Groundwater Application Review Summary Form

Application # G- 19177

GW Reviewer Stacey Garrison/Travis Brown Date Review Completed: 2/27/2024

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 **_February 27 2024_**

TO: **Application** G-**_19177_**

FROM: **GW:** **_Stacey Garrison/Travis Brown_**
(Reviewer's Name)

SUBJECT: Scenic Waterway Interference Evaluation

☐ **YES**
☒ **NO** The source of appropriation is hydraulically connected to a State Scenic Waterway or its tributaries

☐ **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 2/27/2024
FROM: Groundwater Section Stacey Garrison/Travis Brown
Reviewer's Name
SUBJECT: Application G- **19177** 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: **Katherine and Joshua McBee** County: **Marion**

A1. Applicant(s) seek(s) 0.138 cfs from 1 well(s) in the Willamette Basin, Mainstem Willamette River subbasin

A2. Proposed use Nursery Seasonality: Year-round (Jan 1-Dec 31)

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

Well	Logid	Applicant's Well #	Proposed Aquifer*	Proposed Rate(cfs)	Location (T/R-S QQ-Q)	Location, metes and bounds, e.g. 2250' N, 1200' E fr NW cor S 36
1	MARI 18670	2	Alluvial	0.138	3S/1W-33 NE-SE	1965' N, 215' W fr SE cor S 33[a]

* 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	190[b]	101	80	9/1/1993	238	0-20	0-238		PRF 215-236	350		Air

Use data from application for proposed wells.

A4. **Comments:** The requested POA/POU is located approximately 4.5 miles to the west of Canby, Oregon. The applicant requests to use 0.138 cfs (61.7 gpm) for 5.5 ac of nursery use for a maximum annual duty of 27.5 acre-feet (AF) year-round from January 1-December 31.

[a] There appears to be a discrepancy in the Public Lands Survey System (PLSS) projection used in the application map and that used by Department. The "metes-and-bounds" location description provided in the application for the POA is 60 feet southeast of the mapped location. In addition, the mapped location of the POA is 32 ft east of the location for MARI 18670 previously determined by the Department. The applicant's mapped location is used for this review.

[b] Well head elevation estimated based on LIDAR measurements at proposed/existing well locations (Watershed Sciences, 2009).

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 requested POA is anticipated to produce groundwater from a confined aquifer, therefore, per OAR 690-502-0240, the relevant Willamette Basin Rules (OAR 690-502-0050 and -0120) do not apply.

A6. ☐ **Well(s) #** _____ , _____ , _____ , _____ , _____ , tap(s) an aquifer limited by an administrative restriction.
Name of administrative area:
Comments: N/A

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) **7RLN (initial and annual water level measurement)**;

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/POU are located near the northern extent of a northeast-trending synclinal trough, referred to as the French Prairie area (Price 1967). This area is fairly flat, due to filling of the trough with Quaternary surficial deposits also known as the Willamette Silt; the Willamette Silt is primarily associated with rhythmically layered clay, silt, sand and gravel from the Missoula Floods (Price 1967, Gannett & Caldwell 1998, O'Connor et al 2001, Wells et al 2020). The upper 80 ft of the Willamette silt in this area is typified by tan to reddish-brown silts with lenses of sand, and grades into coarser materials with depth (Price 1967). In adjacent areas, the Willamette silt is reported in drillers logs as sand or silty clay, in tones of blue and yellow (Hampton 1972, Swanson et al 1993, Gannett & Caldwell 1998, Conlon et al 2005). The Willamette silt is approximately 130 ft thick in this area, and the underlying Troutdale formation is approximately 260 ft thick (Price 1967). The Troutdale formation, considered part of the Middle Sedimentary Unit and the Willamette aquifer, is the principle source of groundwater in the area and is characterized by poorly-to-well-sorted, alternating layers of clay, silt, and sand (Price 1967, Conlon et al 2005). Gravel, when present, is often poorly sorted, and can result in a lower than anticipated permeability (Price 1967). There is a wide variability in hydraulic characteristics of the Willamette aquifer, owing to the variety of compositions and degree of consolidation (O'Connor et al 2001). The Troutdale formation in this area is described as reddish-brown sands, silts, clays, and gravels (Price 1967).

Nearby well logs report layers of yellow, brown and blue sandy clays above the water-bearing zones, WBZs (MARI 151, MARI 154, MARI 157, MARI 160, MARI 163, MARI 164, MARI 167, MARI 55865, MARI 69448). The proposed POA, MARI 18670, also reports layers of blue and brown sandy clays above the WBZ, so it likely utilizes a WBZ in the Willamette aquifer. MARI 18670 reports multiple WBZs, but is perforated to utilize a single WBZ that is 38 ft thick.
A review of statistics for nearby alluvial well records was completed and compared with the proposed rate of 0.138 cfs (61.7 gpm) for this application (see Well Statistics). Based on the statistics for the township, range, section and surrounding sections of the proposed POA, the proposed rate of use of 0.138 cfs (61.7 gpm) is likely within the capacity of the

groundwater resource; median reported well yield is 30 gpm, and the maximum reported yield is 2,000 gpm. The proposed rate for this application is 206% of the median and 3% of the maximum reported yield. However, the pumping rates of the surrounding wells range from 242 to 1,200 gpm and MARI 18670 reports a pumping rate of 350 gpm.

