

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date December 3, 2015

FROM: Groundwater Section Aurora C Bouchier
Reviewer's Name

SUBJECT: Application G- 18146 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: Nancy Orem County: Clackamas

A1. Applicant(s) seek(s) 0.24 cfs from 1 well(s) in the Willamette Basin,
Molalla-Pudding subbasin

A2. Proposed use Irrigation of 19.6 acres Seasonality: March 1 – 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	CLAC 12036	1	Alluvium	0.24	T3S/R1E-32 NW-SW	400' S, 670' E NW cor SW1/4 S 32
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	90		7	4/15/1965	100	0-24	0-100		25-60, 67-77	30	48	?

Use data from application for proposed wells.

A4. **Comments:** The application is for irrigation of pasture and crops.

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: Well is greater than 1/4-mile from a surface water body, so the pertinent rule (OAR 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) 7C;
 - 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 CLAC 12036 is underlain by a thin layer of top soil directly over the alluvial aquifer. In the vicinity of the well, which lies in the floodplain between the Molalla and Pudding rivers, any fine-grained Willamette Silt material which may have been deposited as part of the Missoula Floods has subsequently eroded away, resulting in an unconfined environment for the alluvial aquifer, locally. The alluvial aquifer consists of course-grained deposits composed primarily of sand and gravel layers interbedded with finer-grained layers (Woodward et al., 1998).

Groundwater observation data for wells within the floodplains between the Molalla and Pudding rivers where the aquifer is locally unconfined is limited to CLAC 8794 (highlighted in blue in the hydrograph below). Groundwater observation data for wells within ~1.5 miles from CLAC 12036, including wells completed on the terrace above the floodplain between the Molalla and Pudding rivers which are likely confined by low permeability Willamette Silt, show no long-term decline (see hydrograph below). This may indicate that, locally, the alluvial aquifer has an efficient connection to, and is fed by, the rivers.

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 well log for CLAC 12036 reports a static water level at 7 feet below land surface, coincident with the top of the first loose gravel layer, this indicates the well is unconfined. The well logs for CLAC 12039 and CLAC 12340 are consistent with CLAC 12036.

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	Molalla River	83	65-85	1,700	☒	☐	☐	☐	☒
1	2	Pudding River	83	65-75	3,780	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: Published water-table maps indicate that locally, the groundwater flows towards, and discharges into, the Molalla and Pudding rivers.

Water Availability Basin the well(s) are located within: 69998 (PUDDING R> MOLALLA R- AT MOUTH). However, the zone of influence will likely include WAB: 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 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	☐	☐	IS69796	100	☐	134.00	☐	22 to 36	☒
1	2	☐	☐	IS73532	36	☐	67.90	☐	.62 to 2.37	☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

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 #		Q _w > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Q _w > 1% ISWR?	80% Natural Flow (cfs)	Q _w > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
			☐			☐		☐		☐
			☐			☐		☐		☐
			☐			☐		☐		☐
			☐			☐		☐		☐

Comments: In the vicinity of CLAC 12036, any fine-grained material which may have been deposited has largely been eroded away. Water-bearing gravel or sand and gravel layers are encountered under a thin layer of topsoil. Since this area is lacking a confining layer, stream depletion was estimated using the Hunt 1999 model using a 3 foot clogging layer at the base of the stream. Depletion from each river was modeled separately, although in reality the well capture would likely come from some combination of the two rivers. An aquifer hydraulic conductivity value of 300 feet/day was used (mid-range for unconsolidated gravel deposits) for each model. For the aquifer specific yield, the models were run at a value of 0.15 (the low end for unconsolidated gravels, and 0.3 (the high end for unconsolidated gravels) (Driscoll, 1986).

