## WATER RESOURCES DEPARTMENT MEMO

March 19,2015

TO:	Application G- 17963
FROM:	Aurora Bachier / Karl Wrizmink Groundwater Section
SUBJECT:	Scenic Waterway Interference Evaluation
YES NO	The source of appropriation is within or above a Scenic Waterway
YES	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**

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

### PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO:		Wate	r Rights S	Section					Date	eMa	arch 19	9, 2015		
FROM	<i>π</i> .		-	ection		A	n C Po							
FROM	/1.	Groui	idwater 5				iewer's Nan		er / Karl C	. wozni	ак			
SUBJ	ECT:	Appli	cation G-	17963		Su	persedes	s rev	iew of			Date of Re		
												Date of Re	view(s)	
OAR welfar to dete the pre	<b>690-310-1</b> e, safety a ermine whe esumption	<b>30 (1)</b> 7 nd heali ether the criteria.	The Depart th as descr presumpt <b>This revi</b>	MPTION; ment shall p ibed in ORS ion is establ ew is based	<i>537.525.</i> Dished. OAR	t a propos Department 690-310- able infor	ed ground t staff rev 140 allow rmation a	view ; ws th and a	groundwate e proposed agency poli	r applica use be m i <b>cies in p</b>	tions u odified lace at	nder OAl l or condi t <b>the time</b>	R 690-31 tioned to of evalu	0-140 meet ation.
A. <u>G</u>	INCKAL	, INFU	RMATI	<u>UN</u> : A	pplicant's r	Name:	Kathlee	n IVI	. Cutsforth		(	County:	Clacka	nas
A1.	Applica	int(s) se	ek(s) <u>0.1</u>	<u>21</u> cfs from	1	well	(s) in the		Willamette					_ Basin,
	1	Middle	Willamette	2		subb	asin	Qua	d Map: <u>C</u> a	anby				
A2. A3.	Propose Well an	ed use d aquife	irri er data ( <b>at</b> t	gation of 9.7 t <b>ach and nu</b>	acres mber logs f	Seas for existin	sonality: <b>1g wells;</b>	mar	<u>March 1 – (</u> k proposed	October : wells as	31 such	under log	gid):	
Well	Logic	ł	Applicant Well #	's Propos	ed Aquifer*		oosed (cfs)		Location (T/R-S QQ		Loca	tion, mete 'N, 1200'	s and bound $\mathbf{E} \in \mathbf{NW}$	nds, e.g.
1	CLAC 9	477	1	A	lluvium	0.1		T.	3S/R1E-S21 S		16	5' N, 1485'	E fr SW co	or S 21
23														
4														
5 * ΔΠων	ium, CRB,	Bedrock												
Alluv		Deutoer												
Well	Well Elev ft msl	First Water ft bls	SWL ft bls	SWL Date	Well Depth (ft)	Seal Interval (ft)	Casing Interval (ft)		Liner Intervals (ft)	Perfora Or Scr (ft)	eens	Well Yield (gpm)	Draw Down (ft)	Test Type
1	165	140	90	6/6/1966	145	0-20	0-140					30	35	Bailer
Use dat	a from app	lication f	for proposed	d wells.										
A4.	Comme	ents: _C	LAC <u>94</u> 77	is an existir	ng well. Thi	<u>s well is</u> c	ased fron	<u>n lan</u>	d surface to	a depth	<u>of 140</u>	ft below	land surf	ace
	<u>(bls). Tl</u>	he top 2		aled with ber										
	140-143	<u> 8 ft bls.</u>												

A5. Provisions of the Willamette Basin rules relative to the development, classification and/or management of groundwater hydraulically connected to surface water  $\Box$  are, or  $\boxtimes$  are not, activated by this application. (Not all basin rules contain such provisions.)

Comments: The well is greater than 1/4 mile from a surface water source, and produces form a confined aquifer, so the pertinent rules (OAR 690-502-2040) do not apply.

Name of administrative area: Comments: \_\_\_\_\_

A6. Well(s) # \_\_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, tap(s) an aquifer limited by an administrative restriction.

