PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date April 9, 2015

FROM: Groundwater Section Karl Wozniak
Reviewer's Name

SUBJECT: Application G- 17788 Supersedes review of September 23, 2014
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: Avinelis County: Linn

A1. Applicant(s) seek(s) 0.85 cfs from 2 well(s) in the Willamette Basin, North Santiam River subbasin Quad Map: Crabtree

A2. Proposed use Irrigation & Temperature Control Seasonality: March 1 – Oct 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~~	~~LINN 4166~~	~~1~~	~~Alluvium~~	~~2.42~~	~~10S/02W-17 SW/NW~~	~~1425' S, 775' E fr NW cor S17~~
~~2~~	~~LINN 61004~~	~~2~~	~~Alluvium~~	~~2.42~~	~~10S/02W-17 NE/NW~~	~~275' S, 1810' E fr NW cor S17~~
~~3~~	~~LINN 4165~~	~~3~~	~~Alluvium~~	~~2.42~~	~~10S/02W-17 NW/NW~~	~~457' S, 770' E fr NW cor S17~~
~~4~~	~~LINN 60537~~	~~4~~	~~Alluvium~~	~~2.42~~	~~10S/02W-17 NW/SW~~	~~237' S, 487' E fr W1/4 cor S17~~
5	Proposed	5	Alluvium	0.85	10S/02W-17 NW/NE	2800' E, 338' S fr NW cor S17
6	Proposed	6	Alluvium	0.85	10S/02W-17 NW/NE	2990' E, 483' S fr NW cor S17

* 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*~~	~~260~~	———	~~17~~	~~06/30/1940~~	~~21~~	~~?~~	~~0-21~~	———	———	~~?~~	———	———
~~2~~	~~262~~	———	———	———	~~21~~	~~?~~	~~0-21~~	———	———	~~?~~	———	———
~~3~~	~~260~~	———	~~14~~	~~02/20/1962~~	~~27~~	~~?~~	~~0-27~~	———	~~21-26~~	~~600~~	~~3~~	~~Pump~~
~~4~~	~~252~~	~~20~~	~~5~~	~~09/03/2013~~	~~60~~	~~0-18~~	~~0-59~~	———	~~32-59~~	~~600~~	———	~~Air~~
5												
6												

Use data from application for proposed wells.

A4. **Comments:** This review is for a revised application, received March 23, 2015, that substitutes two new wells in place of the four wells listed on the original application. The new wells will be similar in depth and construction to the wells on the original application. The proposed locations for the new wells were chosen to be a sufficient distance from the North Santiam River to avoid the potential for substantial interference based on the 30 day interference benchmark using the analytical model parameters specified in the initial review. The revised application also reduces the irrigated lands to 68.22 acres and the maximum requested rate to 0.85 cfs.

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 wells are greater than ¼ mile from a surface water source so the pertinent rules (OAR 690-502-0240) 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) **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 area beneath the proposed irrigated lands and wells is underlain by 60-70 feet of coarse-grained Holocene floodplain deposits associated with the North Santiam River. The water table occurs at shallow depths and groundwater levels approximate the stage of adjacent reaches of the river. The alluvial floodplain aquifer is unconfined and highly permeable. Groundwater level data is sparse in the area but water levels are likely to be stable since well production will be buffered by capture from the adjacent stream. Domestic and irrigation well densities are quite low in the surrounding area. Most of the nearby irrigation wells are at least ¼ mile away from the proposed wells on this permit. Because the aquifer is unconfined and reasonably thick and well density is relatively low, interference from the proposed wells is unlikely to be excessive.

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
~~1-4~~	~~Alluvial~~	☐	☒
5-6	Alluvial	☐	☒
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: The wells will produce from coarse-grained Holocene alluvium. General knowledge indicates that the aquifer is unconfined.

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~~	~~North Santiam River~~	~~240~~	~~235-260~~	~~2330~~	☒	☐	☐	☐	☒
~~2~~	~~1~~	~~North Santiam River~~	~~240~~	~~235-260~~	~~2650~~	☒	☐	☐	☐	☒
~~3~~	~~1~~	~~North Santiam River~~	~~240~~	~~235-260~~	~~1970~~	☒	☐	☐	☐	☒
~~4~~	~~1~~	~~North Santiam River~~	~~240~~	~~235-260~~	~~1890~~	☒	☐	☐	☐	☒
5	1	North Santiam River	240	235-260	3300	☒	☐	☐	☐	☒
6	1	North Santiam River	240	235-260	3550	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: Published water table contour maps show that groundwater flows toward and discharges into the North Santiam River. The floodplain aquifer and the streambed are largely composed of permeable sands and gravels so groundwater should be able to move freely between the stream and the aquifer.

