

Groundwater Application Review Summary Form

Application # G- 18732

GW Reviewer Travis Brown, Dennis J. Iowski Date Review Completed: 3/13/19

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.

3/13/19

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).

MEMO

March 13, 20 19

FROM: GW: Travis Brown, Dennis Olowski
(Reviewer's Name)

SUBJECT: Scenic Waterway Interference Evaluation

☒ YES

The source of appropriation is within or above a Scenic Waterway

☐ NO☒ YES

Use the Scenic Waterway condition (Condition 7J)

☐ NO

☐ Per ORS 390.835, the Groundwater Section is **able** to calculate ground water interference with surface water that contributes to a Scenic Waterway. The calculated interference is distributed below.

☒ Per ORS 390.835, the Groundwater Section is **unable** to calculate ground water 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 water flows necessary to maintain the free-flowing character of a scenic waterway.**

Calculate the percentage of consumptive use by month and fill in the table below. If interference cannot be calculated, per criteria in 390.835, do not fill in the table but check the "unable" option above, thus informing Water Rights that the Department is unable to make a Preponderance of Evidence finding.

Exercise of this permit is calculated to reduce monthly flows in _____ Scenic Waterway by the following amounts expressed as a proportion of the consumptive use by which surface water flow is reduced.

[illegible]

OK
KJW

MEMO

To: Kristopher Byrd, Well Construction and Compliance Section Manager
From: Joel Jeffery, Well Construction Program Coordinator,
Subject: Review of Water Right Application G-18732
Date: March 22, 2019

The attached application was forwarded to the Well Construction and Compliance Section by Water Rights. Travis Brown and Dennis Orlowski reviewed the application. Please see Travis's and Dennis's Groundwater Review.

Applicant's Well # 1 (CLAC 16627): Based on a review of the Well Report, Applicant's Well # 1 appears to protect the groundwater resource.

The construction of Applicants Well #1 may not satisfy hydraulic connection issues.

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 3/12/2019

FROM: Groundwater Section Travis Brown, Dennis Orlowski
Reviewer's Name

SUBJECT: Application G- 18732 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: Jimmy A. Pearson County: Clackamas

A1. Applicant(s) seek(s) 0.067 cfs from 1 well(s) in the Willamette River Basin,
Clackamas River subbasin

A2. Proposed use Nursery Seasonality: Year-round

A3. Well and aquifer data (**attach and number logs for existing wells; mark proposed wells as such under logid**):

Well	Logid	Applicant's Well #	Proposed Aquifer*	Proposed Rate(cfs)	Location (T/R-S QQ-Q)	Location, metes and bounds, e.g. 2250' N, 1200' E fr NW cor S 36
1	CLAC 16627	1	Alluvium	0.067 ^a	3S/3E-11 SW-SE	App: 800' N, 1580' E fr SW cor DLC 46 ^b WRD: 785' N, 3370' E fr SW cor DLC 46

* 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	~608 ^c	303	241	2/15/1979	308	160	0 to 300		288 to 308	20 ^a	12	Bailer

Use data from application for proposed wells.

A4. **Comments:** The proposed POA/POU is located in the Clear Creek / Clackamas River Basin ~3 miles northwest of the City of Estacada, Oregon. The proposed use is for greenhouse development of 15 acres and in-ground cultivation of 15 acres.

^a The application specifies a well-specific rate for Well 1/CLAC 16627 of 20 gpm (~0.045 cfs), which is equal to the well yield noted on the Water Well Report for CLAC 16627. However, the total maximum rate requested is 30 gpm (~0.067 cfs) and there is only one requested POA. Therefore, Well 1/CLAC 16627 has been evaluated at the total maximum rate of 30 gpm (~0.067 cfs). **Additionally, the Applicant has specified in Section 4 of the Application that the anticipated total annual volume of water to be used is 90 acre-feet; however, at the total maximum rate requested (30 gpm/~0.067 cfs), the maximum volume that could be withdrawn in a year (assuming constant pumping) is ~48.5 acre-feet.**

^b **The metes-and-bounds description of the Well 1/CLAC 16627 location provided in the application does not correspond to the well location as mapped relative to other features (S. Stormer Rd, tax lots, Public Land Survey System [PLSS] Section boundaries, etc.) This review uses the well location as mapped, with the metes-and-bounds measurements as measured by the Department (WRD) listed on the table above.**

^c Land surface elevation at existing well location (WatershedSciences, 2009; USGS, 2013).

