PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date **January 7, 2016**

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

SUBJECT: Application G- **18166** 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: **Perrydale Domestic Water Ass** County: **Polk**

A1. Applicant(s) seek(s) **2** cfs from **1** well(s) in the **Willamette** Basin, **Middle Willamette** subbasin

A2. Proposed use **QM (quasi-municipal)** Seasonality: **Jan 1 – Dec 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	POLK 1109	Radley	Alluvium	2.41	6S/3W-29 SE-NW	
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	121	33	24	4/18/1976	70	0-18	+1-70	na	44-64	1180+	8	2

Use data from application for proposed wells.

A4. **Comments:** POLK 1109 is authorized for 0.41 cfs under Certificate 50346 for irrigation. This evaluation analyzes the combined uses at a rate of 2.41 cfs to account for the water stacking.

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 producing from an unconfined aquifer and is less than ¼-mile from a surface water body, so the pertinent rule (OAR 690-502-0240) apply.

A6. ☐ **Well(s) #** _____ , _____ , _____ , _____ , _____ , tap(s) an aquifer limited by an administrative restriction.
Name of administrative area: **Eola Hills Ground Water Limited Area**
Comments: The well is completed in the gravels overlying the CRBG controlled by the Eola Hills Ground Water Limited Area; therefore the limited area rules do not impact this application.

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 – water levels, + large monitoring and reporting plus a flowmeter**;
   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 well (POLK 1109) develops water from an unconfined alluvial aquifer that is hydraulically connected to the Willamette River. POLK 1109 is located on a bench above the floodplain of the Willamette River, but below a small bluff which essentially coincides with the boundary where the Willamette Silt has been removed. Long term stability of the aquifer will depend on the Willamette River. Interference with nearby water users may be a problem. The seasonal fluctuations are unknown at this time. The nearest state observation wells are MARI 3799 (located ~ 6.7 miles to the northeast, across the Willamette River), and MARI 6564 (located ~ 7.2 miles to the east-southeast also across the Willamette River). Both of these wells show some degree of increased seasonal variation since the 1960, which may be an indication of stress on the aquifer at those localtions.

Perrydale Domestic Water Association owns two nearby alluvial wells (POLK 1140, and POLK 52943). POLK 1140 is located approximately 0.4 miles to the southwest above the 'bluff' of Willamette Silt. The water level in POLK 1140 has decreased by approximately 3 feet since 2012, up until that time the water level appears to have been fairly stable since development in the mid 1990's. POLK 52943 is located approximately 0.3 miles to the southeast on the same bench. The limited groundwater level data available speaks to the need for water level reporting.

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	**Alluvial**	☐	☒
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: The well is located within the flood deposits of the Willamette River. The well log mentions a layer of clay, and the static water level provided on the well log is approximately 9 feet above the depth at which water was first encountered, indicating that the aquifer is, locally, likely semi-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**	**Willamette River**	**121**	**100**	**1290**	☒	☐	☐	☒	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: The well is producing water from sand and gravel layers which are located just under ¼ mile from the Willamette River. The well log first mentions gravel at an elevation roughly coincident with the surface of the Willamette River at the adjacent reach. The static water level listed on the well log is likewise roughly coincident with the elevation of the Willamette River at the adjacent reach.

Water Availability Basin the well(s) are located within: 182: WILLAMETTE R > COLUMBIA R- AB MOLALLA R

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**	☒	☐	**MF182A**	**1500**	☐	**3830**	☐	**>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 interference at 30 days was estimated using the Hunt 1999 model (unconfined aquifer with a streambed clogging layer) and assuming a 3 foot streambed clogging layer. For comparison sake, the interference at 30 days was also estimated using the Hung 2003 model (Confined aquifer with a limited thickness of aquitard beneath the stream).

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:

Application files for: G-18166 and nearby G-17130, G-11935, and LL-1242.

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 Report 2005-5168.

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

Hunt, B., 1999. Unsteady stream depletion from ground water pumping: Groundwater, 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.

OWRD well log and water level reports for: MARI 3799, MARI 6564, POLK 1109, POLK 1140, and POLK 52943.

