Approved:

MEMO

To: Kristopher Byrd, Well Construction Section Manager

From: Tommy Laird, Well Construction Program Coordinator

Subject: Review of Water Right Application G-19186

Date: February 23, 2024

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

Applicant's Well #1 (New): Well #1 is a proposed well, therefore it cannot be reviewed for construction. Construction of this 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 this well, specific attention should be paid to ensure sealing requirements are met and that the well does not commingle aquifers.

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

Groundwater Application Review Summary Form

Application # G- 19186

GW Reviewer Stacey Garrison/Travis Brown Date Review Completed: 3/25/2022

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 **_March 25 2022_**

TO: **Application** G-**_19186_**

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 3/25/2022
FROM: Groundwater Section Stacey Garrison/Travis Brown
Reviewer's Name
SUBJECT: Application G- **19186** 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: **Lindsey Family Farm LLC** County: **Marion**

A1. Applicant(s) seek(s) 0.66 cfs from 1 well(s) in the Willamette Basin, Mainstem Willamette River subbasin

A2. Proposed use irrigation Seasonality: Mar 1-Oct 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	NEW	1	alluvial[a]	0.66	6S/3W-21	550' N, 1420' W fr SE cor S 21[b]

* 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	125[c]				50[a]	18[a]						

Use data from application for proposed wells.

A4. **Comments:** The requested POA/POU is located approximately 1.3 miles to the northwest of Keizer, Oregon. The applicant requests to use 0.66 cfs (~296 gpm) for 52.9 ac of irrigation use for a maximum annual duty of 132.25 acre-feet (AF), March 1-October 31.

[a] Per applicant's proposed well construction information.

[b] 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 20 feet west of the mapped location. The applicant's mapped location is used for this review.

[c] Well head elevation estimated based on LIDAR measurements at proposed well location (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 well location is greater than ¼-mile from a surface water source, therefore per OAR 690-502-0240, the relevant Willamette Basin Rules (OAR 690-502-0050) do not apply.

A6. ☐ **Well(s) #** _____ , _____ , _____ , _____ , _____ , tap(s) an aquifer limited by an administrative restriction.
Name of administrative area:
Comments: NA-not in an administratively restricted aquifer or area.

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 water measurement condition) Large 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 **unconfined 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): NA

B3. **Groundwater availability remarks:**

The proposed POA/POU are located on Holocene floodplain deposits of the Willamette River, characterized by discontinuous sand and loose gravel (O'Connor et al 2001, Piper 1942). These deposits are part of the Upper sedimentary unit, with high values for permeability, porosity, and well yields (Conlon et al 2005). The Upper sedimentary unit is considered part of the Willamette Aquifer; the Holocene flood deposits have the highest permeability of Willamette Aquifer units, and are up to 50 ft in thickness under the Willamette River floodplain (O'Connor et al 2001). The Holocene deposits can be further delineated as active channel gravel and sand, floodplain sand and silt, and floodplain gravel and sand lenses (Wallick et al 2013). The Willamette River in this area is entrenched 10 to 20 ft below its adjacent floodplain surfaces and the proposed POA's elevation is 23 feet above the River's elevation, thus the proposed POA would likely be on the floodplain sand and silt portion of the Holocene deposits, with the active channel gravel and sand underlying at a relatively shallow depth (Wallick et al 2013). Underlying and interfingering with the Holocene flood deposits are Quaternary surficial deposits 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 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 60 ft thick in this area (Gannet and Caldwell 1998).

Four of the six wells within 3000 ft do not have any apparent confining layer (MARI 5330, MARI 5335, MARI 4969, MARI 4970), with static water levels, SWLs, ranging from 93 to 113 ft msl. The other two wells report yellow clay soil (MARI 4981), and sandy yellow clay and cemented sand/gravel (MARI 5321) with static water levels at 96 ft and 102 ft msl, respectively. Given that these wells are all on the Holocene floodplain deposits of the Willamette River, any confining layers are likely to be discontinuous due to lateral and vertical accretion action by the river (O'Connor et al 2001). This is supported by the SWL of the confined wells being within the range of the SWL for the unconfined wells. In addition, the water table elevation in this area is approximately 100 ft msl, which is within 2 ft of the elevation of the Willamette River (Conlon et al 2005, Gannet and Caldwell 1998, Piper 1942). The Holocene floodplain gravel deposits have a strong hydraulic connection to the Willamette River (Conlon et al 2005, Gannet and Caldwell 1998).