### 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:
  - **is** over appropriated, **is not** over appropriated, *or* **cannot be determined to be** over appropriated during any a. 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;
  - will not or will likely be available in the amounts requested without injury to prior water rights. \* This finding b. is limited to the groundwater portion of the injury determination as prescribed in OAR 690-310-130;
  - will not or will likely to be available within the capacity of the groundwater resource; or c.
  - d. will, if properly conditioned, avoid injury to existing groundwater rights or to the groundwater resource:
    - i. The permit should contain condition #(s) <u>7C, Seven Year Minimum Measurement</u>
       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;

**Condition** to allow groundwater production from no deeper than \_\_\_\_\_\_ ft. below land surface; B2. a.

- Condition to allow groundwater production from no shallower than \_\_\_\_\_\_ ft. below land surface; b.
- **Condition** to allow groundwater production only from the condition to allow groundwater production only from the groundwater reservoir between approximately \_\_\_\_\_\_ ft. and \_\_\_\_\_\_ c. 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 9477 is underlain by a thick sequence of clay and silt beds with relatively thin beds of gravel and sand. The CLAC 9477 produces from a layer of course-grained sand from 140-143 feet bls, or 22-25 ft above mean sea level (amsl). This layer is below the elevation of the adjacent reach of the Willamette River (~50-53 ft amsl, with bathymetry mapped at 18 ft below the river surface), and is not likely to be in direct communication with the river. Similarly, it is also below the adjacent reach of the Molalla River (~62-64 ft amsl), and is not likely to be in direct communication. Nearby groundwater levels appear to be stable (see attached hydrograph). These factors indicate that the alluvial groundwater resource is not likely to be over appropriated. However, the capacity of the production zone is likely to be somewhat limited because the layer is relatively thin and the associated aquifer is confined. This suggests that it would be prudent to monitor groundwater levels for some time to assess the impact of this production.

### 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	$\boxtimes$	

**Basis for aquifer confinement evaluation:** The well log for MARI 9477 indicates the static water level is above the producing sand bed. Regionally, the principal water-bearing zones appear to be relatively thin gravel and sand beds in a thick sequence of low permeability clay and silt.

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	75	50-53	3,200		
1	2	Molalla River	75	62-64	4,640		
	1						

**Basis for aquifer hydraulic connection evaluation:** <u>Published water-table maps indicate that groundwater in the alluvial</u> aquifer flows toward, and discharges to, the Molalla and Willamette rivers.

Water Availability Basin the well(s) are located within: <u>181 (Willamette R> Columbia R-at mouth)</u>, and 69796 (Molalla R> Willamette R-at mouth).

C3a. **690-09-040** (4): Evaluation of stream impacts for <u>each well</u> 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 181A	1500		4,890		<25	
1	2			IS69796 A	100		134		<<25	

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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: \_

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.

Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q	as CFS												
Interfere	ence CFS												
D													
Well	uted Wells SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	S TH	%	%	%	%	%	%	%	%	70	%	%	%
Well O	as CFS				10								
	ence CFS					1							
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q	as CFS												
Interfere	ence CFS												
	-	%	%	%	%	%	%	%	%	%	%	%	%
Well Q	as CFS								1				
Interfere	ence CFS				Sec								
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q	as CFS				and a second			-					
Interfere	ence CFS												
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q	as CFS												
Interfere	ence CFS												
		%	%	%	%	%	%	%	%	%	%	%	%
	as CFS				SC2244								
Interfere	ence CFS												
(A) = To	tal Interf.												
<b>(B) = 80</b>	% Nat. Q												- C
(C) = 1	% Nat. Q												
(D) = (	A) > (C)	1		V	1	- 1-		1			7		1
	(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.

CI 0,	<b>Basis for impact evaluation:</b> <u>Stream depletion was estimated using the Hunt 2003 model. Interference with both the</u>
	Willamette River and the Molalla River at 30 days is likely to be less than 25% as production is from a thin sand bed that is at a
	lower elevation than the rivers. The fine-grained material between the bottom of the streams and the production zone will likely result in an inefficient connection between the aquifer and the streams.
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.	<ul> <li>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:         <ul> <li>i. The permit should contain condition #(s)</li> <li>iii (s)</li> </ul> </li> </ul>
	ii. The permit should contain special condition(s) as indicated in "Remarks" below;
	SW / GW Remarks and Conditions
-	
-	
-	
-	
_	
<u>(</u>	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.
	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.
_	Hunt, B., 2003, Unsteady stream depletion when pumping from semiconfined aquifer: Journal of Hydrologic Engineering, anuary/February, 2003.
	verson, 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.
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Nearby well logs and water level data, especially CLAC 9477, CLAC 9679, and CLAC 9698.