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

Comments: The proposed POA is greater than 1/4-mile from the nearest stream or surface water source and appears to produce water from a confined alluvial aquifer; therefore, per OAR 690-502-0240, the relevant Willamette Basin rules (OAR 690-502-0040 & 690-502-0140) do not apply.

A6. ☐ **Well(s) #** _____, _____, _____, _____, _____, tap(s) an aquifer limited by an administrative restriction.
Name of administrative area: Not Applicable
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) 7c (7-years of measurements), 7j (Scenic Waterway), medium 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:** Groundwater for the proposed use cannot be determined to be over-appropriated due to insufficient available data regarding rates of recharge and the current quantity of groundwater withdrawals from the local aquifer system.

According to its Water Well Report, the proposed POA (Well 1/CLAC 16627) appears to produce water from a thin layer of sand between ~301 and 303 ft below land surface (bls) (and potentially some gravel from ~303 to 308 ft bls) within the Troutdale Formation (Fmn) and Sandy River Mudstone as mapped by Leonard and Collins (1983), who note that “[s]leeps from perched-water zones are visible in valley walls...along Clear Creek southwest of Estacada.” Review of nearby water well reports appears to indicate that water is present in numerous thin and likely discontinuous beds of sand and/or gravel from near land surface (the Springwater Fmn per Leonard and Collins [1983]) to greater than 300 ft in depth. Hydrostratigraphically, the predominantly fine grained sediments at the depths from which the POA is producing have been assigned to the Willamette confining unit of Woodward et al., (1998), estimated at ~600 ft thick in this area, and to the Lower Sedimentary Unit (LSU) of Conlon et al., (2005).

Water level data is sparse around the POA. The nearest observation wells with potentially applicable water level data (CLAC 2006 and CLAC 64823) are greater than 11,800 ft from the POA (see Hydrographs, attached). While CLAC 64823 does show an apparent declining trend of ~0.5 ft/yr on average, CLAC 2006 does not show a declining trend in recent years. It is also unclear whether CLAC 2006 and CLAC 64823 may be completed in different, hydraulically-distinct water-bearing zones from the POA, due to the seemingly discontinuous nature of the water-bearing sands and gravels. Bulk well report statistics from water wells completed in the same or adjacent quarter-quarter sections as the POA were also analyzed (see Well Statistics – Adjacent QQ, attached). These statistics do not show trends which would indicate declining water levels over time. **As such, at this time, it cannot be determined whether the proposed use will or will not be available within the capacity of the resource. It is recommended, therefore, that the permit be conditioned as specified in B(1)(d)(i) above.**

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	Sand and gravel lenses of the Troutdale Fmn/Sandy River Mudstone	☒	☐

Basis for aquifer confinement evaluation: The reported static water level in the proposed POA (Well 1/CLAC 16627) is ~60 ft above the noted water-bearing zone, within the depth range of a ~90 ft layer described as "blue clay w/ small to large gravel). Other water wells in the same or adjacent quarter-quarter sections also predominantly have static water levels above their respective water-bearing zones. It would appear, therefore, that the local alluvial aquifer system is predominantly confined.

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	Unnamed tributary to Clear Creek	~370 ^a	~370 ^b	~3,700	☒	☐	☐	☐	☒
1	2	Clackamas River	~370 ^a	~240 ^b	~3,975	☒	☐	☐	☐	☒
1	3	Clear Creek	~370 ^a	~305 ^b	~5,085	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation: Reported static water levels in the proposed POA (Well 1/CLAC 16627) and similar nearby wells are generally above local surface water elevations, which supports the conclusion that local groundwater is discharging to surface water and is therefore hydraulically connected. Furthermore, two of the applicable surface water drainages (SW 2 and 3) have incised below the elevation of the water-bearing zone (~305 ft above mean sea level [msl]) from which the proposed POA (Well 1/CLAC 16627) produces. Groundwater in the applicable water-bearing zone is presumed to discharge where exposed with little to no barrier to flow.