A review of statistics for nearby well records was completed and compared with the proposed rate of 0.66 cfs (296 gpm) for this application (see Well Statistics). The proposed rate of use of 0.66 cfs (296 gpm) is likely within the capacity of the groundwater resource; median reported well yield is 100 gpm, and the maximum reported yield is 1,180 gpm. The proposed

rate for this application is 296% of the median and 25% of the maximum reported yield. Not all of these wells are likely completed in the Holocene floodplain deposits, but the loose, gravel-dominated deposits of the Holocene floodplains deposits are anticipated to have the higher reported yields for the Willamette aquifer (Woodward et al 1998). In addition, the pumping rates of the surrounding wells within 3000 ft range from 270 to 750 gpm.

Water level trends for nearby (0.2 to 2 miles from POA) wells that utilize alluvial aquifers appear to be stable (see Water Levels Measurements in Nearby Wells). All the selected wells are located on Holocene floodplain deposits, nearly all with water levels within 10 feet of the elevation of the Willamette River. Two of the wells have water levels that are 15 to 20 ft above the Willamette River elevation recorded in the LiDAR dataset, however, these higher well readings are taken in the early spring when the Willamette River is elevated, whereas the LiDAR elevation was likely recorded in the summer when the river is at its lowest (see Gage Height for USGS 14191000). Water levels in the Holocene floodplain deposits are closely tied to the stream stage of the Willamette River (Conlon et al 2005). As a result, groundwater levels in the Holocene floodplains deposits are anticipated to be stable in the long-term, but seasonal fluctuations may be pronounced, particularly in late summer (see Gage Height for USGS 14191000). It appears that the proposed used is within the capacity of the resource.

The nearest groundwater user to Well 1 that is not on the same taxlot is MARI 5330 (POA for multiple certificates, oldest priority date on Claim GR 368 12/31/1968), with an estimated location 1,060 ft south of the POA, at an elevation of ~117 ft msl. MARI 5330 is completed to a depth of 46 ft bls (71 ft msl). It is likely the proposed use would cause some degree of well-to-well interference with MARI 5330. To assess the degree of drawdown, a Theis drawdown analysis was conducted for the proposed use (see Theis Drawdown Analysis). Results indicate that the proposed use is not likely to cause well-to-well interference with MARI 5330 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 and within capacity of the resource. The conditions specified in B1(d)(i) and B2(c) are 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 is proposed to be constructed to 50 ft depth [elevation of 75 ft msl] with a seal to 18 ft bls [107 ft msl]. Given the applicant's proposed well depth of 50 ft and the thickness of the Holocene deposits, it is likely that the proposed POA will utilize an unconsolidated gravel water-bearing zone in the gravel and sand Holocene deposits. A continuous confining layer is not likely, given the reported geology in nearby well logs[a] and the geomorphology of the Willamette River (Wallick et al 2013). The POA is most likely to be developed in an unconfined aquifer.

[a] MARI 5330, MARI 5335, MARI 4969, MARI 4970, MARI 4981, MARI 5321

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**	**93-113[a]**	**88-97[c]**	**4100**	☒	☐	☐	☐	☒
1	**2**	**Clagget Creek**	**93-113[a]**	**100-120[b]**	**4715**	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation: Groundwater SWL in nearby wells ranges from 93 to 113 ft msl[a], and the reported regional water table elevation in the vicinity is 100 ft msl (Conlon et al 2005, Gannet and Caldwell 1998).

The streambed of SW 1 (Willamette River) is 88-97 ft in msl[c]. The streambed of SW 2 (Clagget Creek) is between 100 and 120 ft msl within a mile of the proposed location for Well 1[b]. The local groundwater is hydraulically connected to SW 1 and SW 2 (Conlon et al 2005).

[a] Groundwater elevation calculated from static water level reported in well logs and/or latest static water level reported for MARI 5330, MARI 5335, MARI 4969, MARI 4970, MARI 4981, MARI 5321 and well head elevations estimated based on LIDAR measurements at existing well locations (Watershed Sciences, 2009).