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

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #:** 1 **Logid:** POLK 1109

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

WILLAMETTE R > COLUMBIA R - AB MOLALLA R

Watershed ID #: 182 Basin: WILLAMETTE Exceedance Level: 80
Time: 9:30 AM Date: 01/07/2016

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	21,400.00	2,290.00	19,100.00	0.00	1,500.00	17,600.00
FEB	23,200.00	7,470.00	15,700.00	0.00	1,500.00	14,200.00
MAR	22,400.00	7,250.00	15,200.00	0.00	1,500.00	13,700.00
APR	19,900.00	6,910.00	13,000.00	0.00	1,500.00	11,500.00
MAY	16,600.00	4,230.00	12,400.00	0.00	1,500.00	10,900.00
JUN	8,740.00	1,970.00	6,770.00	0.00	1,500.00	5,270.00
JUL	4,980.00	1,800.00	3,180.00	0.00	1,500.00	1,680.00
AUG	3,830.00	1,640.00	2,190.00	0.00	1,500.00	686.00
SEP	3,890.00	1,390.00	2,500.00	0.00	1,500.00	996.00
OCT	4,850.00	747.00	4,100.00	0.00	1,500.00	2,600.00
NOV	10,200.00	877.00	9,320.00	0.00	1,500.00	7,820.00
DEC	19,300.00	958.00	18,300.00	0.00	1,500.00	16,800.00
ANN	15,200,000	2,250,000	13,000,000	0	1,090,000	11,900,000

