Groundwater Application Review Summary Form

Application # G- 18531

GW Reviewer DENNIS ORLOWSKI **Date Review Completed:** 8/22/2012

Summary of GW Availability and Injury Review:

[ ] Groundwater for the proposed use is either over appropriated, will not likely be available in the amounts requested without injury to prior water rights, OR will not likely be available within the capacity of the groundwater resource per Section B of the attached review form.

Summary of Potential for Substantial Interference Review:

[X] There is the potential for substantial interference per Section C of the attached review form.

Summary of Well Construction Assessment:

[ ] The well does not appear to meet current well construction standards per Section D of the attached review form. Route through Well Construction and Compliance Section.

This is only a summary. Documentation is attached and should be read thoroughly to understand the basis for determinations and for conditions that may be necessary for a permit (if one is issued).

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 08/22/2017
FROM: Groundwater Section Dennis Orlowski
Reviewer's Name
SUBJECT: Application G- 18531 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: Douglas Silbernagel Living Trust County: Marion

A1. Applicant(s) seek(s) 0.125 cfs from one well(s) in the Willamette Basin, Mill Creek > Pudding River subbasin

A2. Proposed use Nursery (5.0 acres) 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	**MARI 53258**	**1**	**Alluvium**	**0.125**	**T5S/R1W-4 NW-SW**	**1550'N, 960'E fr SW cor S 4**

* 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	**180**	**45**	**54**	**8/12/1998**	**131**	**0-19**	**+1-131**		**127-131**	**55**	**10**	**Pump**

Use data from application for proposed wells.

A4. **Comments:** The proposed POA/POU area is located immediately northeast of the city limits of Woodburn, Oregon.

The proposed POA, existing well MARI 53258, originally drilled as a domestic well, is being proposed to provide groundwater for year-round nursery use on 5.0 acres.

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 proposed POA, Well 1/MARI 53258, obtains groundwater from a confined aquifer, so the pertinent basin rules (OAR 690-520-0240) do not apply.

A6. ☐ **Well(s) #** _____, _____, _____, _____, _____, tap(s) an aquifer limited by an administrative restriction.
Name of administrative area: _____
Comments: Not applicable.

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) **Medium water-use reporting, 7c (7-yrs meas.)**;
   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 **alluvial** 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 proposed POA, MARI 53258, obtains groundwater from water-bearing sand and gravel deposits (~50 feet thick) of the Willamette Aquifer system. These deposits are overlain by approximately 80 ft of low-permeability silts and clays (Willamette Silt) (Conlon and others, 2005; Gannett and Caldwell, 1998).

Within approximately one mile of the proposed POA location there are about 40 irrigation, nursery and municipal groundwater rights with wells completed in the alluvial aquifer, with more exempt (domestic) wells also likely in the area.

Groundwater level data for several alluvial aquifer wells in the area shows relative long-term stability, particularly since about 2005 (see attached hydrograph). Seasonal fluctuations in alluvial aquifer groundwater levels can be moderately high, on the order of 10-15 ft, so there is the potential for seasonal pumping interference.

These factors indicate that water for the proposed use is likely available within the capacity of the resource, but if a permit is granted the recommended permit conditions should be included to monitor and protect the resource and other groundwater rights in the area.

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 (Willamette Aquifer)**	☒	☐

Basis for aquifer confinement evaluation: Proposed Well 1, MARI 53258, obtains groundwater from sand and gravel deposits of the Willamette Aquifer, which in this area is confined by approximately 80 ft of low-permeability silts and clays (Willamette Silt). In the central Willamette Valley, Conlon and others (2005) report that fine-grained deposits (silt and clay) of 'more than 40 ft' thickness typically create confined conditions in the underlying water-bearing sand/gravel deposits. Furthermore, static groundwater levels in nearby wells are above the top of water-bearing units within the aquifer. These factors suggest that proposed Well 1 obtains groundwater from a confined aquifer.

