

Approved: 

MEMO

To: Kristopher Byrd, Well Construction and Compliance Section Manager
From: Travis Kelly, Well Construction Program Coordinator
Subject: Review of Water Right Application G-19001
Date: December 11, 2020

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

Applicant's Well 1 (No Well Report): There is no well report associated with this well that shows how it was originally constructed to verify compliance with well construction standards.

My recommendation is that the Department **not issue** a permit for Applicant's Well 1 unless it is brought into compliance with current minimum well construction standards or information is provided showing that it is constructed to meet current minimum well construction standards.

The repair of Applicant's Well 1 may not satisfy hydraulic connection issues.

Applicant's Proposed Well 2 (Proposed Well): Well 2 is a proposed well, therefore it cannot be reviewed for construction. Construction of the proposed well shall be completed in a manner that protects ground water resources as required under Oregon Administrative Rules 690-200 through 690-240. During construction of the well, specific attention should be paid to ensure sealing requirements are met and that the well does not commingle aquifers.

The proposed Well 2 may not satisfy hydraulic connection issues.

Groundwater Application Review Summary Form

Application # G- 19001

GW Reviewer Travis Brown Date Review Completed: 12/9/2020

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).

WATER RESOURCES DEPARTMENT

MEMO

December 9, 2020

TO: **Application G- 19001**

FROM: **GW: Travis Brown**
 (Reviewer's Name)

SUBJECT: Scenic Waterway Interference Evaluation

YES The source of appropriation is hydraulically connected to a State Scenic Waterway or its tributaries

NO

YES

NO Use the Scenic Waterway Condition (Condition 7J)

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**

DISTRIBUTION OF INTERFERENCE

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 [Enter] Scenic Waterway by the following amounts expressed as a proportion of the consumptive use by which surface water flow is reduced.

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | | | | | | | | | | |

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 12/9/2020
 FROM: Groundwater Section Travis Brown
Reviewer's Name
 SUBJECT: Application G- 19001 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: Merle and Grace Stutzman County: MARION

- A1. Applicant(s) seek(s) 0.15 cfs from 2 well(s) in the Willamette Basin,
Molalla-Pudding subbasin
- A2. Proposed use Irrigation (12.25 acre; 30.6 af/yr) 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 ID | 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 | NO WELL LOG^a | "Well 1" | Alluvium | 0.15 | 4S/1W-32 NE-SE | 485' S, 1030' W fr E ¼ cor S 32 |
| 2 | PROPOSED | "Well 2" | Alluvium | 0.15 | 4S/1W-32 NW-SE | 490' S, 1500' W fr E ¼ cor S 32 |

* 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 | ~185 ^b | Unknown ^a | Unknown ^a | Unknown ^a | ~130 ^a | Unknown ^a | Unknown ^a | Unknown ^a | Unknown ^a | Unknown ^a | Unknown ^a | Unknown ^a |
| 2 | ~185 ^b | | | | ~130 | 0-18+ | | | | | | |

Use data from application for proposed wells.

- A4. **Comments:** The proposed POA/POU are ~3/4 mile west of Hubbard, Oregon.
- ^a Applicant did not provide a well log or detailed construction information for existing Well 1. Based on property records accessed via the Marion County Assessor's online database, log MARI 886 is believed to correspond to existing Well 1. Applicant should provide additional construction information (including, at a minimum, height of casing above ground surface, depth of seal interval, and an accurate total depth) to determine whether Well 1 meets Well Construction Standards and, if possible, confirm whether Well 1 is in fact MARI 886.
- ^b Ground surface elevation at POA location, estimated from LIDAR (Watershed Sciences, 2009).

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 POA are greater than ¼ mile from the nearest surface water source. Per OAR 690-502-0240, the relevant basin rules do not apply.

A6. **Well(s) #** _____, _____, _____, _____, _____, tap(s) an aquifer limited by an administrative restriction.
 Name of administrative area: N/A
 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 measurement), medium water use;
 - 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:** 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 aquifer system.

The proposed POA will produce from ~20-40 ft of sand and gravel (the Willamette aquifer) which occur beneath ~80-100 ft of fine-grained sediments (the Willamette Silt) (Gannett and Caldwell, 1998). The requested rate (0.15 cfs) is well within the range of reported yields for water wells in this area (see attached Well Statistics). Static water levels are typically 15-35 ft bls in this area of the Willamette aquifer, though seasonal water level fluctuations in the shallow alluvium are typically 50-60 ft per year (see attached Hydrographs). Despite the substantial fluctuation in water level, which is expected to grow as groundwater use increases in this area, and the relatively shallow total depths of the proposed POA, the low requested rate should mean that there will be sufficient available head for the proposed use. Nearby hydrographs do not indicate progressive, area-wide declines (see attached Hydrographs).

