

Groundwater Application Review Summary Form

Application # G- 18621

GW Reviewer Alicia Beuchien Date Review Completed: 9/20/2018

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 9/20/2018
 FROM: Groundwater Section Aurora Bouchier
 Reviewer's Name
 SUBJECT: Application G- 18621 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: Gerig Farms LLC County: Linn

A1. Applicant(s) seek(s) 1.01* cfs from 1* well(s) in the Willamette Basin,
POA 1 is in Upper Willamette* subbasin

A2. Proposed use Irrigation (80.97 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	proposed	1	Alluvium	1.01	12S/3W-2 NE-SW	See comment
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	285				Est 30							

Use data from application for proposed wells.

A4. **Comments:** *The application includes 2 proposed wells to irrigate 2 parcels of land which are NOT adjacent to one another, are located approximately 5.5 miles from each other, are located in different watersheds and will impact different streams. The groundwater review is therefore divided into 2 separate reviews.

POA 1 is to irrigate 80.97 acres located in 12S/3W-2. In order to be located in the tax lot and quarter-quarter as shown on the map, the metes and bounds should read something along the lines of 740' S and 2860' W from the EAST ¼ corner of Section 2. The proposed well construction is minimal: only listing a total well depth of 30' +/-.

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 well (POA 1) is not within ¼ mile of any perennial surface water features so 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) 7N (annual measurements); Large Water Use Reporting ;
 - 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:** _____

Proposed well 1 is located in an area that contains fine-grained sediments (Willamette Silt) from land surface to a depth of 10-20 feet (Gannett et al., (1998) which in general acts to confine the underlying alluvial fan deposits (referred to as the Lebanon Fan in Woodward et al., 1998). These deposits are composed of coarse- to fine-grained sediments up to >140 ft thick and are considered to be very productive aquifer system within the Willamette Valley. The aquifer is generally unconfined to semi-confined in the deeper zones and SWLs (both observed and reported on driller’s logs) are typically within a 20 ft of land surface. The nearest well with long term water-level observations is LINN 7478 (located approximately 2.5 miles to the north) shows seasonal fluctuation of approximately 10 feet (see hydrograph below). Within 2 miles of the proposed POA 1 there is very little permitted groundwater use (see Site Specific Well Location Map below) and few, yet large, tax-lots imply there are not many domestic wells in the area. The thickness of these deposits, the overall high transmissivity of them, and sparse development in the area suggest little concern of negative impacts of the proposed use.

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 of Lebanon Fan	<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"/>

Basis for aquifer confinement evaluation: Almost all of the well logs in the area surrounding the location of POA 1 are greater than 30 feet deep. Many of the area well logs list a Static Water Level coincident with or a few feet above the zone at which water was first encountered, indicating unconfined to semi-confined conditions. Well logs listing deeper water bearing zones in also list Static Water Levels tens of feet above the water bearing zone, indicating greater confinement with depth. In general, in the Southern Willamette Valley the Willamette Silt does not act to confine the underlying aquifer (Conlon et al., 2005, page 13).

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	Calapooia R.	260-280	170-220	33,000	<input checked="" type="checkbox"/>	<input 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"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer hydraulic connection evaluation: Proposed POA 1 lies approximately equidistant from the Calapooia and S Fk Santiam rivers. According to published groundwater elevation maps by Conlon et al. (2005) groundwater flows from the S Fk Santiam River near Lebanon northwest to the Calapooia and Willamette Rivers. Appropriation of water from the applicant's proposed well 1 would intersect water that would eventually flow into the Calapooia River. Smaller creeks in the immediate area are not perennial.

Water Availability Basin the well(s) are located within: Well 1: Watershed ID #76 Calapooia R > Willamette R – AB Mouth

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?
		<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: The applicant's proposed POAs are not within 1 mile of any perennial surface water.

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	1	%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS		0	0	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	0	0
Interference CFS				0.000	0.001	0.006	0.017	0.032	0.050	0.069	0.088	0.107	0.128
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													
(A) = Total Interf.				0.000	0.001	0.006	0.017	0.032	0.050	0.069	0.088	0.107	0.128
(B) = 80 % Nat. Q		592	650	575	423	234	111	49	26	22.7	29.6	133	499
(C) = 1 % Nat. Q		5.92	6.50	5.75	4.23	2.34	1.11	0.49	0.26	0.23	0.30	1.33	4.99
(D) = (A) > (C)													
(E) = (A / B) x 100		%	%	0 %	<<1%	<<1%	<<1%	<<1%	<<1%	<1%	<<1%	<<1%	<<1%

(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: Impacts to the Calapooia River were evaluated using the Hunt (1999) analytical model for stream depletion by pumping. Ultimately, the high transmissivity and thickness of the aquifer and large distance between the proposed POA 1 and the river greatly reduces the potential for significant impacts.

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:** Impacts of pumping from the applicant's proposed POA 1 will be spread out over a large area and should have minimal impact to perennial surface water reaches.

References Used:

Application files: G-18621 and nearby G-18141.

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.

Herra, N. B., Burns, E. R., and 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, 152 p., <http://dx.doi.org/10.3133/sir20155136>.

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

Hunt, B., 1999, Unsteady stream depletion from ground water pumping: Ground Water, v. 37, no. 1, p. 98-102.

Woodward, Dennis G., 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.

Nearby well logs and water level data.