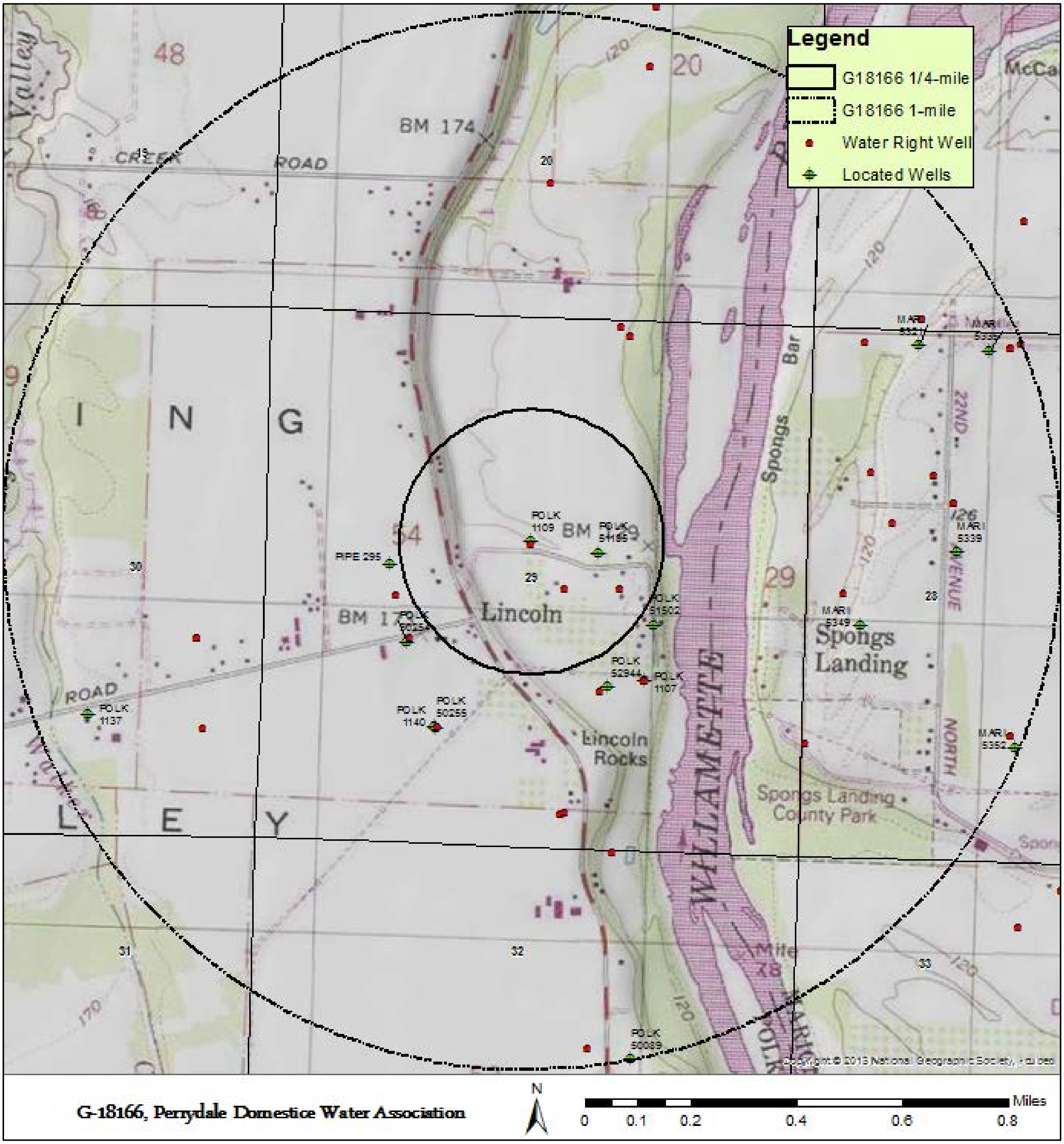
DETAILED REPORT OF INSTREAM REQUIREMENTS

WILLAMETTE R > COLUMBIA R - AB MOLALLA R

Watershed ID #: 182 Basin: WILLAMETTE
Time: 9:30 AM Date: 01/07/2016

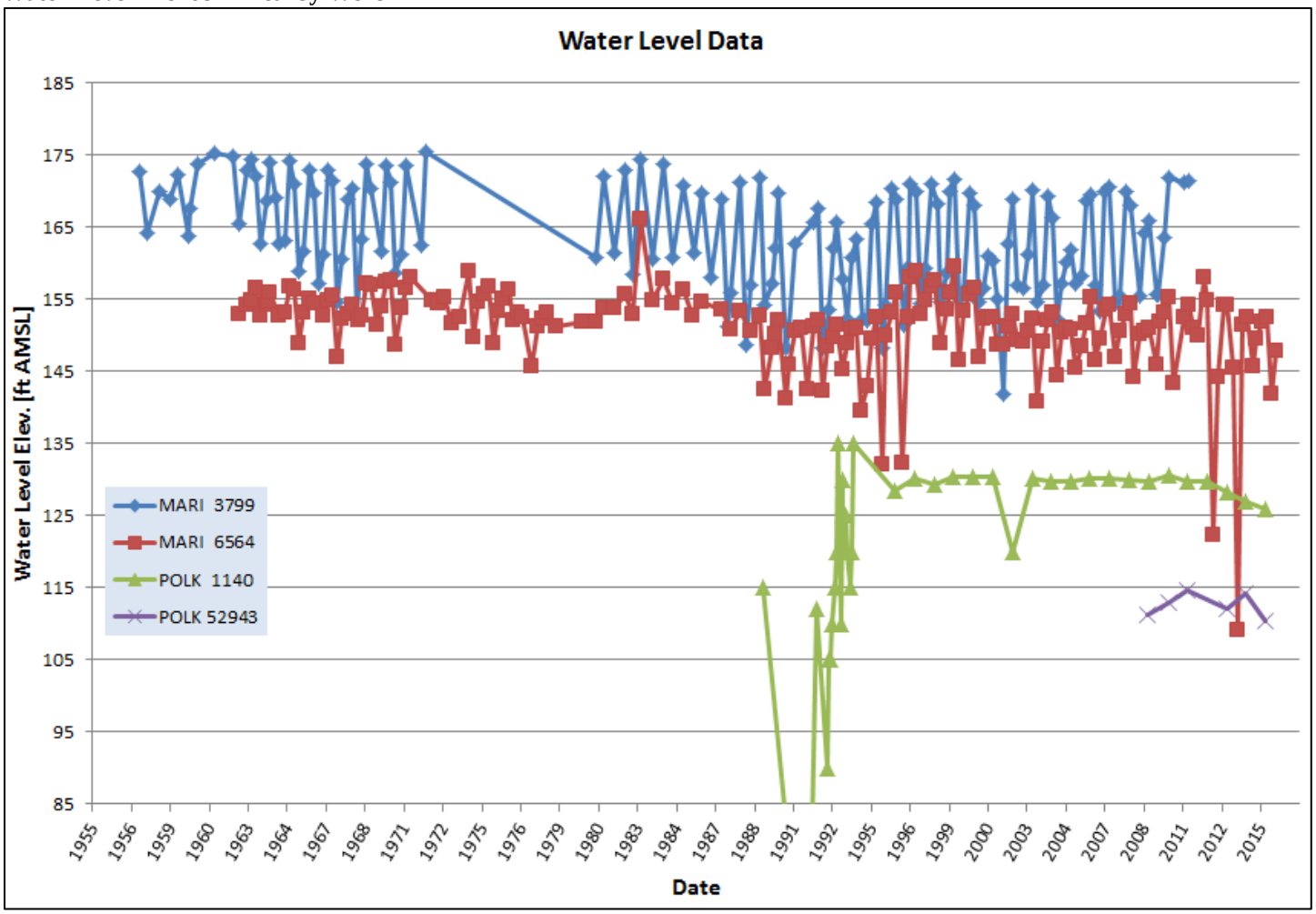
Application Number	Status	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
		Monthly values are in cfs.											
MF182A	APPLICATION	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.00	1500.0
MAXIMUM		1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0