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**	**Mill Creek**	**140-145**	**140-150**	**3500**	☒	☐	☐	☐	☒
1	**2**	**Pudding River**	**140-145**	**100-110**	**6300**	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation: The range of estimated groundwater elevations in the alluvial aquifer are coincident with or just above the elevations of SW1 and SW2. Furthermore, water table maps in the area indicate that groundwater in the alluvial aquifer system flows towards and discharges into local streams incised in the Willamette Silt (Conlon and others, 2003, 2005; Gannett and Caldwell, 1998). These facts indicate that the alluvial aquifer and local streams are hydraulically connected.

Mill Creek (SW 1) and the Pudding River (SW 2) are not fully incised through the Willamette Silt in this area. Thus, the depletion of these local streams by proposed Well 1 will be attenuated, but not eliminated, by the low vertical hydraulic conductivity (permeability) of the Willamette Silt and other clays and silts that lie between the deeper sands and gravels and the stream beds. Net impacts will be small at the onset of pumping, but will increase with time until a new equilibrium between local recharge and discharge is reached. At that time depletion is expected to be relatively constant throughout the year.

Water Availability Basin the well(s) are located within:
SW 1: Mill Creek > Pudding River – at mouth (WID 30200901)
SW 2: Pudding River > Molalla River – above Mill Creek (WID 151)

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**	☐	☐			☐	**1.88**	☒	**<<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.

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?
			☐			☐		☐		☐

Comments: C3a: PSI was assumed for SW 1 (Mill Creek) because the proposed Qw (0.125 cfs) exceeds 1% of the lowest 80% exceedance natural flow of SW1.

The Hunt 2003 analytical stream depletion model was used to estimate pumping interference at 30 days at SW1 (Mill Creek). Aquifer storativity was based on values reported in Iverson, 2002. Aquifer hydraulic conductivity values were based on analytical results from pumping tests performed in nearby wells, notable MARI 1488 and MARI 17630. Model results indicate that interference is expected to be much less than 25% of the maximum allocated pumping rate at 30 days.

C3b: not applicable.

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
1	**2**												
Well Q as CFS		**0.125**	**0.125**	**0.125**	**0.125**	**0.125**	**0.125**	**0.125**	**0.125**	**0.125**	**0.125**	**0.125**	**0.125**
Interference CFS													
Distributed Wells													
Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
(A) = Total Interf.													
(B) = 80 % Nat. Q		**1040.00**	**1180.00**	**1010.00**	**787.00**	**425.00**	**224.00**	**109.00**	**71.00**	**67.30**	**91.60**	**363.00**	**957.00**
(C) = 1 % Nat. Q		**10.40**	**11.80**	**10.10**	**7.87**	**4.25**	**2.24**	**1.09**	**0.710**	**0.673**	**0.916**	**3.63**	**9.57**
(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: Because the requested allocation, 0.125 cfs, is less than all of the 1% natural flows for SW 2, it was not necessary to use the Hunt 2003 analytical stream depletion model to calculate monthly interference estimates.

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;

SW / GW Remarks and Conditions:

References Used: Application file: G-18531.

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.D., Lee, K.K., and Risley, J.R., 2003, Heat tracing in streams in the central Willamette Basin, Oregon, *in* Stonestrom, D.A. and Constantz, Jim, eds., Heat as a tool for studying the movement of groundwater near streams: U.S. Geological Survey Circular 1260, chapter 5, p. 29-34.

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., 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.

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #:** _____ **Logid:** _____

D2. **THE WELL does not appear to meet current well construction standards based upon:**

