# Groundwater Application Review Summary Form

**Application # G-** 18478

**GW Reviewer** DENNIS ORLOWSKI **Date Review Completed:** 8/2/2017

**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 08/02/2017
FROM: Groundwater Section Dennis Orlowski
Reviewer's Name
SUBJECT: Application G- 18478 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: Chris Gesik County: Clackamas

A1. Applicant(s) seek(s) 0.25 cfs from one well(s) in the Willamette Basin, Molalla River subbasin

A2. Proposed use Nursery (10.0 acres) 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 9705/58310** | **1** | **Alluvium** | **0.25** | **T3S/R1E-28** | **140'S, 675' E fr NW cor S 28** |

* 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** | **165** | **123** | **131** | **11/05/2002** | **270** | **0-18** | **0-255** | | **238-270** | **180** | **69** | **Pump** |

Use data from application for proposed wells.

A4. **Comments:** The proposed POA is located approximately 1.5 miles due north of Canby, Oregon.

The proposed POA is existing well CLAC 9705 which was drilled to 260 ft deep in 1980. This well was altered in 2002, done to address a sand pumping problem which was presumably resolved by removing a 6-inch perforated liner and installing screen from 238-270 ft (CLAC 58310).

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: Well 1 (CLAC 9705/58310) obtains groundwater from a confined aquifer, so the 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: Not applicable.

## 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) **Medium water-use reporting, 7c (7-yrs measurements)**;
   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 **alluvial** 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 POA, CLAC 9705/58310, obtains groundwater from water-bearing sand deposits (~20-40 feet cumulative thickness) encased in fine-grained silts and clays (Willamette Silt) (Conlon and others, 2005; Gannett and Caldwell, 1998). This location is the distal end of the Canby alluvial fan deposit, thus marked by generally finer-grained/lower-permeability deposits than those found to the south and east. This particular area is a minor upland about 30-60 ft above lower areas to the south and east, and about 60-90 ft above lowlands associated with the Willamette and Molalla Rivers. These lowlands to the west, north and east are areas where Willamette Silt deposits have been mostly eroded by both river systems, and where more recent sediments (of variable composition) were subsequently deposited by those same systems.

Within approximately one mile of the proposed POA location are about 30 groundwater rights, almost all irrigation, with 65 associated authorized POAs (wells); almost all of these are located to the southeast and south.. Over this same general area are reportedly more than 100 domestic wells. Yields for wells completed in the alluvial aquifer range from about 10 to several hundred gpm, but the vast majority are reportedly in the 25-100 gpm range. Due south about 1.5 miles is the City of Canby, which provides water to all or most of residents within its incorporated area, primarily from a surface water source.

Despite numerous wells in the area, groundwater level data is quite sparse. However, available data show generally stable levels, particularly in the nearest observation well CLAC 9698 (see attached hydrograph). It is likely that groundwater in the alluvial aquifer is replenished by surfaced water from the adjacent major stream systems, thus mitigating potential declines that would otherwise result from the high number of alluvial aquifer wells in the area.

These factors indicate that water for the proposed use is likely available within the capacity of the resource, but that the recommended permit conditions should be included to monitor and protect the resource.

## 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** | ☒ | ☐ |

**Basis for aquifer confinement evaluation:** Proposed Well 1 (CLAC 9705/58310) taps water-bearing sand deposits that are confined by at least 50-60 feet of low-permeability, fine-grained sediments (Willamette Silt). In the central Willamette Valley, Conlon and others (2005) report that fine-grained deposits (silt and clay) of 'more than 40 ft' thickness typically create confined conditions in the underlying water-bearing sand/gravel deposits. Furthermore, static groundwater levels in nearby wells are above the top of water-bearing units within the aquifer. These factors suggest that proposed Well 1 obtains groundwater from a confined 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 | **Willamette River** | **70-80** | **50-60** | **3100** | ☒ | ☐ | ☐ | ☐ | ☒ |
| 1 | 2 | **Molalla River** | **70-80** | **50-60** | **3850** | ☒ | ☐ | ☐ | ☐ | ☒ |
| 1 | 3 | **Pudding River** | **70-80** | **60** | **4500** | ☒ | ☐ | ☐ | ☐ | ☒ |

**Basis for aquifer hydraulic connection evaluation:** Groundwater elevations in the alluvial aquifer are just above the elevations of SW1, SW2 and SW3. Furthermore, water table maps in the area indicate that groundwater in the alluvial aquifer system flows towards and discharges into local streams incised in the Willamette Silt (Conlon and others, 2003, 2005; Gannett and Caldwell, 1998). These facts indicate that the alluvial aquifer and local streams are hydraulically connected.