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:** _____

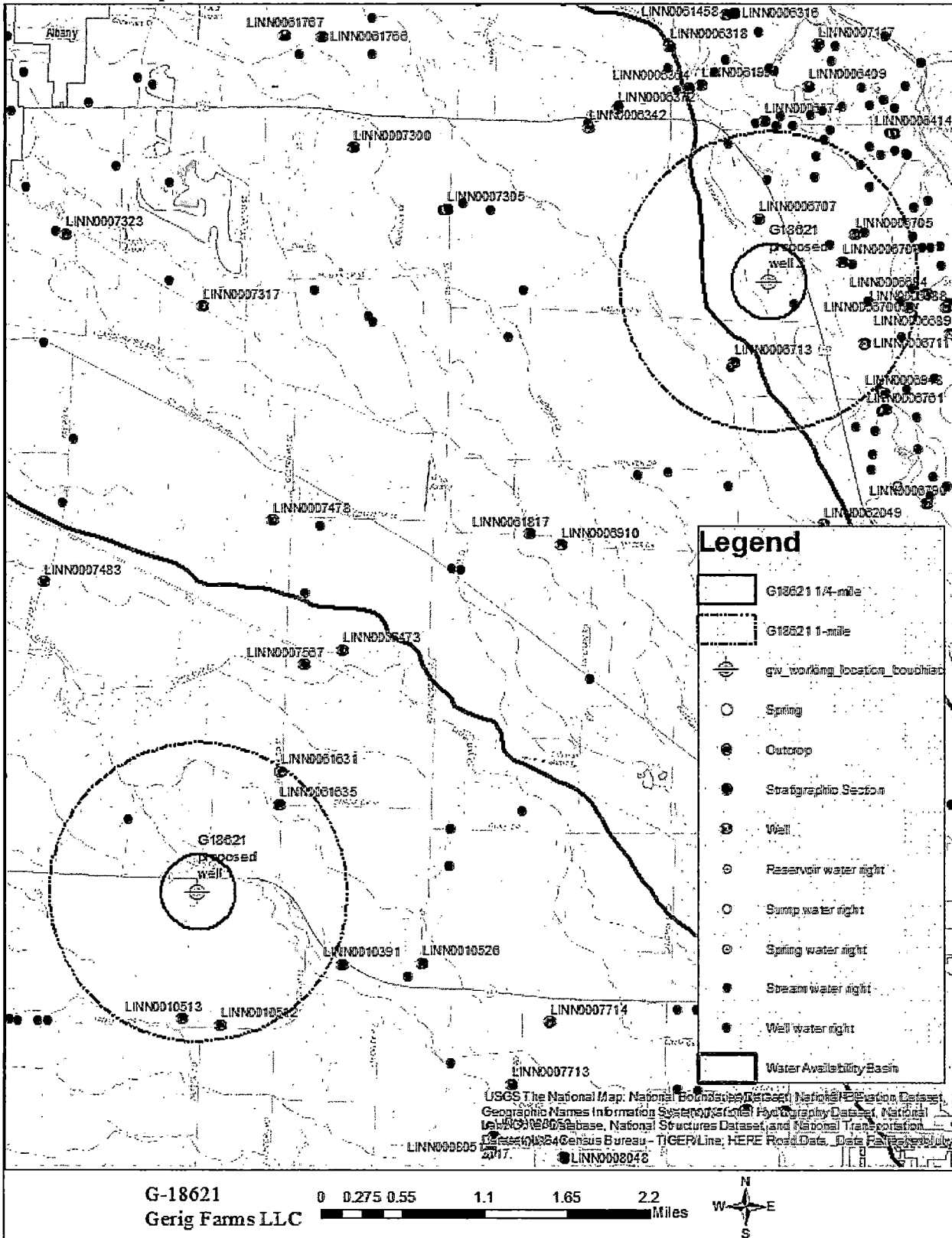
D4. Route to the Well Construction and Compliance Section for a review of existing well construction.

