

Groundwater Review Summary Form

Application # G- 18341

GW Reviewer A. Zouchier Date Review Completed: 10/12/16

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:

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 December 12, 2016
 FROM: Groundwater Section Aurora C Bouchier
 Reviewer's Name
 SUBJECT: Application G- 18341 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: Clearlake Farms LLC County: Marion

A1. Applicant(s) seek(s) 0.29 cfs from 1 well(s) in the Willamette Basin,
Middle Willamette subbasin (Mission Bottom quad)

A2. Proposed use Irrigation (23.4 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	MARI 17388	1	Alluvial	0.29	6S/3W-23 SE-NE	40' N, 580' W fr E 1/4 cor S 23
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	180	75	62	6/19/1991	200	0-19	+1-200	Na	120-150, 183-200	500+		Air

Use data from application for proposed wells.

A4. **Comments:** The applicant is requesting a rate of 0.29 cfs (130 gpm), and a specific rate of 150 gpm. This evaluation is based on a rate of 130 gpm.

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 well produces from a confined source and is greater than 1/4-mile from a surface water source, so the pertinent 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) 7N;
 - 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 applicant's well is located in an area that contains fine-grained sediment (Willamette Silt) from land surface to a depth of approximately 60-70 feet (Gannett and Caldwell, 1998). A sequence of water-bearing sands and gravels beds with inter-fingered silt and clays beds exist under the silt with a combined thickness of approximately 100-120 feet locally (Gannett and Caldwell, 1998). Beneath this the alluvium becomes dominated by fine-grained material which progressively confines deeper water-bearing zones (Woodward et al., 1998) to a depth of approximately 400 feet below sea level (Gannett and Caldwell, 1998).

State Observation Well MARI 4160 is located just over 3 miles to the east-northeast, and State Observation Well MARI 4217 is located approximately 2 miles to the northeast. Water level measurements from the State Observation Wells and other nearby wells indicate relatively stable long-term trends (approximately 6 feet of water level decline between the early 1960's to present, with a seasonal variation of up to about 40 feet) for alluvial wells in the immediate area of the proposed well (see attached hydrograph). However, increased groundwater development in the area indicates a need for additional water-level monitoring.

Pump tests at nearby wells similarly located on the Willamette Silt terrace have calculated transmissivity (T) values of approximately 20,000-25,000 gpd/ft (MARI 17870 and MARI 58798), with an outlying T value of 175,997 gpd/ft (MARI 17319). The nearest permitted well (MARI 5080) is located just over 550 feet from the proposed well. Using the T values mentioned above, the interference at a distance of 550 feet resulting from pumping at a rate of 130 gallons per minute for 240 day continuously is calculated to be approximately 4.5-6.5 feet (see below). The cone of depression created at the proposed well is expected to be broad and shallow, and the increase in interference is not expected to prevent nearby water rights from receiving water.

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	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer confinement evaluation: The coarse-grained sediments in the area are confined beneath about 60-70 feet of silt and clay (Gannett and Caldwell, 1998). The well log for MARI 17388 lists a static water level above the water-bearing zone at which it was encountered, corroborating the finding of confined conditions.

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	Clear Lake	~120	~107	4260	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	2	Unnamed Trib to Labish Creek Ditch	~120	140-170	1510	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer hydraulic connection evaluation: The water level in the well is greater than the elevation of Clear Lake/Claggett Creek and of the Willamette River, indicating hydraulic connection with the groundwater contributing to the surface water bodies. The unnamed tributary to Labish ditch is intermittent within a mile of the applicant's well and likely carries runoff from drain tiles. Water table maps in the area (Woodward and others, 1998, Conlon et al., 2005) indicate that the water table is at an elevation of about 120-130 feet in the area, which is below the elevation of nearby intermittent stream. Therefore, it is unlikely that surface water is connected to ground water within a mile of the applicant's proposed well.

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	<input type="checkbox"/>	<input type="checkbox"/>	MF 182	1500.00	<input type="checkbox"/>	3830.00	<input type="checkbox"/>	<<25%	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

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?
	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

Comments: Interference to Clear Lake at 30 days was estimated using the Hunt 2003 model which simulates a confined aquifer as that is the case at the location of the well. Where the Willamette Silt has been eroded away (in the meander belt/flood plain of the Willamette River, which includes Clear Lake) it is likely the aquifer is not confined. However, a 3 feet aquitard thickness below the stream was included to represent a streambed clogging layer.

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													
(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:** _____
The large distance between the wells and the hydraulically connected surface water bodies will likely result in an inefficient connection between the wells and the surface water bodies. However, stream depletion will increase over time.

References Used: _____
 Application file: G-18341, and nearby G-15729, and G-18294.

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.

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, 32p.

