WATER RESOURCES DEPARTMENT MEMO March 16, 2015

TO: **Application G-** 17937

FROM: A. Bachiet / K. Wozniak **- Groundwater Section**

SUBJECT: **Scenic Waterway Interference Evaluation**

_____ YES
✓ NO — The source of appropriation is within or above a Scenic Waterway

_____ YES
✓ NO — Use the Scenic Waterway condition (condition 7J)

_____ Per ORS 390.835, the Groundwater Section is able to calculate groundwater interference with surface water that contributes to a Scenic Waterway. The calculated interference distribution is provided below.

_____ Per ORS 390.835, the Groundwater Section is unable to calculate groundwater interference with surface water that contributes to a scenic waterway; therefore, the Department is unable to find that there is a preponderance of evidence that the proposed use will measurably reduce the surface flows necessary to maintain the free-flowing character of a scenic waterway.

DISTRIBUTION OF INTERFERENCE

Calculate interference as the monthly fraction of the annual consumptive use and fill in the table below. If interference cannot be calculated, per criteria in 390.839, do not fill in the table but check the "unable" option above, thus informing the Water Rights Section that the Department is unable to make a Preponderance of Evidence finding.

Exercise of this permit is calculated to reduce monthly flows in the _____ Scenic Waterway by the following amounts, expressed as a proportion of the annual consumptive use pumped from the well.

Monthly Fraction of Annual Consumptive Use

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date March 16, 2015

FROM: Groundwater Section Aurora C. Bouchier / Karl C. Wozniak
Reviewer's Name

SUBJECT: Application G- 17937 Supersedes review of
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: Robert J. and Eleanor E. Schmidgall County: Marion

A1. Applicant(s) seek(s) 0.487 cfs from 1 (MARI 6106) well(s) in the Willamette Basin, Molalla-Pudding subbasin Quad Maps: Stayton NE, Silverton, and Salem East

A2. Proposed use irrigation, 38.93 acres Seasonality: April 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	**MARI 6160**	**1**	Alluvium	**0.487**	07S/01W-6 SE-NW	160' N, 505' W fr center S 6
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	200	64-127	**41**	10/26/1982	140	0-20	+1-140		80-133			

Use data from application for proposed wells.

A4. **Comments:** The application gives metes and bounds to the property boundary. The location of the well is shown in Table A3 and the attached map based on a comparison of tax lots, Google Earth images, and the application map. The application specifies a maximum rate of 0.535 cfs (240 gpm). Since the proposed use is irrigation of 38.93 acres, the maximum rate we will allow is 38.93 acres * 1/80 cfs per acre = 0.487 cfs (219 gpm). Therefore the review is based on a maximum rate of 0.487 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 applicant's well is greater than ¼ mile from a surface water source, and produces from a confined aquifer, so the pertinent basin 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) **7C, Seven Year Minimum Measurement**;
   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 the applicant's well is underlain by about 65 feet of Willamette Silt which is underlain by a series of sands and gravels that are interbedded with silts and clays. The water table occurs near land surface in the Willamette Silt which acts as a regional confining unit. The shallowest gravel bed (called a conglomerate in the well log) in the subject well, MARI 6106, was logged near the base of the Willamette Silt at depths of 56-62 feet below land surface. This corresponds to elevations of approximately 140-150 feet above mean sea level (amsl). The upper surface of the Willamette Silt forms a broad terrace, locally at an elevation of approximately 200 feet amsl. Local streams cut progressively through the terrace until they flow into the Willamette River at an elevation of about 55 feet amsl, well below the top of the upper gravel layer noted in MARI 6106. Water levels in nearby observation wells suggest that groundwater levels are reasonably stable in this area.

Because the productive sand and gravel beds are confined, the cone of depression from the well will spread over a broad area and may interact with multiple surface water bodies. However, more than 20 feet of saturated Willamette Silt occurs between the local surface water bodies and the productive sand and gravel beds at depth. These fine-grained sediments will decrease the efficiency of the groundwater/surface water connection.