Water Availability Tables

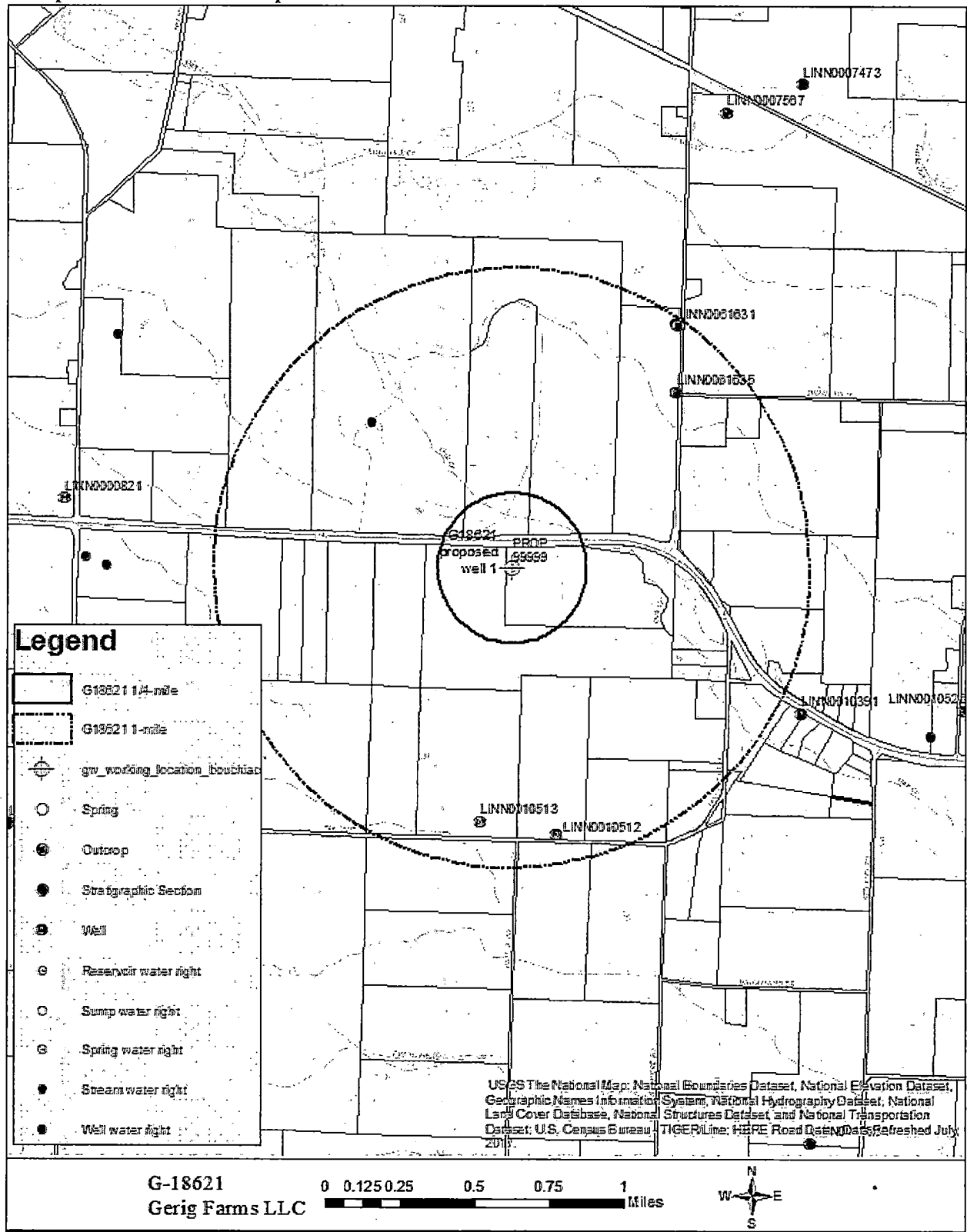
Well 1

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION						
Watershed ID #: 76		CALAPOOIA R > WILLAMETTE R - AB MOUTH			Exceedance Level: 80	
Time: 3:18 PM		Basin: WILLAMETTE			Date: 09/07/2018	
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	592.00	3.38	589.00	0.00	20.00	569.00
FEB	650.00	3.33	647.00	0.00	20.00	627.00
MAR	575.00	2.25	573.00	0.00	20.00	553.00
APR	423.00	1.96	421.00	0.00	20.00	401.00
MAY	234.00	18.30	216.00	0.00	20.00	196.00
JUN	111.00	12.80	98.20	0.00	20.00	78.20
JUL	49.00	19.60	29.40	0.00	20.00	9.42
AUG	26.00	14.10	11.90	0.00	20.00	-8.09
SEP	22.70	7.36	15.30	0.00	20.00	-4.66
OCT	29.60	1.92	27.70	0.00	20.00	7.68
NOV	133.00	2.39	131.00	0.00	20.00	111.00
DEC	499.00	3.34	496.00	0.00	20.00	476.00
ANN	404,000	5,510	398,000	0	14,500	384,000