Water level trends for nearby (1 to 3 miles from POA) wells that utilize alluvial aquifers appear to be declining (see Water Level Measurements in Nearby Wells). Seven of the eleven wells included have experienced water level declines ranging from 3 to 7 ft over the last 10 years (CLAC 62437, MARI 308, MARI 365, MARI 51133, MARI 53448, MARI 59123, MARI 60579). The remaining 4 wells appear to have steady water levels. MARI 308 is part of the Department's long-term monitoring network, and the measurements demonstrate that the decline has been occurring for some time (see Water Level Measurements MARI 308). There are 32 groundwater POAs for 36 water rights within 1 mile of Well 1, and nearly all utilize the alluvial aquifer. While there are steady declines, there is not a preponderance of evidence to support that the water levels in the alluvial groundwater reservoir are declined excessively or excessively declining; therefore, the groundwater reservoir is not over-appropriated.

The nearest groundwater user to Well 1 that is not on the same taxlot is MARI 69448 (an exempt domestic well), with an estimated location 365 ft north of the POA, at an elevation of ~184 ft msl. The address for the property located north of MARI 18670 is reported on the well log for MARI 69448. MARI 69448 is reported to be at 3S/1W-33 NESE on taxlot 801. Without additional information, the center of taxlot 801 was used as the estimated location for MARI 69448. MARI 69448 is completed to a depth of 210 ft bls (-26 ft msl). It is likely the proposed use would cause some degree of well-to-well interference with MARI 69448. To assess the degree of drawdown, a Theis drawdown analysis was conducted for the proposed use (see attached Theis Drawdown Analysis). Results indicate that the proposed use is not likely to cause well-to-well interference with MARI 69448 that exceeds the threshold under the standard condition for alluvial aquifers in the Willamette Basin.

Based on this analysis of the available data and under the assumptions previously identified, groundwater for the proposed use **will likely be available in the amounts requested within capacity of the resource.** If a permit is issued for this application, the conditions specified in B1(d)(i) and B2(c) are strongly recommended to protect senior users and the groundwater resource.

NOTE: This evaluation considers a conservative scenario for the nearest authorized POA not owned by the applicant. Other authorized POAs in the area may also experience an increase in interference as a result of this application, although to a lesser extent than the scenario evaluated here.

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**	☒	☐

Basis for aquifer confinement evaluation: Well 1 (MARI 18670) has a static water level (SWL) reported to be 80 ft bls [elevation of 110 ft msl]. MARI 18670 reports clay layers from surface to 172 ft bls [18 to 190 ft msl], including a 3 ft thick layer of water-bearing sands not utilized by the well. A sand and gravel WBZ not utilized by the well is reported from 172 to 192 ft bls [-2 to 18 ft msl] with an 80 ft [110 ft msl] SWL. A hardpan layer is reported from 192 to 196 ft bls [-6 to -2 ft msl], and the WBZ utilized by the well is 196 to 234 ft bls [-44 to -6 ft msl]. It's possible that the hardpan layer is the confining layer, but even if it is not, a confined aquifer is confirmed as the SWL is 92 ft above the bottom of the clay layers that extends to 172 ft bls [18 ft msl]. MARI 18670 is continuously sealed to 20 ft bls [170 ft msl].

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**	**Deer Creek**	**140-160[a]**	**145-171[b]**	**2,815**	☒	☐	☐	☐	☒
1	**2**	**Willamette River**	**140-160[a]**	**20-26 [c]**	**6,286**	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation: MARI 18670 is continuously sealed to 20 ft bls [170 ft msl]. The SWL is 80 ft bls [110 ft msl] and the utilized WBZ is between 196 to 234 ft bls [-44 to -6 ft msl]. The streambed of SW 1 (Deer Creek) is between 145 and 171 ft elevation within a mile of MARI 18670. Although the SWL of MARI 18670 is 35 ft lower than the surface water elevations estimated for SW 1, the measurement reported for MARI 18670 was collected in early September, when groundwater levels are anticipated to be temporarily depressed due to increased pumping and decreased recharge. The SWL reported in published literature for the area is between 140 and 160 ft msl (Price 1967, Woodward and Gannet 1998). The

local groundwater is likely discharging to SW 1, and the preponderance of evidence indicates that SW 1 (Deer Creek) is hydraulically connected to the alluvial aquifer system.
The bed of SW 2 (Willamette River) is approximately 20-26 ft msl in elevation in the reach near the POA, indicating that the local groundwater is discharging to SW 2. This is consistent with regional groundwater models, which report that the Willamette River has incised completely through the Willamette silt confining layer, and into the Willamette aquifer (Morgan and McFarland 1996, Woodward et al 1998, Conlon et al 2005). The local alluvial aquifer is hydraulically connected to SW 2.
[a] Price 1967, Woodward et al 1998
[b] Surface water elevation were estimated from land surface elevations along stream reaches (Watershed Sciences, 2009; USGS, 2013).