Locally, the Molalla River has a cobble substrate (personal communication with Water Master Amy Kim, 12/3/2015), therefore a streambed hydraulic conductivity value of 1ft/day was used (on the low end of the range for a clean sand) (Driscoll, 1986). The interference estimates for the Molalla River at 30 days of pumping range from 22% - 36% (high-end to low-end range, respectively, for specific yield of unconsolidated gravels)

Locally, the Pudding River has a fine-sand to muddy substrate (personal communication with Water Master Amy Kim, 12/3/2015), therefore a streambed hydraulic conductivity value of 0.1ft/day was used (mid-range value for sands and silts) (Driscoll, 1986). The interference estimates for the Pudding River at 30 days of pumping range from 0.62% - 2.37% (high-end to low-end range, respectively, for specific yield of unconsolidated gravels)

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:
- ☐ The permit should contain condition #(s) _____;
 - ☐ The permit should contain special condition(s) as indicated in "Remarks" below;

C6. **SW / GW Remarks and Conditions:**

References Used:

Driscoll, Fletcher G. Ph.D., 1986, Groundwater and Wells, second edition.

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.

Well logs and water level data in the OWRD database. Specifically well logs for: CLAC 12036, CLAC 12039, CLAC 12040, and CLAC 53455, and water level data for CLAC 8562, CLAC 8578, CLAC 8790, CLAC 8794, CLAC 9698, CLAC 18450, CLAC 53111, CLAC 53487, and CLAC 59086.

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**

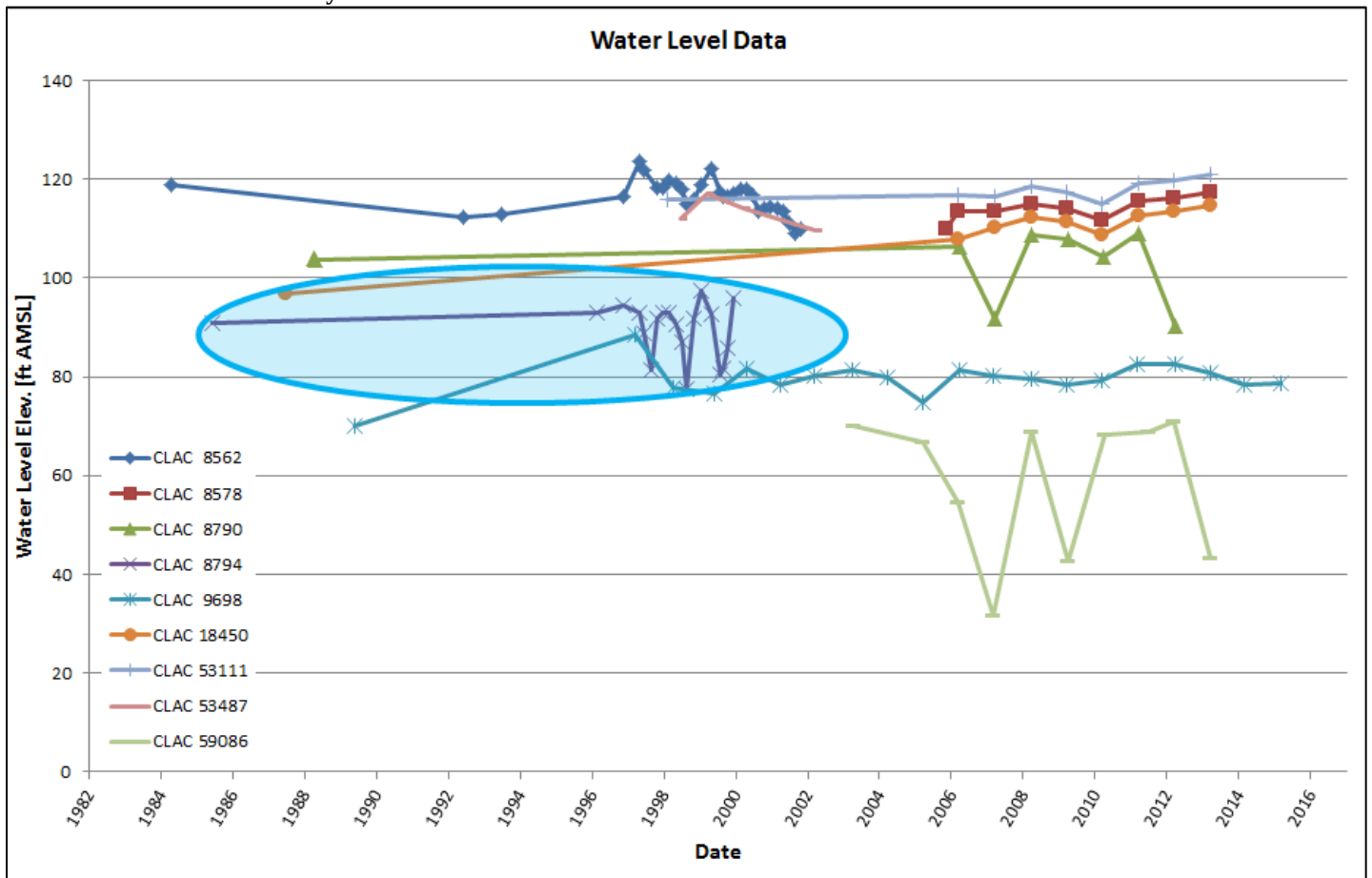
DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION						
Watershed ID #: 69998		PUDDING R > MOLALLA R - AT MOUTH			Exceedance Level: 80	
Time: 3:36 PM		Basin: WILLAMETTE			Date: 12/02/2015	
Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net water Available
Monthly values are in cfs. Storage is the annual amount at 50% exceedance in ac-ft.						
JAN	1,120.00	130.00	990.00	0.00	80.00	910.00
FEB	1,260.00	121.00	1,140.00	0.00	80.00	1,060.00
MAR	1,080.00	91.10	989.00	0.00	80.00	909.00
APR	834.00	64.50	769.00	0.00	80.00	689.00
MAY	448.00	60.40	388.00	0.00	80.00	308.00
JUN	231.00	82.50	148.00	0.00	60.00	88.50
JUL	111.00	127.00	-16.10	0.00	50.00	-66.10
AUG	71.60	105.00	-33.30	0.00	40.00	-73.30
SEP	67.90	61.40	6.48	0.00	40.00	-33.50
OCT	91.50	16.90	74.60	0.00	60.00	14.60
NOV	364.00	55.00	309.00	0.00	80.00	229.00
DEC	1,010.00	124.00	886.00	0.00	80.00	806.00
ANN	748,000	62,700	686,000	0	48,900	642,000

