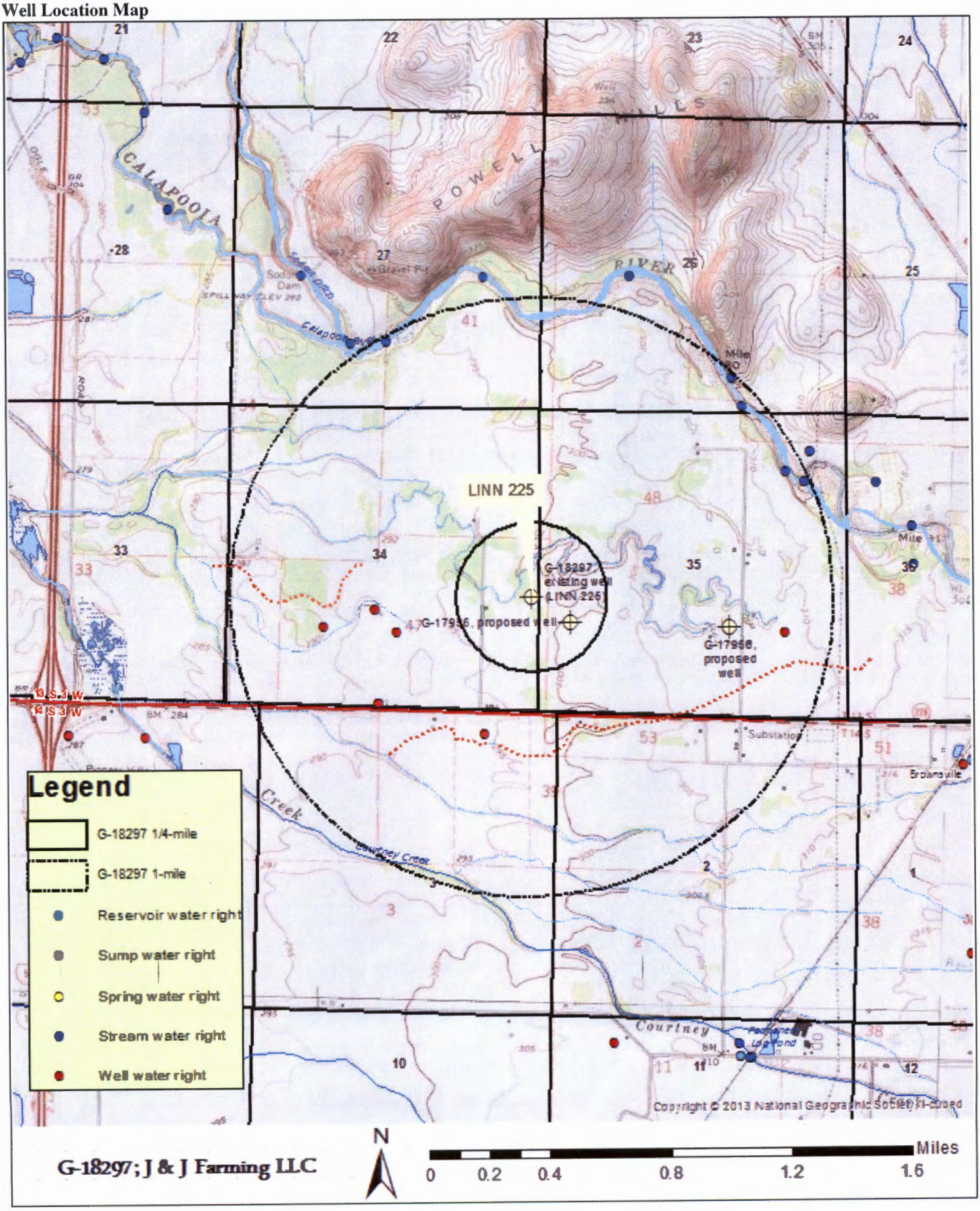
CALAPOOIA R > WILLAMETTE R - AB MOUTH

Watershed ID #: 76 Basin: WILLAMETTE
Time: 4:17 PM Date: 08/24/2016

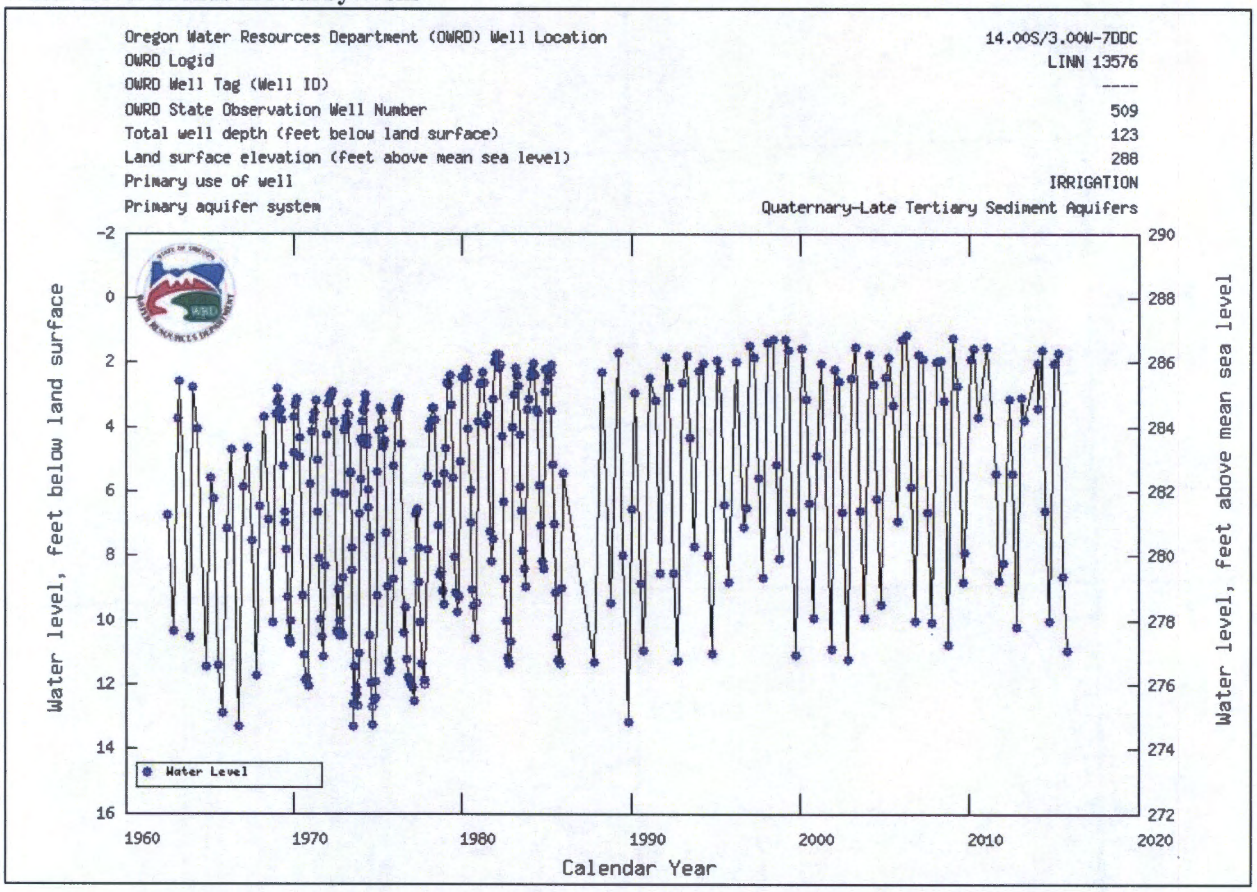
Monthly values are in cfs.

Application Number	Status	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MF76A	CERTIFICATE	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.00	20.0
MAXIMUM		20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0