Well Location Map

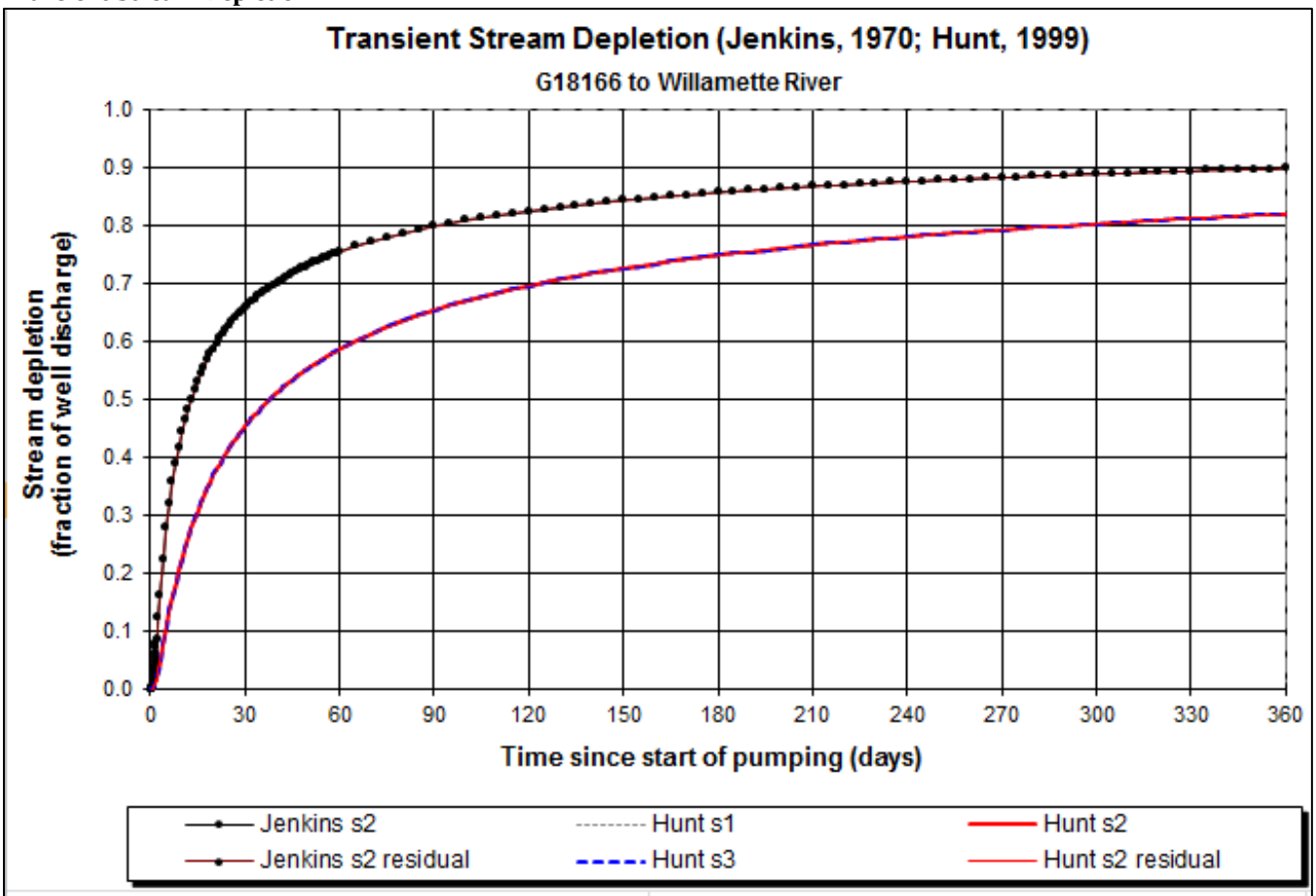


G-18166, Perrydale Domestice Water Association

Water-Level Trends in Nearby Wells

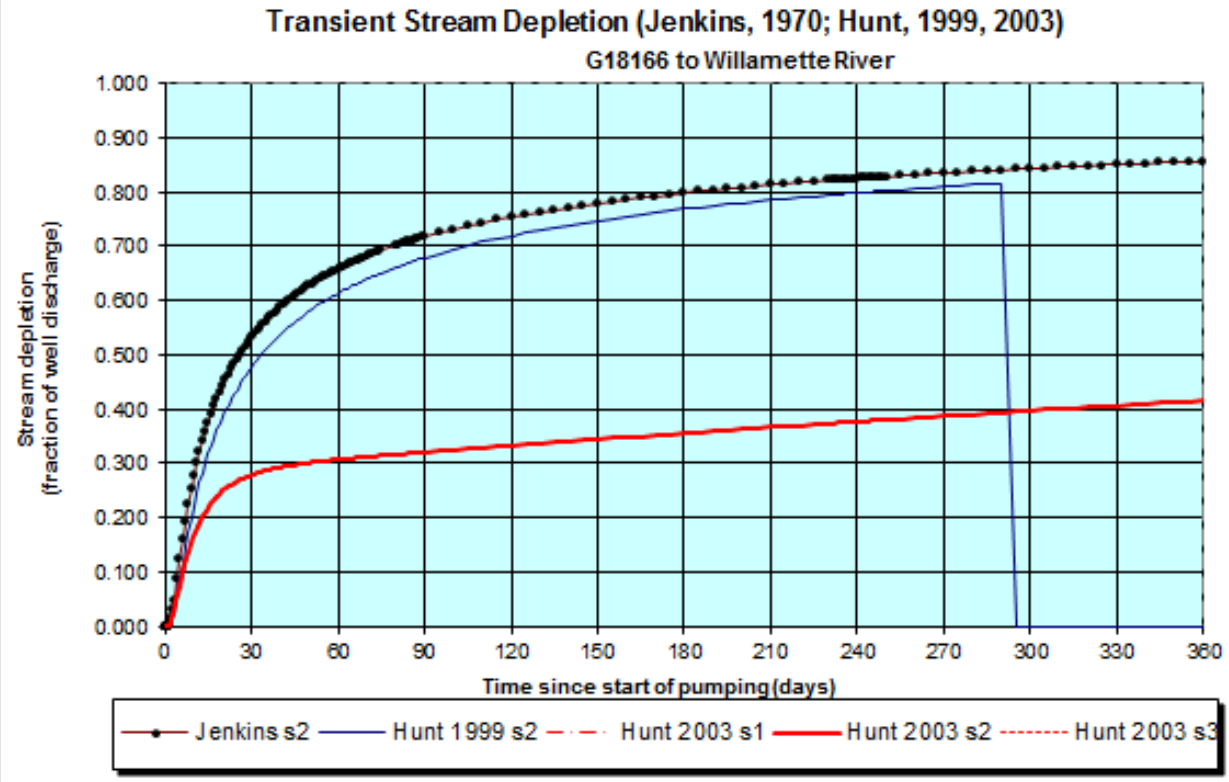


Transient Stream Depletion



Output for Hunt Stream Depletion, Scenerio 2 (s2):						Time pump on = 365 days						
Days	**30**	60	90	120	150	180	210	240	270	300	330	360
Qw, cfs	2.410	2.410	2.410	2.410	2.410	2.410	2.410	2.410	2.410	2.410	2.410	2.410
Jenk SD s2 %	**65.75**	75.39	79.80	82.46	84.28	85.64	86.69	87.54	88.25	88.85	89.37	89.82
Jen SD s2 cfs	1.585	1.817	1.923	1.987	2.031	2.064	2.089	2.110	2.127	2.141	2.154	2.165
Hunt SD s2 %	**45.33**	58.63	65.35	69.59	72.57	74.82	76.59	78.04	79.24	80.27	81.16	81.94
Hunt SD s2 cfs	1.092	1.413	1.575	1.677	1.749	1.803	1.846	1.881	1.910	1.934	1.956	1.975

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate	Qw	2.41	2.41	2.41	cfs
Distance to stream	a	1330	1330	1330	ft
Aquifer hydraulic conductivity	K	50	50	50	ft/day
Aquifer thickness	b	30	30	30	ft
Aquifer transmissivity	T	1500	1500	1500	ft*ft/day
Aquifer storage coefficient	S	0.01	0.01	0.01	
Stream width	ws	850	850	850	ft
Streambed hydraulic conductivity	Ks	0.01	0.01	0.01	ft/day
Streambed thickness	bs	3	3	3	ft
Streambed conductance	sbc	2.833333333	2.833333333	2.833333333	ft/day
Stream depletion factor (Jenkins)	sdf	11.79266667	11.79266667	11.79266667	days
Streambed factor (Hunt)	sbf	2.512222222	2.512222222	2.512222222	



Output for Stream Depletion, Scenerio 2 (s2):	Time pump on (pumping duration) = 365 days											