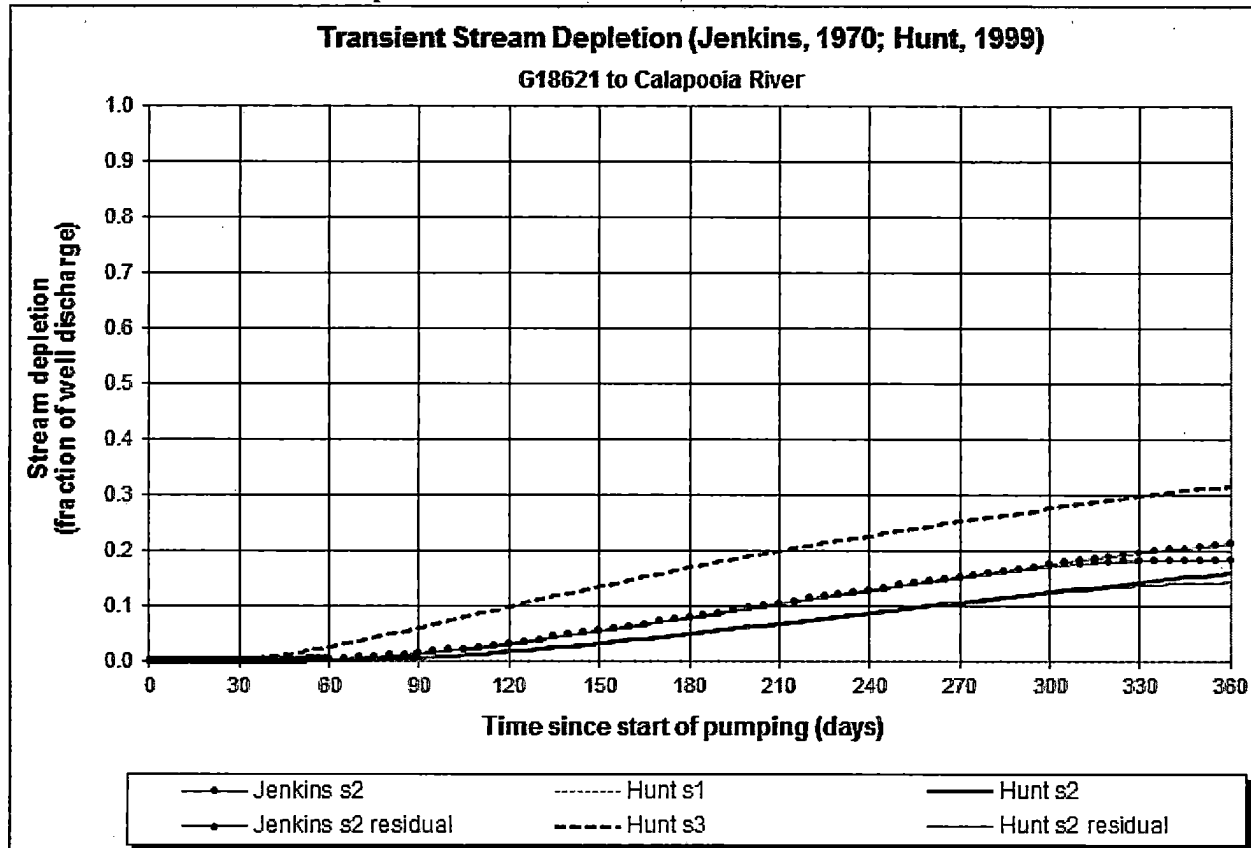
Well Location Map



Site Specific Well Location Map



Results of Hunt-1999 Stream Depletion Model



Output for Hunt Stream Depletion, Scenario 2 (s2):													Time pump on = 240 days
Days	30	60	90	120	150	180	210	240	270	300	330	360	
Qw, cfs	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	1.010	
Jenk SD s2 %	0.00	0.23	1.30	3.14	5.43	7.89	10.38	12.81	15.14	17.12	18.15	18.27	
Jen SD s2 cfs	0.000	0.002	0.013	0.032	0.055	0.080	0.105	0.129	0.153	0.173	0.183	0.185	
Hunt SD s2 %	0.00	0.03	0.62	1.70	3.19	4.93	6.80	8.71	10.60	12.37	13.64	14.30	
Hunt SD s2 cfs	0.000	0.001	0.006	0.017	0.032	0.050	0.069	0.088	0.107	0.125	0.138	0.144	
Parameters:				Scenario 1	Scenario 2	Scenario 3	Units						
Net steady pumping rate	Qw			1.01	1.01	1.01	cfs						
Distance to stream	a			33000	33000	33000	ft						
Aquifer hydraulic conductivity	K			10	70	200	ft/day						
Aquifer thickness	b			140	140	140	ft						
Aquifer transmissivity	T			1400	9800	28000	ft*ft/day						
Aquifer storage coefficient	S			0.01	0.01	0.01							
Stream width	ws			100	100	100	ft						
Streambed hydraulic conductivity	Ks			0.2	0.2	0.2	ft/day						
Streambed thickness	bs			5	5	5	ft						
Streambed conductance	sbc			4	4	4	ft/day						
Stream depletion factor (Jenkins)	sdf			7778.571429	1111.22449	388.9285714	days						
Streambed factor (Hunt)	sbf			94.28571429	13.46938776	4.714285714							

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 9/20/2018
 FROM: Groundwater Section Aurora Bouchier
 Reviewer's Name
 SUBJECT: Application G- 18621 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: Gerig Farms LLC County: Linn

A1. Applicant(s) seek(s) 2.20* cfs from 1* well(s) in the Willamette Basin,
POA 2 is in South Santiam* subbasin

A2. Proposed use Irrigation (176.0 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
2	proposed	2	Alluvium	2.20	11S/2W-16 SW-NW	See comment
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
2	280				Est 100							

Use data from application for proposed wells.

A4. **Comments:** *The application includes 2 proposed wells to irrigate 2 parcels of land which are NOT adjacent to one another, are located approximately 5.5 miles from each other, are located in different watersheds and will impact different streams. The groundwater review is therefore divided into 2 separate reviews.

POA 2 is to irrigate 176.0 acers of land located in 11S/2W-16 and -17 (approximately XX-miles to the northeast of the land irrigated by POA 1). In order to be located in the tax lot and quarter-quarter as shown on the map, the meets and bounds should read something along the lines of 450'N and 470' E from the WEST ¼ corner of Section 16. The proposed well construction is minimal: only listing a total well depth of 100' +/-.

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 well (POA 2) is not within ¼ mile of any perennial surface water features so 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) 7N (annual measurements); Large Water Use Reporting;
 - 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 proposed POA 2 is mapped as Pleistocene Sand and Gravels deposited after the Missoula Floods (Qg1 from O'Connor et al., 2001), is considered part of the Upper Sedimentary Unit (Conlon et al., 2005), and consists of alluvial material of mixed sand, clay, and gravels (Woodward and Gannett, 1998). Well yields in this material are generally low to moderate (< 50 gpm) but wells yielding > 100 gpm are not uncommon. There are few observation wells in the area and those show SWLs that fluctuate seasonally (likely due to changes in river stage and/or pumping) and have stable long-term trends. There are numerous groundwater POAs to the east of the proposed POA toward the Santiam River but significantly fewer to the west. There are few groundwater rights within ½ mile of the proposed POA that could potentially be affected by the applicant's proposed use, but impacts will not likely be significant in this type of aquifer systems (thick, mixed material sediments) – standard interference conditions should apply.

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
2	Alluvium	<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"/>

Basis for aquifer confinement evaluation: Many of the area well logs list a *Static Water Level* coincident with or a few feet above the zone at which water was first encountered, indicating unconfined to semi-confined conditions. Well logs listing deeper water bearing zones in also list *Static Water Levels* tens of feet above the water bearing zone, indicating greater confinement with depth. In general, in the Upper Sedimentary Unit is unconfined (Conlon et al., 2005).

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
2	1	Mill Creek	270-280	276-280	4,480	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	2	South Santiam River	270-280	266	7,250	<input checked="" type="checkbox"/>	<input 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"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer hydraulic connection evaluation:
Relative groundwater and surface water elevations.

Water Availability Basin the well(s) are located within: Well 2: Watershed ID #30200601 S Santiam R > Santiam R – AT Mouth.

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?
2	1	<input type="checkbox"/>	<input type="checkbox"/>	NA	NA	<input type="checkbox"/>	253	<input type="checkbox"/>	See comment	<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: Impacts to Mill Creek were evaluated using the Hunt (1999) analytical model for stream depletion by pumping. Published aquifer parameters for the Upper Sedimentary Unit include hydraulic conductivity values (calculated from specific capacity and aquifer tests) which ranges from 0.03 to 7,000 feet per day (with an average of 200 ft/day) and specific yield values (also calculated from specific capacity and aquifer tests) which ranges from 0.003 – 0.2. Using the average hydraulic conductivity value of 200 ft/day and changing the specific yield the interference at 30-days ranges from 0.26% to 32%. A specific yield value of 0.02 ft/day results in interference at 30-days of 6.69%.

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
2	2	%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS		0	0	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	0	0
Interference CFS				0.182	0.467	0.671	0.820	0.933	1.023	1.096	1.157	1.027	0.787
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													
(A) = Total Interf.				0.182	0.467	0.671	0.820	0.933	1.023	1.096	1.157	1.027	0.787
(B) = 80 % Nat. Q		3090	3360	3170	2950	2050	968	450	275	253	363	1450	3040
(C) = 1 % Nat. Q		30.9	33.6	31.7	29.5	20.5	9.68	4.50	2.75	2.53	3.63	14.5	30.4
(D) = (A) > (C)													
(E) = (A / B) x 100		%	%	0.005 %	0.015 %	0.033 %	0.085 %	0.207 %	0.372 %	0.433 %	0.319 %	0.071 %	0.025 %

(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: Impacts to the South Santiam River were evaluated using the Hunt (1999) analytical model for stream depletion by pumping. As stated in section Cb, published aquifer parameters for the Upper Sedimentary Unit include hydraulic conductivity values (calculated from specific capacity and aquifer tests) which ranges from 0.03 to 7,000 feet per day (with an average of 200 ft/day) and specific yield values (also calculated from specific capacity and aquifer tests) which ranges from 0.003 – 0.2. The mid-range specific yield value of 0.02 ft/day was used to model the interference to the South Santiam River.