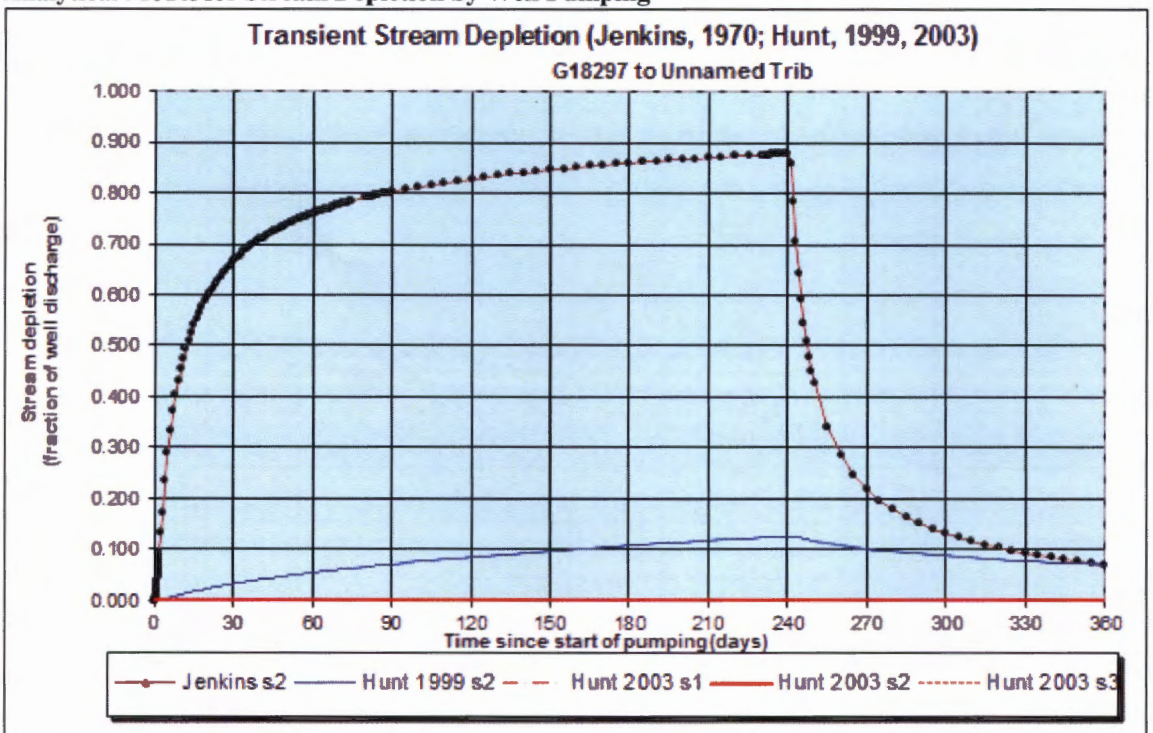
Well Location Map



Water-Level Trends in Nearby Wells

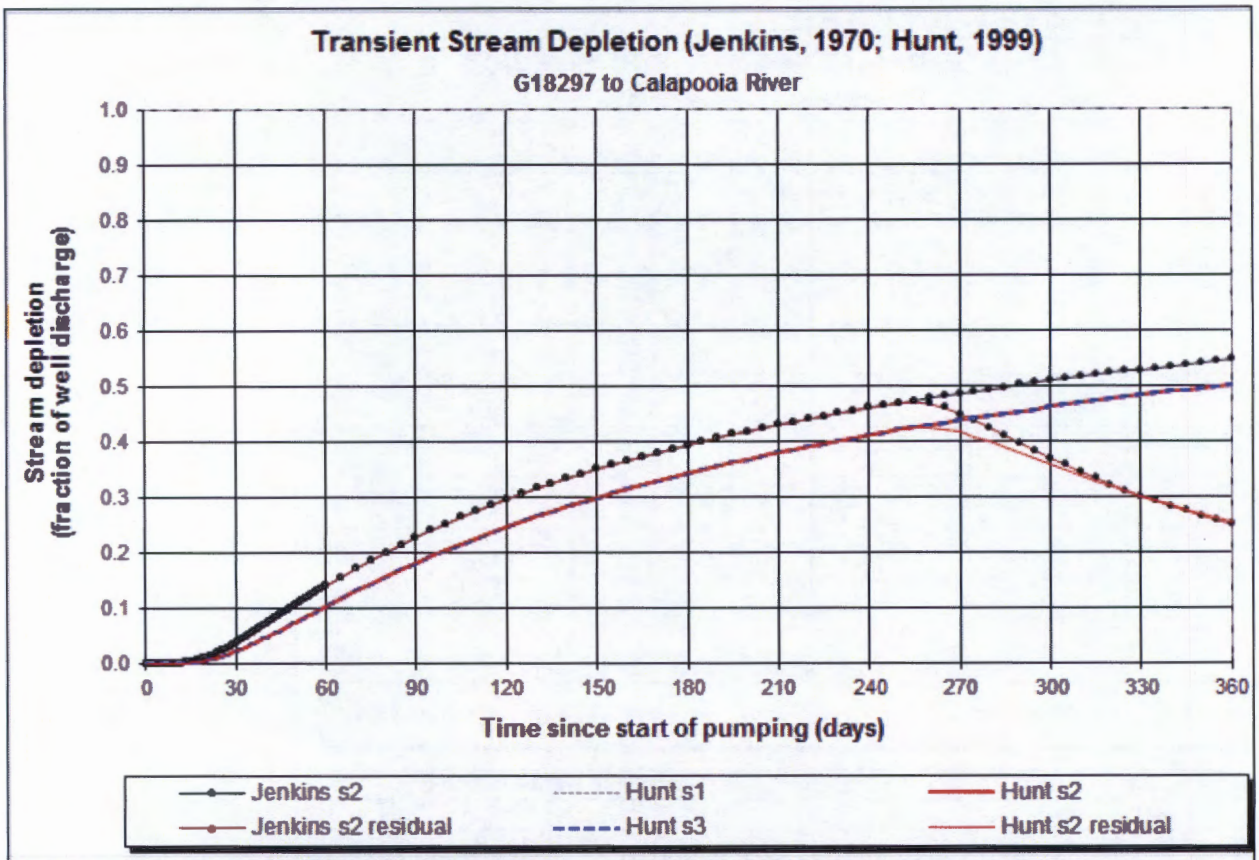


Analytical Model for Stream Depletion by Well Pumping



Output for Stream Depletion, Scenerio 2 (s2):	Time pump on (pumping duration) = 240 days											
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	66.5%	76.0%	80.3%	82.9%	84.7%	86.0%	87.0%	87.8%	22.0%	13.1%	9.3%	7.2%
H SD 1999	3.3%	5.5%	7.1%	8.5%	9.7%	10.8%	11.8%	12.7%	10.2%	8.8%	7.8%	7.1%
H SD 2003	0.05%	0.06%	0.07%	0.08%	0.10%	0.11%	0.13%	0.14%	0.11%	0.12%	0.12%	0.12%
Qw, cfs	0.134	0.134	0.134	0.134	0.134	0.134	0.134	0.134	0.134	0.134	0.134	0.134
H SD 99, cfs	0.004	0.007	0.010	0.011	0.013	0.014	0.016	0.017	0.014	0.012	0.010	0.010
H SD 03, cfs	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	60.00	60.00	60.00	gpm
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	3350	3350	3350	ft
Well depth	d	83	83	83	ft
Aquifer hydraulic conductivity	K	50	50	50	ft/day
Aquifer saturated thickness	b	20	20	20	ft
Aquifer transmissivity	T	1000	1000	1000	ft*ft/day
Aquifer storativity or specific yield	S	0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva	0.01	0.01	0.01	ft/day
Aquitard saturated thickness	ba	10	10	10	ft
Aquitard thickness below stream	babs	5	5	5	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	10	10	10	ft
Streambed conductance (lambda)	sbc	0.020000	0.020000	0.020000	ft/day
Stream depletion factor	sdf	11.222500	11.222500	11.222500	days