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: Reports indicate that the Willamette Silt is a regional confining unit which hosts the water table at shallow depths. This is consistent with information on the well log for MARI 6106, which shows a static water level approximately 22 feet above the top of the first productive gravel at 64 feet below ground surface.

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**	**Pudding River**	**159**	**155-158**	**2,910**	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: Published water table maps and reports indicate that the groundwater flows towards, and discharges into, The Pudding River and other local perennial streams. Head data from MARI 6106 and nearby wells corroborate this.

Water Availability Basin the well(s) are located within: WAB 152 (Pudding R > Molalla R –AB Howell Prairie).

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**	☐	☐	**MF 152A**	**10.00**	☒	**22.70**	☒	**<<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 Pudding River stream depletion at 30 days was estimated using the Hunt 2003 model. The presence of low permeability Willamette Silt between the aquifer and the beds of streams results in an inefficient connection between the aquifer and the stream, therefore the stream depletion at 30 days is much less than 25%. However, stream depletion will increase over time until all of the pumped water is balanced by reduced stream flow.

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													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(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., Fischer, 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, 83 p.

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

Herrera, N.B, Burns, E.R., Conlon, T.D., 2014, Simulation of groundwater flow and the interaction of groundwater and surface water in the Willamette Basin and Central Willamette subbasin, Oregon: U. S. Geological Survey Scientific Investigations Report: 2014-5136.

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

Iverson, Justin, 2002, Investigation of the hydraulic, physical, and chemical buffering capacity of Missoula Flood deposis for water quality and supply in the Willamette Valley of Oregon: Corvallis, Oregon, Oregon State University, M.S. thesis.

Woodward, Dennis BG., 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.

The subject well (MARI 6106) and nearby well logs and water level data, especially MARI 17590, MARI 3510, MARI 58801, and MARI 6109.

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #:** 1 **Logid:** MARI 6106

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

PUDDING R > MOLALLA R - AB HOWELL PRAIRIE

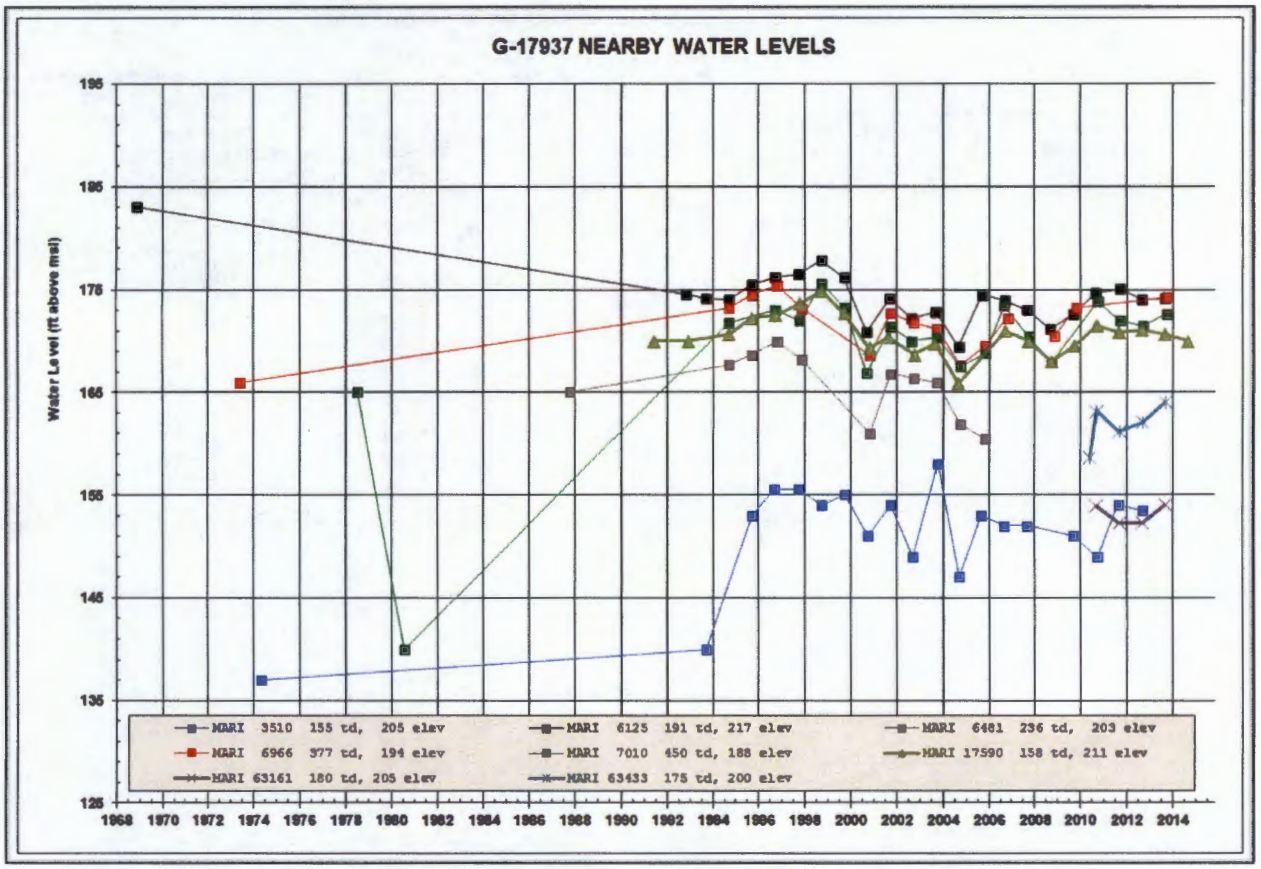
Watershed ID #: 152 Basin: WILLAMETTE Exceedance Level: 80