DETAILED REPORT OF INSTREAM REQUIREMENTS													
Watershed ID #: 69998		PUDDING R > MOLALLA R - AT MOUTH										Basin: WILLAMETTE	
Time: 3:40 PM												Date: 12/02/2015	
Application Number	Status	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Monthly values are in cfs.													
IS69998A	CERTIFICATE	80.0	80.0	80.0	80.0	80.0	60.0	50.0	40.0	40.0	60.0	80.00	80.0
IS73532A	CERTIFICATE	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.00	36.0
MAXIMUM		80.0	80.0	80.0	80.0	80.0	60.0	50.0	40.0	40.0	60.0	80.0	80.0

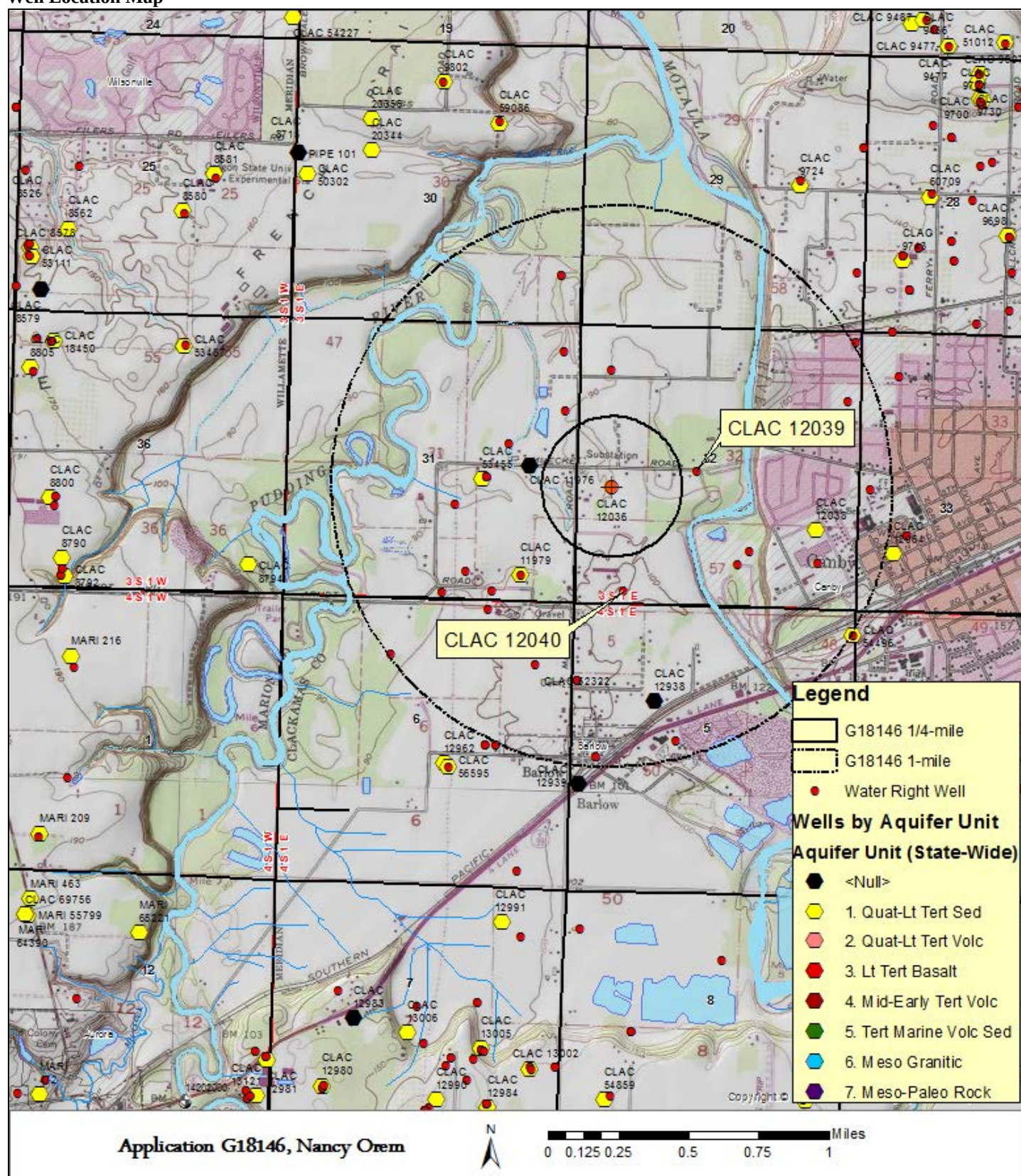
DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION						
Watershed ID #: 69796		MOLALLA R > WILLAMETTE R - AT MOUTH			Exceedance Level: 80	
Time: 3:40 PM		Basin: WILLAMETTE			Date: 12/02/2015	
Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net water Available
Monthly values are in cfs. Storage is the annual amount at 50% exceedance in ac-ft.						
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	85,400	1,240,000	0	295,000	966,000

DETAILED REPORT OF INSTREAM REQUIREMENTS													
Watershed ID #: 69796		MOLALLA R > WILLAMETTE R - AT MOUTH										Basin: WILLAMETTE	
Time: 3:50 PM												Date: 12/03/2015	
Application Number	Status	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Monthly values are in cfs.													
IS69796A	CERTIFICATE	500.0	500.0	500.0	500.0	500.0	500.0	200.0	100.0	150.0	450.0	500.00	500.0
MAXIMUM		500.0	500.0	500.0	500.0	500.0	500.0	200.0	100.0	150.0	450.0	500.0	500.0