Streambed factor	sbf	0.067000	0.067000	0.067000	
input #1 for Hunt's Q_4 function	t'	0.089107	0.089107	0.089107	
input #2 for Hunt's Q_4 function	K'	11.222500	11.222500	11.222500	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	0.067000	0.067000	0.067000	



Output for Hunt Stream Depletion, Scenerio 2 (s2): Time pump on = 240 days

Days	30	60	90	120	150	180	210	240	270	300	330	360
Qw, cfs	0.134	0.134	0.134	0.134	0.134	0.134	0.134	0.134	0.134	0.134	0.134	0.134
Jenk SD s2 %	3.66	13.94	22.75	29.60	34.99	39.35	42.95	45.99	44.94	36.92	30.10	25.03
Jen SD s2 cfs	0.005	0.019	0.030	0.040	0.047	0.053	0.057	0.061	0.060	0.049	0.040	0.033
Hunt SD s2 %	2.24	10.32	18.16	24.64	29.92	34.28	37.95	41.08	41.55	35.85	30.10	25.50
Hunt SD s2 cfs	0.003	0.014	0.024	0.033	0.040	0.046	0.051	0.055	0.056	0.048	0.040	0.034

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate	Qw	0.1337	0.1337	0.1337	cfs
Distance to stream	a	5120	5120	5120	ft
Aquifer hydraulic conductivity	K	50	50	50	ft/day
Aquifer thickness	b	20	20	20	ft
Aquifer transmissivity	T	1000	1000	1000	ft*ft/day
Aquifer storage coefficient	S	0.01	0.01	0.01	
Stream width	ws	100	100	100	ft
Streambed hydraulic conductivity	Ks	0.1	0.1	0.1	ft/day
Streambed thickness	bs	3	3	3	ft
Streambed conductance	sbc	3.333333333	3.333333333	3.333333333	ft/day
Stream depletion factor (Jenkins)	sdf	262.144	262.144	262.144	days
Streambed factor (Hunt)	sbf	17.06666667	17.06666667	17.06666667	