[c] Willamette River bed elevation from Willamette River Bathymetric Survey (USGS 2002).

Water Availability Basin the well(s) are located within:
SW 1: MILL CR>PUDDING R-AT MOUTH
SW 2: WILLAMETTE R>COLUMBIA R-AB MOLALLA R

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**	☐	☐	**NA**	**NA**	☐	**1.88**	☒	**<1%**	☒

Comments: **The total maximum rate requested 0.138 cfs (61.7 gpm) and a prorated rate based on the maximum allowed duty of 0.038 cfs (17 gpm) are both greater than 1 percent (0.0188 cfs) of the 80% Natural Flow (1.88 cfs) for SW 1 (Deer Creek). Therefore, per OAR 690-009-0040 (4) (c), the requested POA and allocation are assumed to have the potential to cause substantial interference (PSI) with SW 1. However, if the applicant reduces the total maximum rate requested to less than 0.0188 cfs (~8.44 gpm), PSI would no longer be assumed on this basis.**
Potential depletion (interference with) SW 1 (Deer Creek) was estimated using 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.

Because only the distance is expected to vary between the POA and surface water sources, only the POA-SW pair with the shortest distance (in this case, POA 1 and SW 1) was analyzed quantitatively for interference (stream depletion). All other POA-SW pairs would presumably result in less interference due to their greater separation relative to POA 1 and SW 1. Therefore, the interference of both proposed POA with all surface water sources within 1 mile are anticipated to result in much less than 25 percent of the well discharge at 30 days of continuous pumping.

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: N/A-the rate is not distributed among multiple wells.

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		**0.038**	**0.038**	**0.038**	**0.038**	**0.038**	**0.038**	**0.038**	**0.038**	**0.038**	**0.038**	**0.038**	**0.038**
Interference CFS													
Distributed Wells Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
(A) = Total Interf.													
(B) = 80 % Nat. Q		**21,400**	**23,200**	**22,400**	**19,900**	**16,600**	**8,740**	**4,980**	**3,830**	**3,890**	**4,850**	**10,200**	**19,300**
(C) = 1 % Nat. Q		**214**	**232**	**224**	**199**	**166**	**87.4**	**49.8**	**38.3**	**38.9**	**48.5**	**102**	**193**
(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: It is not possible for the proposed pumping rate of 0.138 cfs (61.7 gpm) to result in an interference (stream depletion) greater than 1% of the natural flow of SW 1 (Willamette River) during any month.

C4b. **690-09-040 (5) (b) The potential to impair or detrimentally affect the public interest is to be determined by the Water Rights Section.**

C5. ☐ **If properly conditioned**, the surface water source(s) can be adequately protected from interference, and/or groundwater use under this permit can be regulated if it is found to substantially interfere with surface water:

i. ☐ The permit should contain condition #(s)_____;

ii. ☐ The permit should contain special condition(s) as indicated in "Remarks" below;

C6. **SW / GW Remarks and Conditions:** **The proposed maximum rate 0.138 cfs (61.7 gpm) and a prorated rate based on the maximum allowed duty of 0.038 cfs (17 gpm) are both greater than 1 percent (0.0188 cfs) of the 80% Natural Flow (1.88 cfs) for SW 1 (Deer Creek). The applicant may revise the proposed maximum rate to less than 0.0188 cfs (~8.44 gpm) to avoid triggering PSI on this basis without the need for a new groundwater review.**

References Used:

Application file: G-19177

Pumping Test Files: CLAC 8578, CLAC 8661, CLAC 18450, CLAC 53111, MARI 163, MARI 172, MARI 209, MARI 358, MARI 53183, MARI 53448, MARI 56999

Well Reports: MARI 18670, MARI 151, MARI 154, MARI 157, MARI 160, MARI 163, MARI 164, MARI 167, MARI 55865, MARI 69448

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.

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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.

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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.

O'Connor, J.E., Sarna-Wojcick, A., Woznikak, K.C., Polette, D.J., Fleck, R.J., 2001, Origin, Extent, and Thickness of Quaternary Geologic Units in the Willamette Valley, Oregon; U.S. Geological Survey, Professional Paper 1620, 51 p.

