

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date February 8, 2016

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

SUBJECT: Application G- 18163 Supersedes review of December 22, 2015
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: Stanley J. and Lori L. Boshart County: LINN

A1. Applicant(s) seek(s) 0.2 cfs from 3 well(s) in the Willamette Basin,
Calapooia subbasin

A2. Proposed use Irrigation (80 ac primary) Seasonality: March1 – October 31

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	Well 1	Alluvium	0.2	11S/04W-26 SENE	945'S, 25'E of NW cor DLC 76 ^B
2	PROP	Well 2	Alluvium	0.2	11S/04W-24 SWSW	2130'N, 1250'E of NW cor DLC 76 ^B
3	PROP	Well 3	Alluvium	0.2	11S/04W-25 NWNW	130'N, 1210'E of NW cor DLC 76 ^B
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	215		12 ^A		100	0-50	0-100		80-100			
2	215		12 ^A		100	0-50	0-100		80-100			
3	215		12 ^A		100	0-50	0-100		80-100			

Use data from application for proposed wells.

A4. **Comments:** ^AWells are proposed; SWLs based on average depth to water from a nearby state observation well (LINN 8508).

^BThe consultant for the applicant submitted a revised map with new locations to the Department on 01/25/2016 which initiated this re-review. New locations are referenced to Donation Land Claim corner.

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) 7E (Reference Level); "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:** There is a State Observation Well (LINN 8508) located < ¼ mile from the applicant's proposed Well #2 that shows very stable water levels over the past four decades suggesting that groundwater is not over-appropriated in the area (see figure below). Additionally, there are few permitted groundwater rights in the immediate vicinity of the proposed POAs so injury to existing groundwater users is unlikely.

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	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Alluvium of Willamette Aquifer	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Alluvium of Willamette Aquifer	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer confinement evaluation: Many well logs in the area show SWLs higher than reported water-bearing zones and most logs list clay to 10-20 ft BLS under the material log.

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	Calapooia R.	200	200	1425 ^A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	1	Calapooia R.	200	195	1420 ^A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	1	Calapooia R.	200	197	1500 ^A	<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"/>

Basis for aquifer hydraulic connection evaluation: Coincident GW and SW Elevations; large seasonal fluctuations in observation well (LINN 8508) coincident with river stage suggests efficient connection.

^ADistances have been revised from original review due to new locations

Water Availability Basin the well(s) are located within: Calapooia R > Willamette R – AB Mouth (ID# 76)

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"/>	MF76A	20	<input type="checkbox"/>	22.7	<input type="checkbox"/>	< 1%	<input checked="" type="checkbox"/>
2	1	<input type="checkbox"/>	<input type="checkbox"/>	MF76A	20	<input type="checkbox"/>	22.7	<input type="checkbox"/>	< 1%	<input type="checkbox"/>
3	1	<input type="checkbox"/>	<input type="checkbox"/>	MF76A	20	<input type="checkbox"/>	22.7	<input type="checkbox"/>	< 1%	<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 days was evaluated using the Hunt (2003) analytical model and aquifer parameter values taken from Herrera et al., (2014). Results of the model for the closest well (Well #2) are attached below.

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?
			<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: _____

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 Well #1 is hydraulically connected to and within 1/4 mile of surface water so per OAR 690-009-0040 it is assumed to have Potential for Substantial Interference with the Calapooia River. Wells #2 and #3 are beyond 1/4 mile and do not trigger PSI.~~

It is the finding of the Department that all three of the applicant's wells are hydraulically connected to the Calapooia R. but are beyond 1/4 mile from the river and therefore not assumed to have Potential for Substantial Interference per OAR 690-009-0040.

References Used:

Gannett, 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

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

CALAPOOIA R > WILLAMETTE R - AB MOUTH
WILLAMETTE BASIN

Water Availability as of 12/21/2015

Watershed ID #: 76 ([Map](#)) Exceedance Level: 80% ▾

Date: 12/21/2015 Time: 4:19 PM

Water Availability Calculation
Consumptive Uses and Storages
Instream Flow Requirements
Reservations