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

Iverson, J., 2002, Investigation of the hydraulic, physical, and chemical buffering capacity of Missoula Flood deposits for water quality and supply in the Willamette Valley of Oregon: Oregon State University, Unpublished Master's thesis, 147 p.

Theis, C.V., 1941, The effect of a well on the flow of a nearby stream: Am. Geophys. Union Trans., V. 22, pt. 3, p. 734-738.

Walton, W.C., 1984, Practical Aspects of Groundwater Modeling: National Water-Well Assoc., pp. 268-269 & 298-303.

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, 82p.

Nearby well logs and water level data, specifically: MARI 17388, MARI 4160, MARI 4217, MARI 5079, and MARI 5080.

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:** _____

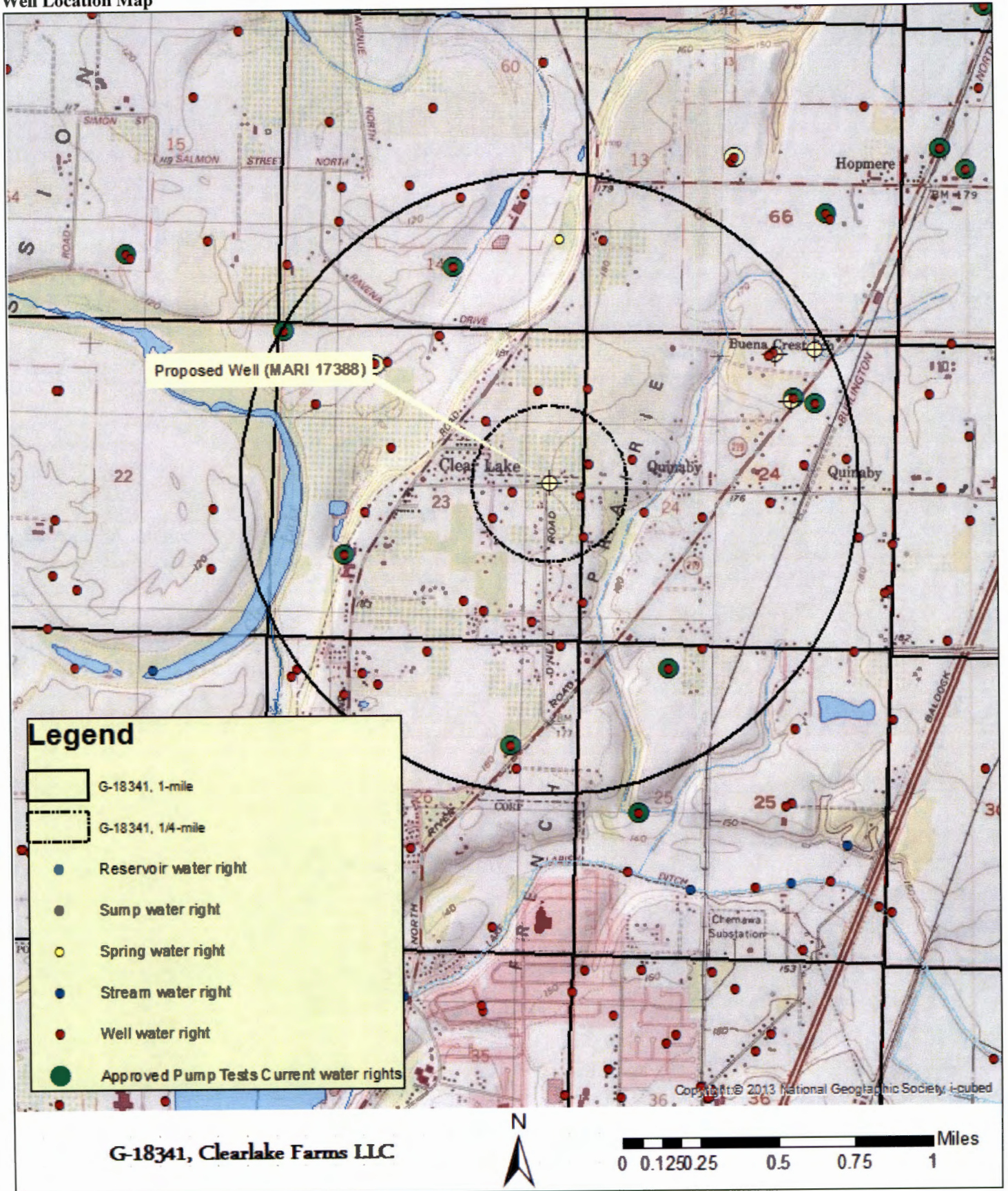
D4. **Route to the Well Construction and Compliance Section for a review of existing well construction.**