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Swanson, R.D., McFarland, W.D., Gonthier, J.B., Wilkinson, J.M. 1993. A description of hydrogeologic units in the Portland Basin, Oregon and Washington: U.S. Geological Survey Water Resources Investigations Report 90-4196, 62 p

United States Geological Survey, 2002, Willamette River Bathymetric Survey-Willamette River Water Temperature Investigation: Willamette River, elevation data. Obtained from <https://or.water.usgs.gov/projs_dir/will_tmdl/main_stem_bth.html> on March 23 2022.

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

United States Geological Survey, 2014, *Sherwood quadrangle*, Oregon [map], 1:24,000, 7.5 minute topographic series, U.S. Department of the Interior, Reston, Virginia.

Wells, R.E., Haugerud, R.A., Niem, A.R., Niem, W.A., Ma, L., Evarts, R.C., O'Connor, J.E., Madin, I.P., Sherrod, D.R., Beeson, M.H., Tolan, T.L., Wheeler, K.L., Hanson, W.B., and Sawlan, M.G., 2020, Geologic map of the greater Portland metropolitan area and surrounding region, Oregon and Washington: U.S. Geological Survey Scientific Investigations Map 3443, pamphlet 55 p., 2 sheets, scale 1:63,360

Watershed Sciences, 2009, LIDAR remote sensing data collection, Department of Geology and Mineral Industries, Willamette Valley Phase I, Oregon, Portland, OR, December 21.

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:** MARI 18670

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:** N/A-no deficiencies identified.

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

Water Availability Tables

Water Availability Analysis
Detailed Reports

MILL CR > PUDDING R - AT MOUTH
WILLAMETTE BASIN
Water Availability as of 3/7/2022

Watershed ID #: 30200901 (Map)
Date: 3/7/2022

Exceedance Level: 80%
Time: 1:29 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	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	7.10	20.50	0.00	0.00	20.50
MAY	13.70	5.73	7.97	0.00	0.00	7.97
JUN	8.72	7.06	1.66	0.00	0.00	1.66
JUL	3.79	10.80	-7.05	0.00	0.00	-7.05
AUG	2.09	8.81	-6.72	0.00	0.00	-6.72
SEP	1.88	4.81	-2.93	0.00	0.00	-2.93
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	5,520.00	25,300.00	0.00	0.00	25,300.00

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Water Availability Analysis
Detailed Reports

WILLAMETTE R > COLUMBIA R - AB MOLALLA R
WILLAMETTE BASIN
Water Availability as of 3/7/2022

Watershed ID #: 182 (Map)
Date: 3/7/2022

Exceedance Level: 80%
Time: 1:27 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	21,400.00	2,300.00	19,100.00	0.00	1,500.00	17,600.00
FEB	23,200.00	7,480.00	15,700.00	0.00	1,500.00	14,200.00
MAR	22,400.00	7,250.00	15,100.00	0.00	1,500.00	13,600.00
APR	19,900.00	6,910.00	13,000.00	0.00	1,500.00	11,500.00
MAY	16,600.00	4,250.00	12,400.00	0.00	1,500.00	10,900.00
JUN	8,740.00	1,980.00	6,760.00	0.00	1,500.00	5,260.00
JUL	4,980.00	1,810.00	3,170.00	0.00	1,500.00	1,670.00
AUG	3,830.00	1,650.00	2,180.00	0.00	1,500.00	682.00
SEP	3,890.00	1,390.00	2,500.00	0.00	1,500.00	998.00
OCT	4,850.00	749.00	4,100.00	0.00	1,500.00	2,600.00
NOV	10,200.00	885.00	9,310.00	0.00	1,500.00	7,810.00
DEC	19,300.00	969.00	18,300.00	0.00	1,500.00	16,800.00
ANN	15,200,000.00	2,250,000.00	13,000,000.00	0.00	1,090,000.00	11,900,000.00