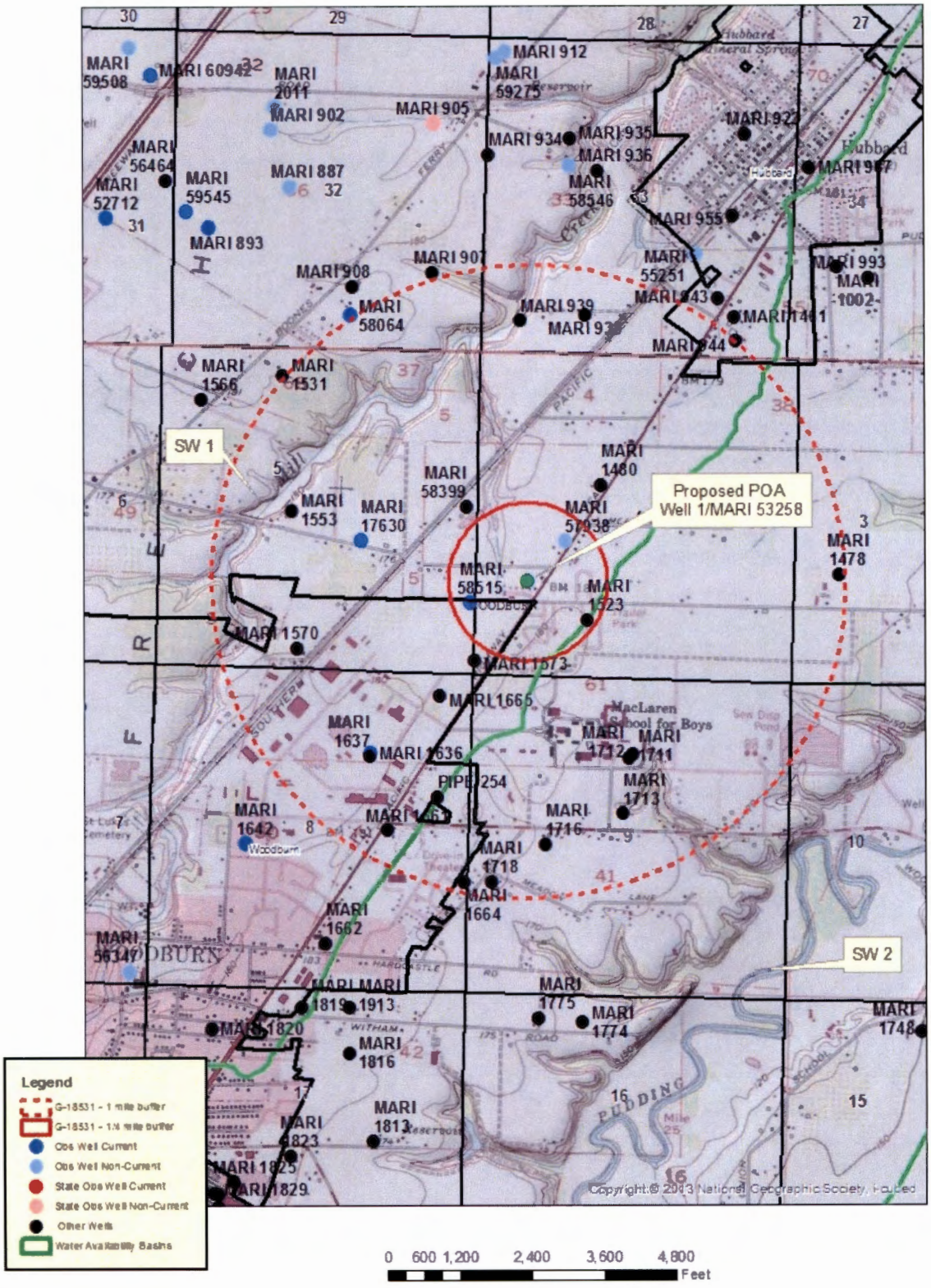
a. ☐ review of the well log;
b. ☐ field inspection by _____;
c. ☐ report of CWRE _____;
d. ☐ other: (specify) _____
_____

D3. **THE WELL construction deficiency or other comment is described as follows:** _____
_____
_____
_____
_____