The nearest neighboring well to the proposed POA appears to be MARI 906, ~270 ft northeast of proposed POA 2 and ~380 ft northwest of POA 1 (see Well Location Map, attached). However, several residences presumed to be served by exempt domestic wells are closer than MARI 906 to the proposed POA. Regardless, given the low requested rate (0.15 cfs), the proposed use is not anticipated to cause interference with neighboring wells sufficient to meet the definition of injury.

In order to protect the groundwater resource and neighboring users, the conditions specified in B1(d)(i) and B2(c), above, are recommended for any permit issued pursuant to this application.

C. GROUNDWATER/SURFACE WATER CONSIDERATIONS, OAR 690-09-040

C1. **690-09-040 (1):** Evaluation of aquifer confinement:

| Well | Aquifer or Proposed Aquifer | Confined | Unconfined |
|------|-----------------------------|-------------------------------------|--------------------------|
| 1 | Alluvium | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2 | Alluvium | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Basis for aquifer confinement evaluation: Water levels in area wells are generally above the relevant water-bearing zones, which are overlain by a >80 ft-thick sequence of fine-grained sediments. Based on the available evidence, the aquifer is 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 | Mill Creek | ~150-170 | ~131-145 ^a | ~1,910 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 | 1 | Mill Creek | ~150-170 | ~132-145 ^a | ~2,200 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Basis for aquifer hydraulic connection evaluation: Estimated groundwater elevations are above the nearby surface water elevations for SW 1 (Mill Creek). Additionally, potentiometric mapping in this area indicates that groundwater is discharging to surface water (Woodward et al., 1998). Based on the available evidence, the proposed POA would be hydraulically connected to SW 1.

^a Surface water elevation within 1 mile of proposed POA, estimated from LIDAR (Watershed Sciences, 2009).

Water Availability Basin the well(s) are located within: WID #30200901 MILL CR > PUDDING 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 (SW) source. Limit evaluation to instream rights and minimum stream flows that are pertinent to that SW source, not lower SW sources to which the stream under evaluation is tributary. Compare the requested rate against the 1% of 80% *natural* flow for the pertinent Water Availability Basin (WAB). If Q is not distributed by well, use full rate for each well. Any checked box indicates the well is assumed to have the potential to cause PSI.

| Well | SW # | Well < ¼ mile? | Qw > 5 cfs? | Instream Water Right ID | Instream Water Right Q (cfs) | Qw > 1% ISWR? | 80% Natural Flow (cfs) | Qw > 1% of 80% Natural Flow? | Interference @ 30 days (%) | Potential for Subst. Interfer. Assumed? |
|------|------|--------------------------|--------------------------|-------------------------|------------------------------|--------------------------|------------------------|-------------------------------------|----------------------------|---|
| 1 | 1 | <input type="checkbox"/> | <input type="checkbox"/> | N/A | N/A | <input type="checkbox"/> | 1.88 | <input checked="" type="checkbox"/> | <25% | <input checked="" type="checkbox"/> |
| 2 | 1 | <input type="checkbox"/> | <input type="checkbox"/> | N/A | N/A | <input type="checkbox"/> | 1.88 | <input checked="" type="checkbox"/> | <25% | <input checked="" 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"/> |

Comments: The requested rate (0.15 cfs) is greater than 1 percent (0.0188 cfs) of the stream discharge which is equaled or exceeded 80 percent of time (1.88 cfs) for SW 1. Per OAR 690-009-0040(c), the Potential for Substantial Interference (PSI) is assumed.

The anticipated interference with SW 1 due to the proposed use was quantitatively estimated using the Hunt (2003) model. Hydraulic parameters used for the analysis were derived from regional data and studies (Pumping Test Reports; 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 given parameter within the hydrogeologic regime (Domenico and Mifflin, 1965; Freeze and Cherry, 1979; Halford and Kuniansky, 2002). Results indicate that interference with SW 1 is not anticipated to exceed 25 percent of the rate of withdrawal

within the first 30 days of continuous pumping. Depletion of local surface water will be buffered by the low vertical hydraulic conductivity and substantial thickness of fine-grained sediments between the relevant water-bearing zones and local streambeds. However, there will still be some depletion of surface water. 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 which time surface water depletion is anticipated to be relatively constant throughout the year.