The proposed POA is above the Clackamas River State Scenic Waterway. Due to the hydraulic connection between SW 1/2/3 and the shallow aquifer system in this area, the relevant State Scenic Waterway provisions apply to the proposed use.

^a Groundwater elevation estimated from CLAC 16627.

^b Surface water elevations were estimated from land surface elevations along stream reaches (WatershedSciences, 2009; USGS, 2013).

Water Availability Basin the well(s) are located within: SW 1 and SW 3: CLEAR CR > CLACKAMAS R – AT MOUTH
SW 2: CLACKAMAS R > WILLAMETTE 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?
1	1	☐	☐	N/A	N/A	☐	5.65	☒	<25%	☒
1	2	☐	☐	MF96	40	☐	822	☐	*	☐
1	3	☐	☐	MF82	20	☐	5.65	☒	*	☒

- 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: C3a: The total maximum rate requested (30 gpm/~0.067 cfs) is greater than 1 percent (0.0565 cfs) of the discharge that is equaled or exceeded 80 percent of the time (5.65 cfs) as estimated for SW 1 (Unnamed tributary) and SW 3 (Clear Creek). Therefore, per OAR 690-09-0040(4)(c), the requested POA and allocation are assumed to have the potential to cause substantial interference (PSI) with SW 1 and SW 3. However, if the applicant reduces the total maximum rate requested to less than 0.0565 cfs (~25.4 gpm), PSI would no longer be assumed on this basis.

Potential depletion (interference with) SW 1 (Unnamed tributary) was estimated using the Hunt 2003 analytical model. Hydraulic parameters used for the model were derived from regional data or studies of the hydrogeologic regime (OWRD Well Log Query Report; Conlon et al., 2003, 2005; Iverson, 2002; McFarland and Morgan, 1996; Woodward et al., 1998) or are within a typical range of values for the parameter within the hydrogeologic regime (Freeze and Cherry, 1979; Domenico and Mifflin, 1965). See attached "Stream Depletion Analysis – SW 1" for the specific parameters used in the analysis.

The Hunt 2003 analytical model results indicate that depletion of (interference with) SW 1 due to pumping of the proposed POA is anticipated to be much less than 25 percent of the well discharge at 30 days of continuous pumping.

* Interference at 30 days could not be estimated for either the Clackamas River or Clear Creek because the hydrogeologic setting (high-relief slopes and potentially free-flowing seeps) does not sufficiently meet model assumptions of the available techniques for determining stream depletion (e.g. Hunt 2003 and similar).

- 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													
(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:
- ☐ The permit should contain condition #(s) _____;
 - ☐ The permit should contain special condition(s) as indicated in "Remarks" below;

C6. SW / GW Remarks and Conditions:

C2 (OAR 690-08-0040(2)(3)): **The proposed POA is determined to be hydraulically connected to SW 1 (Unnamed tributary), SW 2 (Clackamas River), and SW 3 (Clear Creek), which are above or within the Clackamas River State Scenic Waterway.**

C3a (OAR 690-09-0040(4)): **At the total maximum rate requested (30 gpm/~0.067 cfs), the proposed POA is assumed to have PSI with SW 1 (Unnamed tributary) and SW 3 (Clear Creek). A reduction of the total maximum rate requested to less than 0.0565 cfs (~25.4 gpm) would negate this assumption of PSI.**

References Used:

Application File: G-18644

Water Well Reports: CLAC 2006, 14047, 16621, 16627, 16629, 16691, 16714, 16898, 53288, 64823

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

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*.

Domenico, P.A. and Mifflin, 1965, Water from low-permeability sediments and land subsidence: *Water Resource Research*, v. 1, no. 4, p. 563-576.

Freeze, R.A. and Cherry, J.A., 1979, *Groundwater*, Prentice Hall, Englewood Cliffs, New Jersey, 604 p.

Gannett, M.W. and Caldwell, R., 1998, *Geologic framework of the Willamette Lowland aquifer system, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-A*, 32 p.

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

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: Unpublished M.S. thesis, Oregon State University*, 147 p.