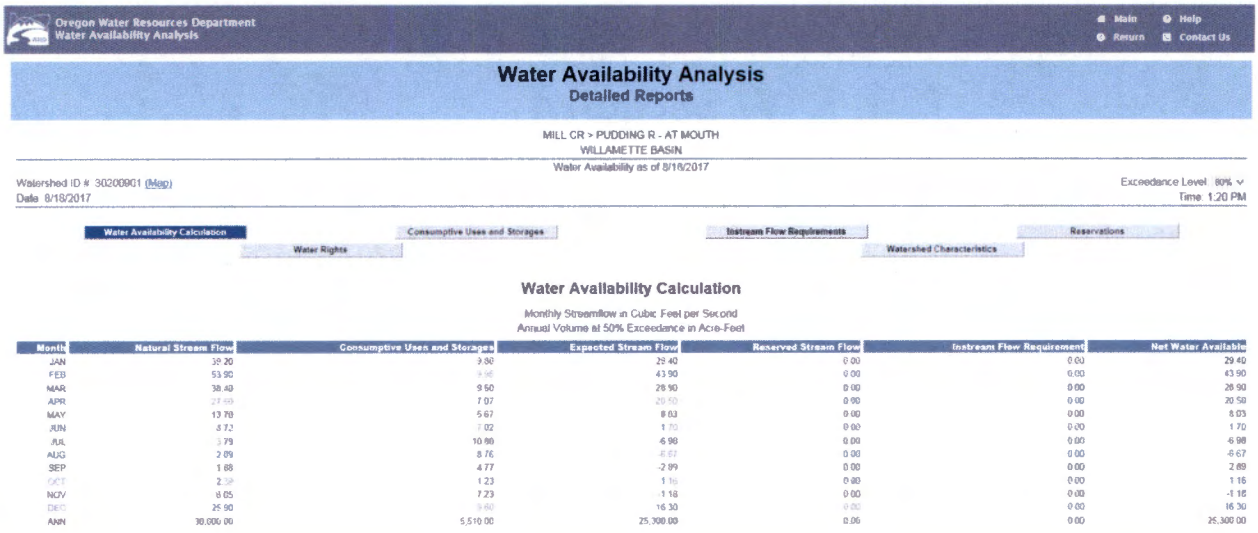
D4. ☐ **Route to the Well Construction and Compliance Section for a review of existing well construction.**

Well Location Map

Application G-18531 Silbernagel
T5S, R1W Section 4



Water Availability Tables



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Water Availability Analysis

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Water Availability Analysis
Detailed Reports

MILL CR > PUDDING R - AT MOUTH
WILLAMETTE BASIN
Water Availability as of 8/18/2017