Appli	cation	G-17	963
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#### **D. WELL CONSTRUCTION, OAR 690-200**

D1. Well #: 1 Logid: CLAC 9477

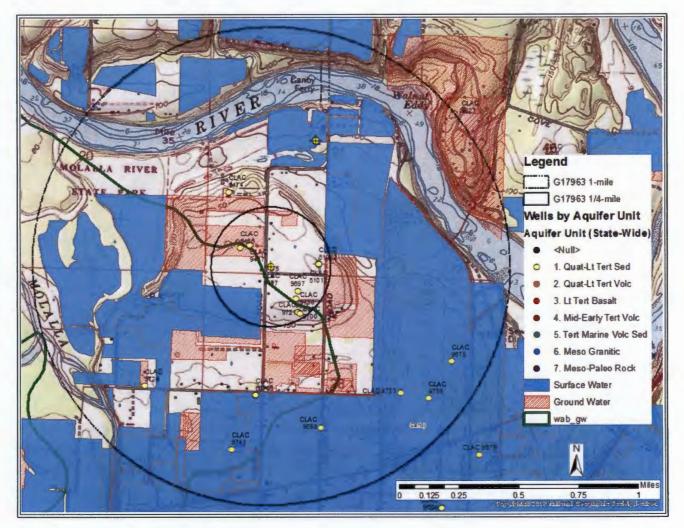
THE WELL does not appear to meet current well construction standards based upon: D2.

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

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

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

### Location Map



# Water Availability Tables

		DETAILED REPORT	ON THE WATER AVAILA	BILITY CALCULATIO	DN	
watershed ID #: Time: 4:42 PM	: 181	WILLAW	ETTE R > COLUMBIA R Basin: WILLAMET			dance Level: 80 ate: 03/16/2015
Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net Water Available
		Storage is	Monthly values a the annual amount at	re in cfs. 50% exceedance i	in ac-ft.	
JAN FEB MAR APR MAY JUN JUL	27,500.00 30,000.00 28,500.00 25,400.00 20,700.00 11,000.00 6,280.00	2,770.00 8,040.00 7,600.00 7,210.00 4,460.00 2,430.00 2,370.00	24,700.00 22,000.00 20,900.00 18,200.00 16,200.00 8,570.00 3,910.00	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	1,500.00 1,500.00 1,500.00 1,500.00 1,500.00 1,500.00 1,500.00	23,200,00 20,500,00 19,400,00 16,700,00 14,700,00 7,070,00 2,410,00
AUG SEP OCT NOV DEC ANN 1	4,890.00 4,930.00 5,990.00 12,700.00 24,800.00 19,700,000	2,130.00 1,760.00 735.00 1,030.00 1,420.00 2,510,000	2,760.00 3,170.00 5,250.00 11,700.00 23,400.00 17,200,000	0,00 0,00 0,00 0,00 0,00 0,00	1,500.00 1,500.00 1,500.00 1,500.00 1,500.00 1,090,000	1,260,00 1,670,00 3,750,00 10,200,00 21,900,00 16,100,000

		DETAILED REPORT	ON THE WATER AVAIL	ABILITY CALCULATIO	ÐN	
Watershed ID Time: 4:41 PM		MOLALL	A R > WILLAMETTE R - Basin: WILLAME			dance Level: 80 ate: 03/16/2015
Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net Water Available
		Storage is	Monthly values a the annual amount an	are in cfs. 50% exceedance i	n ac-ft.	
JAN FEB MAR APR MAY	1,870.00 2,010.00 1,830.00 1,530.00 927.00	154.00 144.00 116.00 89.30 99.20	1,720.00 1,870.00 1,710.00 1,440.00 828.00	0.00 0.00 0.00 0.00 0.00 0.00	500.00 500.00 500.00 500.00 500.00	1,220.00 1,370.00 1,210.00 941.00 328.00
JUN JUL AUG	431.00 204.00 139.00	119.00 183.00 154.00	312.00 21.10 -15.20 50.70	0.00 0.00 0.00	500.00 200.00 100.00	-188.00 -179.00 -115.00 -99.30
OCT NOV DEC ANN	188.00 637.00 1,700.00 1,320,000	41.70 79.50 149.00 85,400	146.00 558.00 1,550.00 1,240,000	0.00 0.00 0.00 0.00	450.00 500.00 500.00 295,000	-304.00 57.50 1,050.00 966,000

