PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date **November 18, 2015**

FROM: Groundwater Section **Michael J. Thoma**
Reviewer's Name

SUBJECT: Application G- **18141** 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: **Lee Holdings LLC** County: **Linn**

A1. Applicant(s) seek(s) **2.67** cfs from **2** well(s) in the **Willamette** Basin, **Calapooia** subbasin

A2. Proposed use **Irrigation (410 ac. primary)** Seasonality: **April 1 – October 31 (213 d)**

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	PROP	1	Alluvium	1.34	11S/03W-35 SESE	1200'N, 60'W of SE cor S35
2	PROP	2	Alluvium	1.34	11S/03W-35 SESE	0'N, 60'W of SE cor S35
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		5-20[a]		300							
2	285		5-20[a]		300							

Use data from application for proposed wells.

A4. **Comments:** [a]Both wells are proposed. SWL range is based on published WT elevation maps by Gannett and Caldwell (1998) and Conlon et al., (2005).

A5. ☒ **Provisions of the** Willamette (OAR 690-502) 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 wells are 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 SWL); '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 proposed wells are in an area underlain by thick alluvial fan deposits referred to as the Lebanon Fan by Woodward et al., (1998). These deposits are composed of coarse to fine sediments that reach > 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 and fluctuate seasonally (see Figure 3). Within 2 miles of the proposed POAs there is very little permitted groundwater use (see Figure 2) and few, yet large, taxlots 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	**Alluvial of Lebanon Fan**	☐	☒
2	**Alluvial of Lebanon Fan**	☐	☒
		☐	☐

Basis for aquifer confinement evaluation: Many of the shallow wells (< 100 ft) in the area show evidence of unconfined conditions as do some deeper wells (although few wells > 150 ft are in the area). Without specific well construction information provided by the applicant (e.g., casing and seal depth) the department assumes minimum 18 ft case and seal and open interval within the upper zones of the 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**	**Calapooia R.**	**260-280**	**200-260**	**31,000**	☒	☐	☐	☐	☒
2	**1**	**Calapooia R.**	**260-280**	**200-260**	**31,000**	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation: The proposed POAs lie 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 POAs would be intersecting 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: Calapooia R. > Willamette R – AB Mouth (ID# 76)

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?
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

C3b. **690-09-040 (4):** Evaluation of stream impacts by total appropriation for all wells determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water source. **Complete only if Q is distributed among wells**. Otherwise same evaluation and limitations apply as in C3a above.

	SW #		Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
			☐			☐		☐		☐

Comments: The applicant's proposed POAs are not within 1 mi of 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
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
Distributed Wells													
Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	**1**	%	%	%	**<1 %**	**<1 %**	**<1 %**	**<1 %**	**<1 %**	**<1 %**	**<1 %**	**<1 %**	**<1 %**
Well Q as CFS		**0**	**0**	**0**	**1.34**	**1.34**	**1.34**	**1.34**	**1.34**	**1.34**	**1.34**	**0**	**0**
Interference CFS					**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**
2	**1**	%	%	%	**<1 %**	**<1 %**	**<1 %**	**<1 %**	**<1 %**	**<1 %**	**<1 %**	**<1 %**	**<1 %**
Well Q as CFS					**1.34**	**1.34**	**1.34**	**1.34**	**1.34**	**1.34**	**1.34**	**0**	**0**
Interference CFS					**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**
(A) = Total Interf.					**<0.02**	**<0.02**	**<0.02**	**<0.02**	**<0.02**	**<0.02**	**<0.02**	**<0.02**	**<0.02**
(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		%	%	%	**<<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 where 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 POAs 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 POAs will be spread out over a large area and will have minimal impact to perennial surface water reaches.

References Used:

Herrera, N. B., Burns, E. R., and T. D. Conlon. 2014. *Simulation of Groundwater Flow and the Interaction of Groundwater and Surface Water in the Willamette Basin and Central Willamette Subbasin*, Oregon. USGS Scientific Investigations Report 2014-5136

Gannet, M. W. and R. R. Caldwell. 1998. *Geologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington*. USGS Professional Paper 1424-A.

Hunt, B. 1999. *Unsteady Stream Depletion from Ground Water Pumping*. Journal of Hydrologic Engineering, Vol 8(1). 12-19

Woodward, D. G., M. W. Gannett, and J. J. Vaccaro. 1998. *Hydrogeologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington*. USGS Professional Paper 1424-B.