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	53.1%	65.8%	71.7%	75.4%	77.9%	79.8%	81.3%	82.5%	83.4%	84.3%	85.0%	85.6%
H SD 1999	47.7%	61.4%	67.9%	72.0%	74.8%	76.9%	78.5%	79.8%	81.0%	######	######	######
H SD 2003	27.92%	30.73%	32.08%	33.28%	34.44%	35.56%	36.65%	37.69%	38.72%	39.72%	40.68%	41.61%
Qw, cfs	2.410	2.410	2.410	2.410	2.410	2.410	2.410	2.410	2.410	2.410	2.410	2.410
H SD 99, cfs	1.150	1.479	1.637	1.734	1.802	1.852	1.892	1.924	1.951	######	######	######
H SD 03, cfs	0.673	0.741	0.773	0.802	0.830	0.857	0.883	0.908	0.933	0.957	0.980	1.003

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	2.41	2.41	2.41	cfs
Time pump on (pumping duration)	tpon	365	365	365	days
Perpendicular from well to stream	a	1330	1330	1330	ft
Well depth	d	70	70	70	ft
Aquifer hydraulic conductivity	K	25	25	25	ft/day
Aquifer saturated thickness	b	30	30	30	ft
Aquifer transmissivity	T	750	750	750	ft*ft/day
Aquifer storativity or specific yield	S	0.01	0.01	0.01	
Aquitard vertical hydraulic conductivity	Kva	0.01	0.01	0.01	ft/day
Aquitard saturated thickness	ba	20	20	20	ft
Aquitard thickness below stream	babs	1	1	1	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	850	850	850	ft
Streambed conductance (lambda)	sbc	8.500000	8.500000	8.500000	ft/day
Stream depletion factor	sdf	23.585333	23.585333	23.585333	days
Streambed factor	sbf	15.073333	15.073333	15.073333	
input #1 for Hunt's Q_4 function	t'	0.042399	0.042399	0.042399	
input #2 for Hunt's Q_4 function	K'	1.179267	1.179267	1.179267	
input #3 for Hunt's Q_4 function	epsilon'	0.050000	0.050000	0.050000	
input #4 for Hunt's Q_4 function	lamda'	15.073333	15.073333	15.073333	