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 proposed POA is in an area where there is likely strong hydraulic connection between the aquifer and nearby surface water sources. However, the nature of the aquifer system (mixed-sediments) and surface water bodies (large perennial rivers and numerous seasonal creeks) suggest that interference will not rise to the level of PSI under current Division 9 Rules (OAR 690-0009).

References Used:

Application files: G-18621 and nearby G-18173.

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.

Herra, N. B., Burns, E. R., and 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, 152 p., <http://dx.doi.org/10.3133/sir20155136>.

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

Hunt, B., 1999, Unsteady stream depletion from ground water pumping: Ground Water, v. 37, no. 1, p. 98-102.

Woodward, Dennis G., 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.

Nearby well logs and water level data.

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) _____

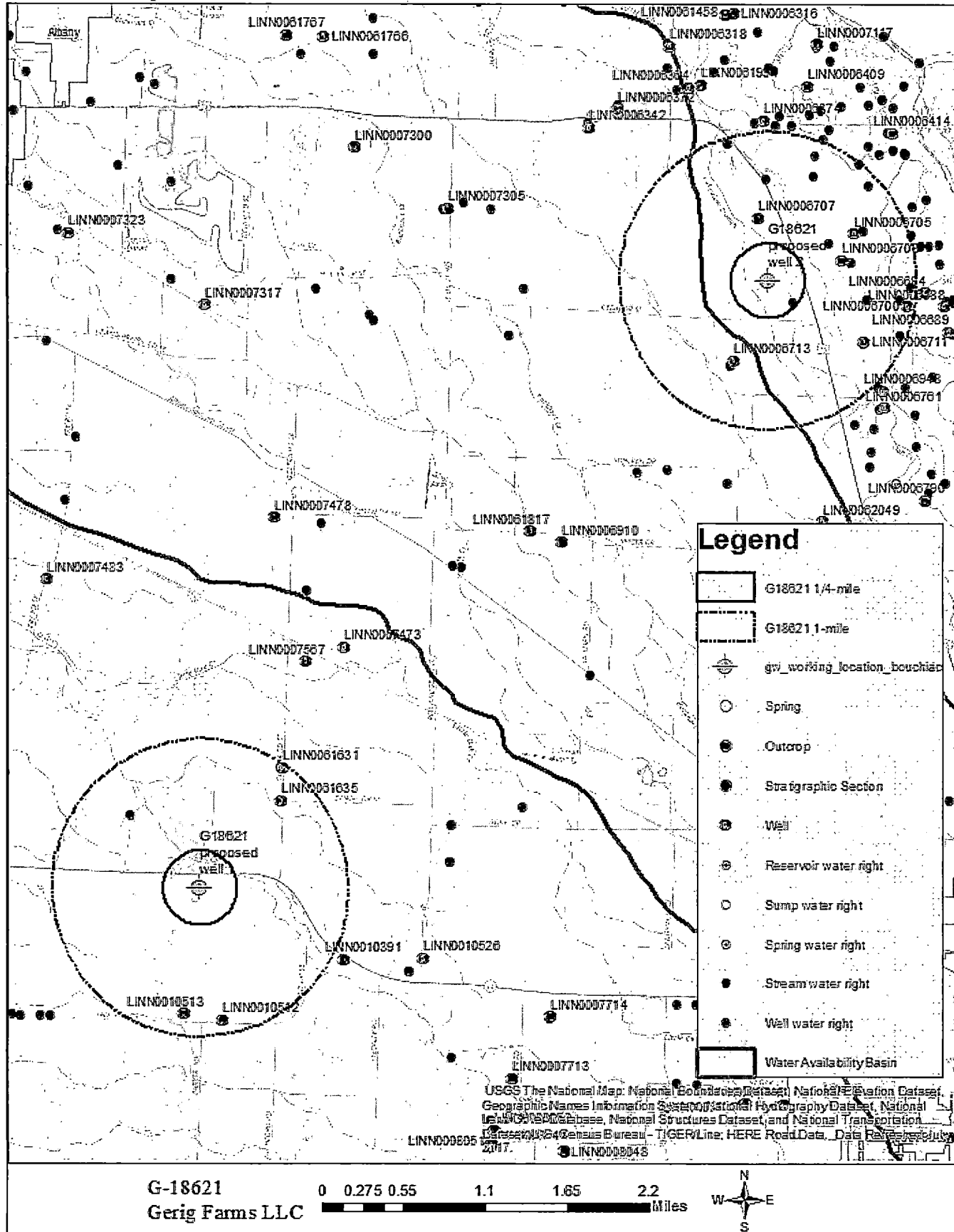
D3. **THE WELL construction deficiency or other comment is described as follows:** _____

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

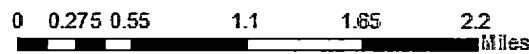
**Water Availability Tables
Well 2**

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION						
Watershed ID #: 30200601 Time: 3:20 PM		S SANTIAM R > SANTIAM R - AT MOUTH Basin: WILLAMETTE			Exceedance Level: 80 Date: 09/07/2018	
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	3,090.00	266.00	2,820.00	0.00	0.00	2,820.00
FEB	3,360.00	1,530.00	1,830.00	0.00	0.00	1,830.00
MAR	3,170.00	1,250.00	1,920.00	0.00	0.00	1,920.00
APR	2,950.00	1,050.00	1,900.00	0.00	0.00	1,900.00
MAY	2,050.00	710.00	1,340.00	0.00	0.00	1,340.00
JUN	968.00	182.00	786.00	0.00	0.00	786.00
JUL	450.00	203.00	247.00	0.00	0.00	247.00
AUG	275.00	189.00	86.40	0.00	0.00	86.40
SEP	253.00	158.00	94.60	0.00	0.00	94.60
OCT	363.00	137.00	226.00	0.00	0.00	226.00
NOV	1,450.00	139.00	1,310.00	0.00	0.00	1,310.00
DEC	3,040.00	143.00	2,900.00	0.00	0.00	2,900.00
ANN	2,330,000	355,000	1,980,000	0	0	1,980,000