The depletion of local streams by proposed Well 1 will be attenuated, but not eliminated, by the low vertical hydraulic conductivity (permeability) of the Willamette Silt and other clays and silts that lie between the deeper sands and gravels and the stream beds. Net impacts will be small at the onset of pumping, but will increase with time until a new equilibrium between local recharge and discharge is reached. At that time depletion is expected to be relatively constant throughout the year.

**Water Availability Basin the well(s) are located within:**
SW1: Willamette River > Columbia River – at mouth (WID 181)
SW2: Molalla River > Willamette River – at mouth (WID 69796)
SW3: Pudding River > Molalla River – at mouth (WID 69998)

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 | ☐ | ☐ | **MF181A** | **1500.00** | ☐ | **4890.00** | ☐ | **<25%** | ☐ |
| 1 | 2 | ☐ | ☐ | **IS69796A** | **100.00** | ☐ | **134.00** | ☐ | **<25%** | ☐ |
| 1 | 3 | ☐ | ☐ | **IS69998A** | **40.00** | ☐ | **67.90** | ☐ | **<25%** | ☐ |

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 requested allocation (0.25 cfs) is much less than 1% of relevant flows in both SW1 and SW2, and somewhat less than in SW3 (although the latter is likely immaterial because the relevant portion of SW3 (Pudding River) is limited to a very small reach near its confluence with SW2 (Molalla River); furthermore, most if not all, stream interference will be with the two nearer streams).

The Hunt 2003 analytical stream depletion model was used to estimate pumping interference at 30 days at SW1 (Willamette River). Model results indicate that interference is expected to be less than 25% of the maximum allocated pumping rate at 30 days.

C3b: not applicable.

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:** Not applicable.

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:** _____

**References Used:** Application file: G-18478.

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.

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.

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.

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.

## D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #:** _____ **Logid:** _____

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

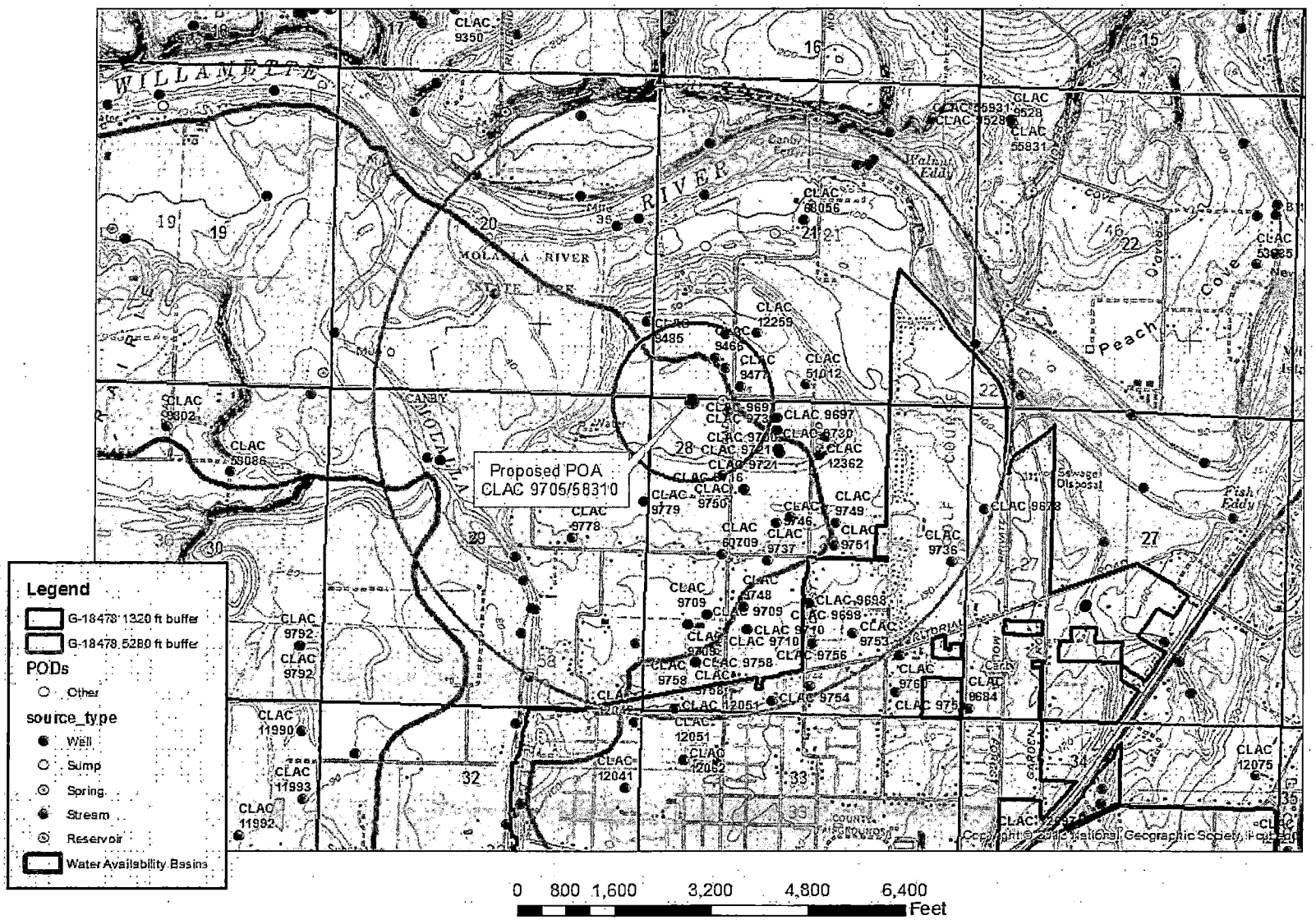
a. ☐ review of the well log;
b. ☐ field inspection by _____;
c. ☐ report of CWRE _____;
d. ☐ other: (specify) _____