Time: 3:27 PM Date: 03/09/2015

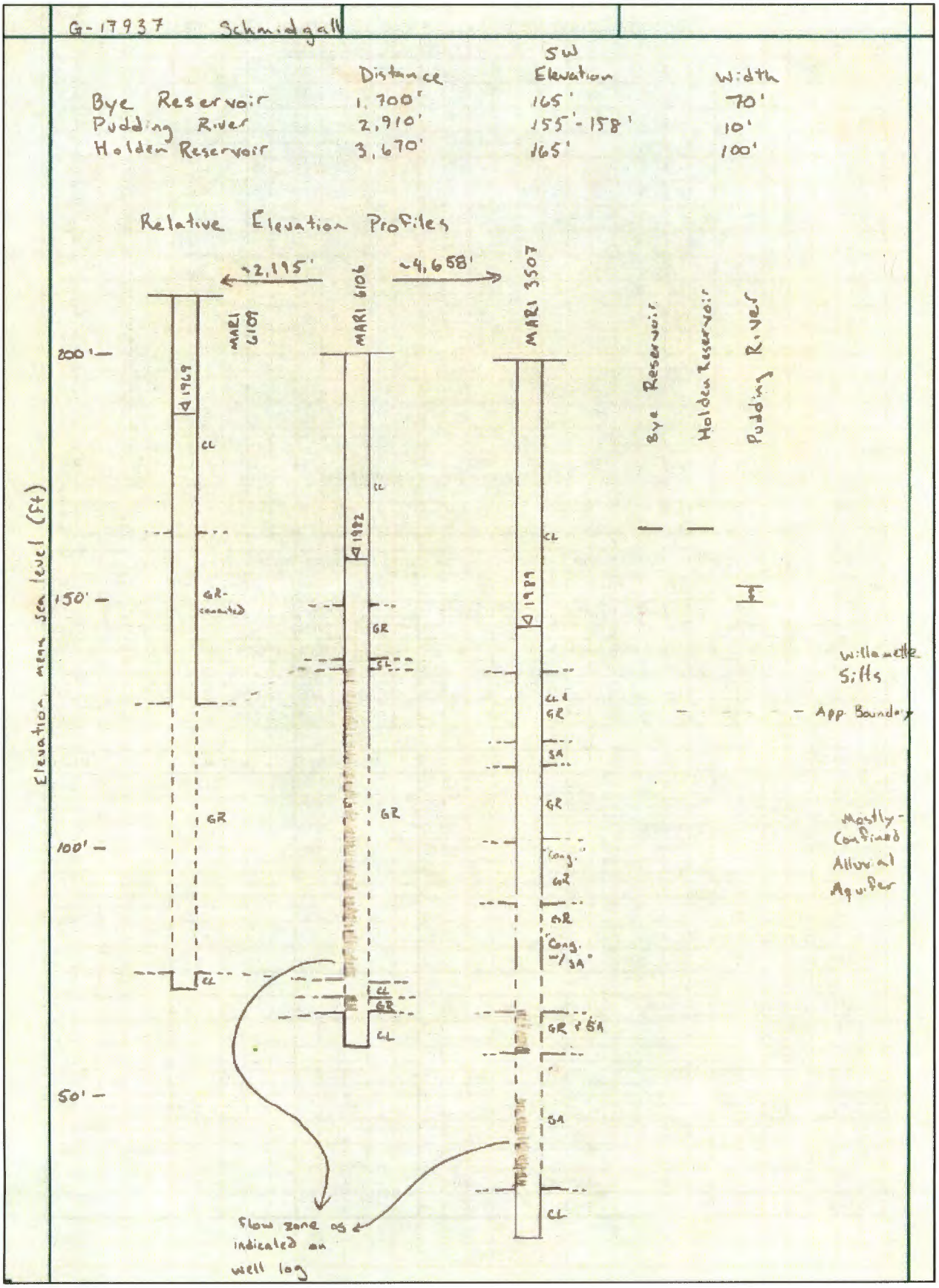
Monthly values are in cfs.
Storage is the annual amount at 50% exceedance in ac-ft.

Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net Water Available
JAN	603.00	69.60	533.00	0.00	10.00	523.00
FEB	649.00	60.80	588.00	0.00	10.00	578.00
MAR	587.00	42.90	544.00	0.00	10.00	534.00
APR	451.00	24.40	427.00	0.00	10.00	417.00
MAY	235.00	17.10	218.00	0.00	10.00	208.00
JUN	111.00	32.20	78.80	0.00	10.00	68.80
JUL	43.60	47.80	-4.17	0.00	10.00	-14.20
AUG	24.70	40.20	-15.50	0.00	10.00	-25.50
SEP	22.70	25.30	-2.58	0.00	10.00	-12.60
OCT	38.90	7.35	31.50	0.00	10.00	21.50
NOV	233.00	18.50	214.00	0.00	10.00	204.00
DEC	608.00	63.60	544.00	0.00	10.00	534.00
ANN	385,000	27,100	359,000	0	7,240	352,000