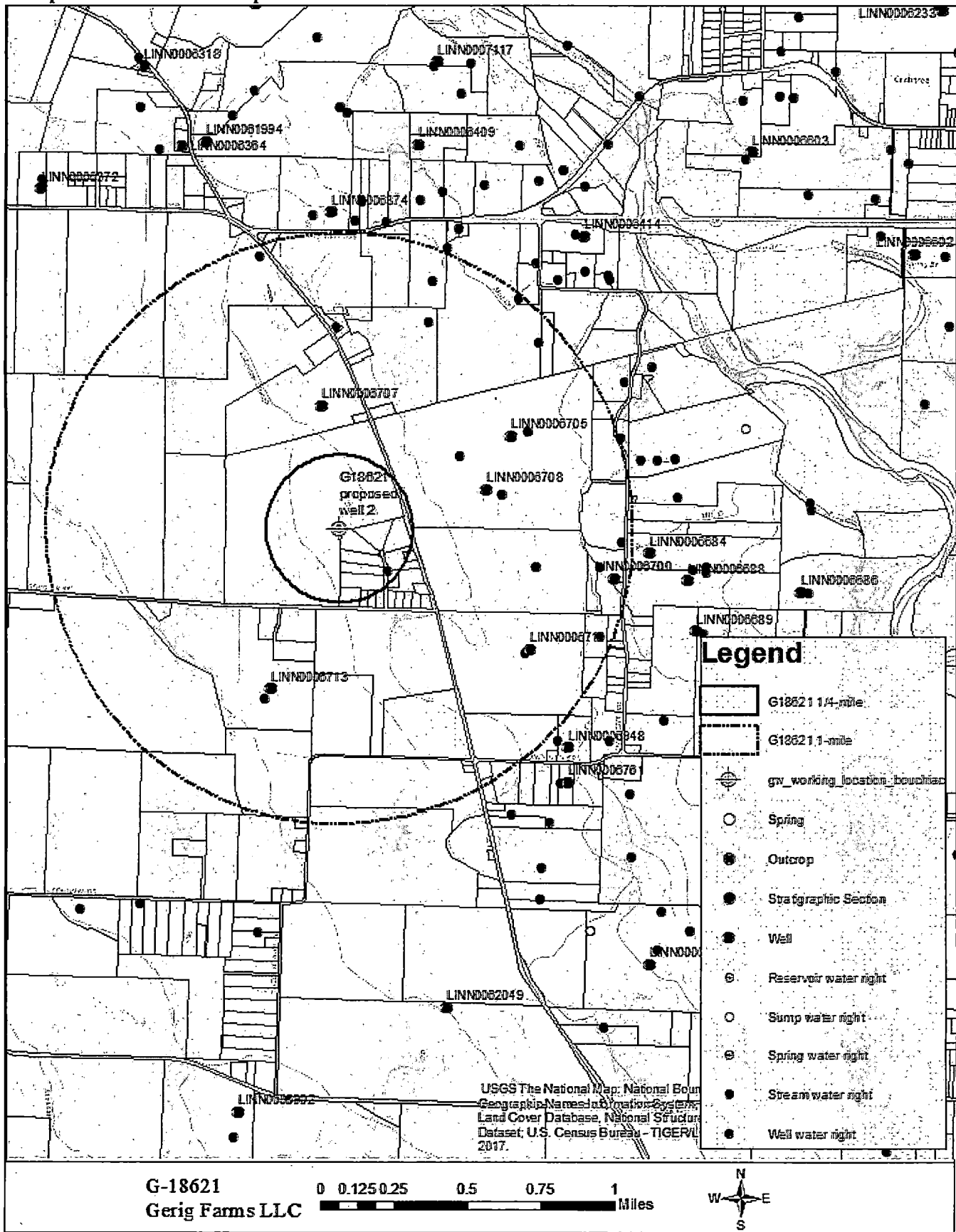
Well Location Map



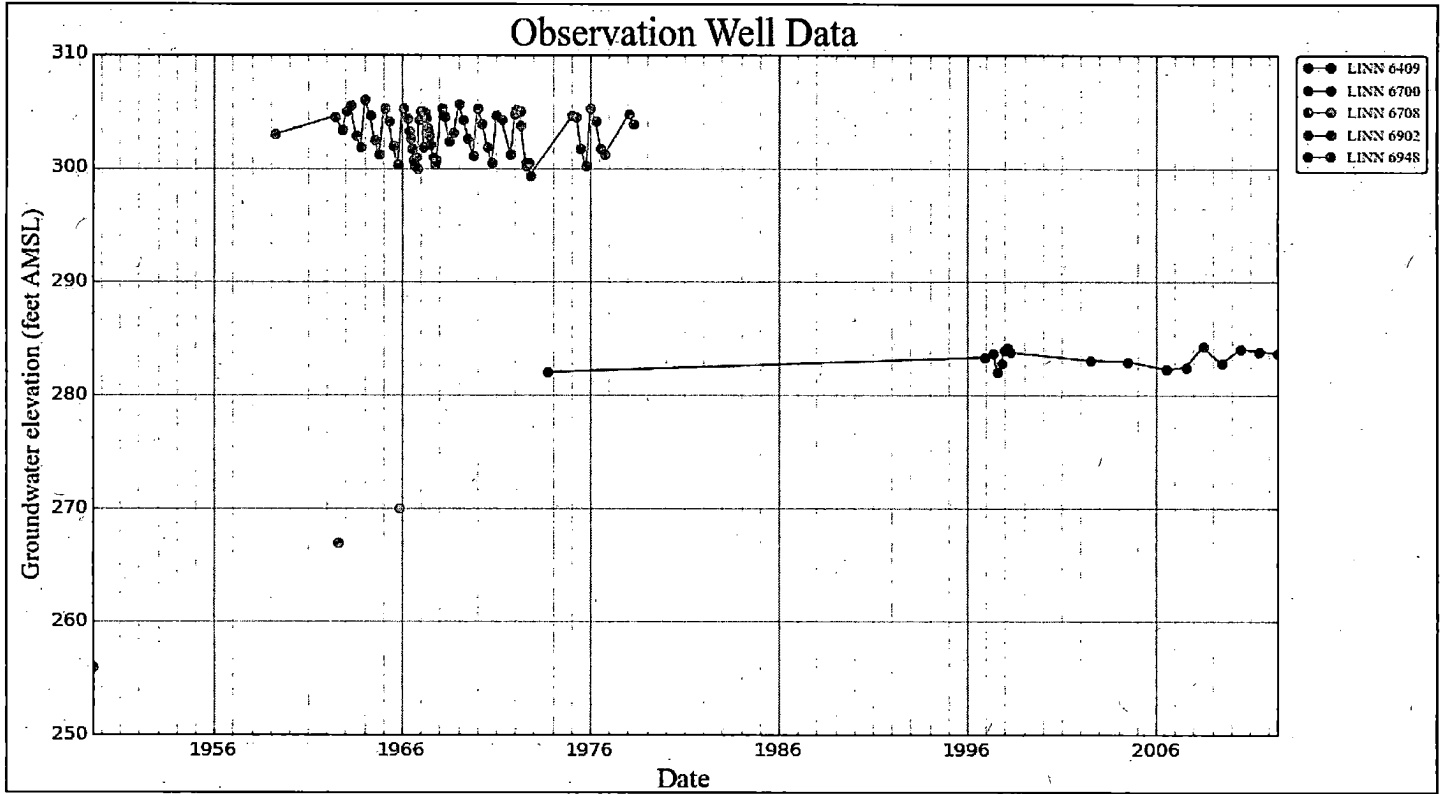
G-18621
Gerig Farms LLC



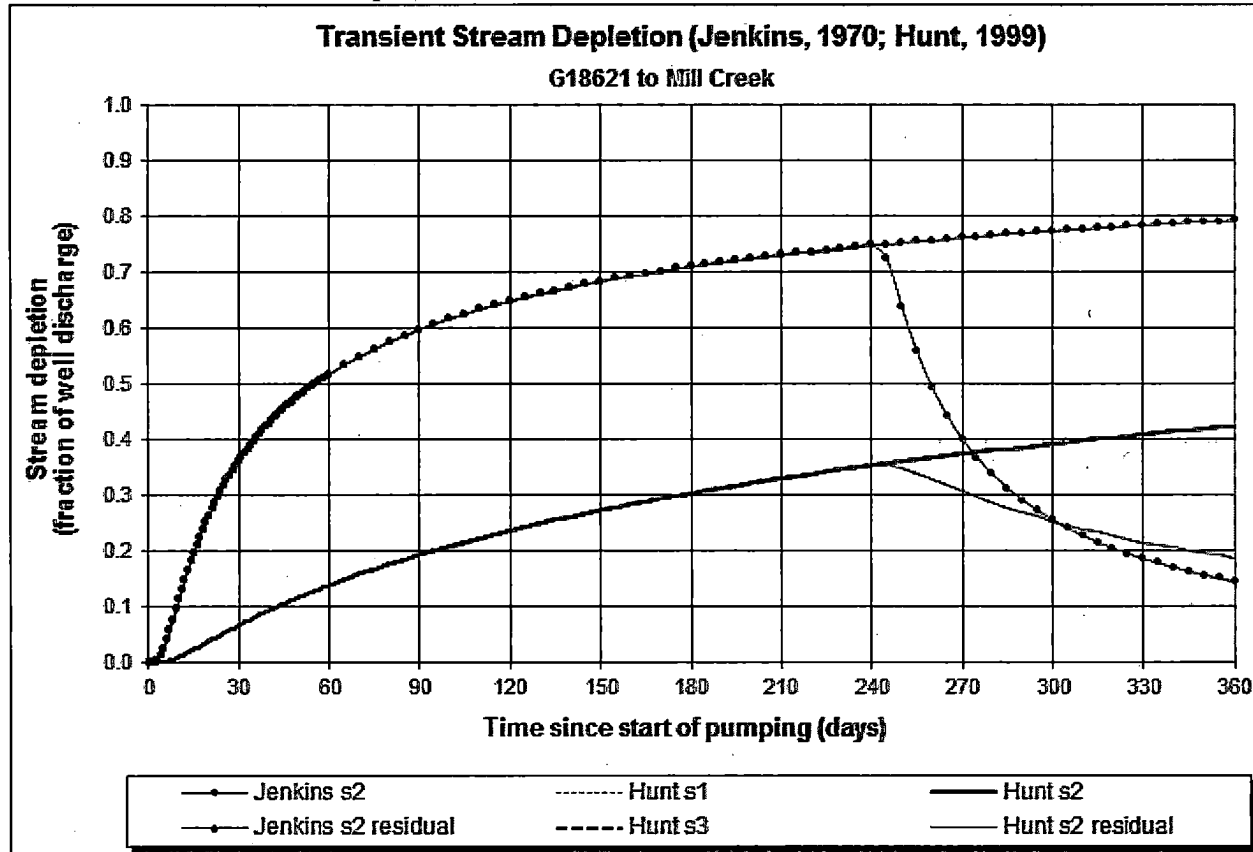
Site Specific Well Location Map



Water-Level Trends in Nearby Wells



Results of Hunt-1999 Stream Depletion Model

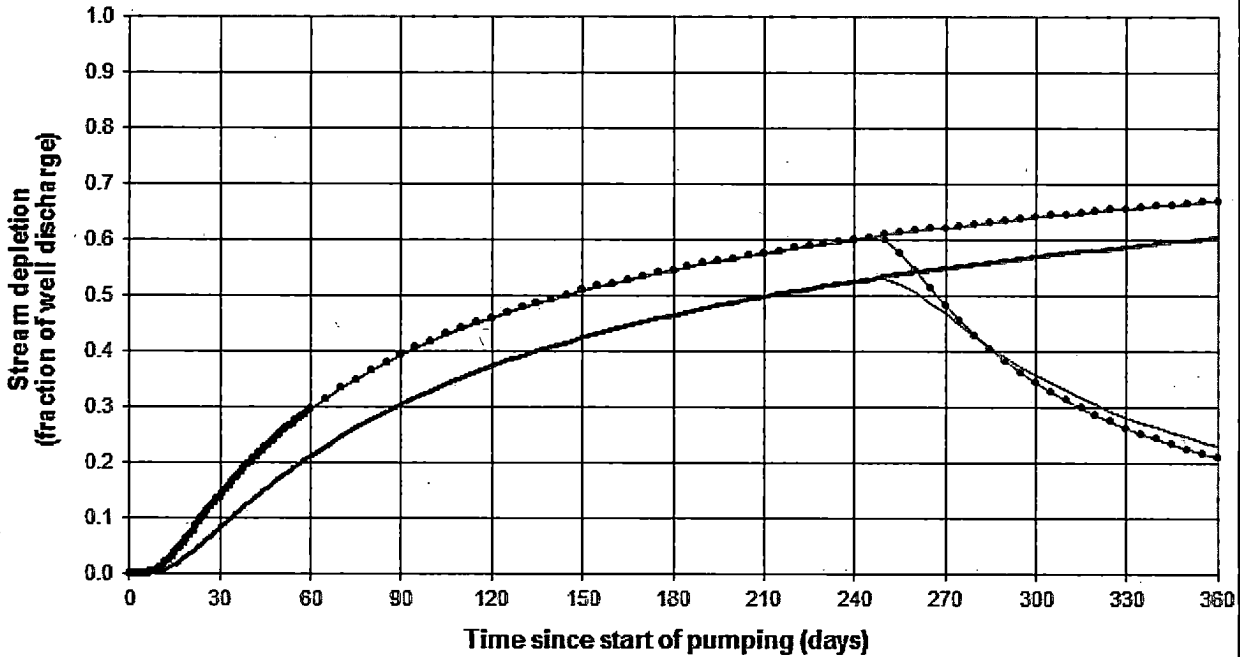


Output for Hunt Stream Depletion, Scenario 2 (s2):												
Days	30	60	90	120	150	180	210	240	270	300	330	360
Qw, cfs	2.200	2.200	2.200	2.200	2.200	2.200	2.200	2.200	2.200	2.200	2.200	2.200
Jenk SD s2 %	36.05	51.79	59.75	64.75	68.26	70.89	72.96	74.65	40.00	25.46	18.52	14.43
Jen SD s2 cfs	0.793	1.139	1.315	1.424	1.502	1.560	1.605	1.642	0.880	0.560	0.408	0.317
Hunt SD s2 %	6.69	13.37	19.32	23.65	27.22	30.23	32.59	35.21	30.57	25.25	21.49	18.69
Hunt SD s2 cfs	0.147	0.305	0.425	0.520	0.599	0.666	0.724	0.775	0.673	0.555	0.473	0.411

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate	Qw	2.2	2.2	2.2	cfs