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.**

**Well Location Map**

Application G-18478 Gesik
T3S, R1E, Section 28



## Water Availability Tables

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Water Availability Analysis

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### Water Availability Analysis
Detailed Reports

WILLAMETTE R > COLUMBIA R - AT MOUTH
WILLAMETTE BASIN
Water Availability as of 8/1/2017

Watershed ID #: 181 (Map)
Date: 8/1/2017

Exceedance Level: 80%
Time: 2:43 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 | 27,500.00 | 2,740.00 | 24,900.00 | 0.00 | 1,500.00 | 23,300.00 |
| FEB | 30,000.00 | 8,010.00 | 22,000.00 | 0.00 | 1,500.00 | 20,500.00 |
| MAR | 28,500.00 | 7,570.00 | 20,900.00 | 0.00 | 1,500.00 | 19,400.00 |
| APR | 25,400.00 | 7,170.00 | 18,200.00 | 0.00 | 1,500.00 | 16,700.00 |
| MAY | 20,700.00 | 4,430.00 | 16,300.00 | 0.00 | 1,500.00 | 14,800.00 |
| JUN | 11,000.00 | 2,340.00 | 8,660.00 | 0.00 | 1,500.00 | 7,160.00 |
| JUL | 6,260.00 | 2,290.00 | 3,990.00 | 0.00 | 1,500.00 | 2,490.00 |
| AUG | 4,890.00 | 2,040.00 | 2,850.00 | 0.00 | 1,500.00 | 1,350.00 |
| SEP | 4,930.00 | 1,670.00 | 3,260.00 | 0.00 | 1,500.00 | 1,760.00 |
| OCT | 5,990.00 | 708.00 | 5,280.00 | 0.00 | 1,500.00 | 3,780.00 |
| NOV | 12,700.00 | 1,000.00 | 11,700.00 | 0.00 | 1,500.00 | 10,200.00 |
| DEC | 24,800.00 | 1,390.00 | 23,400.00 | 0.00 | 1,500.00 | 21,900.00 |
| ANN | 19,700,000.00 | 2,480,000.00 | 17,300,000.00 | 0.00 | 1,090,000.00 | 16,200,000.00 |

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### Water Availability Analysis
Detailed Reports

MOLALLA R > WILLAMETTE R - AT MOUTH
WILLAMETTE BASIN
Water Availability as of 8/1/2017