Water Availability Basin the well(s) are located within: N Santiam R > Santiam 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 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~~	☐	☐	~~MF141~~	~~430~~	☐	~~267~~	☐	~~33~~	☒
~~2~~	~~1~~	☐	☐	~~MF141~~	~~430~~	☐	~~267~~	☐	~~30~~	☒
~~3~~	~~1~~	☐	☐	~~MF141~~	~~430~~	☐	~~267~~	☐	~~37~~	☒
~~4~~	~~1~~	☐	☐	~~MF141~~	~~430~~	☐	~~267~~	☐	~~38~~	☒
5	1	☐	☐	MF141	430	☐	267	☐	24	☐
6	1	☐	☐	MF141	430	☐	267	☐	22	☐
		☐	☐			☐		☐		☐

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 Hunt99 (Hunt, 1999) model was used to estimate stream interference after 30 days of pumping. A value of 1000 ft/day was used for the hydraulic conductivity of the Holocene floodplain sediments based on the high yields and high specific capacity of nearby wells and field observations and mapped descriptions that show the unit to be unconsolidated sand and gravel. Streambed conductivity was assumed to be 1 feet per day, the equivalent of a silty sand. A sand and gravel streambed is more likely based on field observations in other areas. The model parameters and results for both proposed wells are included at the end of this review.

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**_____

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.

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.

O'Connor, J.E., Sarna-Wojcicki, A., Wozniak, K.C., Polette, D.J., and Fleck, R.J., 2001: U.S. Geological Survey Professional Paper 1620.

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.

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #:** ~~1, 2, & 3~~ **Logid:** ~~LINN 4166, LINN 61004, & LINN 4165~~

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:** ~~No apparent or likely seal in Well 1 and Well 2. No documented seal in Well 3.~~