[b] Surface water elevations 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: 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**	☐	☐	**MF182A**	**1500**	☐	**3830**	☐	**<25%**	☐
1	**2**	☐	☐	**MF182A**	**1500**	☐	**3830**	☐	**<25%**	☐

Comments: Potential depletion (interference with) SW 1 (Willamette River) and SW 2 (Clagget Creek) was estimated using the Hunt 1999 analytical model. Hydraulic parameters used for the model were derived from nearby wells, regional data or studies of the hydrogeologic regime (OWRD Well Log Query Report; Conlon et al., 2003, 2005; McFarland and Morgan, 1996; Woodward et al., 1998; Iverson 2002) or are within a typical range of values for the parameter within the hydrogeologic regime (Freeze and Cherry, 1979; Domenico and Mifflin, 1965; Morgan and Johnson 1967; Heath 1983). See attached "Stream Depletion Analysis – SW 1" for the specific parameters used in the analysis. The Hunt 1999 analytical model results indicate that depletion of (interference with) SW 1 due to pumping of the proposed POA is anticipated to be 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: NA-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													
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												
(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:

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 POA is hydraulically connected to, but not anticipated to have the potential for substantial interference with SW 1 (Willamette River) or SW 2 (Clagget Creek).

References Used:

Application file: G-19186

Pumping Test Files: MARI 5336, POLK 100, POLK 1116, POLK 1127

Well Reports: MARI 4969, MARI 4970, MARI 4981, MARI 5321, MARI 5330, MARI 5335

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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.

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Heath, R.C. 1983. Basic ground-water hydrology. United States Geological Survey Water Supply Paper 2220, 86 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, Mission Bottom quadrangle, Oregon [map], 1:24,000, 7.5 minute topographic series, U.S. Department of the Interior, Reston, Virginia.

Wallick, J.R., Jones, K.L. O'Connor, J.E., Keith, M.K., Hulse, David, and Gregory, S.V., 2013, Geomorphic and vegetation processes of the Willamette River floodplain, Oregon—Current understanding and unanswered questions: U.S. Geological Survey Open-File Report 2013-1246., 70 p.

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 #**: _____ **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.**