Watershed ID #: 69786 (Map)
Date: 8/1/2017

Exceedance Level: 80%
Time: 2:44 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 | 1,870.00 | 153.00 | 1,720.00 | 0.00 | 500.00 | 1,220.00 |
| FEB | 2,010.00 | 143.00 | 1,870.00 | 0.00 | 500.00 | 1,370.00 |
| MAR | 1,830.00 | 111.00 | 1,720.00 | 0.00 | 500.00 | 1,220.00 |
| APR | 1,530.00 | 84.60 | 1,450.00 | 0.00 | 500.00 | 945.00 |
| MAY | 927.00 | 95.00 | 832.00 | 0.00 | 500.00 | 332.00 |
| JUN | 431.00 | 116.00 | 315.00 | 0.00 | 500.00 | -185.00 |
| JUL | 204.00 | 180.00 | 24.30 | 0.00 | 200.00 | -176.00 |
| AUG | 139.00 | 151.00 | -12.00 | 0.00 | 100.00 | -112.00 |
| SEP | 134.00 | 80.00 | 54.00 | 0.00 | 150.00 | -96.00 |
| OCT | 108.00 | 38.30 | 150.00 | 0.00 | 450.00 | -300.00 |
| NOV | 637.00 | 78.60 | 558.00 | 0.00 | 500.00 | -58.40 |
| DEC | 1,700.00 | 148.00 | 1,550.00 | 0.00 | 500.00 | 1,050.00 |
| ANN | 1,320,000.00 | 83,200.00 | 1,240,000.00 | 0.00 | 295,000.00 | 967,000.00 |

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Water Availability Analysis

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# Water Availability Analysis
## Detailed Reports

PUDDING R > MOLALLA R - AT MOUTH
WILLAMETTE BASIN
Water Availability as of 8/2/2017

Watershed ID #: 69998 (Map)
Date: 8/2/2017

Exceedance Level: 80%
Time: 8:32 AM

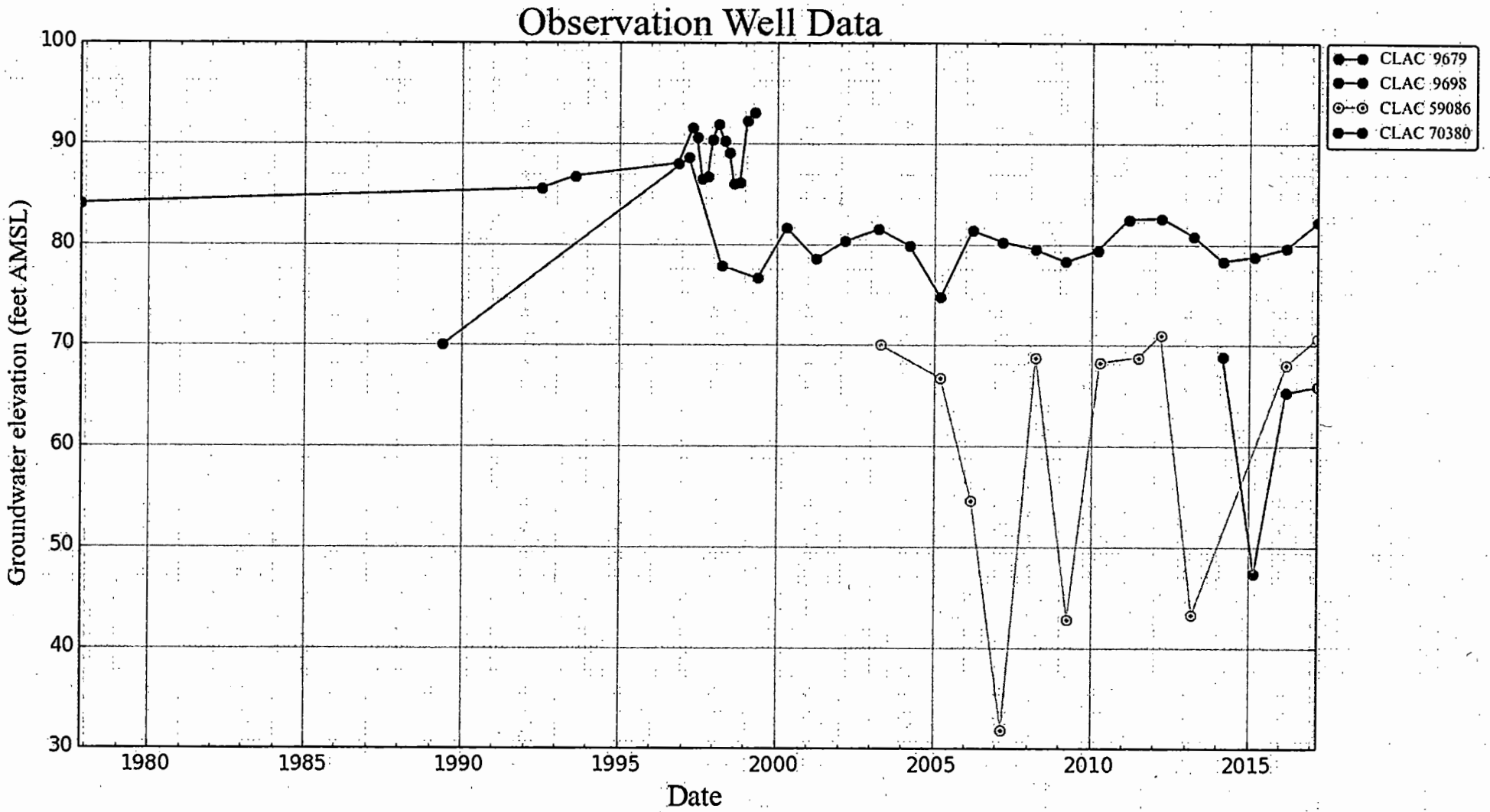
Water Availability Calculation | Consumptive Uses and Storages | Instream Flow Requirements | Reservations | Water Rights | Watershed Characteristics