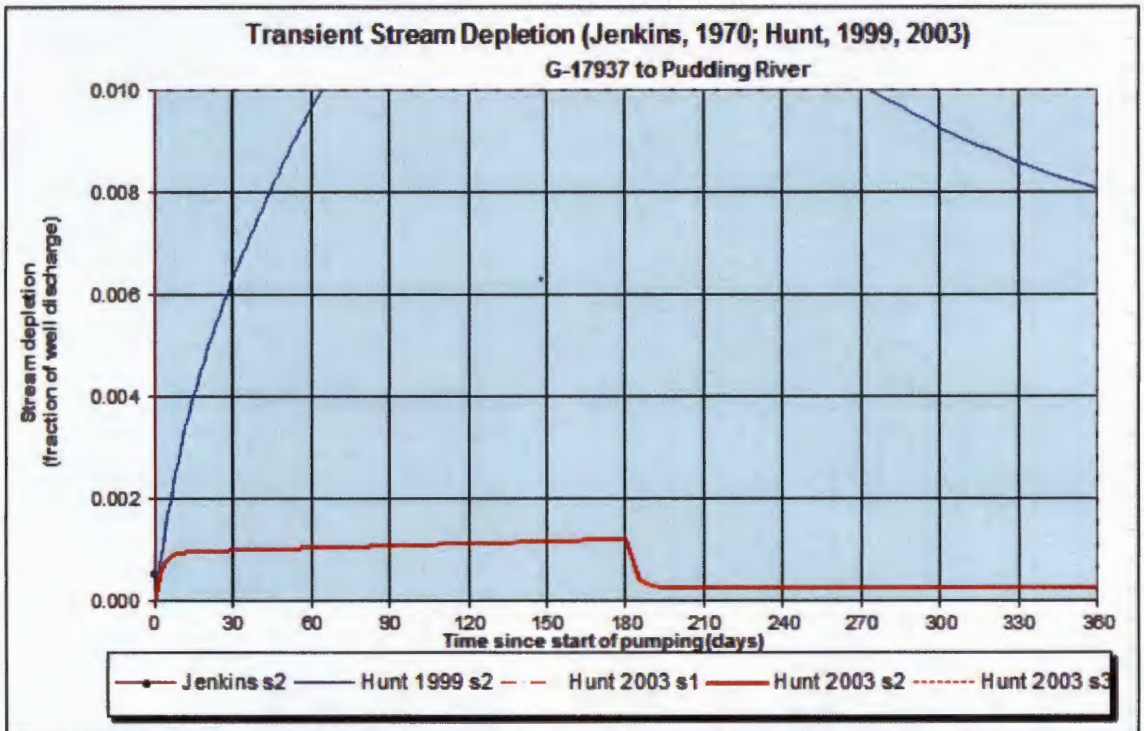
Water Level Trends



Elevation Profile for Well, Nearby Wells and Local Surface Water Bodies



Stream Depletion Model Results



Output for Stream Depletion, Scenerio 2 (s2):	Time pump on (pumping duration) = 180 days											
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	84.1%	88.7%	90.8%	92.0%	92.8%	93.5%	9.9%	5.6%	3.9%	2.9%	2.3%	1.9%
H SD 1999	0.6%	1.0%	1.2%	1.4%	1.6%	1.8%	1.3%	1.1%	1.0%	0.9%	0.9%	0.8%
H SD 2003	0.10%	0.10%	0.11%	0.11%	0.12%	0.12%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%
Qw, cfs	0.488	0.488	0.488	0.488	0.488	0.488	0.488	0.488	0.488	0.488	0.488	0.488
H SD 99, cfs	0.003	0.005	0.006	0.007	0.008	0.009	0.006	0.006	0.005	0.005	0.004	0.004
H SD 03, cfs	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	219.00	219.00	219.00	gpm
Time pump on (pumping duration)	tpon	180	180	180	days
Perpendicular from well to stream	a	2910	2910	2910	ft
Well depth	d	140	140	140	ft
Aquifer hydraulic conductivity	K	50	50	50	ft/day
Aquifer saturated thickness	b	70	70	70	ft
Aquifer transmissivity	T	3500	3500	3500	ft*ft/day
Aquifer storativity or specific yield	S	0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva	0.01	0.01	0.01	ft/day
Aquitard saturated thickness	ba	30	30	30	ft
Aquitard thickness below stream	babs	20	20	20	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	10	10	10	ft
Streambed conductance (lambda)	sbc	0.005000	0.005000	0.005000	ft/day
Stream depletion factor	sdf	2.419457	2.419457	2.419457	days
Streambed factor	sbf	0.004157	0.004157	0.004157	
input #1 for Hunt's Q_4 function	t'	0.413316	0.413316	0.413316	
input #2 for Hunt's Q_4 function	K'	0.806486	0.806486	0.806486	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	0.004157	0.004157	0.004157	

Application Review Map