Water Availability Table

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

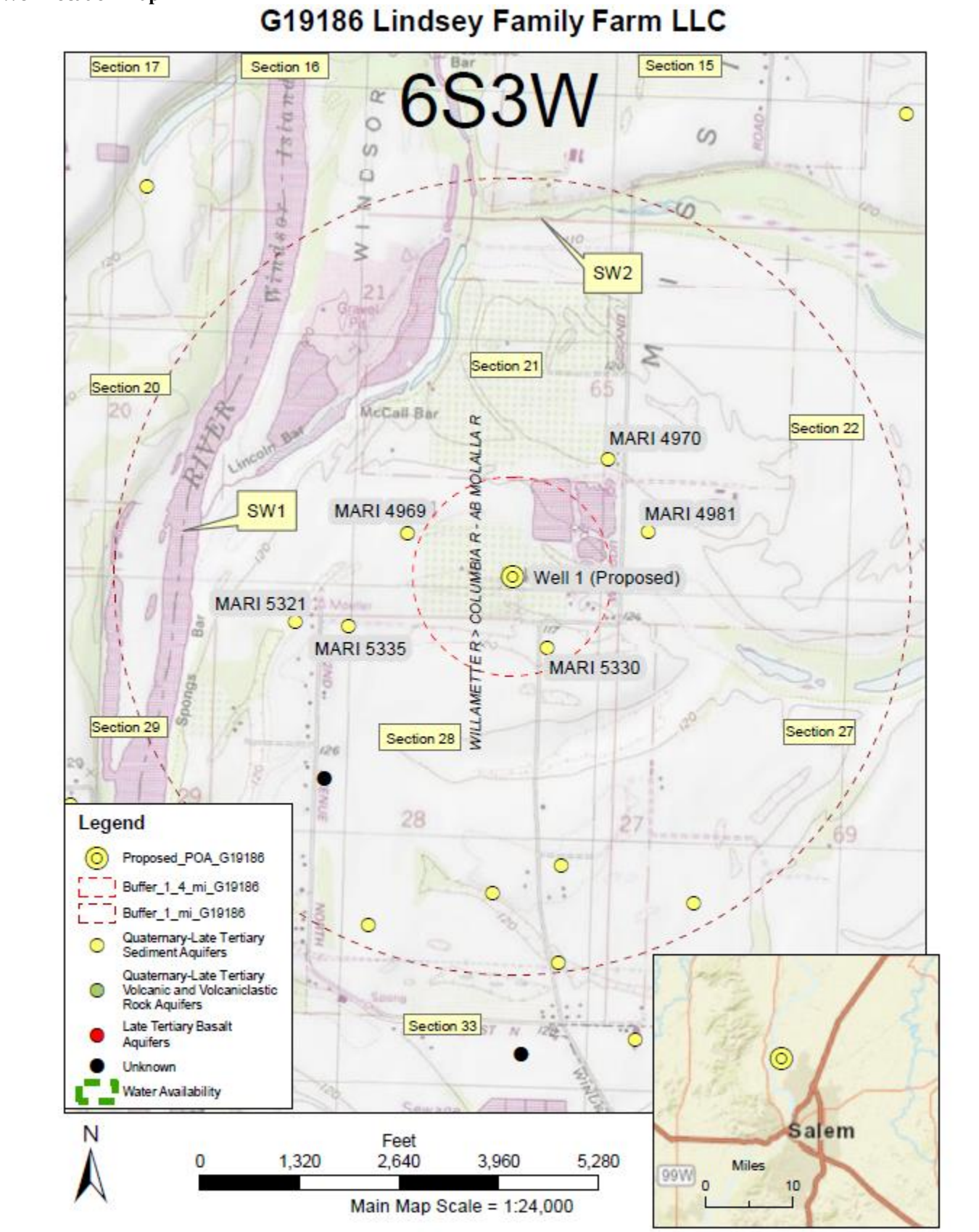
Water Availability Calculation

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

Download Data (Text - Formatted , Text - Tab Delimited , Excel)