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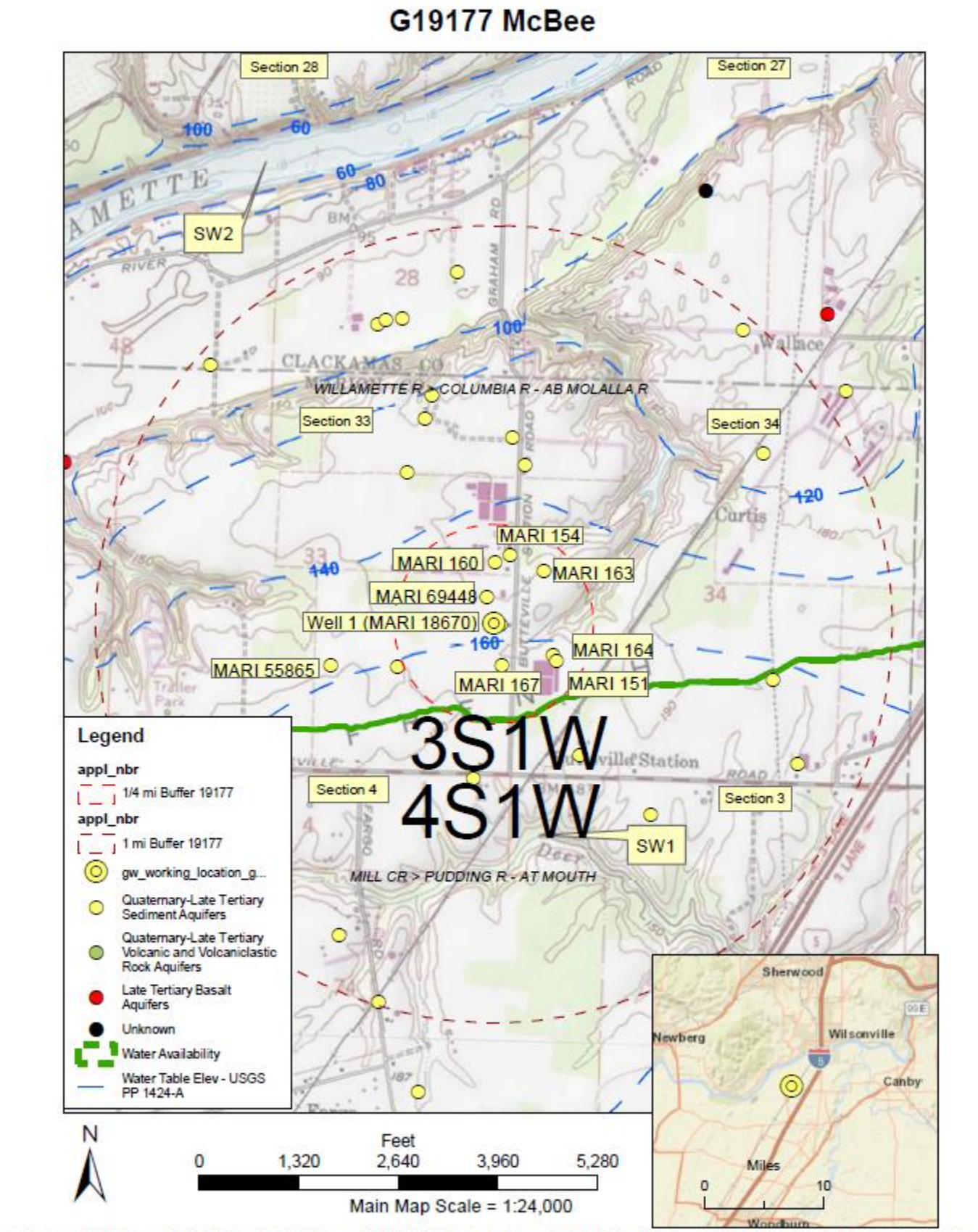
