PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date **11/20/2015**

FROM: Groundwater Section **Jen Woody**
Reviewer's Name

SUBJECT: Application G- **18143** Supersedes review of **n/a**
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: **Catherine Johnson** County: **Clackamas**

A1. Applicant(s) seek(s) **0.225** cfs from **1** well(s) in the **Willamette** Basin, **Molalla River** subbasin

A2. Proposed use **nursery** 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	PROP 999999	1	Sand and gravel	0.225	T3S/R1E-19 SW ¼ NW ¼	2120' S, 200' E fr NW cor S 19
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	100		25*		180	0-60	0-190	unknown	150-180			

Use data from application for proposed wells.

A4. **Comments:** The well is proposed as 180' deep, and will access sand and gravel of the Willamette Aquifer.
*Water level estimated from water table elevation contours of Conlon et al. (2005).

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 aquifer is confined, so 690-502-0240 does 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, 7T, 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 applicant's wells are located in an area where fine-grained sediments of the Willamette silt occur from land surface to a depth of less than 80 feet (Woodward et al., 1998). A package of water-bearing lenses of sand and gravel underlie the silt. About 600 feet of mostly fine-grained alluvial sediments with some thin packages of sands and gravels are found beneath the sand and gravel layer. Nearby well logs report fine-grained materials with water-bearing sand and gravel zones ranging from 5-25 feet thick between about 50 feet below land surface to approximately 180 feet below land surface.

Similar groundwater elevations indicate nearby wells share the same aquifer. Groundwater level trends (see Figure 4) indicate water levels are relatively stable at the current level of use. Additionally, the proximity and hydraulic connection to the Willamette River likely maintains stable groundwater levels. Water level monitoring and reporting conditions are recommended to protect the resource and other users.

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	**Sand and gravel of the Willamette Aquifer**	☒	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: Well logs and Gannett and Caldwell (1998) report about 20 feet of saturated Willamette Aquifer (sand and gravel of alluvial origin), overlain by up to 80 feet of low permeability Willamette Silt**.** Aquifer test data from the Willamette aquifer suggest storage values consistent with confined aquifers.

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**	**Willamette River**	**75**	**20**	**830**	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: The Willamette Silt's thickness changes between the proposed well site and the Willamette River. According to Gannett and Caldwell (1998), the low permeability silt thins to less than 40 feet at the Willamette River directly north of the well site. Water table elevations show regional groundwater discharges to the river in this reach, indicating hydraulic connection.

Water Availability Basin the well(s) are located within: Watershed ID #: 181: WILLAMETTE R > COLUMBIA R - AT MOUTH**; Watershed ID #: 69796**: MOLALLA R > WILLAMETTE 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 S1W 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**	☒	☐	MF181 A	**1500**	☐	**4,930.00**	☐	**<<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 proposed well triggers PSI because it is hydraulically connected to the Willamette River and located less than ¼ mile from the river.

Calculated stream depletion using the Hunt (2003) model indicates interference with the Willamette River is on the order of 3% at 30 days (see attached analytical model results). Nearby pump test data from CLAC 70380 and CLAC 59086 identify transmissivity values of 20-400 ft^2/d; these were used in stream depletion calculations.

Interference with the Molalla River is not calculated because the cone of depression will intersect the Willamette River first and likely not expand to interfere significantly with the Molalla River.

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: See comments in Section C3b.

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:**

References Used:

Conlon, T.D., Wozniak, K.C., Woodcock, D., Herrera, N.B., Fisher, 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.

Conlon, T., Lee, K., Risley, J., 2003, Heat tracing in streams in the central Willamette Valley , in Heat as a Tool for Studying the movement of Groundwater Near streams, U. S. Geological Survey Circular 1260, 96 p.

Gannett, M.W. and Caldwell, R., 1998, Geologic framework of the Willamette Lowland aquifer system, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-A, 32 p.

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

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

Woodward, D.G., Gannett, M.W., and Vaccaro, J.J., 1998, Hydrogeologic framework of the Willamette Lowland aquifer system, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-B, 82 p.

US Geological Survey Topographic Quadrangle Maps.

OWRD water level database, includes reported water levels, accessed 11/18/2015.

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.**

Figure 1. Water Availability Tables

Water Availability Analysis

Detailed Reports

MOLALLA R > WILLAMETTE R - AT MOUTH

WILLAMETTE BASIN

Water Availability as of 11/18/2015

Watershed ID #: 69796 (Map) Exceedance Level:80%

Date: 11/18/2015 Time: 9:09 AM

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	1,870.00	155.00	1,720.00	0.00	500.00	1,220.00
FEB	2,010.00	145.00	1,870.00	0.00	500.00	1,370.00
MAR	1,830.00	116.00	1,710.00	0.00	500.00	1,210.00
APR	1,530.00	89.30	1,440.00	0.00	500.00	941.00
MAY	927.00	99.10	828.00	0.00	500.00	328.00
JUN	431.00	119.00	312.00	0.00	500.00	-188.00
JUL	204.00	183.00	21.10	0.00	200.00	-179.00
AUG	139.00	154.00	-15.20	0.00	100.00	-115.00
SEP	134.00	83.30	50.70	0.00	150.00	-99.30
OCT	188.00	41.70	146.00	0.00	450.00	-304.00
NOV	637.00	79.80	557.00	0.00	500.00	57.20
DEC	1,700.00	150.00	1,550.00	0.00	500.00	1,050.00
ANN	1,320,000.00	85,400.00	1,240,000.00	0.00	295,000.00	966,000.00