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: N/A

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:** **If the applicant reduces the requested rate to less than 0.0188 cfs, PSI will no longer be assumed.**

References Used:

Application File: G-19001

Pumping Test Reports: MARI 809, 884, 905, 1519, 2011, 17630, 55251, 58399, 58546, 59508

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.

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, Professional Paper 1424-A, 32 p: U. S. Geological Survey, Reston, VA.

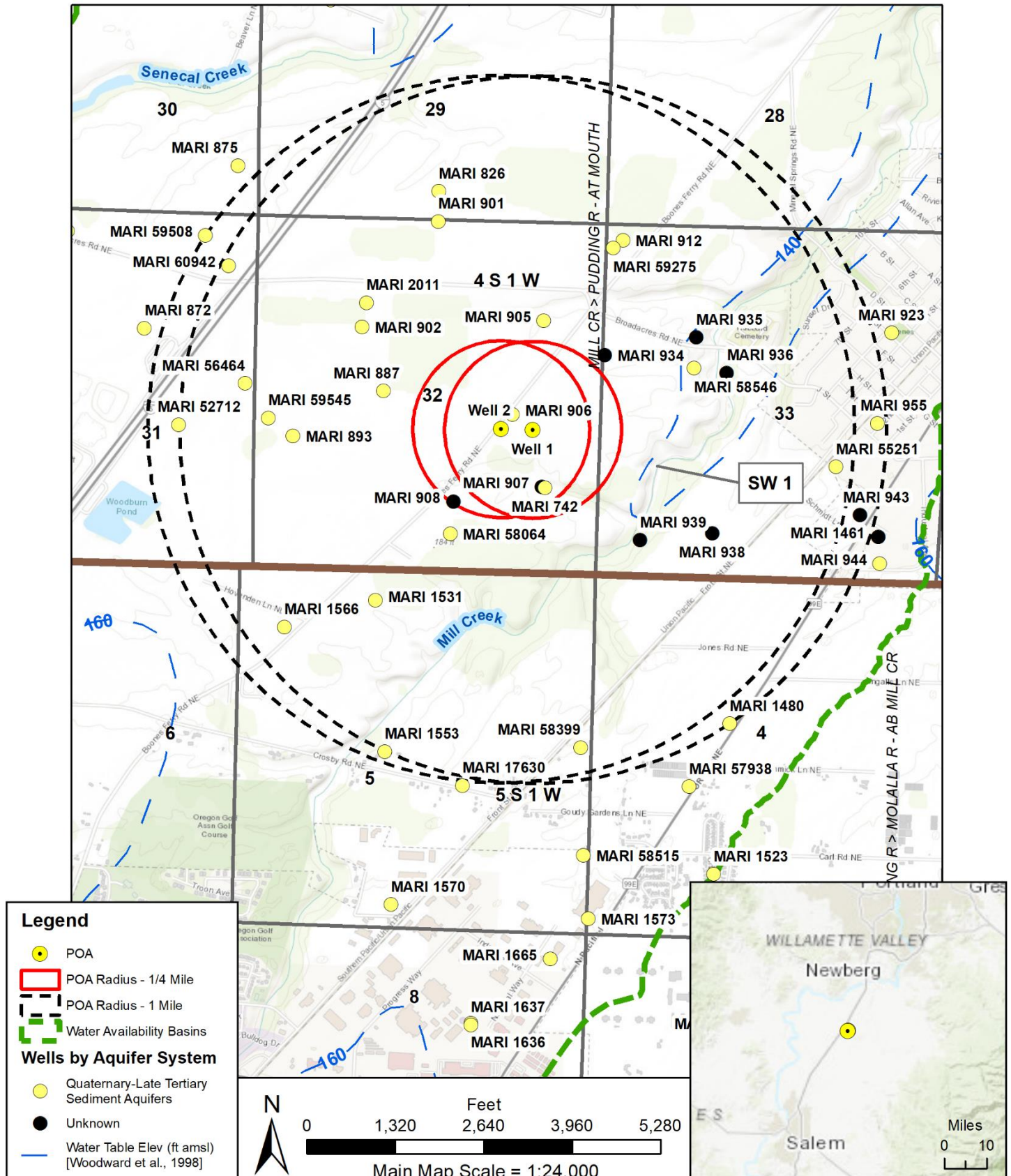
- Halford, K.J., and Kuniansky, E.L., 2002, Documentation of Spreadsheets for the Analysis of Aquifer-Test and Slug-Test Data, Open File Report 02-197, 51 p: U. S. Geological Survey, Reston, VA.
- Iverson, J., 2002, Investigation of the hydraulic, physical, and chemical buffering capacity of Missoula flood deposits for water quality and supply in the Willamette Valley of Oregon: Unpublished M.S. thesis, Oregon State University, 147 p.
- McFarland, W.D., and Morgan, D.S., 1996, Description of the Ground-Water Flow System in the Portland Basin, Oregon and Washington, Water Supply Paper 2470-A, 58 p: U. S. Geological Survey, Reston, VA.
- United States Geological Survey, 2014, National Hydrography Dataset (NHD), 1:24,000, U. S. Department of the Interior, Reston, VA.
- United States Geological Survey, 2017, Woodburn quadrangle, Oregon [map], 1:24,000, 7.5 minute topographic series, U.S. Department of the Interior, Reston, VA.
- Watershed Sciences, 2009, LIDAR remote sensing data collection, Department of Geology and Mineral Industries, Hood to Coast, Oregon: Portland, OR, May 27.
- 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 #: 1 Logid: NO WELL LOG
- D2. **THE WELL does not appear to meet current well construction standards based upon:**
- review of the well log;
 - field inspection by _____;
 - report of CWRE _____;
 - other: (specify) _____
- D3. **THE WELL construction deficiency or other comment is described as follows:** Applicant did not provide a well log or detailed construction information for existing Well 1. Based on property records accessed via the Marion County Assessor's online database, log MARI 886 is believed to correspond to existing Well 1. Applicant should provide additional construction information (including, at a minimum, height of casing above ground surface, depth of seal interval, and an accurate total depth) to determine whether Well 1 meets Well Construction Standards and, if possible, confirm whether Well 1 is in fact MARI 886.
- D4. **Route to the Well Construction and Compliance Section for a review of existing well construction.**
-