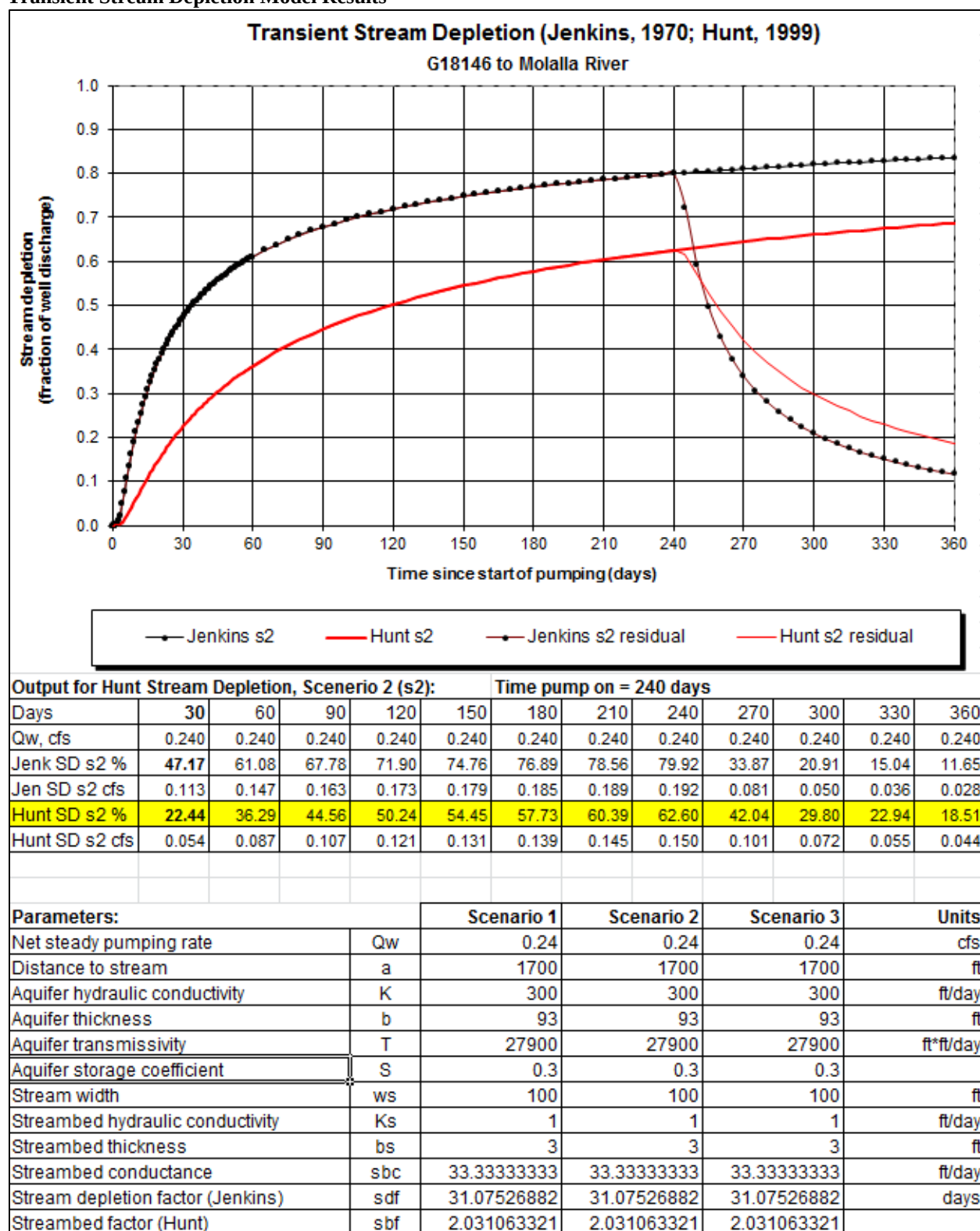
Water-Level Trends in Nearby Wells

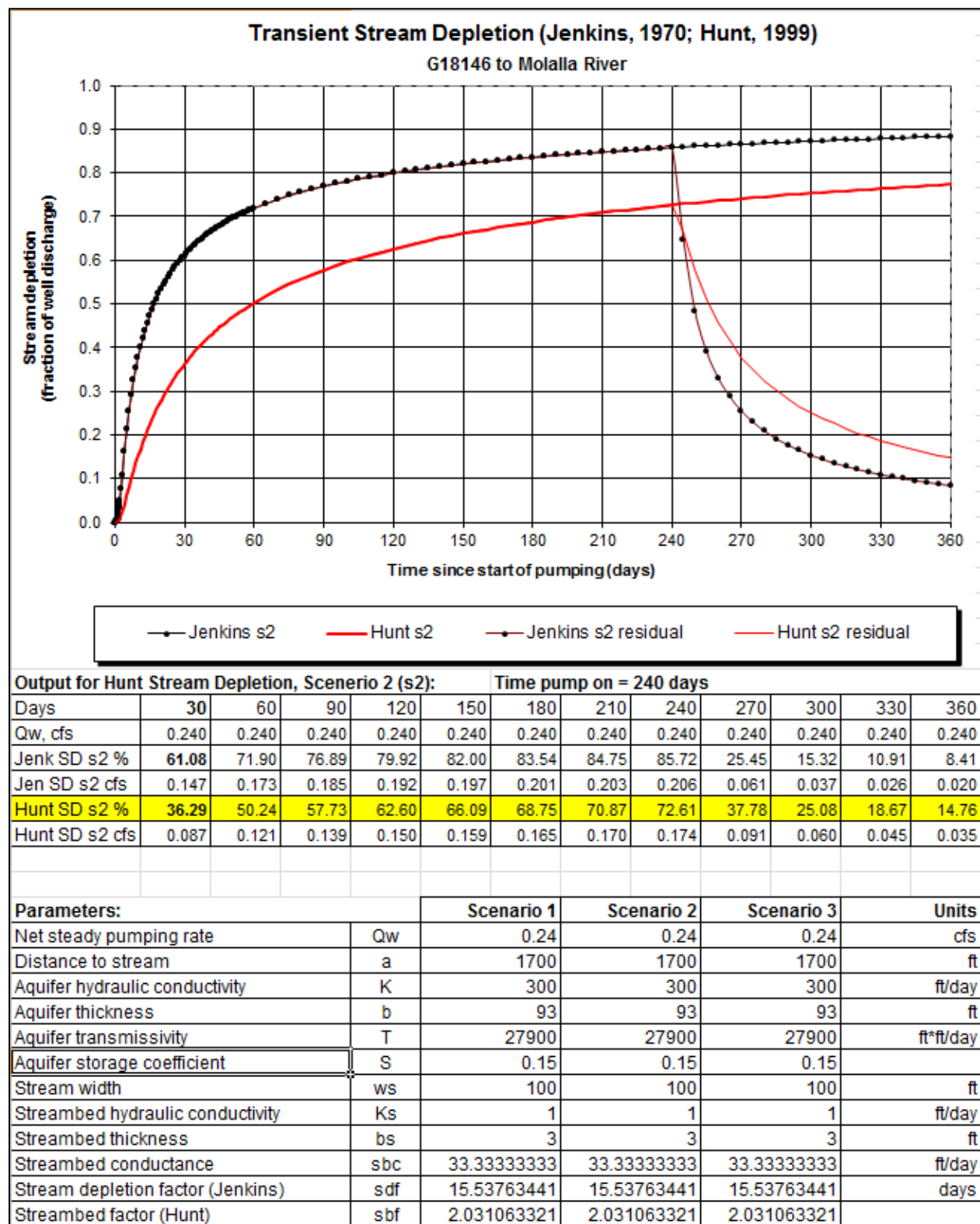


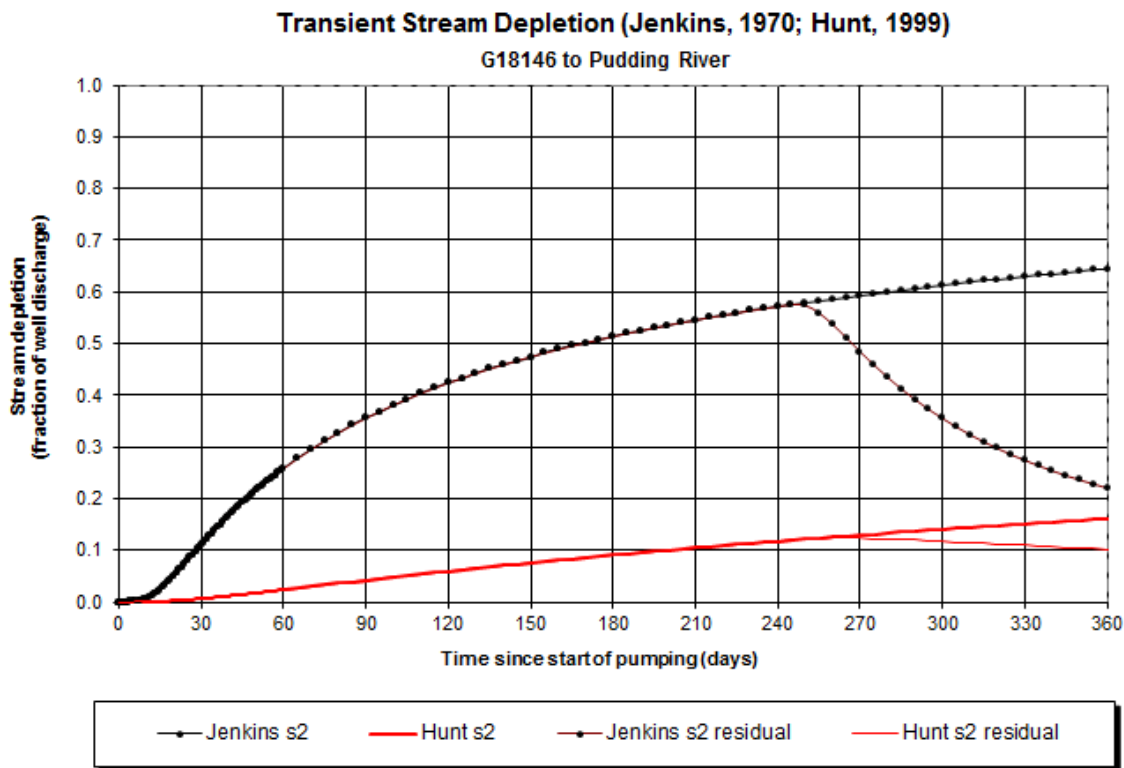
Well Location Map



Transient Stream Depletion Model Results

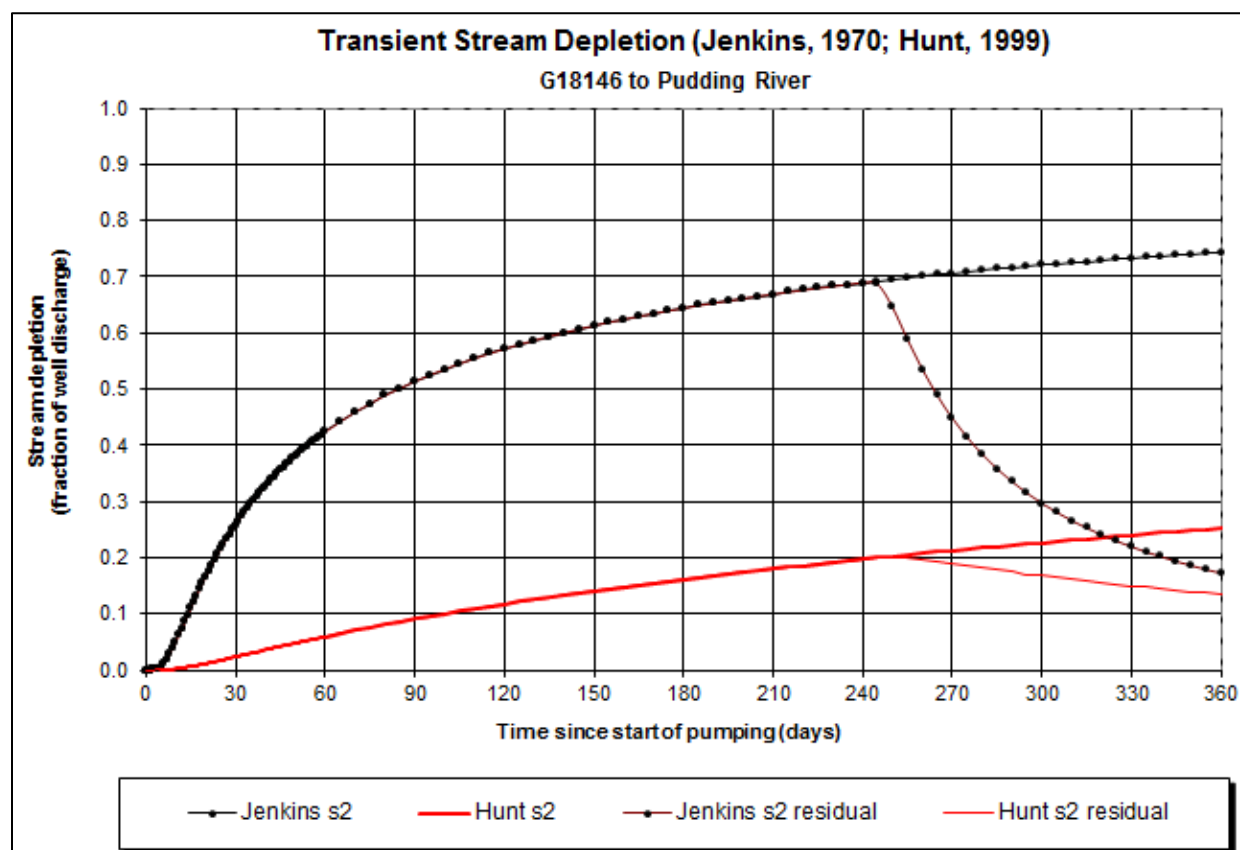






Output for Hunt Stream Depletion, Scenerio 2 (s2):						Time pump on = 240 days						
Days	30	60	90	120	150	180	210	240	270	300	330	360
Qw, cfs	0.240	0.240	0.240	0.240	0.240	0.240	0.240	0.240	0.240	0.240	0.240	0.240
Jenk SD s2 %	10.96	25.78	35.56	42.37	47.42	51.36	54.53	57.16	48.42	35.50	27.39	22.05