Distance to stream	a	4480	4480	4480	ft
Aquifer hydraulic conductivity	K	200	200	200	ft/day
Aquifer thickness	b	40	40	40	ft
Aquifer transmissivity	T	8000	8000	8000	ft ² /day
Aquifer storage coefficient	S	0.02	0.02	0.02	
Stream width	ws	20	20	20	ft
Streambed hydraulic conductivity	Ks	0.2	0.2	0.2	ft/day
Streambed thickness	bs	3	3	3	ft
Streambed conductance	sbc	1.333333333	1.333333333	1.333333333	ft/day
Stream depletion factor (Jenkins)	sdf	50.176	50.176	50.176	days
Streambed factor (Hunt)	sbf	0.746666667	0.746666667	0.746666667	

Transient Stream Depletion (Jenkins, 1970; Hunt, 1999)

G18621 to South Santiam River



—•— Jenkins s2	----- Hunt s1	——— Hunt s2
—•— Jenkins s2 residual	----- Hunt s3	——— Hunt s2 residual

Output for Hunt Stream Depletion, Scenario 2 (s2):												
Time pump on = 240 days												
Days	30	60	90	120	150	180	210	240	270	300	330	360
Qw, cfs	2.200	2.200	2.200	2.200	2.200	2.200	2.200	2.200	2.200	2.200	2.200	2.200