Leonard, A.R., and Collins, C.A., 1983, *Ground water in the northern part of Clackamas County, Oregon: Oregon Water Resources Department Ground Water Report 29*, 85 p.

McFarland, W.D., and Morgan, D.S., 1996, *Description of the Ground-Water Flow System in the Portland Basin, Oregon and Washington: U.S. Geological Survey Water Supply Paper 2470-A*, 58 p.

Trimble, D.E., 1963, *Geology of Portland, Oregon, and adjacent areas: U.S. Geological Survey Bulletin 1119*, 119 p.

United States Geological Survey, 2013, *National Elevation Dataset (NED) [DEM geospatial data]*, 1/9th arc-second, updated 2013.

United States Geological Survey, 2017, *Redland quadrangle, Oregon [map]*, 1:24,000, 7.5 minute topographic series, U.S. Department of the Interior, Reston, Virginia.

Woodward, D.G., Gannett, M.W., and Vaccaro, J.J., 1998, *Hydrogeologic framework of the Willamette Lowland aquifer system, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-B*, 82 p.

Watershed Sciences, 2009, *LIDAR remote sensing data collection, Department of Geology and Mineral Industries, Hood to Coast 2009, Portland, OR, May 27*.

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) _____

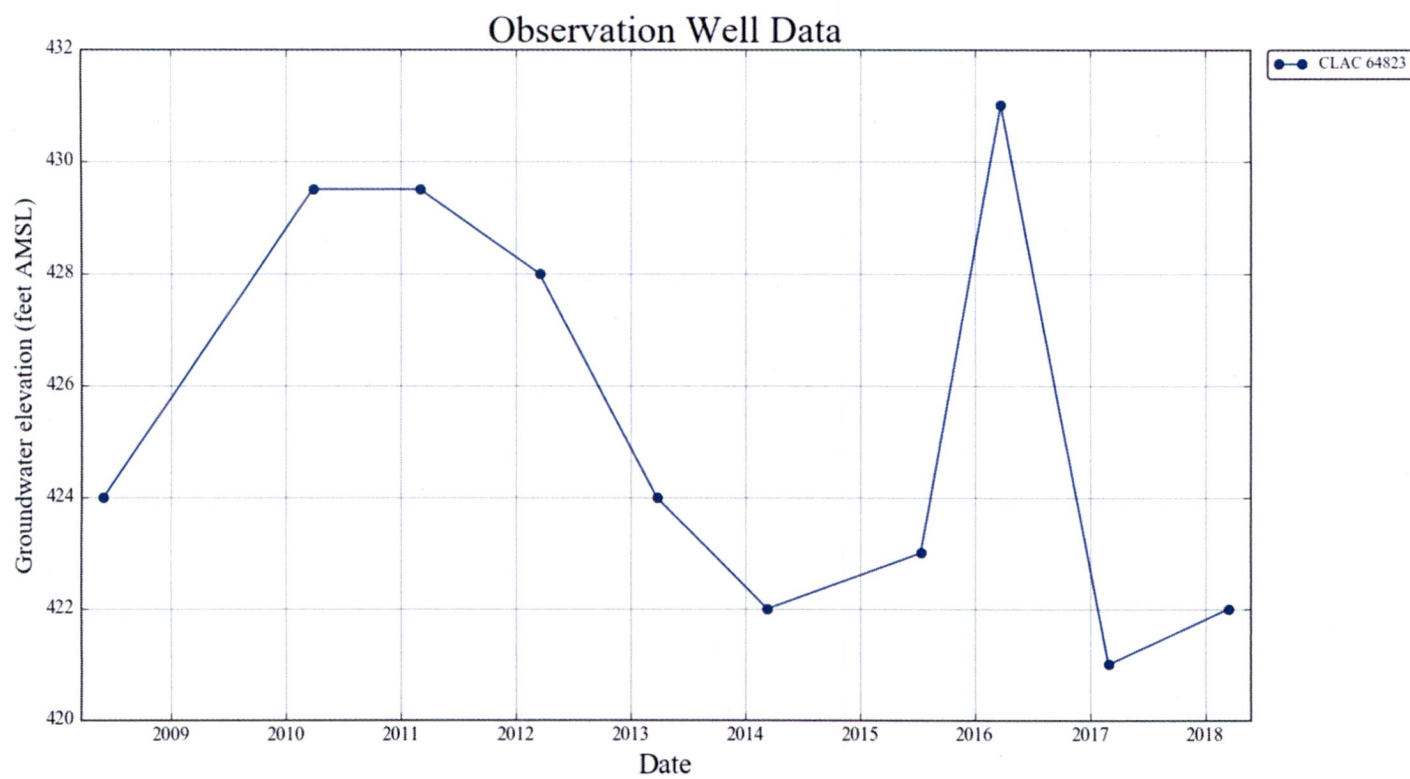
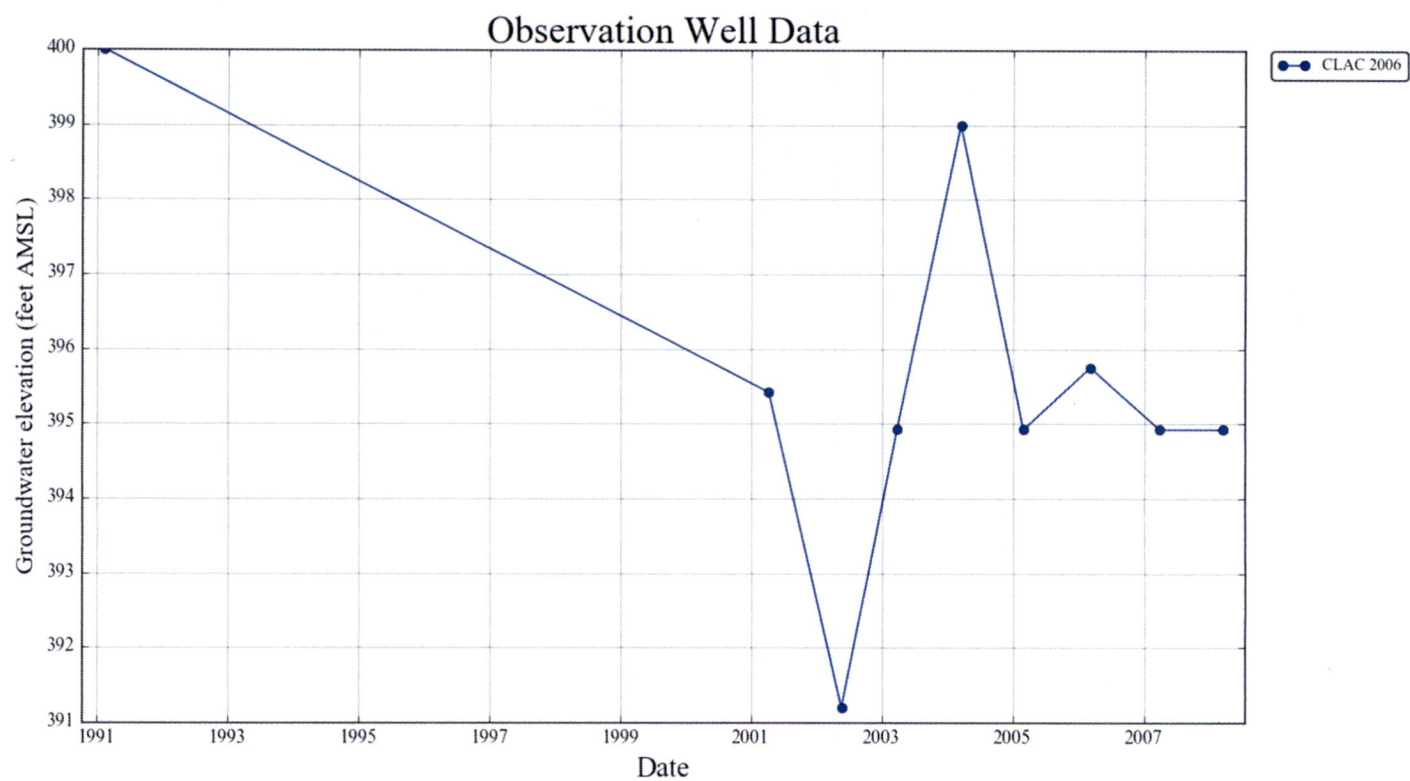
D3. **THE WELL construction deficiency or other comment is described as follows:** _____