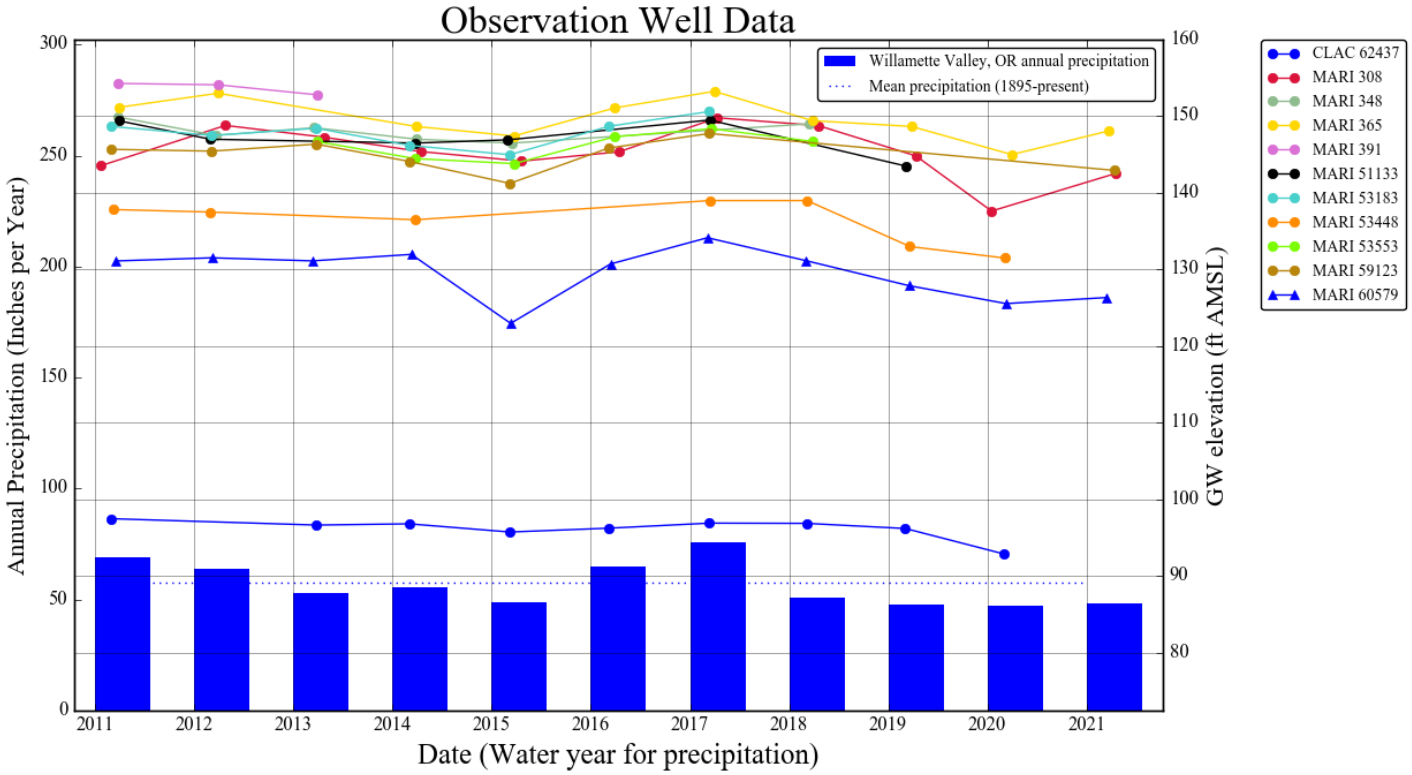
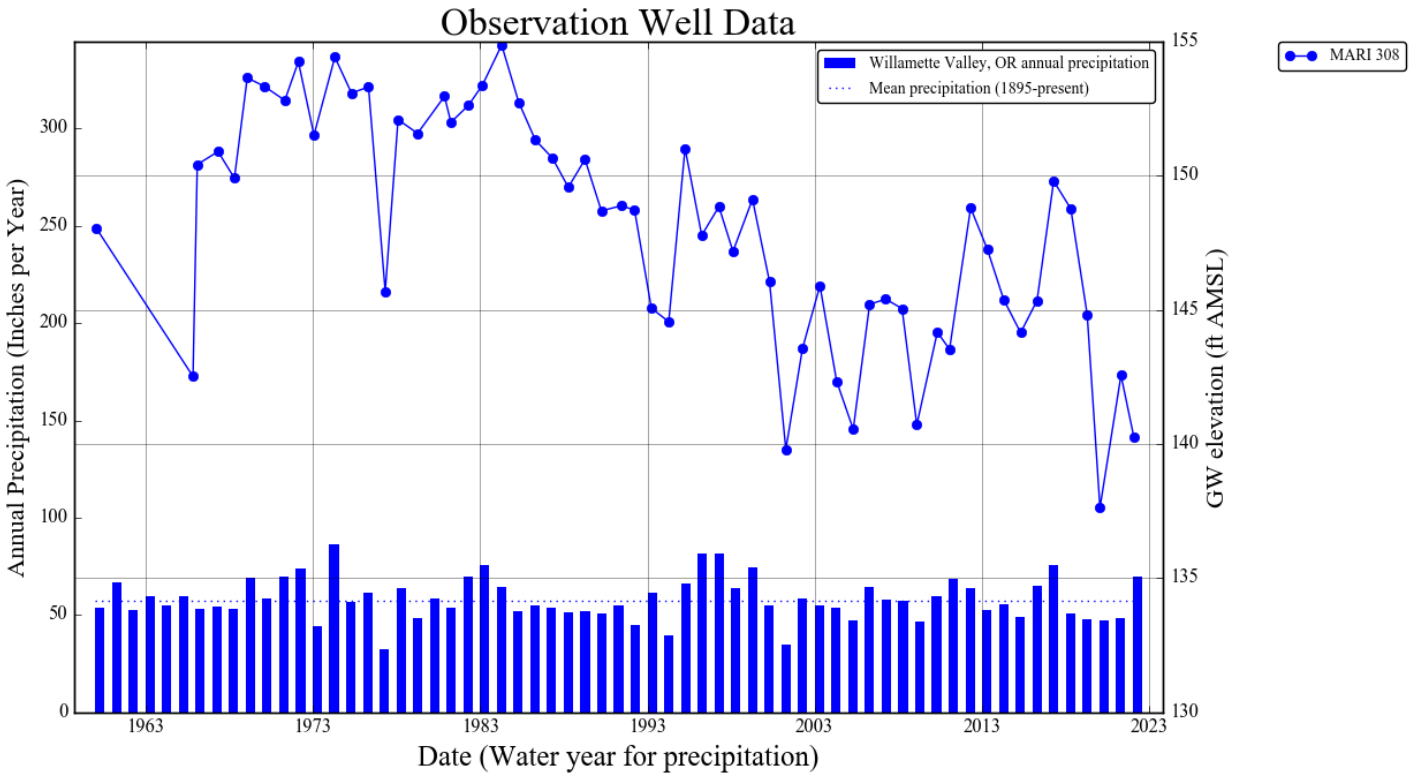
Well Location Map