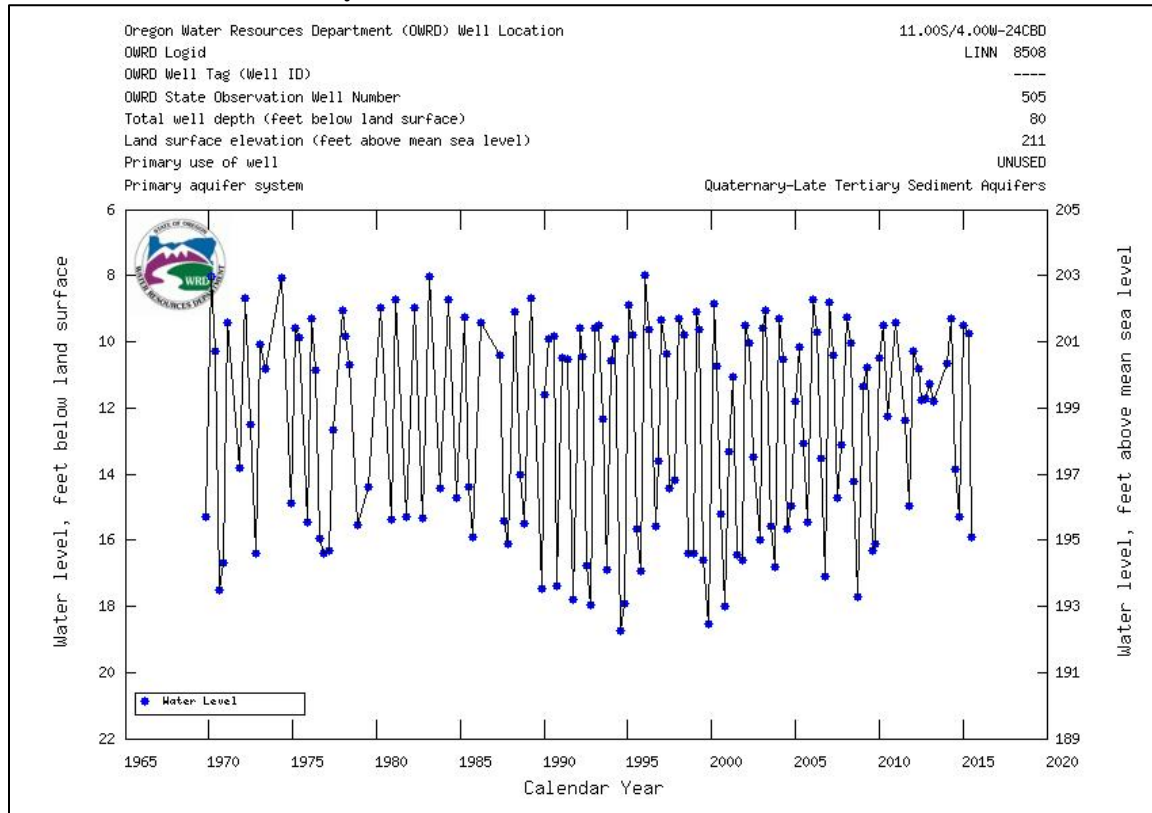
Water Rights
Watershed Characteristics

Water Availability Calculation

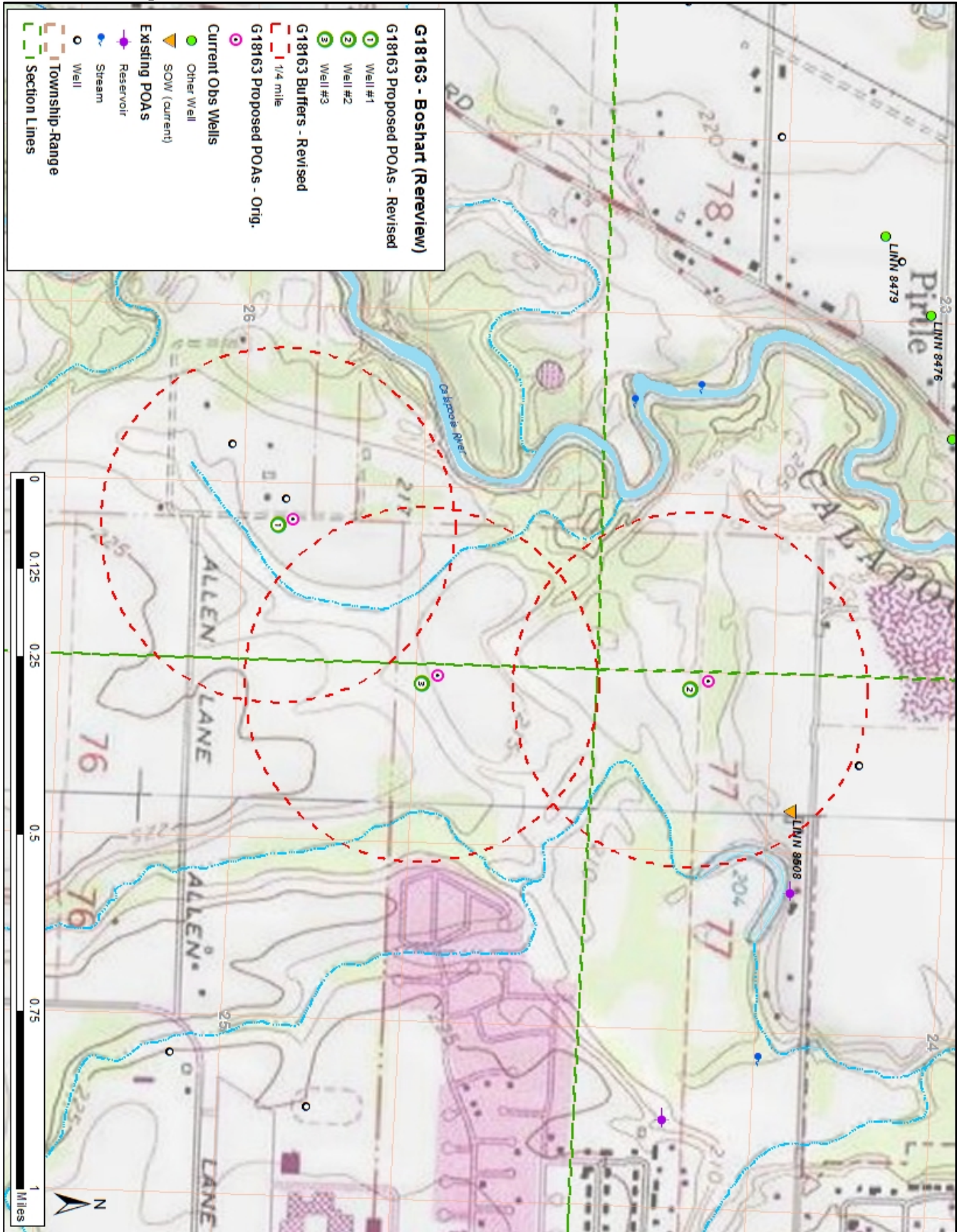
Monthly Streamflow in Cubic Feet per Second
Annual Volume at 50% Exceedance in Acre-Feet

Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	592.00	2.84	589.00	0.00	20.00	569.00
FEB	650.00	2.78	647.00	0.00	20.00	627.00
MAR	575.00	2.11	573.00	0.00	20.00	553.00
APR	423.00	1.81	421.00	0.00	20.00	401.00
MAY	234.00	6.82	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	1.87	131.00	0.00	20.00	111.00
DEC	499.00	2.80	496.00	0.00	20.00	476.00
ANN	404,000.00	4,560.00	399,000.00	0.00	14,500.00	385,000.00