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

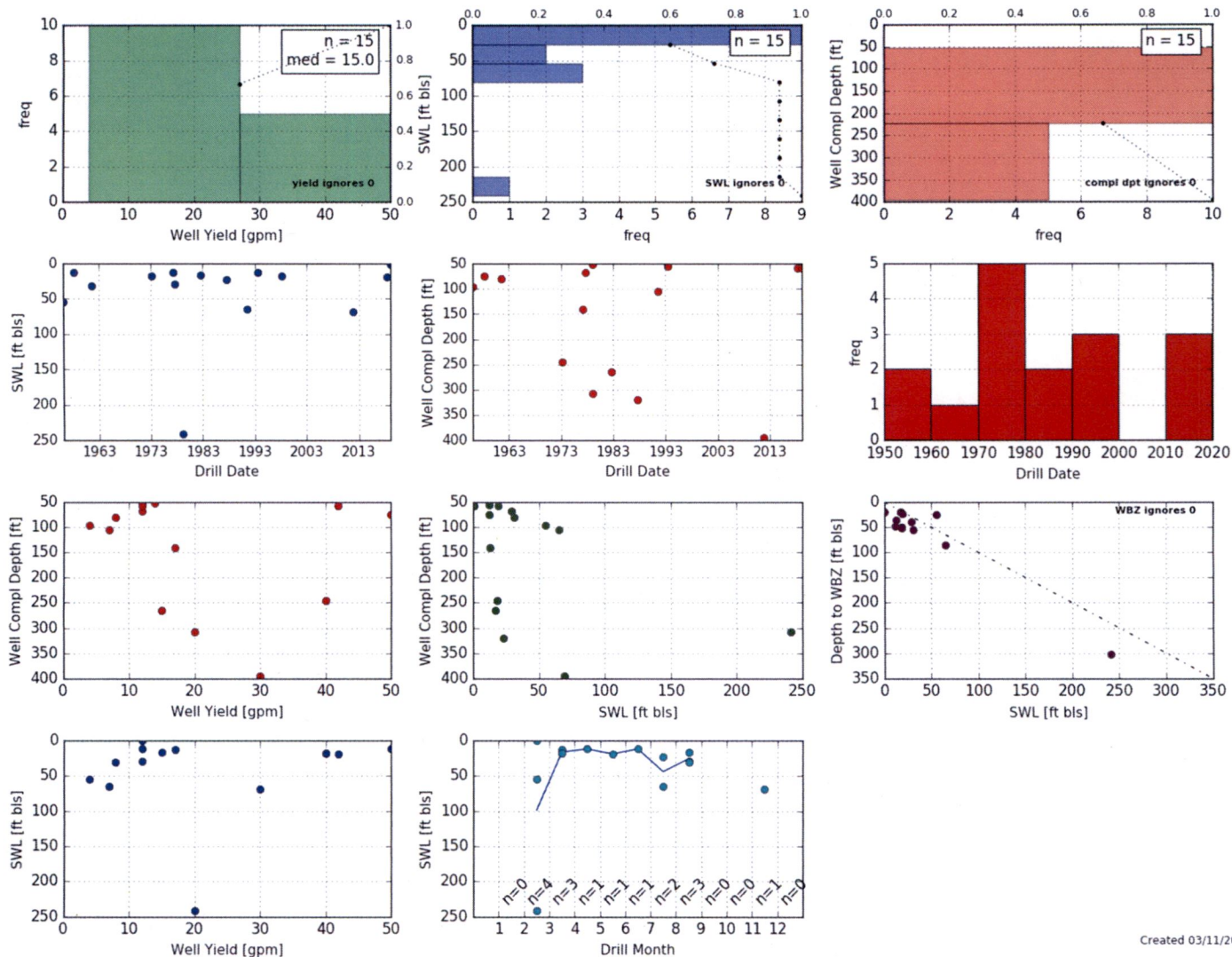
G-18732 Pearson



Hydrographs



Well Statistics – Adjacent QQ



Created 03/11/2019

Water Availability Tables

Water Availability Analysis

Detailed Reports

CLEAR CR > CLACKAMAS R - AT MOUTH
WILLAMETTE BASIN

Water Availability as of 3/12/2019

Watershed ID #: 82 ([Map](#))