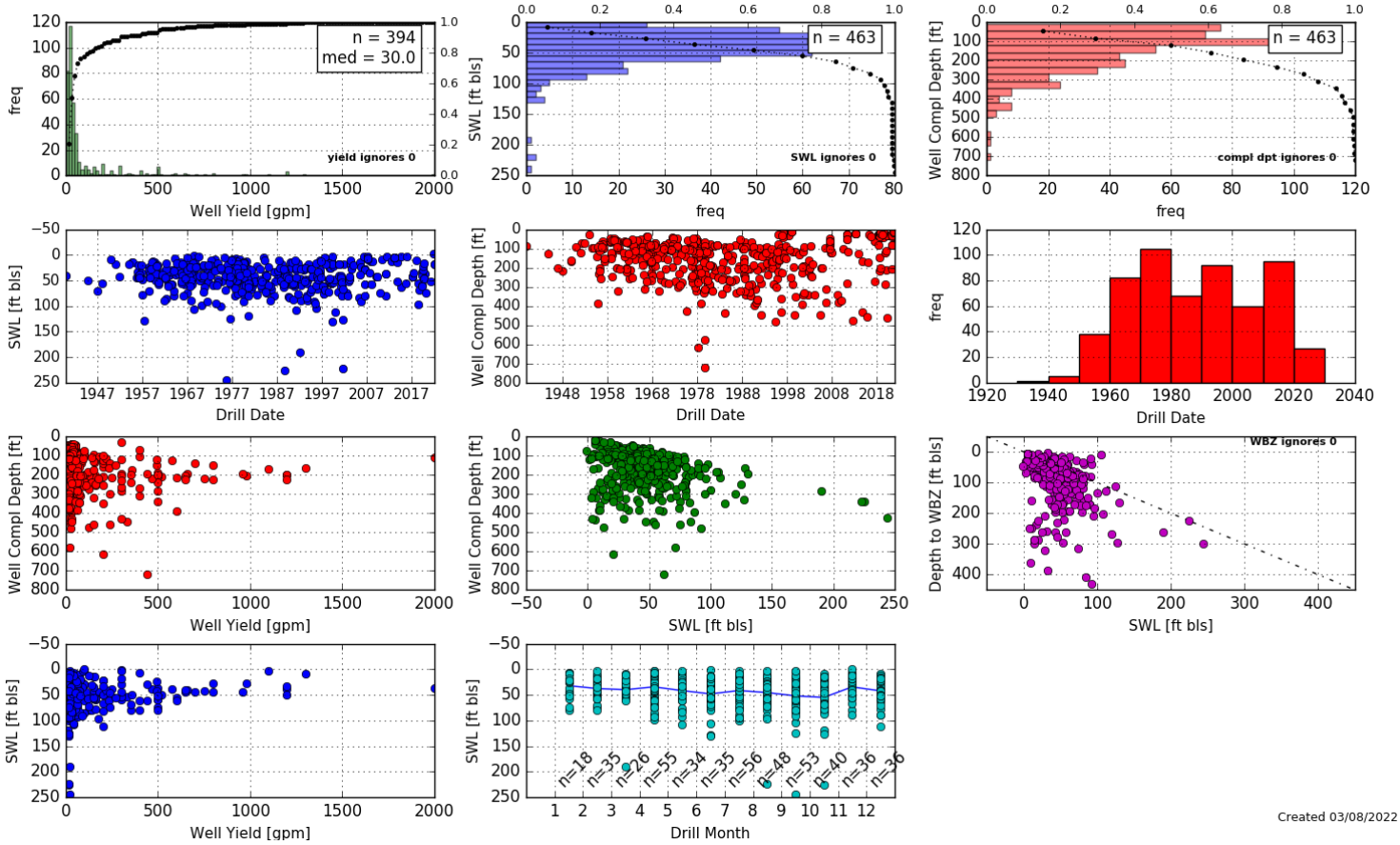
Water-Level Measurements in Nearby Wells