Watershed ID # 30200901 (Map)
Date 8/18/2017

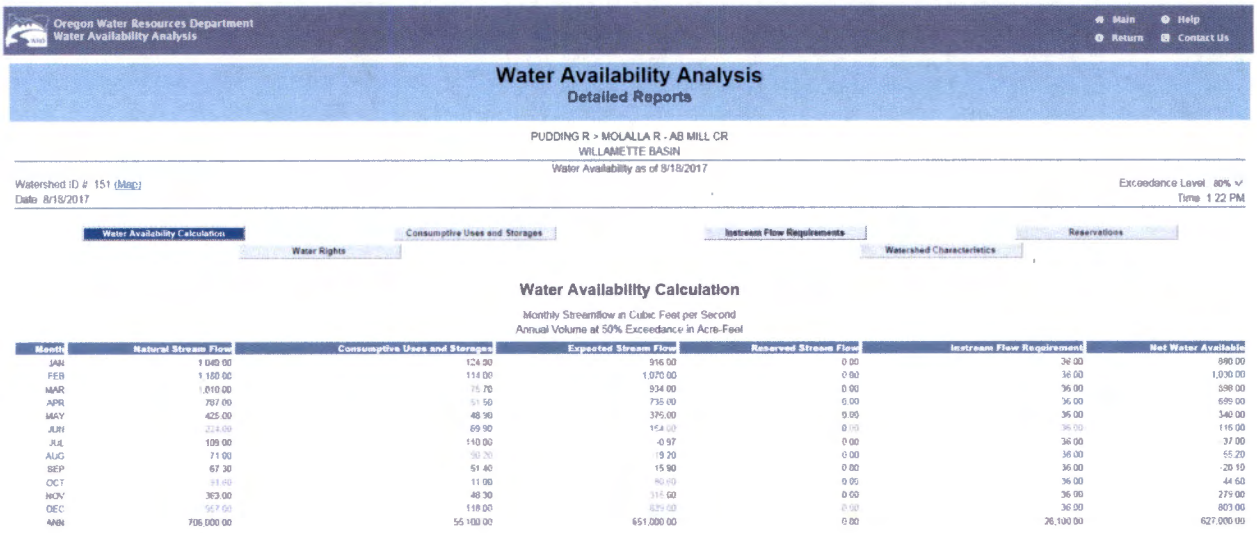
Exceedance Level 80%
Time 1:20 PM

Water Availability Calculation | Consumptive Uses and Storages | Instream Flow Requirements | Reservations
Water Rights | Watershed Characteristics

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	38.20	8.80	29.40	0.00	0.00	29.40
FEB	53.90	9.96	43.90	0.00	0.00	43.90
MAR	38.49	9.50	28.90	0.00	0.00	28.90
APR	27.69	7.07	20.50	0.00	0.00	20.50
MAY	13.78	5.67	8.03	0.00	0.00	8.03
JUN	3.72	2.02	1.70	0.00	0.00	1.70
JUL	3.79	10.86	-6.98	0.00	0.00	-6.98
AUG	2.09	8.76	-6.67	0.00	0.00	-6.67
SEP	1.88	4.77	-2.89	0.00	0.00	2.89
OCT	2.39	1.23	1.16	0.00	0.00	1.16
NOV	8.05	7.23	1.18	0.00	0.00	-1.18
DEC	25.90	9.60	16.30	0.00	0.00	16.30
ANN	30,000.00	5,510.00	25,300.00	0.00	0.00	25,300.00



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Water Availability Analysis

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PUDDING R > MOLALLA R - AB MILL CR
WILLAMETTE BASIN
Water Availability as of 8/18/2017