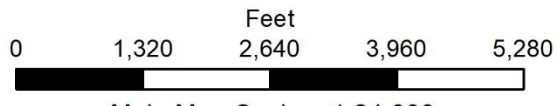
Well Location Map

G-19001 Stutzman

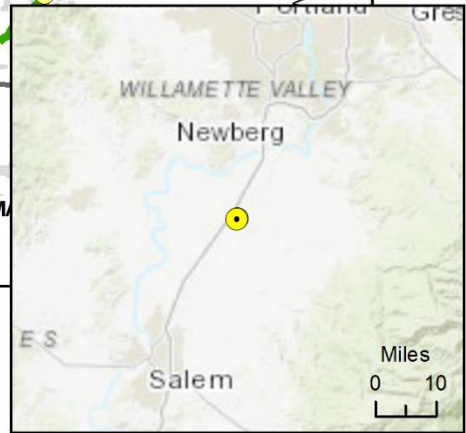


Legend

- POA
- POA Radius - 1/4 Mile
- POA Radius - 1 Mile
- Water Availability Basins
- Wells by Aquifer System**
- Quaternary-Late Tertiary Sediment Aquifers
- Unknown
- Water Table Elev. (ft amsl) [Woodward et al., 1998]

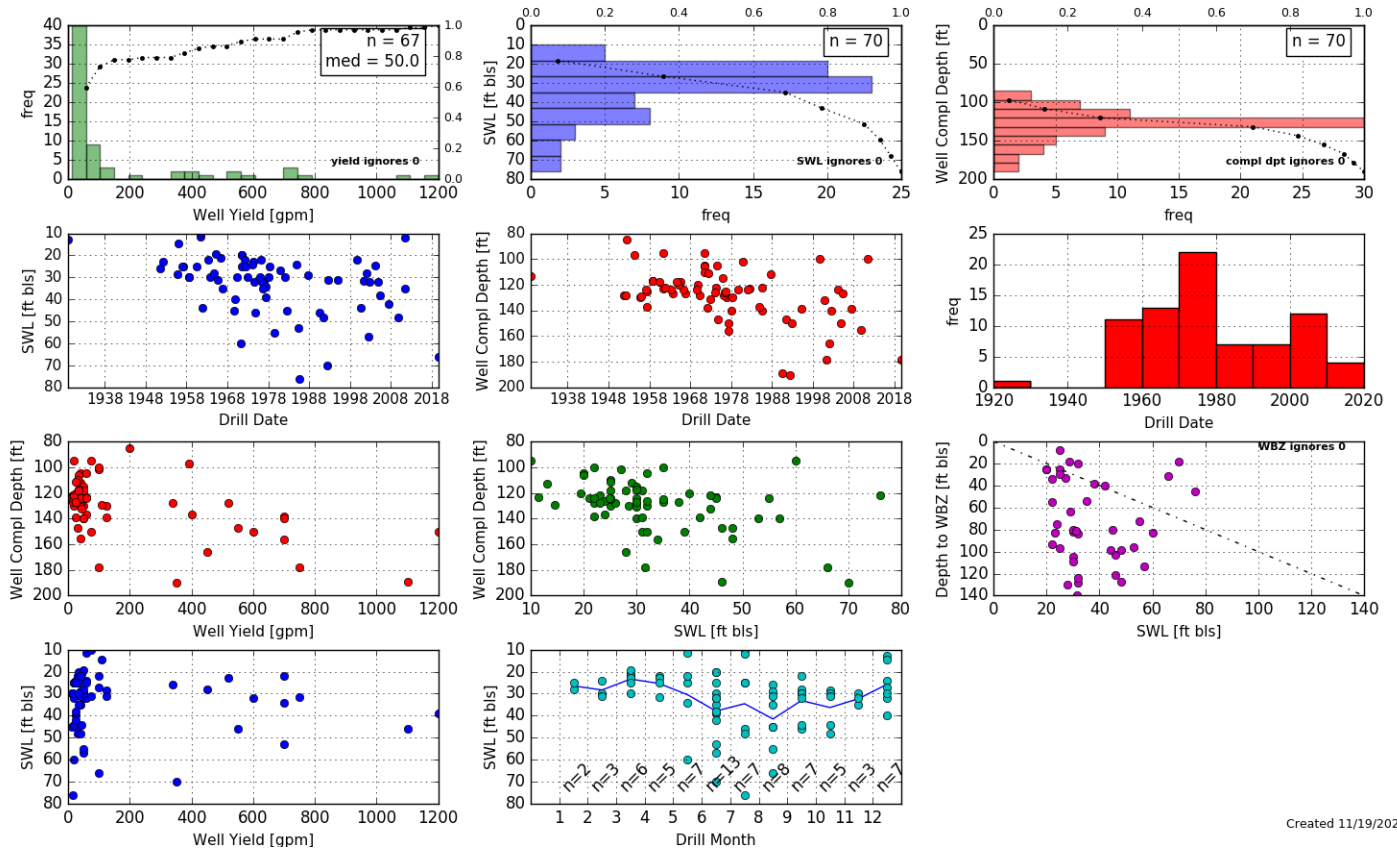


Main Map Scale = 1:24,000



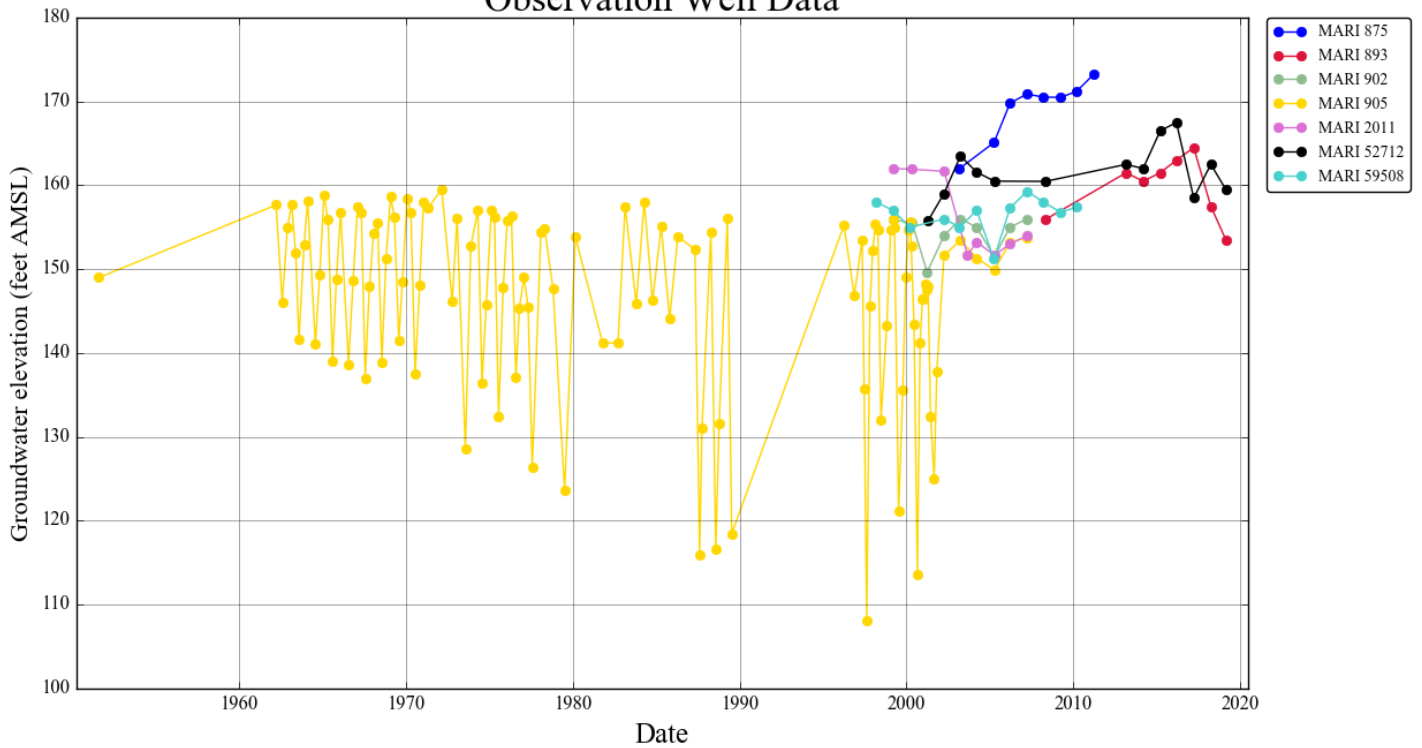
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Well Statistics – T4S/R1W S32 & S33