## Water Availability Calculation

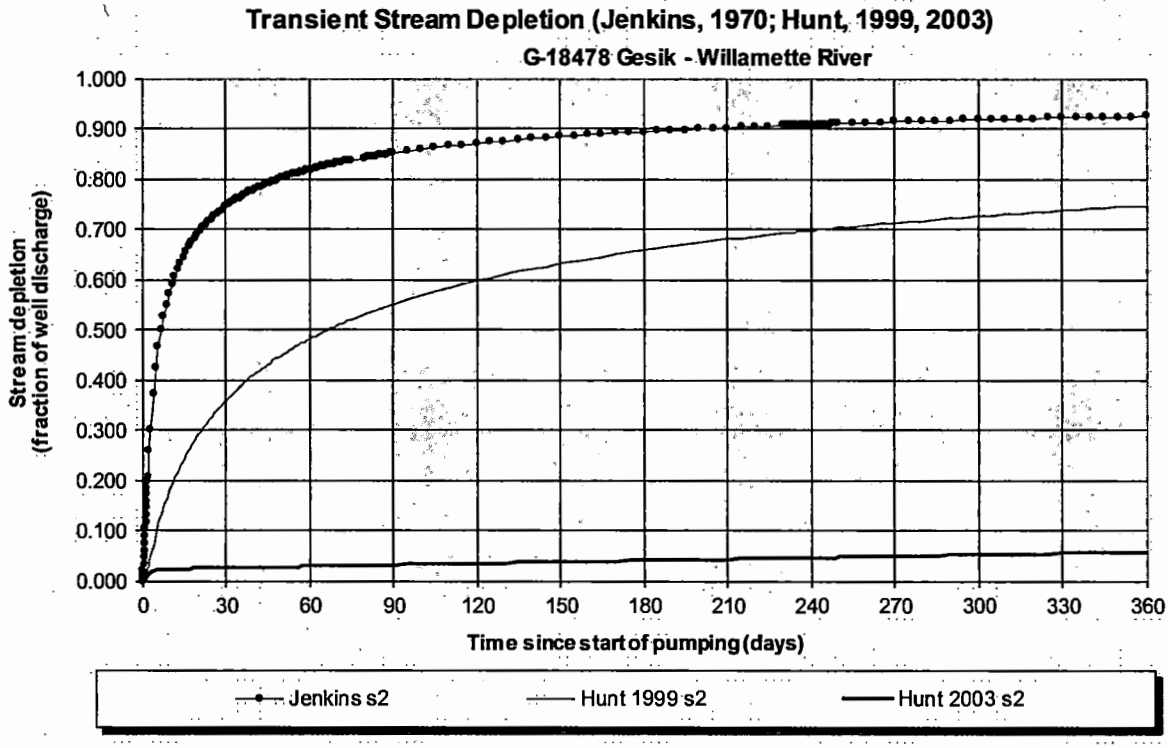
Monthly Streamflow in Cubic Feet per Second
Annual Volume at 50% Exceedance in Acre-Feet