Water Availability Tables

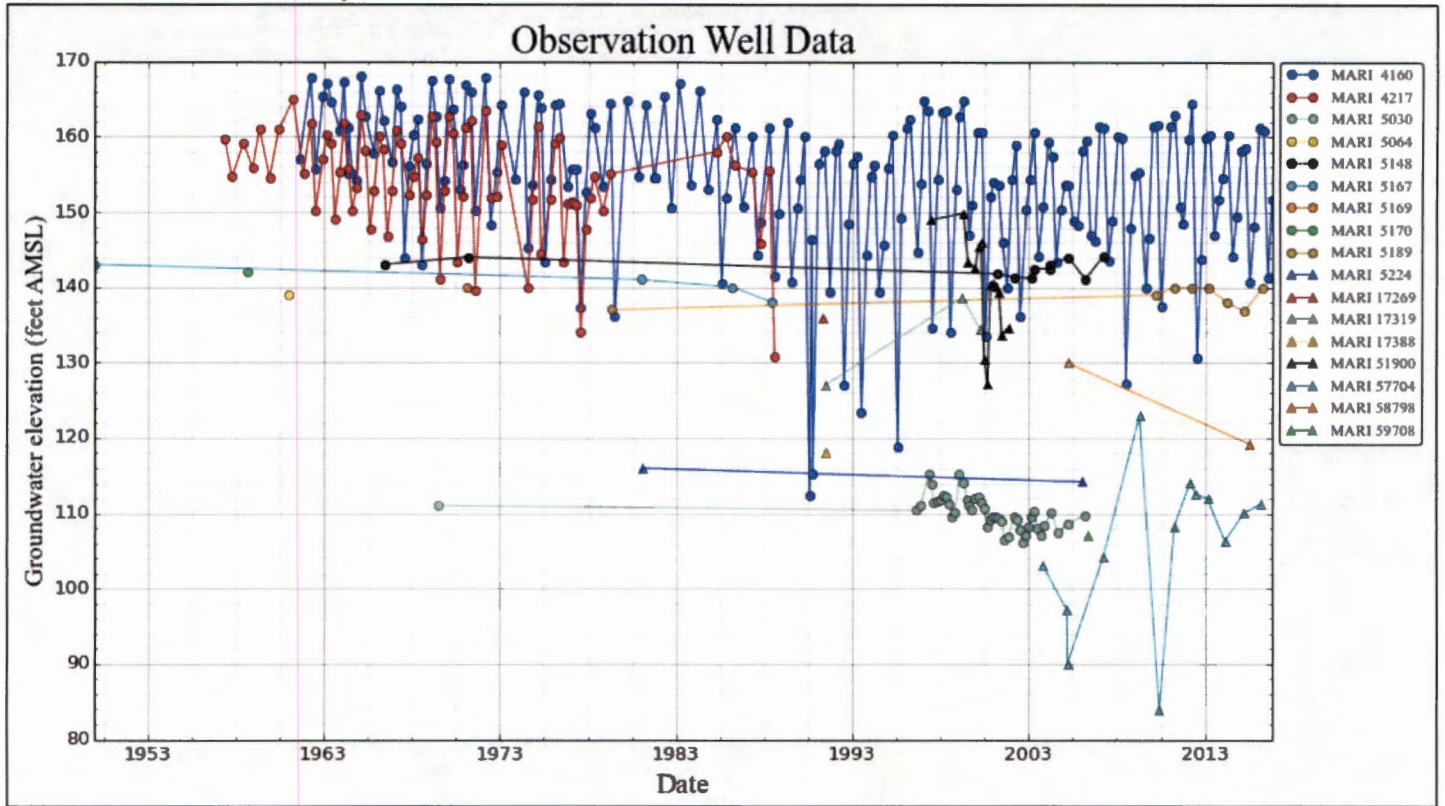
DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION						
Watershed ID #: 182		WILLAMETTE R > COLUMBIA R - AB MOLALLA R			Exceedance Level: 80	
Time: 11:06 AM		Basin: WILLAMETTE			Date: 12/12/2016	
Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream 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	15,100.00	0.00	1,500.00	13,600.00
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	748.00	4,100.00	0.00	1,500.00	2,600.00
NOV	10,200.00	879.00	9,320.00	0.00	1,500.00	7,820.00
DEC	19,300.00	962.00	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													
Watershed ID #: 182		WILLAMETTE R > COLUMBIA R - AB MOLALLA R										Basin: WILLAMETTE	
Time: 11:06 AM												Date: 12/12/2016	
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	1500.0	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