Jen SD s2 cfs	0.026	0.062	0.085	0.102	0.114	0.123	0.131	0.137	0.116	0.085	0.066	0.053
Hunt SD s2 %	0.62	2.37	4.22	5.96	7.58	9.07	10.45	11.74	12.32	11.71	10.93	10.19
Hunt SD s2 cfs	0.001	0.006	0.010	0.014	0.018	0.022	0.025	0.028	0.030	0.028	0.026	0.024

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate	Qw	0.24	0.24	0.24	cfs
Distance to stream	a	3780	3780	3780	ft
Aquifer hydraulic conductivity	K	300	300	300	ft/day
Aquifer thickness	b	93	93	93	ft
Aquifer transmissivity	T	27900	27900	27900	ft ² /day
Aquifer storage coefficient	S	0.3	0.3	0.3	
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	153.6387097	153.6387097	153.6387097	days
Streambed factor (Hunt)	sbf	0.451612903	0.451612903	0.451612903	



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	0.240	0.240	0.240	0.240	0.240	0.240	0.240	0.240	0.240	0.240	0.240	0.240
Jenk SD s2 %	25.78	42.37	51.36	57.16	61.28	64.41	66.89	68.91	44.82	29.68	21.94	17.24
Jen SD s2 cfs	0.062	0.102	0.123	0.137	0.147	0.155	0.161	0.165	0.108	0.071	0.053	0.041
Hunt SD s2 %	2.37	5.96	9.07	11.74	14.08	16.15	18.01	19.70	18.89	16.73	14.95	13.52
Hunt SD s2 cfs	0.006	0.014	0.022	0.028	0.034	0.039	0.043	0.047	0.045	0.040	0.036	0.032

Parameters:

		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate	Qw	0.24	0.24	0.24	cfs
Distance to stream	a	3780	3780	3780	ft
Aquifer hydraulic conductivity	K	300	300	300	ft/day
Aquifer thickness	b	93	93	93	ft
Aquifer transmissivity	T	27900	27900	27900	ft*ft/day
Aquifer storage coefficient	S	0.15	0.15	0.15	
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	76.81935484	76.81935484	76.81935484	days
Streambed factor (Hunt)	sbf	0.451612903	0.451612903	0.451612903	