Well Location Map



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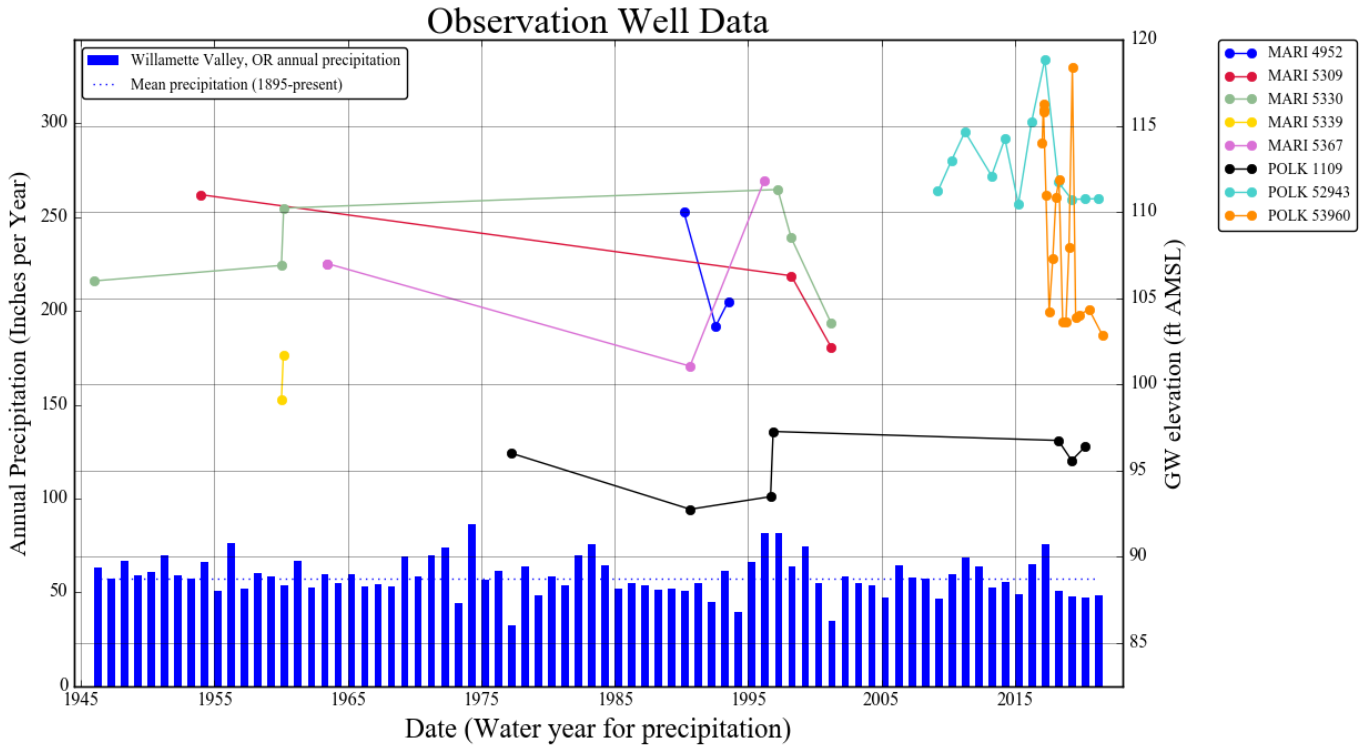
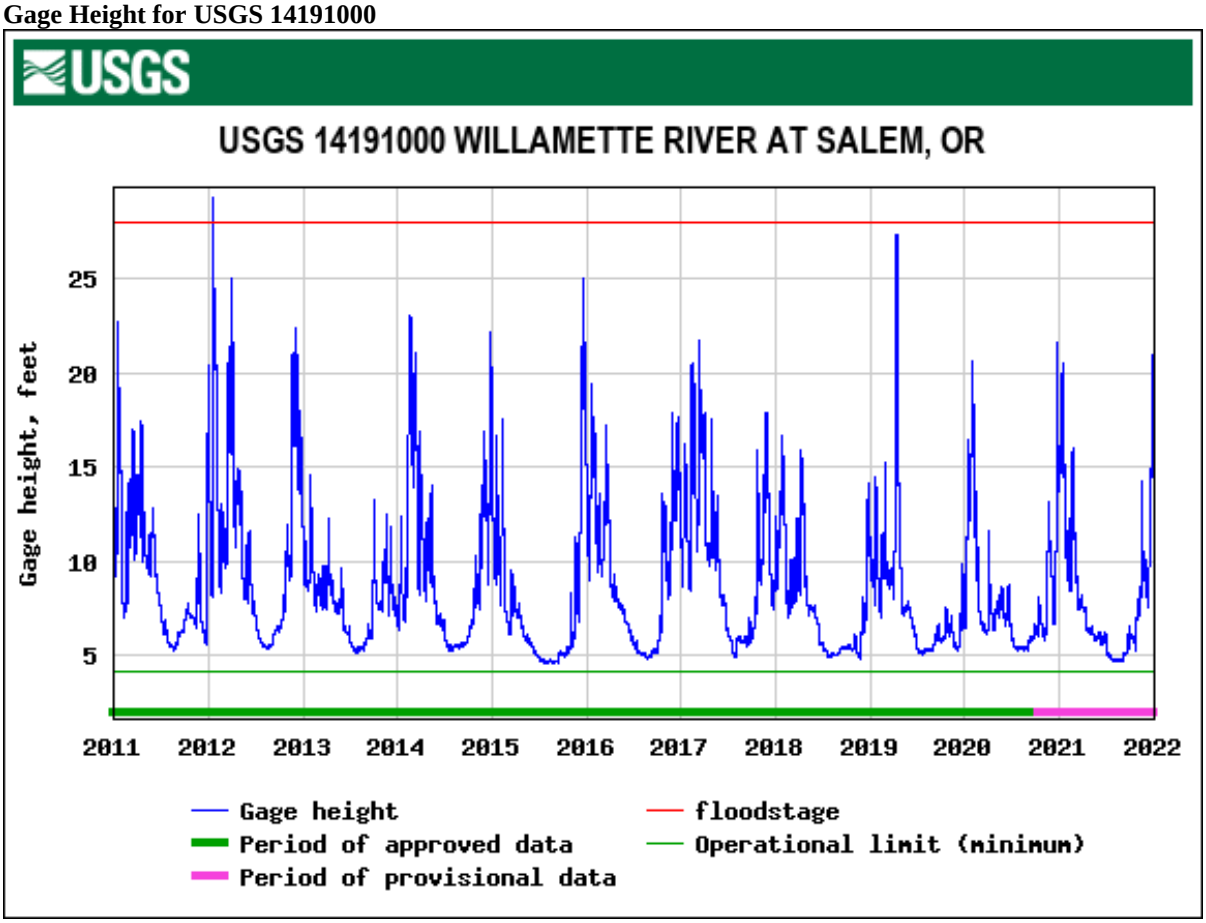
Water-Level Measurements in Nearby Wells