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

Water Availability Tables

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION

N SANTIAM R > SANTIAM R - AT MOUTH
Basin: WILLAMETTE

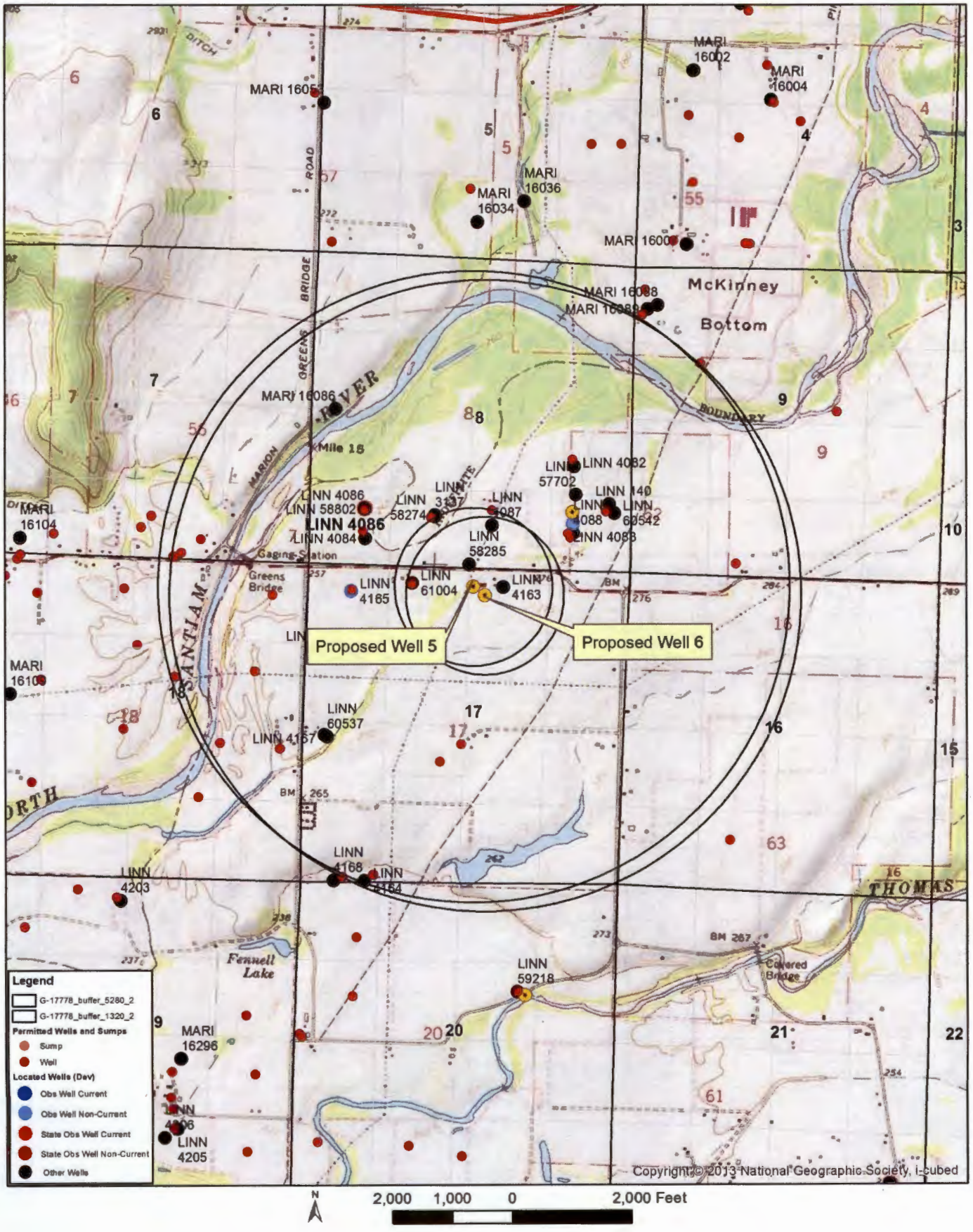
Watershed ID #: 141
Time: 2:28 PM

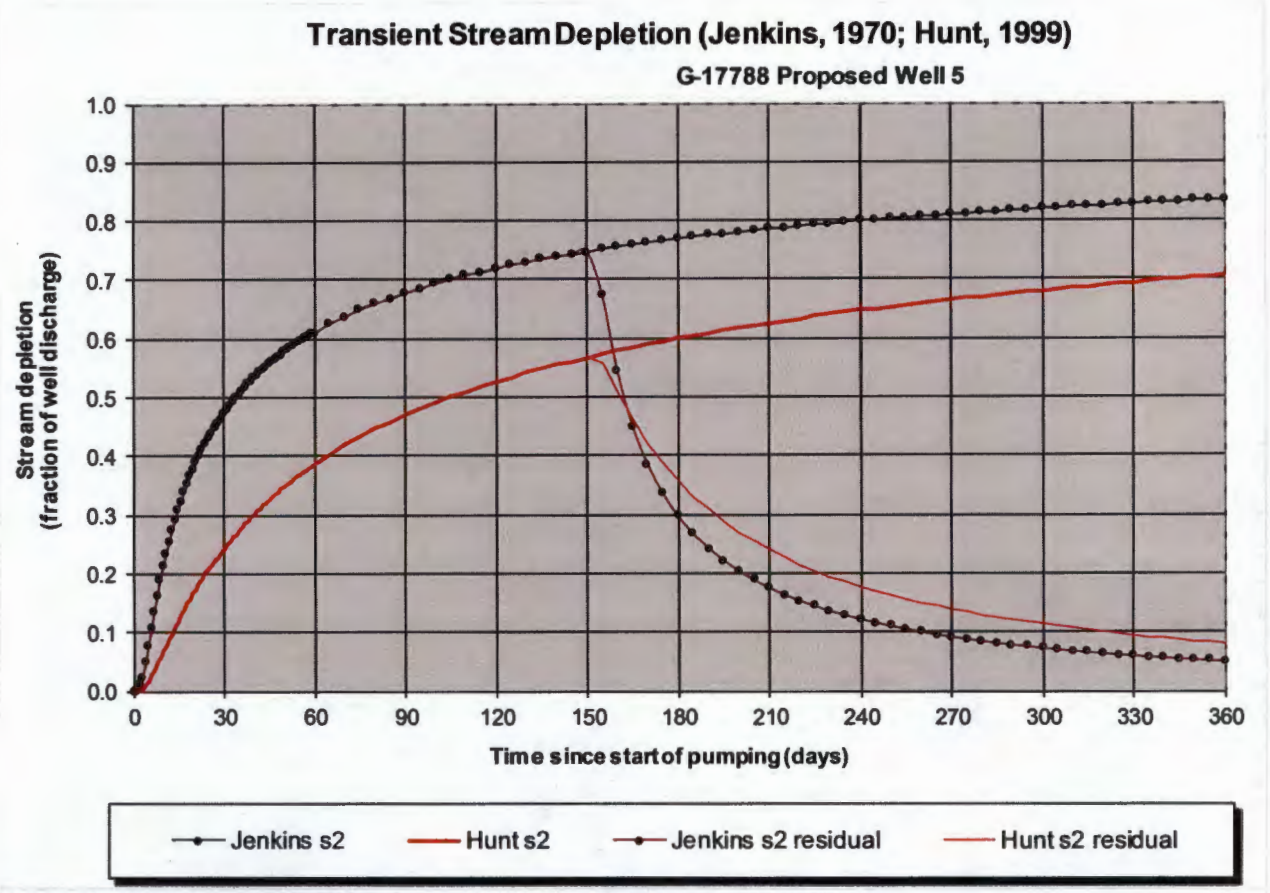
Exceedance Level: 80
Date: 09/22/2014

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	2,330.00	482.00	1,850.00	0.00	430.00	1,420.00
FEB	2,670.00	1,490.00	1,180.00	0.00	430.00	749.00
MAR	2,540.00	1,320.00	1,220.00	0.00	430.00	790.00
APR	2,500.00	1,480.00	1,020.00	0.00	430.00	587.00
MAY	2,590.00	804.00	1,790.00	0.00	430.00	1,360.00
JUN	1,500.00	436.00	1,060.00	0.00	430.00	634.00
JUL	858.00	333.00	525.00	0.00	430.00	94.70
AUG	661.00	320.00	341.00	0.00	430.00	-88.60
SEP	627.00	297.00	330.00	0.00	430.00	-100.00
OCT	694.00	267.00	427.00	0.00	430.00	-2.79
NOV	1,380.00	268.00	1,110.00	0.00	430.00	682.00
DEC	2,540.00	269.00	2,270.00	0.00	430.00	1,840.00
ANN	1,960,000	465,000	1,500,000	0	312,000	1,190,000

G-17788, Avinelis (Quiet Meadows Farm)