Download Data (Text - Formatted , Text - Tab Delimited , Excel)

Water Availability Analysis

Detailed Reports

WILLAMETTE R > COLUMBIA R - AT MOUTH

WILLAMETTE BASIN

Water Availability as of 11/18/2015

Watershed ID #: 181 (Map) Exceedance Level:80%

Date: 11/18/2015 Time: 9:28 AM

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	27,500.00	2,760.00	24,700.00	0.00	1,500.00	23,200.00
FEB	30,000.00	8,030.00	22,000.00	0.00	1,500.00	20,500.00
MAR	28,500.00	7,590.00	20,900.00	0.00	1,500.00	19,400.00
APR	25,400.00	7,200.00	18,200.00	0.00	1,500.00	16,700.00
MAY	20,700.00	4,450.00	16,200.00	0.00	1,500.00	14,700.00
JUN	11,000.00	2,420.00	8,580.00	0.00	1,500.00	7,080.00
JUL	6,280.00	2,370.00	3,910.00	0.00	1,500.00	2,410.00
AUG	4,890.00	2,120.00	2,770.00	0.00	1,500.00	1,270.00
SEP	4,930.00	1,760.00	3,170.00	0.00	1,500.00	1,670.00
OCT	5,990.00	732.00	5,260.00	0.00	1,500.00	3,760.00
NOV	12,700.00	1,020.00	11,700.00	0.00	1,500.00	10,200.00
DEC	24,800.00	1,410.00	23,400.00	0.00	1,500.00	21,900.00
ANN	19,700,000.00	2,510,000.00	17,200,000.00	0.00	1,090,000.00	16,100,000.00

Download Data (Text - Formatted , Text - Tab Delimited , Excel)