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.**

Figure 1: Water Availability Tables

CALAPOOIA R > WILLAMETTE R - AB MOUTH
WILLAMETTE BASIN

Water Availability as of 11/18/2015

Watershed ID #: 76 (Map) Exceedance Level: 80%
Date: 11/18/2015 Time: 11:04 AM

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	592.00	2.84	589.00	0.00	20.00	569.00
FEB	650.00	2.78	647.00	0.00	20.00	627.00
MAR	575.00	2.11	573.00	0.00	20.00	553.00
APR	423.00	1.81	421.00	0.00	20.00	401.00
MAY	234.00	6.82	227.00	0.00	20.00	207.00
JUN	111.00	12.50	98.50	0.00	20.00	78.50
JUL	49.00	19.30	29.70	0.00	20.00	9.69
AUG	26.00	13.80	12.20	0.00	20.00	-7.82
SEP	22.70	7.25	15.40	0.00	20.00	-4.55
OCT	29.60	1.38	28.20	0.00	20.00	8.22
NOV	133.00	1.87	131.00	0.00	20.00	111.00
DEC	499.00	2.80	496.00	0.00	20.00	476.00
ANN	404,000.00	4,560.00	399,000.00	0.00	14,500.00	385,000.00

Figure 2: Well Location Map

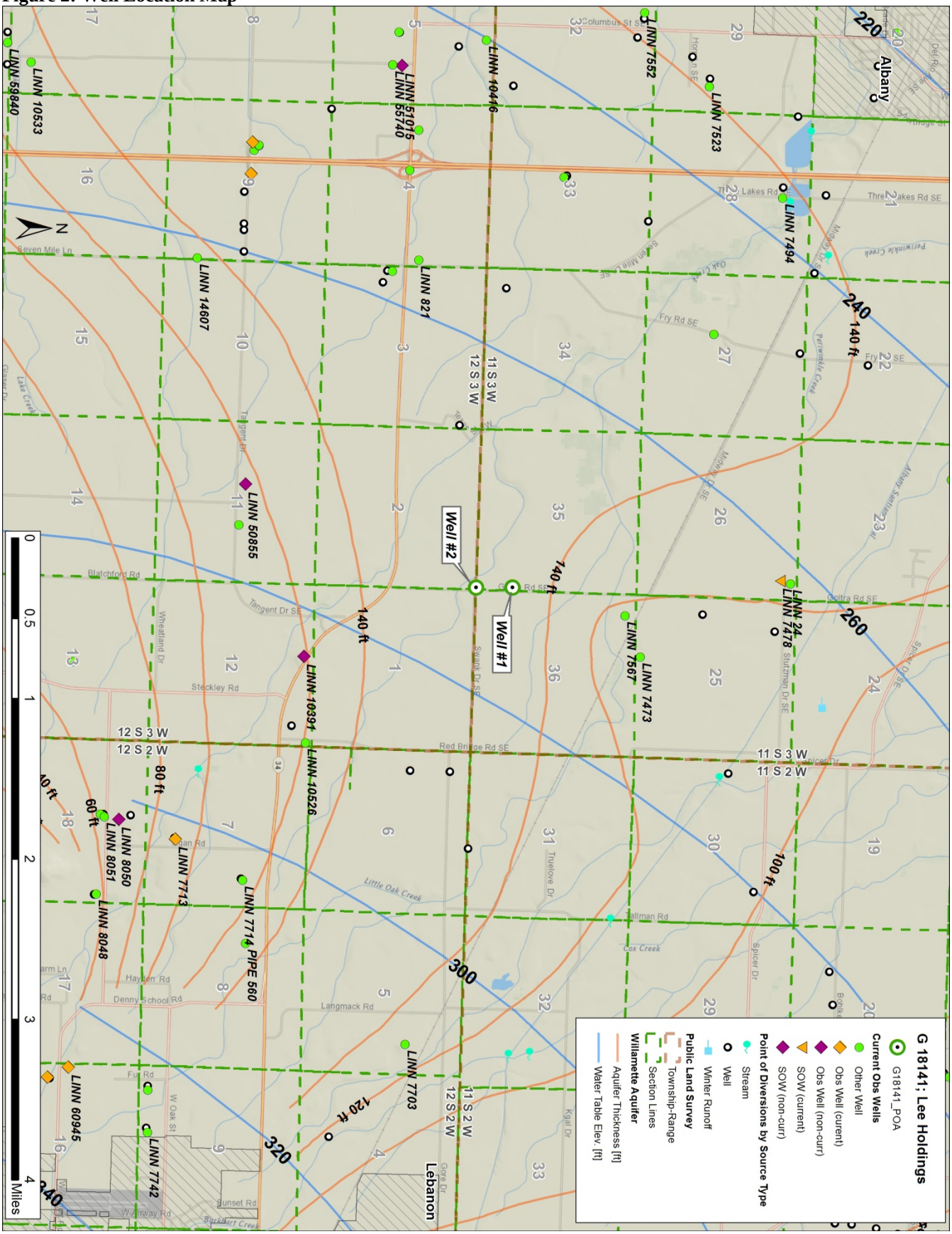
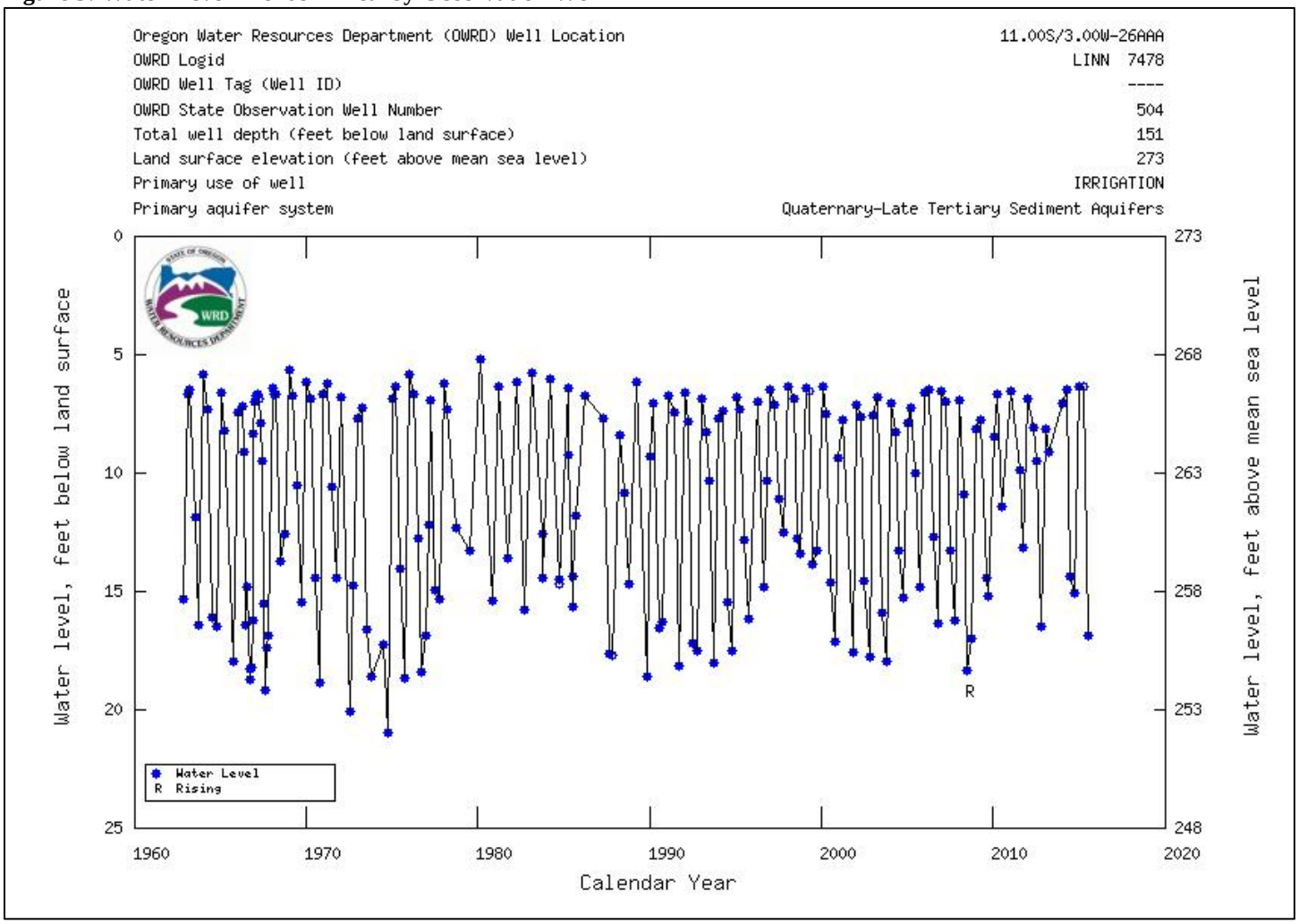


Figure 3: Water-Level Trends in Nearby Observation Well



Results of Hunt-1999 Stream Depletion Model

Output for Hunt Stream Depletion, Scenerio 2 (s2):						**Time pump on = 214 days**						
Days	**30**	60	90	120	150	180	210	240	270	300	330	360
Qw, cfs	1.337	1.337	1.337	1.337	1.337	1.337	1.337	1.337	1.337	1.337	1.337	1.337
Jenk SD s2 %	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Jen SD s2 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
Hunt SD s2 %	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hunt SD s2 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	Qw	600	**600**	600	gpm
Distance to stream	a	32000	**32000**	32000	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	0.1	**0.1**	0.1	
Stream width	ws	100	**100**	100	ft
Streambed hydraulic conductivity	Ks	0.01	**0.01**	0.01	ft/day
Streambed thickness	bs	5	**5**	5	ft
Streambed conductance	sbc	0.2	**0.2**	0.2	ft/day
Stream depletion factor (Jenkins)	sdf	73142.86	**10448.98**	3657.14	days
Streambed factor (Hunt)	sbf	4.57	**0.65**	0.23	