Water-Level Measurements in MARI 308

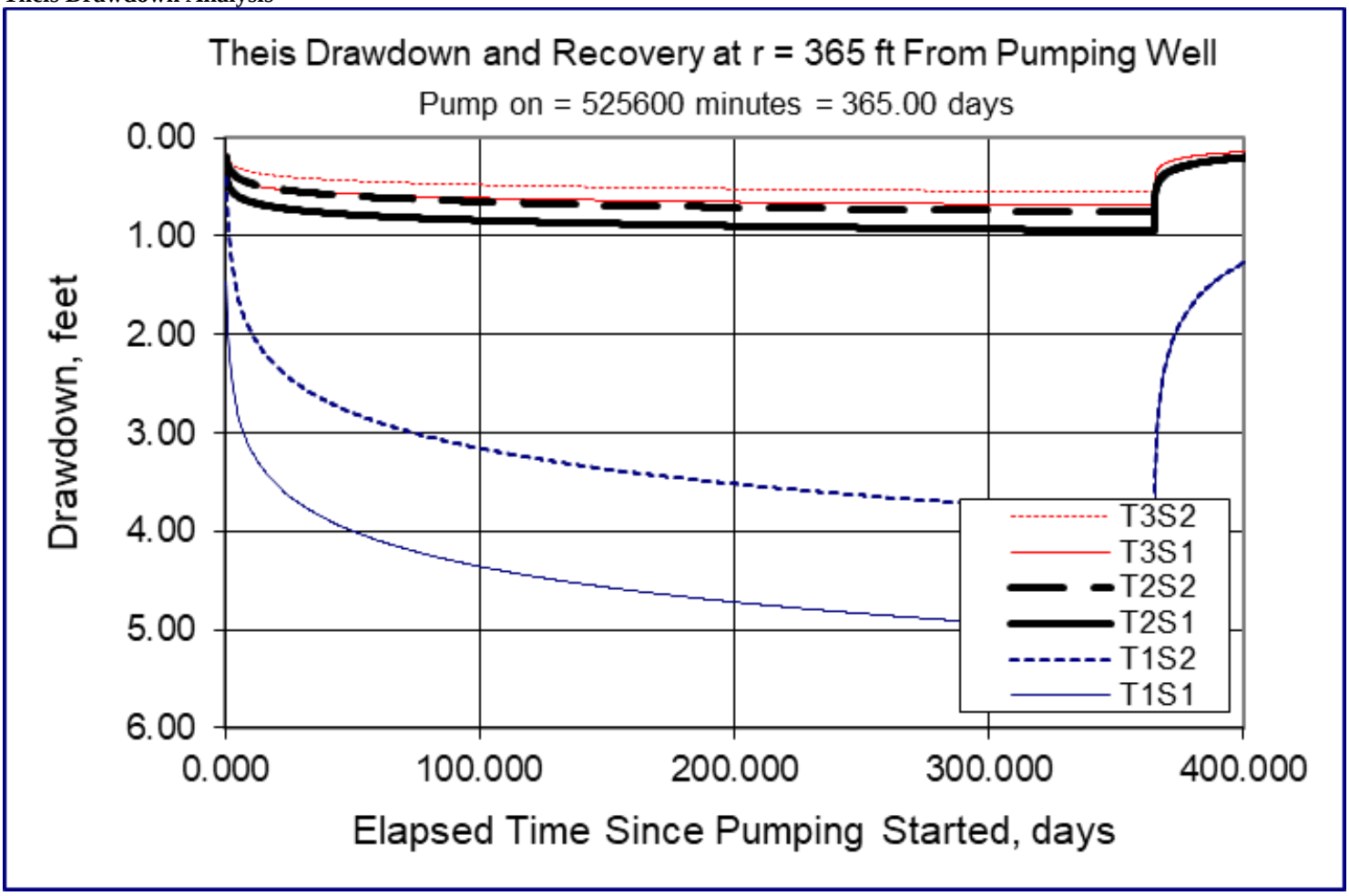


Well Statistics



Created 03/08/2022

Theis Drawdown Analysis



Radial distance from pumping well (r)=365 ft [estimated radial distance to nearest user, MARI 69448]
Pumping Rate (Q)= 0.038 cfs (~17 gpm) *
Aquifer Transmissivity (T1)= 3,740 gpd/ft (500 ft^2/day), (T2)= 23,743.02 gpd/ft (3,174.2 ft^2/day), (T3)= 33,660 gpd/ft (4,500 ft^2/day)
Storativity (s1) = 2 X 10^{-4}, (s2) = 2 X 10^{-3} [Conlon et al 2005, Tables 1 and 2 values for Central MSU]
Total pumping time = 365 days
*The full pumping rate could not be utilized continuously for the entire 365-day period of use without exceeding the 27.5 ac-ft maximum allowed duty. For the maximum allowed duty of 27.5 ac-ft, continuous pumping would occur for 365 days at a rate of 0.038 cfs (~17 gpm).

Stream Depletion Analysis-SW 1

Application type:	G
Application number:	19177
Well number:	1
Stream Number:	1
Pumping rate (cfs):	0.038
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	2815.0	2815.0	2815.0	ft
Aquifer transmissivity	T	500.0	3174.0	4500.0	ft2/day
Aquifer storativity	S	0.001	0.0003	0.0001	-
Aquitard vertical hydraulic conductivity	Kva	0.01	0.005	0.001	ft/day
Aquitard saturated thickness	ba	120	120	120	ft
Aquitard thickness below stream	babs	120.0	120.0	120.0	ft
Aquitard specific yield	Sya	0.2	0.2	0.2	-
Stream width	ws	10	10	10	ft