Exceedance Level: 80%

Date: 3/12/2019

Time: 4:14 PM

Water Availability Calculation

Consumptive Uses and Storages

Instream Flow Requirements

Reservations

Water Rights

Watershed Characteristics

Water Availability Calculation

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

Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	126.00	1.29	125.00	0.00	0.00	125.00
FEB	128.00	1.19	127.00	0.00	0.00	127.00
MAR	128.00	0.85	127.00	0.00	0.00	127.00
APR	131.00	1.00	130.00	0.00	0.00	130.00
MAY	111.00	2.71	108.00	0.00	0.00	108.00
JUN	48.10	3.76	44.30	0.00	40.00	4.34
JUL	19.00	6.47	12.50	0.00	40.00	-27.50
AUG	8.02	5.29	2.73	0.00	20.00	-17.30
SEP	5.65	2.28	3.37	0.00	20.00	-16.60
OCT	6.23	0.92	5.31	0.00	0.00	5.31
NOV	21.50	0.85	20.60	0.00	0.00	20.60
DEC	103.00	1.36	102.00	0.00	0.00	102.00
ANN	99,100.00	1,700.00	97,400.00	0.00	7,260.00	93,300.00

Water Availability Analysis

Detailed Reports

CLACKAMAS R > WILLAMETTE R - AT MOUTH
WILLAMETTE BASIN

Water Availability as of 3/12/2019

Watershed ID #: 80 ([Map](#))

Exceedance Level: 80%

Date: 3/12/2019

Time: 4:14 PM

Water Availability Calculation

Consumptive Uses and Storages

Instream Flow Requirements

Reservations

Water Rights

Watershed Characteristics

Water Availability Calculation

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

Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	2,670.00	326.00	2,340.00	0.00	1,000.00	1,340.00
FEB	2,900.00	361.00	2,540.00	0.00	1,000.00	1,540.00
MAR	2,800.00	330.00	2,470.00	0.00	1,000.00	1,470.00
APR	3,010.00	399.00	2,610.00	0.00	1,000.00	1,610.00
MAY	2,740.00	398.00	2,340.00	0.00	1,000.00	1,340.00
JUN	1,620.00	309.00	1,310.00	0.00	1,000.00	311.00
JUL	980.00	309.00	671.00	0.00	1,000.00	-329.00
AUG	822.00	294.00	528.00	0.00	890.00	-362.00
SEP	833.00	283.00	550.00	0.00	890.00	-340.00
OCT	882.00	276.00	606.00	0.00	1,000.00	-394.00
NOV	1,630.00	323.00	1,310.00	0.00	1,000.00	307.00
DEC	2,650.00	328.00	2,320.00	0.00	1,000.00	1,320.00
ANN	2,110,000.00	237,000.00	1,870,000.00	0.00	711,000.00	1,200,000.00

Stream Depletion Analysis – SW 1

Application type:	G
Application number:	18732
Well number:	1
Stream Number:	1
Pumping rate (cfs):	0.067
Pumping duration (days):	365
Pumping start month number (3=March)	1

Parameter	Symbol	Scenario 1	Scenario 2	Scenario 3	Units
Distance from well to stream	a	3700	3700	3700	ft
Aquifer transmissivity	T	70	130	300	ft ² /day
Aquifer storativity	S	0.001	0.0004	0.0001	-
Aquitard vertical hydraulic conductivity	Kva	0.001	0.005	0.01	ft/day
Aquitard saturated thickness	ba	300	300	300	ft
Aquitard thickness below stream	babs	3	3	3	ft
Aquitard specific yield	Sya	0.2	0.2	0.2	-
Stream width	ws	5	5	5	ft

Stream depletion for Scenario 2:

Days	10	30	60	90	120	150	180	210	240	270	300	330	360
Depletion (%)	0	1	2	2	2	2	2	2	2	2	2	2	2
Depletion (cfs)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