| Month | Natural Stream Flow | Consumptive Uses and Storages | Expected Stream Flow | Reserved Stream Flow | Instream Flow Requirement | Net Water Available |
|---|---|---|---|---|---|---|
| JAN | 1,120.00 | 128.00 | 992.00 | 0.00 | 80.00 | 912.00 |
| FEB | 1,260.00 | 119.00 | 1,140.00 | 0.00 | 80.00 | 1,060.00 |
| MAR | 1,080.00 | 86.30 | 994.00 | 0.00 | 80.00 | 914.00 |
| APR | 834.00 | 59.70 | 774.00 | 0.00 | 80.00 | 694.00 |
| MAY | 448.00 | 56.20 | 392.00 | 0.00 | 80.00 | 312.00 |
| JUN | 231.00 | 79.10 | 152.00 | 0.00 | 60.00 | 91.90 |
| JUL | 111.00 | 124.00 | -12.80 | 0.00 | 50.00 | -62.80 |
| AUG | 71.60 | 102.00 | -30.00 | 0.00 | 40.00 | -70.00 |
| SEP | 67.90 | 58.00 | 9.88 | 0.00 | 40.00 | -30.10 |
| OCT | 91.50 | 13.30 | 78.20 | 0.00 | 60.00 | 18.20 |
| NOV | 364.00 | 53.70 | 310.00 | 0.00 | 80.00 | 230.00 |
| DEC | 1,010.00 | 123.00 | 887.00 | 0.00 | 80.00 | 807.00 |
| ANN | 748,000.00 | 60,400.00 | 688,000.00 | 0.00 | 48,900.00 | 644,000.00 |

**Water-Level Trends in Nearby Wells**



**Stream Depletion Modeling**




| Output for Stream Depletion, Scenerio 2 (s2): | | | | | | Time pump on (pumping duration) = 365 days | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Days | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 |
| J SD | 74.4% | 81.7% | 85.0% | 87.0% | 88.4% | 89.4% | 90.2% | 90.8% | 91.3% | 91.8% | 92.2% | 92.5% |
| H SD 1999 | 35.8% | 48.1% | 55.0% | 59.7% | 63.1% | 65.8% | 67.9% | 69.7% | 71.2% | 72.5% | 73.7% | 74.7% |
| H SD 2003 | 2.57% | 2.87% | 3.16% | 3.46% | 3.75% | 4.04% | 4.33% | 4.63% | 4.92% | 5.21% | 5.50% | 5.80% |
| Qw, cfs | 0.250 | 0.250 | 0.250 | 0.250 | 0.250 | 0.250 | 0.250 | 0.250 | 0.250 | 0.250 | 0.250 | 0.250 |
| H SD 99, cfs | 0.090 | 0.120 | 0.138 | 0.149 | 0.158 | 0.164 | 0.170 | 0.174 | 0.178 | 0.181 | 0.184 | 0.187 |
| H SD 03, cfs | 0.006 | 0.007 | 0.008 | 0.009 | 0.009 | 0.010 | 0.011 | 0.012 | 0.012 | 0.013 | 0.014 | 0.014 |

| Parameters: | | Scenario 1 | Scenario 2 | Scenario 3 | Units |
|---|---|---|---|---|---|
| Net steady pumping rate of well | Qw | 0.25 | 0.25 | 0.25 | cfs |
| Time pump on (pumping duration) | tpon | 365 | 365 | 365 | days |
| Perpendicular from well to stream | a | 3100 | 3100 | 3100 | ft |
| Well depth | d | 270 | 270 | 270 | ft |
| Aquifer hydraulic conductivity | K | 5 | 50 | 500 | ft/day |
| Aquifer saturated thickness | b | 30 | 30 | 30 | ft |
| Aquifer transmissivity | T | 150 | 1500 | 15000 | 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 | 165 | 165 | 165 | ft |
| Aquitard thickness below stream | babs | 145 | 145 | 145 | ft |
| Aquitard porosity | n | 0.2 | 0.2 | 0.2 | |
| Stream width | ws | 550 | 550 | 550 | ft |
| Streambed conductance (lambda) | sbc | 0.379310 | 0.379310 | 0.379310 | ft/day |
| Stream depletion factor | sdf | 64.066667 | 6.406667 | 0.640667 | days |
| Streambed factor | sbf | 7.839080 | 0.783908 | 0.078391 | |
| input #1 for Hunt's Q_4 function | t' | 0.015609 | 0.156087 | 1.560874 | |
| input #2 for Hunt's Q_4 function | K' | 38.828283 | 3.882828 | 0.388283 | |
| input #3 for Hunt's Q_4 function | epsilon' | 0.005000 | 0.005000 | 0.005000 | |
| input #4 for Hunt's Q_4 function | lamda' | 7.839080 | 0.783908 | 0.078391 | |