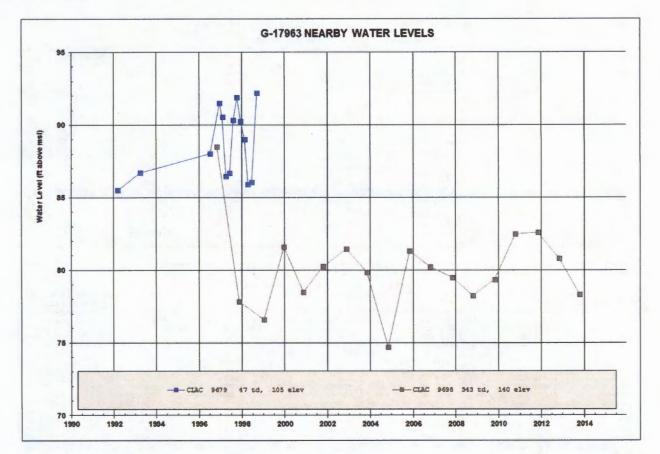
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### Water Level Trends



## Stream Depletion Model Results - Willamette River

		indi	SIGHT 2	ueami	-	-		970; Flu nette Riv	int, 1999 er	, 2003)		
1.000	1	1	1	1	r		- T	Tottonar				
Chart												
0.900	y warmen ?	-										-
0.800							-					
_		/										
0.700		-		-	-							
C F	1		-	-								
0.600		-	-									-
0.700 0.700 0.600 0.600 0.600 0.600 0.400 0.300	11	/		-	_							
0.500	1	1					1					-
2 5 0.400	II	1					11					
the second	+/			1			1/1					
0.300							14					
100	+/						1					
0.200							1	-				-
0.100	1		-					and and	-	~		
0.100	1								Desses			-
0.000		-	-				-					
-	- Jeni	kins s2 -	Hu		e since s s2 — —				int 2003 s	2	Hunt 20	03 s3
Dutput for S	Stream D	epletio	n, Scene	erio 2 (s	2):	Time p		(pumpi	ing durat	tion) = 1	80 days	
Days	30	60	90	120	150	180				300	330	36
I SD	73.6%	81.1%	84.6%	86.6%	88.0%	89.0%	16.3%	9.4%	6.5%	4.9%	3.9%	3.2
H SD 1999	47.7%	60.1%	66.5%	70.5%	73.3%	75.5%	29.5%	18.4%	13.2%	10.2%	8.2%	6.8
H SD 2003	11.41%		12.10%			13.25%	2.26%	-		2.54%	2.45%	2.35
	0.123	0.123	0.123	0.123								
Qw, cfs	V. 12.J				0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.12
Qw, cfs H SD 99, cfs	0.058	0.074	0.081	0.086	0.123	0.123	0.123			0.123	0.123	
H SD 99, cfs		-	0.081					0.023	0.016			0.12
H SD 99, cfs	0.058	0.074		0.086	0.090	0.092	0.036	0.023	0.016	0.012	0.010	0.00
H SD 99, cfs H SD 03, cfs	0.058 0.014	0.074		0.086	0.090	0.092	0.036	0.023	0.016	0.012 0.003	0.010	0.00
H SD 99, cfs H <mark>SD 03, cfs</mark> Parameters	0.058 0.014	0.074	0.015	0.086	0.090	0.092	0.036	0.023	0.016 0.003 Sce	0.012 0.003 mario 3	0.010	0.00 0.00 Unit
H SD 99, cfs H SD 03, cfs Parameters Net steady p	0.058 0.014 a: umping ra	0.074 0.014 te of we	0.015	0.086 0.015 Qw	0.090	0.092 0.016 enario 1	0.036	0.023 0.003 enario 2	0.016 0.003 Sce	0.012 0.003	0.010	0.00 0.00 Unit
H SD 99, cfs H SD 03, cfs Parameters Net steady pu Time pump or	0.058 0.014 a: umping ra n (pumpin	0.074 0.014 te of we g duratio	0.015	0.086	0.090	0.092 0.016 enario 1 55.00	0.036	0.023 0.003 enario 2 55.00	0.016 0.003 Sce	0.012 0.003 mario 3 55.00	0.010	0.00
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H SD 99, cfs H SD 03, cfs Parameters Net steady po Time pump or Perpendicula Well depth	0.058 0.014 umping ra (pumpin r from we	0.074 0.014 te of we g duratio	0.015	0.086 0.015 Qw tpon a	0.090	0.092 0.016 enario 1 55.00 180 3200	0.036 0.003 Sc	enario 2 55.00 3200	0.016 0.003 Sce	0.012 0.003 mario 3 55.00 180	0.010	0.00 0.00 Unit gp day
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H SD 99, cfs H SD 03, cfs Parameters Net steady put Time pump or Perpendicula Well depth Aquifer hydra Aquifer satur	0.058 0.014 umping ra (pumpin r from we aulic conc ated thicl	0.074 0.014 te of we g duratio ell to stre	0.015	0.086 0.015 Qw tpon a d	0.090	0.092 0.016 enario 1 55.00 180 3200 145 50 30	0.036 0.003 Sc	enario 2 55.00 180 3200 145 50 30	0.016 0.003 Sce	0.012 0.003 enario 3 55.00 180 3200 145 50 30	0.010	0.00 0.00 Unit gp day ft/da
H SD 99, cfs H SD 03, cfs Parameters Net steady purp Time pump or Perpendicula Well depth Aquifer hydra Aquifer satur Aquifer trans	0.058 0.014 a: umping ra (pumping r from we aulic cond rated thick missivity	0.074 0.014 te of we g duratio ell to stre ductivity kness	0.015 ell en) am	0.086 0.015 Qw tpon a d K b T	0.090	0.092 0.016 enario 1 55.00 180 3200 145 50 30 1500	0.036 0.003 Sc	enario 2 55.00 180 3200 145 50 30 1500	0.016 0.003 Sce	0.012 0.003 mario 3 55.00 180 3200 145 50 30 1500	0.010	0.00 0.00 Unit gp day ft/da
H SD 99, cfs H SD 03, cfs Parameters Net steady purp Time pump or Perpendicula Well depth Aquifer hydra Aquifer stur Aquifer trans Aquifer stora	0.058 0.014 	0.074 0.014 te of we g duratio ell to stre ductivity kness	0.015 ell en) eam	0.086 0.015 Qw tpon a d K b T T S	0.090	0.092 0.016 enario 1 55.00 180 3200 145 50 30 1500 0.001	0.036 0.003 Sc	enario 2 55.00 180 3200 145 50 30 1500 0.001	0.016 0.003 Sce	0.012 0.003 mario 3 55.00 180 3200 145 50 30 1500 0.001	0.010	0.00 0.00 Unit gp day ft/da
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### Stream Depletion Model Results - Molalla River