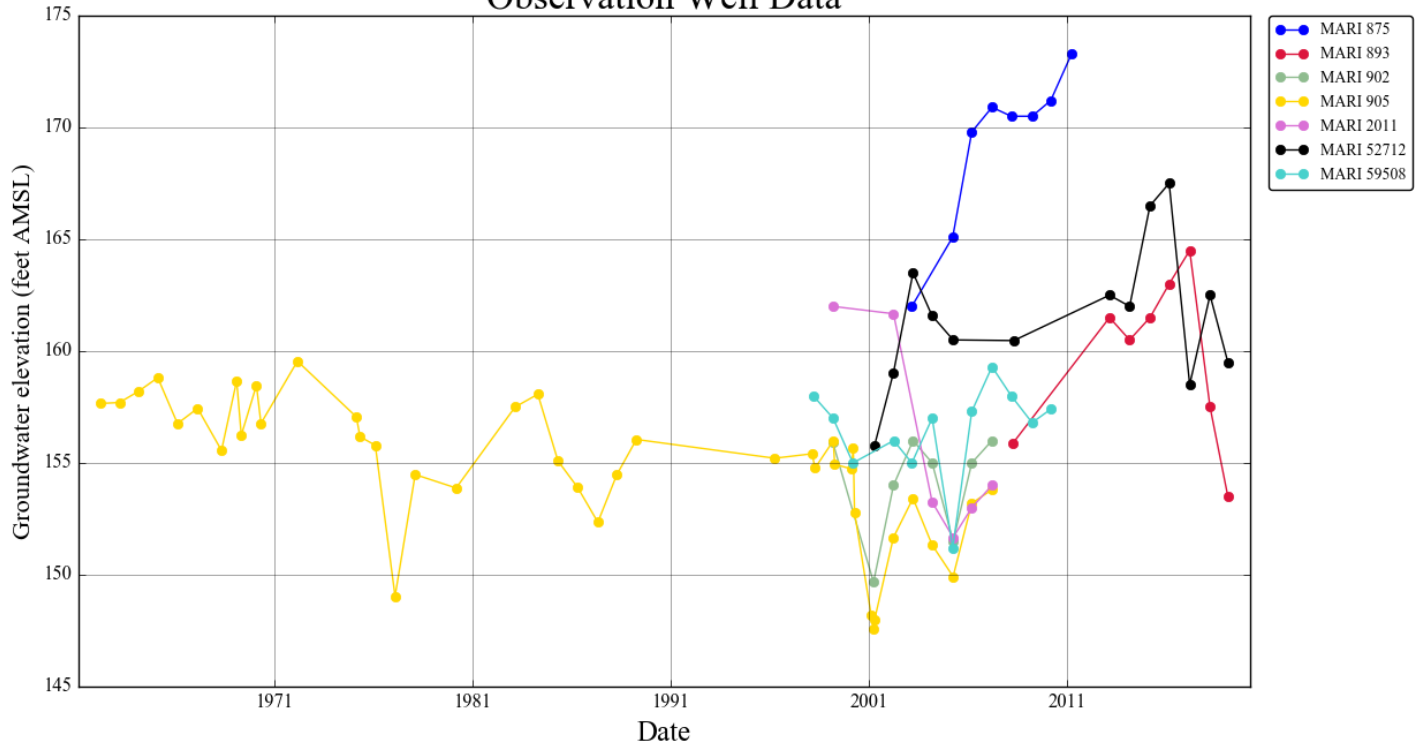
Hydrographs – all measurements

Observation Well Data



Hydrographs – spring measurements only

Observation Well Data



Water Availability Tables

MILL CR > PUDDING R - AT MOUTH
WILLAMETTE BASIN

Water Availability as of 11/23/2020

Watershed ID #: 30200901 [\(Map\)](#)

Exceedance Level: 80%

Date: 11/23/2020

Time: 2:43 PM

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 | 39.20 | 9.74 | 29.50 | 0.00 | 0.00 | 29.50 |
| FEB | 53.90 | 9.88 | 44.00 | 0.00 | 0.00 | 44.00 |
| MAR | 38.40 | 9.47 | 28.90 | 0.00 | 0.00 | 28.90 |
| APR | 27.60 | 7.09 | 20.50 | 0.00 | 0.00 | 20.50 |
| MAY | 13.70 | 5.70 | 8.00 | 0.00 | 0.00 | 8.00 |
| JUN | 8.72 | 7.01 | 1.71 | 0.00 | 0.00 | 1.71 |
| JUL | 3.79 | 10.80 | -6.96 | 0.00 | 0.00 | -6.96 |
| AUG | 2.09 | 8.74 | -6.65 | 0.00 | 0.00 | -6.65 |
| SEP | 1.88 | 4.78 | -2.90 | 0.00 | 0.00 | -2.90 |
| OCT | 2.39 | 1.25 | 1.14 | 0.00 | 0.00 | 1.14 |
| NOV | 6.05 | 7.23 | -1.18 | 0.00 | 0.00 | -1.18 |
| DEC | 25.90 | 9.56 | 16.30 | 0.00 | 0.00 | 16.30 |
| ANN | 30,000.00 | 5,500.00 | 25,300.00 | 0.00 | 0.00 | 25,300.00 |

Stream Depletion Analysis – Hunt (2003)

| | |
|--------------------------------------|-------|
| Application type: | G |
| Application number: | 19001 |
| Well number: | 1 |
| Stream Number: | 1 |
| Pumping rate (cfs): | 0.15 |
| Pumping duration (days): | 245 |
| Pumping start month number (3=March) | 3.0 |

| Parameter | Symbol | Scenario 1 | Scenario 2 | Scenario 3 | Units |
|--|--------|------------|------------|------------|----------------------|
| Distance from well to stream | a | 1910 | 1910 | 1910 | ft |
| Aquifer transmissivity | T | 1000 | 2550 | 5580 | ft ² /day |
| Aquifer storativity | S | 0.005 | 0.001 | 0.0005 | - |
| Aquitard vertical hydraulic conductivity | Kva | 0.001 | 0.005 | 0.01 | ft/day |
| Aquitard saturated thickness | ba | 65 | 55 | 45 | ft |
| Aquitard thickness below stream | babs | 40 | 35 | 25 | ft |
| Aquitard specific yield | Sya | 0.2 | 0.2 | 0.2 | - |
| Stream width | ws | 20 | 20 | 20 | ft |

Stream depletion for Scenario 2:

| Days | 10 | 330 | 360 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 |
|-----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Depletion (%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 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 |