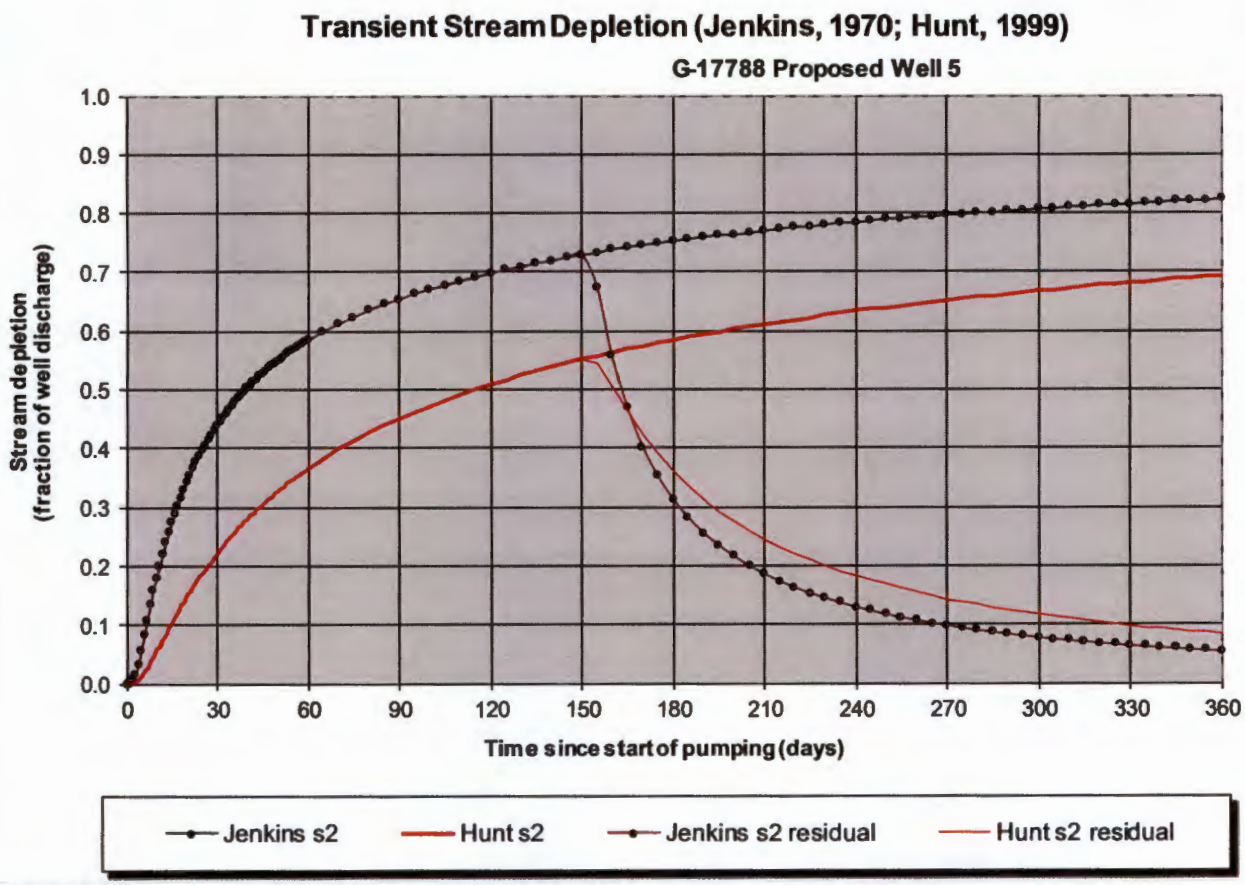




Output for Hunt Stream Depletion, Scenerio 2 (s2): Time pump on = 150 days

Days	30	60	90	120	150	180	210	240	270	300	330	360
Qw, cfs	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850
Jenk SD %	0.471	0.611	0.678	0.719	0.747	0.297	0.175	0.121	0.091	0.072	0.059	0.050
Jen SD cfs	0.401	0.519	0.576	0.611	0.635	0.253	0.149	0.103	0.078	0.062	0.050	0.042
Hunt SD %	0.243	0.386	0.469	0.526	0.567	0.357	0.239	0.177	0.139	0.113	0.095	0.081
Hunt SD cfs	0.206	0.328	0.399	0.447	0.482	0.303	0.204	0.151	0.118	0.096	0.080	0.069

Parameters:		**Scenario 1**	**Scenario 2**	**Scenario 3**	**Units**
Net steady pumping rate	Qw	0.85	0.85	0.85	cfs
Distance to stream	a	3300	3300	3300	ft
Aquifer hydraulic conductivity	K	1000	1000	1000	ft/day
Aquifer thickness	b	70	70	70	ft
Aquifer transmissivity	T	70000	70000	70000	ft*ft/day
Aquifer storage coefficient	S	0.2	0.2	0.2	
Stream width	ws	150	150	150	ft
Streambed hydraulic conductivity	Ks	1	1	1	ft/day
Streambed thickness	bs	3	3	3	ft
Streambed conductance	sbc	50	50	50	ft/day
Stream depletion factor (Jenkins)	sdf	31.11428571	31.11428571	31.11428571	days
Streambed factor (Hunt)	sbf	2.357142857	2.357142857	2.357142857	



Output for Hunt Stream Depletion, Scenerio 2 (s2): Time pump on = 150 days

Days	30	60	90	120	150	180	210	240	270	300	330	360
Qw, cfs	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850
Jenk SD %	0.439	0.584	0.655	0.699	0.729	0.313	0.186	0.129	0.098	0.077	0.064	0.053
Jen SD cfs	0.373	0.496	0.556	0.594	0.620	0.266	0.158	0.110	0.083	0.066	0.054	0.045
Hunt SD %	0.223	0.366	0.451	0.509	0.551	0.362	0.245	0.182	0.143	0.117	0.098	0.083
Hunt SD cfs	0.190	0.311	0.383	0.433	0.469	0.307	0.208	0.155	0.122	0.099	0.083	0.071

Parameters:		**Scenario 1**	**Scenario 2**	**Scenario 3**	**Units**
Net steady pumping rate	Qw	0.85	0.85	0.85	cfs
Distance to stream	a	3550	3550	3550	ft
Aquifer hydraulic conductivity	K	1000	1000	1000	ft/day
Aquifer thickness	b	70	70	70	ft
Aquifer transmissivity	T	70000	70000	70000	ft*ft/day
Aquifer storage coefficient	S	0.2	0.2	0.2	
Stream width	ws	150	150	150	ft
Streambed hydraulic conductivity	Ks	1	1	1	ft/day
Streambed thickness	bs	3	3	3	ft
Streambed conductance	sbc	50	50	50	ft/day
Stream depletion factor (Jenkins)	sdf	36.00714286	36.00714286	36.00714286	days
Streambed factor (Hunt)	sbf	2.535714286	2.535714286	2.535714286	