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		62.5% 3.1%	72.9%	77.8%	80.7% 8.4%	82.7%	84.2%	22.9%	13.3%	9.3%	7.0%	5.6%	4.6
H SD 1999	9	62.5% 3.1% 0.37%	72.9% 5.3% 0.38%	77.8% 6.9% 0.40%	80.7% 8.4% 0.42%		84.2% 10.7%					5.6%	4.6
H SD 1999 H SD 2003 Qw, cfs	3 (	3.1% 0.37% 0.123	5.3%	6.9%	8.4%	82.7% 9.6%	84.2% 10.7% 0.45%	22.9% 8.6%	13.3% 7.3%	9.3% 6.4%	7.0%	5.6% 5.3% 0.10%	4.6 4.9 0.10
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H SD 1999 H SD 2003 Qw, cfs H SD 99, c	3 ( cfs	3.1% 0.37% 0.123	5.3% 0.38% 0.123	6.9% 0.40% 0.123	8.4% 0.42% 0.123	82.7% 9.6% 0.43% 0.123	84.2% 10.7% 0.45% 0.123	22.9% 8.6% 0.10% 0.123	13.3% 7.3% 0.10% 0.123	9.3% 6.4% 0.10% 0.123	7.0% 5.8% 0.10% 0.123	5.6% 5.3% 0.10% 0.123 0.007	4.6 4.9 0.10 0.11 0.11
H SD 1999 H SD 2003 Qw, cfs H SD 99, d H SD 03, d	B B Cfs Cfs	3.1% 0.37% 0.123 0.004	5.3% 0.38% 0.123 0.006	6.9% 0.40% 0.123 0.009	8.4% 0.42% 0.123 0.010	82.7% 9.6% 0.43% 0.123 0.012 0.001	84.2% 10.7% 0.45% 0.123 0.013 0.001	22.9% 8.6% 0.10% 0.123 0.011 0.000	13.3% 7.3% 0.10% 0.123 0.009 0.000	9.3% 6.4% 0.10% 0.123 0.008 0.000	7.0% 5.8% 0.10% 0.123 0.007 0.000	5.6% 5.3% 0.10% 0.123 0.007 0.000	4.6 4.9 0.10 0.11 0.00 0.00
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# Application G-17963

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Page

## **Elevation Profile**

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