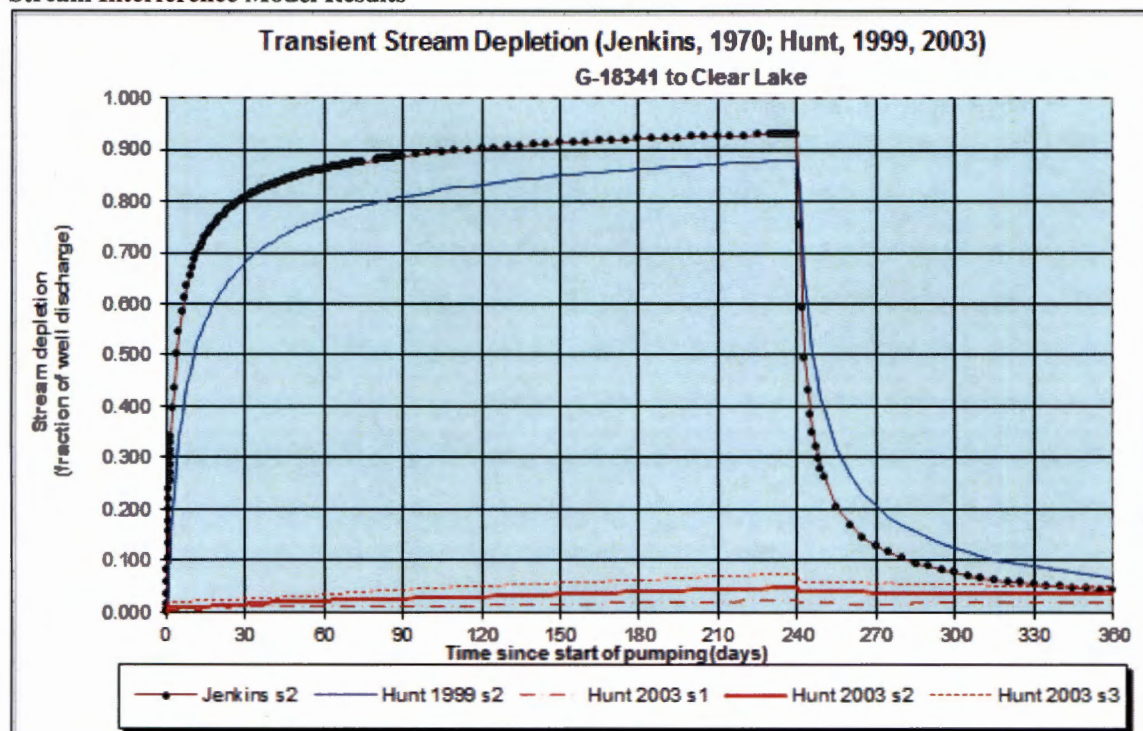
Well Location Map



Water-Level Trends in Nearby Wells



Stream Interference Model Results



Output for Stream Depletion, Scenario 2 (s2):					Time pump on (pumping duration) = 240 days								
Days	30	60	90	120	150	180	210	240	270	300	330	360	
J SD	80.6%	86.2%	88.7%	90.2%	91.2%	92.0%	92.6%	93.1%	12.9%	7.6%	5.4%	4.1%	
H SD 1999	68.0%	76.8%	80.8%	83.3%	85.0%	86.2%	87.2%	88.0%	20.6%	12.4%	8.8%	6.8%	
H SD 2003	1.50%	2.28%	2.64%	3.05%	3.50%	3.92%	4.36%	4.90%	3.84%	3.56%	3.68%	3.82%	
Qw, cfs	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	
H SD 99, cfs	0.197	0.222	0.234	0.241	0.246	0.250	0.253	0.255	0.060	0.036	0.026	0.020	
H SD 03, cfs	0.004	0.007	0.008	0.009	0.010	0.011	0.013	0.014	0.011	0.010	0.011	0.011	

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	130.00	130.00	130.00	gpm
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	4260	4260	4260	ft
Well depth	d	200	200	200	ft
Aquifer hydraulic conductivity	K	25	50	100	ft/day
Aquifer saturated thickness	b	100	100	100	ft
Aquifer transmissivity	T	2500	5000	10000	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	30	30	30	ft
Aquitard thickness below stream	babs	3	3	3	ft
Aquitard porosity	n	0.5	0.5	0.5	
Stream width	ws	100	100	100	ft
Streambed conductance (lambda)	sbc	3.333333	3.333333	3.333333	ft/day
Stream depletion factor	sdf	7.259040	3.629520	1.814760	days
Streambed factor	sbf	5.680000	2.840000	1.420000	
input #1 for Hunt's Q_4 function	t'	0.137759	0.275519	0.551037	
input #2 for Hunt's Q_4 function	K'	24.196800	12.098400	6.049200	
input #3 for Hunt's Q_4 function	epsilon'	0.002000	0.002000	0.002000	
input #4 for Hunt's Q_4 function	lamda'	5.680000	2.840000	1.420000	

Theis Drawdown and Recovery