Watershed ID # 151 (Map)
Date 8/18/2017

Exceedance Level 80%
Time 1:22 PM

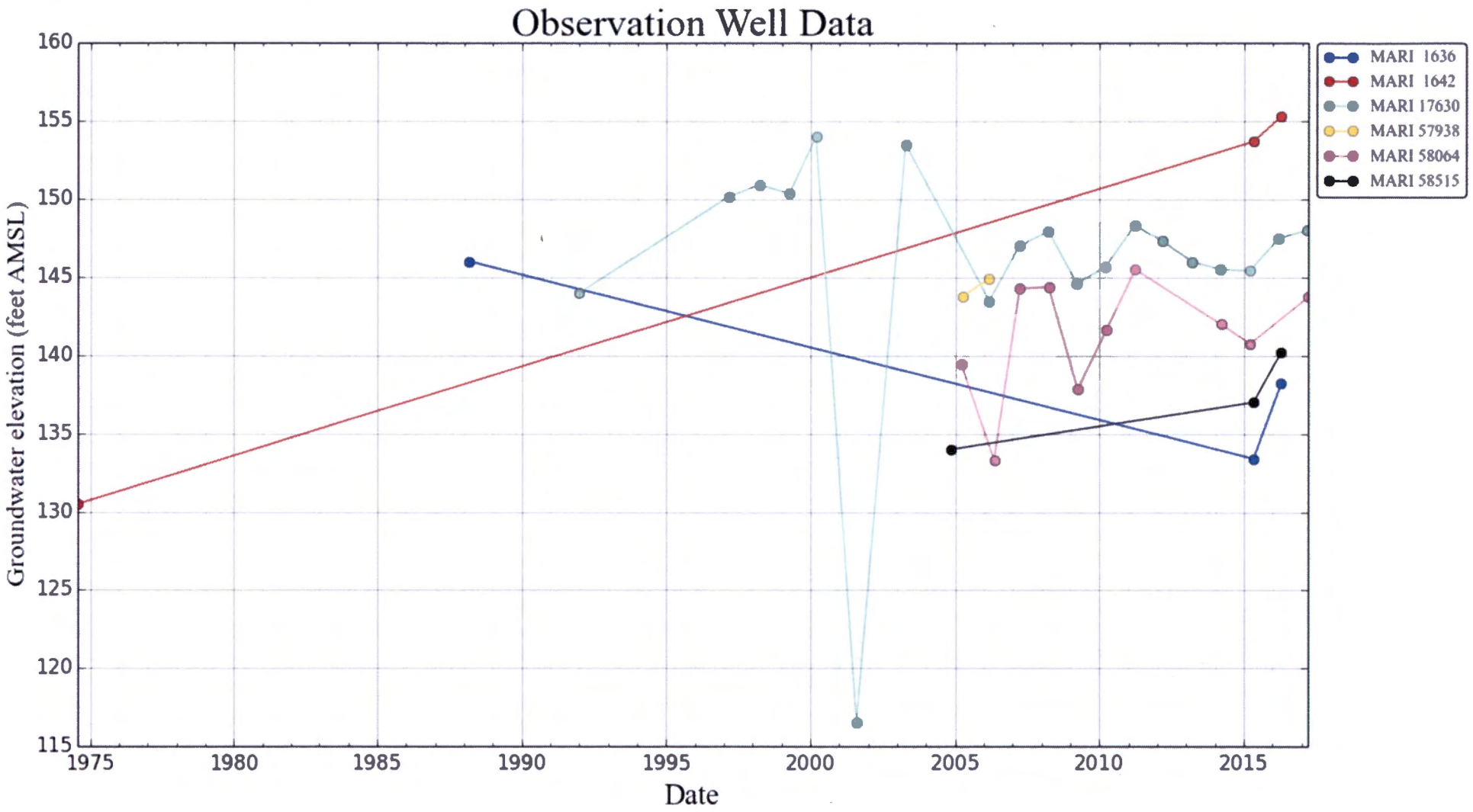
Water Availability Calculation | Consumptive Uses and Storages | Instream Flow Requirements | Reservations
Water Rights | Watershed Characteristics

Water Availability Calculation

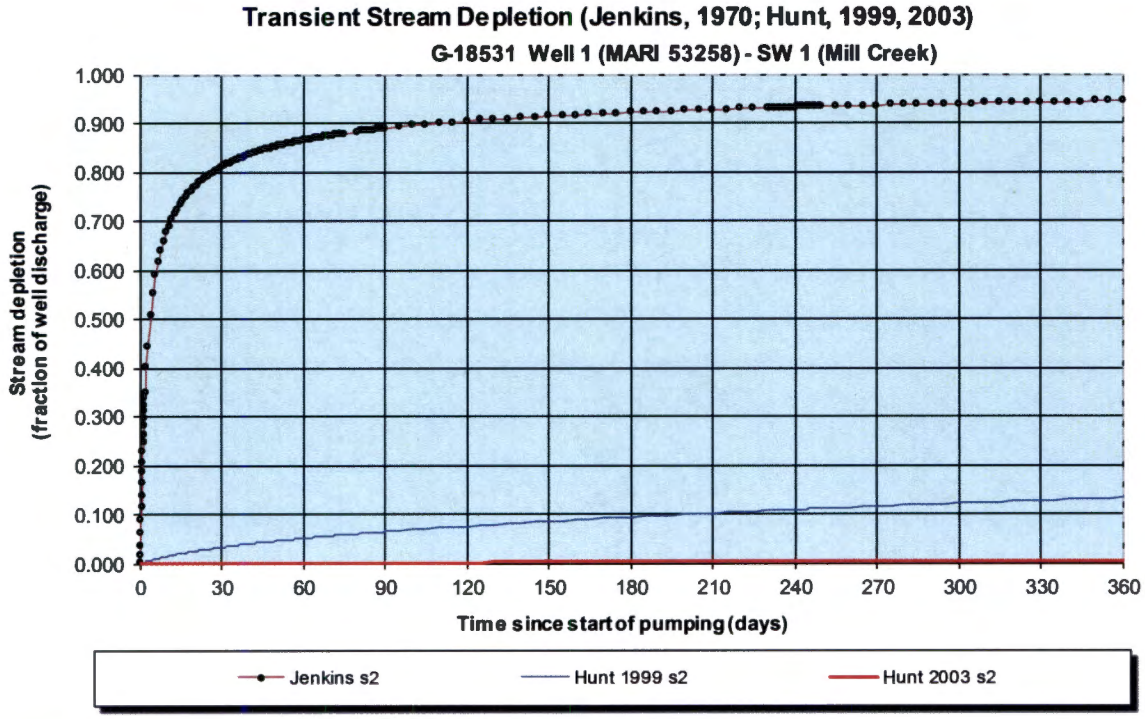
Monthly Streamflow in Cubic Feet per Second
Annual Volume at 50% Exceedance in Acre-Feet

Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	1,048.00	124.00	916.00	0.00	36.00	880.00
FEB	1,150.00	114.00	1,070.00	0.00	36.00	1,030.00
MAR	1,010.00	75.70	934.00	0.00	36.00	898.00
APR	787.00	51.50	735.00	0.00	36.00	699.00
MAY	425.00	48.90	376.00	0.00	36.00	340.00
JUN	224.00	69.90	154.00	0.00	36.00	118.00
JUL	109.00	110.00	-0.97	0.00	36.00	37.00
AUG	71.00	90.20	-19.20	0.00	36.00	55.20
SEP	67.30	51.40	15.90	0.00	36.00	-20.10
OCT	91.40	11.00	80.40	0.00	36.00	44.60
NOV	383.00	48.30	335.00	0.00	36.00	279.00
DEC	967.00	118.00	849.00	0.00	36.00	803.00
ANN	706,000.00	55,100.00	651,000.00	0.00	26,100.00	627,000.00

Water-Level Trends in Nearby Wells



Hunt 2003 Stream Depletion Model Results



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	80.9%	86.4%	88.9%	90.4%	91.4%	92.1%	92.7%	93.2%	93.6%	93.9%	94.2%	94.4%
H SD 1999	3.3%	5.1%	6.4%	7.5%	8.5%	9.4%	10.1%	10.8%	11.5%	12.1%	12.7%	13.3%
H SD 2003	0.11%	0.13%	0.16%	0.18%	0.21%	0.23%	0.26%	0.28%	0.31%	0.34%	0.36%	0.39%
Qw, cfs	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125
H SD 99, cfs	0.004	0.006	0.008	0.009	0.011	0.012	0.013	0.014	0.014	0.015	0.016	0.017
H SD 03, cfs	0.000	0.000	0.000	0.000	0.000	0.000	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	0.13	0.13	0.13	cfs
Time pump on (pumping duration)	tpon	365	365	365	days
Perpendicular from well to stream	a	3500	3500	3500	ft
Well depth	d	131	131	131	ft
Aquifer hydraulic conductivity	K	10	70	500	ft/day
Aquifer saturated thickness	b	50	50	50	ft
Aquifer transmissivity	T	500	3500	25000	ft*ft/day
Aquifer storativity or specific yield	S	0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva	0.1	0.1	0.1	ft/day
Aquitard saturated thickness	ba	80	80	80	ft
Aquitard thickness below stream	babs	70	70	70	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	20	20	20	ft
Streambed conductance (lambda)	sbc	0.028571	0.028571	0.028571	ft/day
Stream depletion factor	sdf	24.500000	3.500000	0.490000	days
Streambed factor	sbf	0.200000	0.028571	0.004000	
input #1 for Hunt's Q_4 function	t'	0.040816	0.285714	2.040816	
input #2 for Hunt's Q_4 function	K'	30.625000	4.375000	0.612500	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	0.200000	0.028571	0.004000	