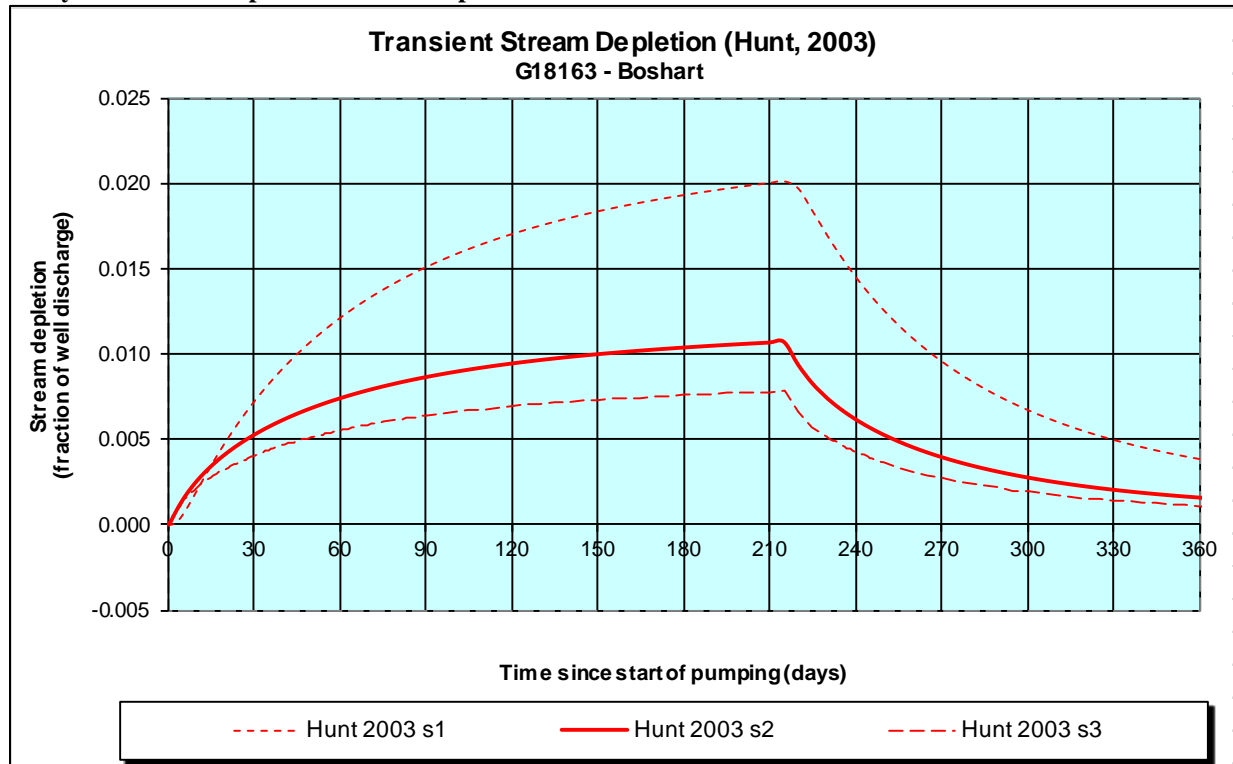
Water-Level Trends in Nearby Wells



Well Location Map



Analytical Stream-depletion Model Output



Output for Stream Depletion, Scenerio 2 (s2):					Time pump on (pumping duration) = 215 days								
Days	30	60	90	120	150	180	210	240	270	300	330	360	
J SD	80.6%	86.2%	88.8%	90.3%	91.3%	92.0%	92.6%	14.3%	7.8%	5.4%	4.1%	3.2%	
H SD 1999	0.6%	0.9%	1.2%	1.4%	1.6%	1.8%	1.9%	1.5%	1.3%	1.2%	1.1%	1.0%	
H SD 2003	0.52%	0.74%	0.86%	0.94%	1.00%	1.04%	1.07%	0.62%	0.40%	0.28%	0.20%	0.16%	
Qw, cfs	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	
H SD 99, cfs	0.001	0.002	0.002	0.003	0.003	0.004	0.004	0.003	0.003	0.002	0.002	0.002	
H SD 03, cfs	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.000	0.000	

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.20	0.20	0.20	cfs
Time pump on (pumping duration)	tpon	215	215	215	days
Perpendicular from well to stream	a	1420	1420	1420	ft
Well depth	d	100	100	100	ft
Aquifer hydraulic conductivity	K	10	70	150	ft/day
Aquifer saturated thickness	b	80	80	80	ft
Aquifer transmissivity	T	800	5600	12000	ft*ft/day
Aquifer storativity or specific yield	S	0.01	0.01	0.01	
Aquitard vertical hydraulic conductivity	Kva	0.001	0.001	0.001	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	100	100	100	ft
Streambed conductance (lambda)	sbc	0.020	0.020	0.020	ft/day
Stream depletion factor	sdf	25.205	3.601	1.680	days
Streambed factor	sbf	0.036	0.005	0.002	
input #1 for Hunt's Q_4 function	t'	0.040	0.278	0.595	
input #2 for Hunt's Q_4 function	K'	0.252	0.036	0.017	
input #3 for Hunt's Q_4 function	epsilon'	0.050	0.050	0.050	
input #4 for Hunt's Q_4 function	lamda'	0.036	0.005	0.002	