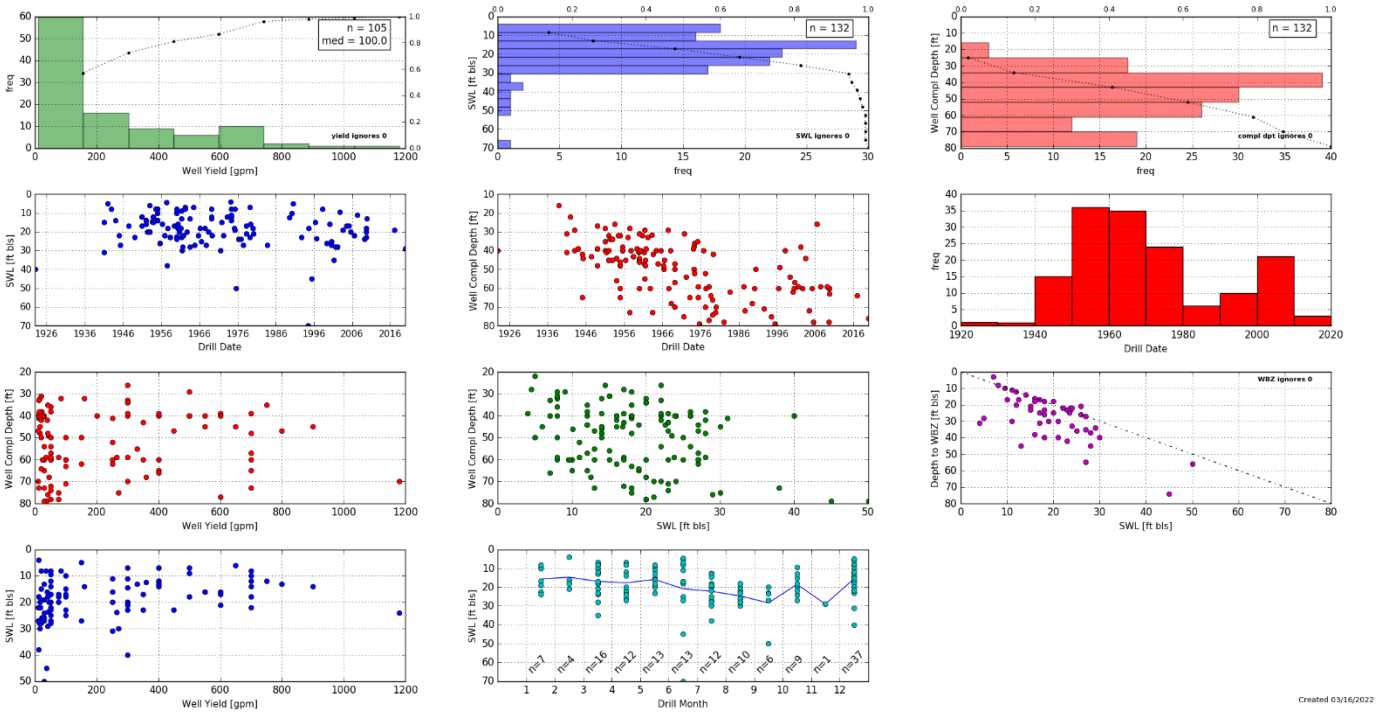


Gage Height for USGS 14191000

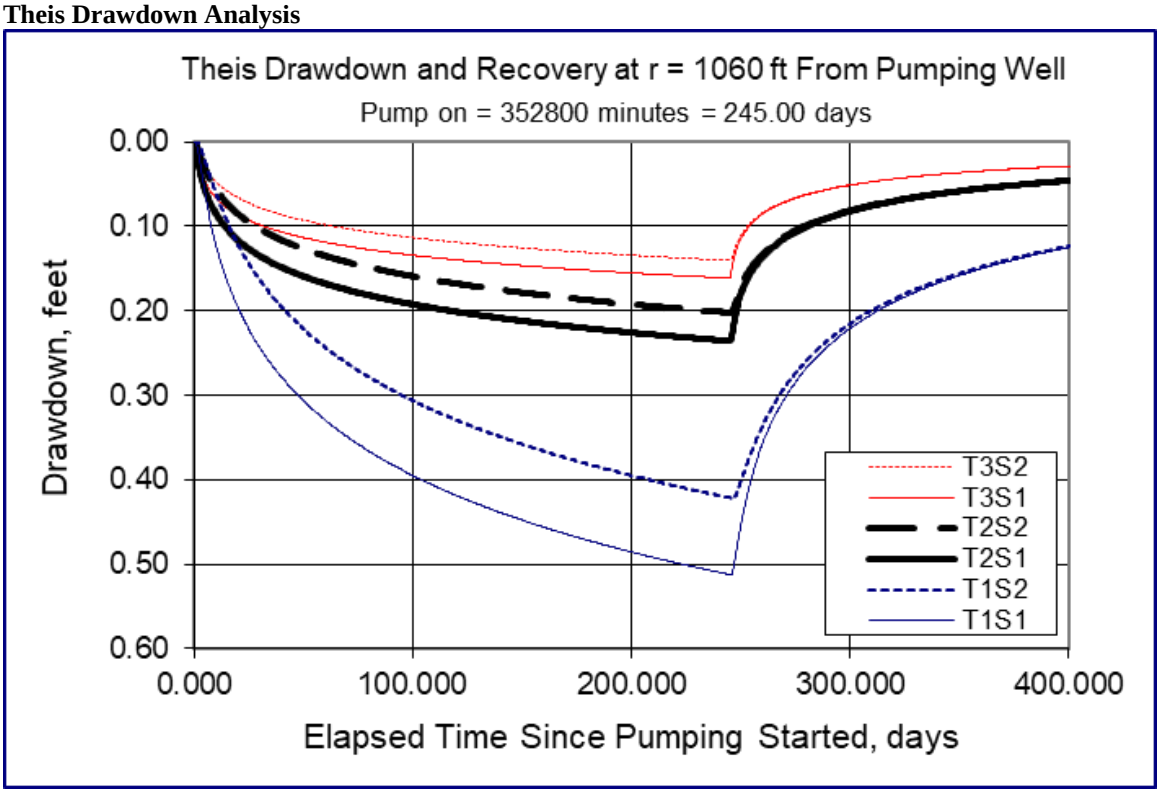


Gage height at USGS gage 14191000 on the Willamette River at Salem OR. Period of record queried is 1/1/2011 through 12/31/2021. Datum of gage is 106.14 ft above NGVD of 1929. Total period of record data available is October 1909 to December 1916, January 1923 to current; maximum gage height for total period of record is 38.3, minimum gage height for total period of record is 3.55 ft.

Well Statistics 6S/3W-21 and surrounding sections



Theis Drawdown Analysis



Radial distance from pumping well (r)=1,060 ft [estimated radial distance to nearest user, MARI 5330]

Pumping Rate (Q)= 0.272 cfs (~122 gpm) *

Aquifer Transmissivity (T1)= 104,720 gpd/ft (14,000 ft^2/day), (T2)= 287,045 gpd/ft (38,375 ft^2/day), (T3)= 460,020 gpd/ft (61,500 ft^2/day)

Storativity (s1) = 0.15, (s2) = 0.30 [Heath 1983 and Morris & Johnson 1967, values for specific yield in gravel and sand]

Total pumping time = 245 days

*The full pumping rate could not be utilized continuously for the entire 365-day period of use without exceeding the 132.25 ac-ft maximum allowed duty. For the maximum allowed duty of 132.25 ac-ft, continuous pumping would occur for 245 days at a rate of 0.272 cfs (~122 gpm).

Stream Depletion-SW 1

Application type:	G
Application number:	19186
Well number:	1
Stream Number:	1
Pumping rate (cfs):	0.66
Pumping duration (days):	245.0
Pumping start month number (3=March)	3.0

Parameter	Symbol	Scenario 1	Scenario 2	Scenario 3	Units
Distance from well to stream	a	4100.0	4100.0	4100.0	ft
Aquifer transmissivity	T	14000.0	38375.0	61500.0	ft2/day
Aquifer storativity	S	0.15	0.2	0.3	-
Aquitard vertical hydraulic conductivity	Kva	0.5	0.5	0.5	ft/day
Not used		10.0	20.0	30.0	
Aquitard thickness below stream	babs	3.0	3.0	3.0	ft
Not used		0.2	0.2	0.2	
Stream width	ws	512.0	512.0	512.0	ft