Jenk SD s2 %	13.89	29.54	39.29	45.93	50.81	54.57	57.59	60.08	48.29	34.44	26.26	20.99
Jen SD s2 cfs	0.306	0.650	0.864	1.011	1.118	1.201	1.267	1.322	1.062	0.758	0.578	0.462
Hunt SD s2 %	8.26	21.22	31.51	37.27	42.42	46.49	49.81	52.53	43.69	35.73	28.23	23.11
Hunt SD s2 cfs	0.182	0.467	0.671	0.820	0.933	1.023	1.086	1.157	1.027	0.787	0.622	0.508

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate	Qw	2.2	2.2	2.2	cfs
Distance to stream	a	7250	7250	7250	ft
Aquifer hydraulic conductivity	K	200	200	200	ft/day
Aquifer thickness	b	40	40	40	ft
Aquifer transmissivity	T	8000	8000	8000	ft ² /day
Aquifer storage coefficient	S	0.02	0.02	0.02	
Stream width	ws	150	150	150	ft
Streambed hydraulic conductivity	Ks	0.2	0.2	0.2	ft/day
Streambed thickness	bs	3	3	3	ft
Streambed conductance	sbc	10	10	10	ft/day
Stream depletion factor (Jenkins)	sdf	131.40625	131.40625	131.40625	days
Streambed factor (Hunt)	sbf	9.0625	9.0625	9.0625	