Figure 2. Well Location Map

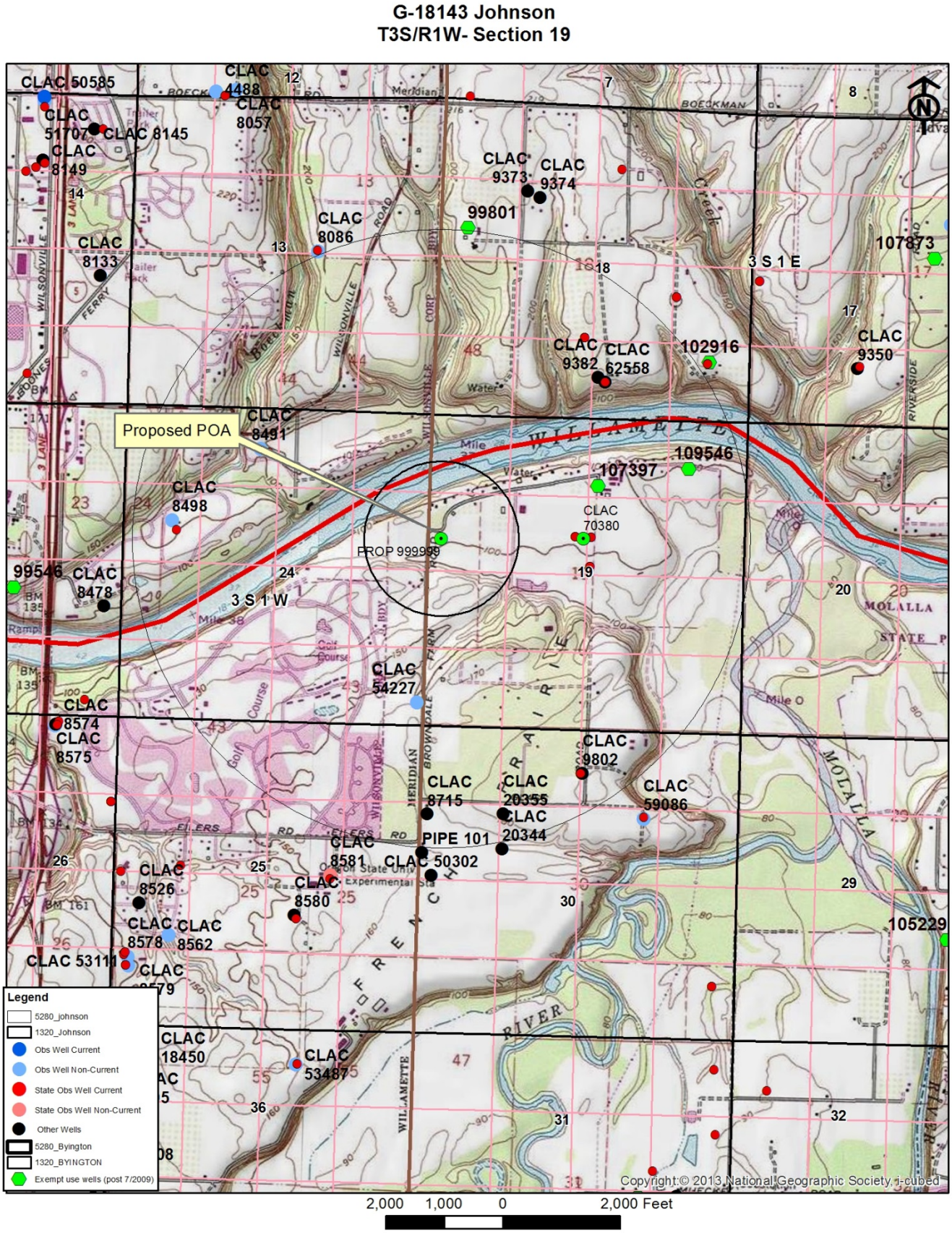
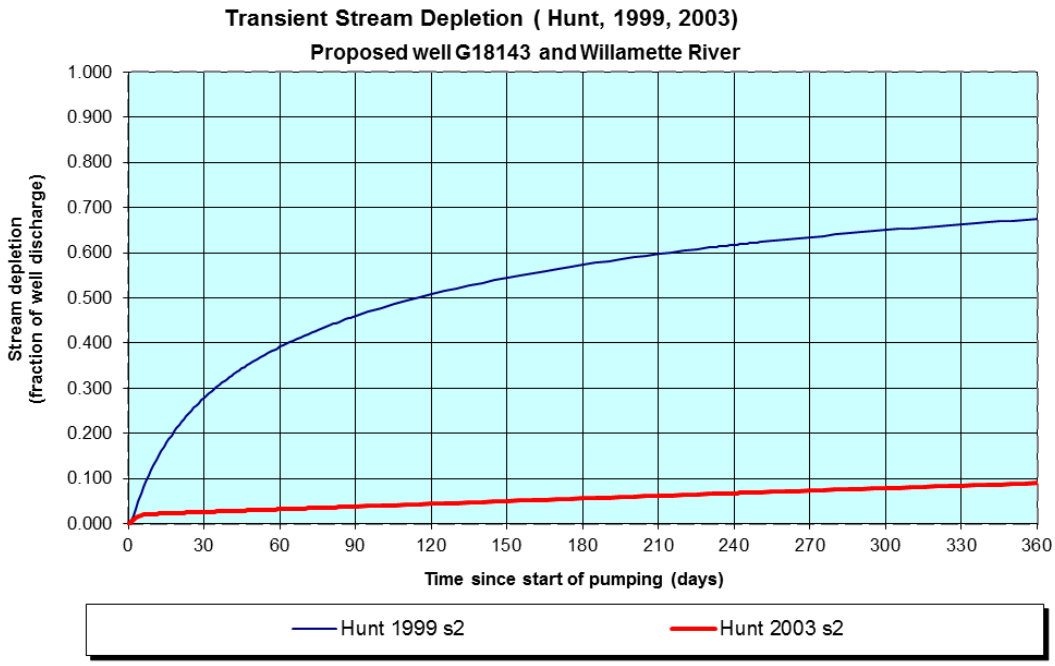


Figure 3. Stream Depletion Estimates



Output for Stream Depletion, Scenerio 2 (s2):	Time pump on (pumping duration) = 360 days											
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	73.5%	81.1%	84.5%	86.5%	88.0%	89.0%	89.8%	90.5%	91.0%	91.5%	91.9%	92.2%
H SD 1999	27.8%	39.1%	46.0%	50.8%	54.4%	57.3%	59.7%	61.7%	63.5%	65.0%	66.3%	67.5%
H SD 2003	2.56%	3.17%	3.78%	4.39%	4.99%	5.58%	6.16%	6.74%	7.30%	7.86%	8.41%	8.94%
Qw, cfs	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223
H SD 99, cfs	0.062	0.087	0.102	0.113	0.121	0.128	0.133	0.138	0.141	0.145	0.148	0.150
H SD 03, cfs	0.006	0.007	0.008	0.010	0.011	0.012	0.014	0.015	0.016	0.018	0.019	0.020

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	100.00	100.00	100.00	gpm
Time pump on (pumping duration)	tpon	360	360	360	days
Perpendicular from well to stream	a	830	830	830	ft
Well depth	d	180	180	180	ft
Aquifer hydraulic conductivity	K	10	15	20	ft/day
Aquifer saturated thickness	b	20	20	20	ft
Aquifer transmissivity	T	200	300	400	ft*ft/day
Aquifer storativity or specific yield	S	0.003	0.003	0.003	
Aquitard vertical hydraulic conductivity	Kva	0.008	0.03	0.1	ft/day
Aquitard saturated thickness	ba	20	20	20	ft
Aquitard thickness below stream	babs	3	3	3	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	20	20	20	ft

Figure 4. Water-Level Trends in Nearby Wells