

## Groundwater Application Review Summary Form

Application # G- 18807

GW Reviewer Phil Marcy

Date Review Completed: 4/24/2019

### 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).*

## MEMO

4/24, 20 19

FROM: GW: Phil Marcy  
(Reviewer's Name)

**SUBJECT: Scenic Waterway Interference Evaluation**

- ☐ YES  
The source of appropriation is within or above a Scenic Waterway
- ☒ NO
- ☐ YES  
Use the Scenic Waterway condition (Condition 7J)
- ☒ NO
- ☐ Per ORS 390.835, the Groundwater Section is **able** to calculate ground water interference with surface water that contributes to a Scenic Waterway. The calculated interference is distributed below.
- ☐ Per ORS 390.835, the Groundwater Section is **unable** to calculate ground water interference with surface water that contributes to a scenic waterway; **therefore, the Department is unable to find that there is a preponderance of evidence that the proposed use will measurably reduce the surface water flows necessary to maintain the free-flowing character of a scenic waterway.**

## 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 \_\_\_\_\_ Scenic Waterway by the following amounts expressed as a proportion of the consumptive use by which surface water flow is reduced.

[illegible]

# PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 04/24/2019  
 FROM: Groundwater Section Phillip I. Marcy  
 Reviewer's Name  
 SUBJECT: Application G- 18807 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: Gary Crossan Farms LLC County: Linn

A1. Applicant(s) seek(s) 0.92 cfs from 2 well(s) in the Willamette Basin,  
Calapooia subbasin

A2. Proposed use Irrigation (73.3 acres) Seasonality: March 1<sup>st</sup> – October 31<sup>st</sup> (245 days)

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    | Proposed | 1                  | Alluvium          | 0.92               | 12S/3W-26 NE-SE       | 250' S, 850' W fr E ¼ cor S 26                                   |
| 2    | Proposed | 2                  | Alluvium          | 0.92               | 12S/3W-26 NE-SE       | 60' S, 40' W fr E ¼ cor S 26                                     |
| 3    |          |                    |                   |                    |                       |                                                                  |

\* 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    | 286              | NA                 | NA         | NA       | ~200            | 0-20               | 0-120                 | Unk                  | 75-115                       | NA               | NA             | NA        |
| 2    | 283              | NA                 | NA         | NA       | ~200            | 0-20               | 0-120                 | Unk                  | 75-115                       | NA               | NA             | NA        |
|      |                  |                    |            |          |                 |                    |                       |                      |                              |                  |                |           |

Use data from application for proposed wells.

A4. **Comments:** Proposed POA wells will likely penetrate a succession of mostly fine-grained alluvium, with interspersed sand and gravel lenses. Most nearby wells produce from sands and gravels that at the proposed POA locations, are expected at depths less than 50-75' (see attached cross-sections).

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: Proposed wells are not within ¼ mile of a perennial stream reach and the well will produce from a confined aquifer. Thus the pertinent 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: \_\_\_\_\_

**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; "Large Water Use Reporting";
  - ii. ☐ The permit should be conditioned as indicated in item 2 below.
  - iii. ☐ The permit should contain special condition(s) as indicated in item 3 below;

- B2.
- a. ☐ **Condition** to allow groundwater production from no deeper than \_\_\_\_\_ ft. below land surface;
  - b. ☐ **Condition** to allow groundwater production from no shallower than \_\_\_\_\_ ft. below land surface;
  - c. ☐ **Condition** to allow groundwater production only from the \_\_\_\_\_ groundwater reservoir between approximately \_\_\_\_\_ ft. and \_\_\_\_\_ ft. below land surface;
  - d. ☐ **Well reconstruction** is necessary to accomplish one or more of the above conditions. The problems that are likely to occur with this use and without reconstructing are cited below. Without reconstruction, I recommend withholding issuance of the permit until evidence of well reconstruction is filed with the Department and approved by the Groundwater Section.

**Describe injury** –as related to water availability– that is likely to occur without well reconstruction (interference w/ senior water rights, not within the capacity of the resource, etc): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- B3. **Groundwater availability remarks:** Nearby domestic well LINN 60950 is located between ¼ and ½ mile from each of the two proposed POA well locations, and utilizes sand and gravel horizons between 260-277' elevation AMSL. Our conceptual model of the hydrogeology in this area is one of an interconnected groundwater flow system, and the reviewer cannot assume isolation of individual productive horizons reported within each borehole since there is not enough evidence to support a laterally continuous low-permeability horizon of significant thickness. The expected seasonal drawdown at LINN 60950 was calculated using a Theis time-drawdown model at the end of 245 days. This calculation assumes a worst-case scenario, where all pumpage occurs from the POA nearest the neighboring well (POA 2 at 1,570 feet distant). Using a range of aquifer parameters derived from nearby pump test values, the expected range of drawdown experienced at LINN 60950 is between 1.85 and 13.72 feet, with a median value of 3.73 feet (see attached model output). With a well depth of 100' and a static water level at 63' BLS, it is unlikely that groundwater at the proposed rate and locations(s) will cause substantial interference with domestic well production from LINN 60950.
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**C. GROUNDWATER/SURFACE WATER CONSIDERATIONS, OAR 690-09-040****C1. 690-09-040 (1):** Evaluation of aquifer confinement:

| Well | Aquifer or Proposed Aquifer                    | Confined                            | Unconfined               |
|------|------------------------------------------------|-------------------------------------|--------------------------|
| 1    | Sand and gravel horizons below Willamette Silt | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2    | Sand and gravel horizons below Willamette Silt | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
|      |                                                | <input type="checkbox"/>            | <input type="checkbox"/> |
|      |                                                | <input type="checkbox"/>            | <input type="checkbox"/> |
|      |                                                | <input type="checkbox"/>            | <input type="checkbox"/> |

**Basis for aquifer confinement evaluation:** Overlying Willamette Silt provides confinement of productive coarse-grained sediments at depth. Static water level elevations within local wells are typically higher than the zones in which water was first encountered.

**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<br>ft msl | SW Elev<br>ft msl | Distance<br>(ft) | Hydraulically Connected?            |                          |                          | Potential for Subst. Interfer. Assumed? |                                     |
|------|------|--------------------|-------------------|-------------------|------------------|-------------------------------------|--------------------------|--------------------------|-----------------------------------------|-------------------------------------|
|      |      |                    |                   |                   |                  | YES                                 | NO                       | ASSUMED                  | YES                                     | NO                                  |
| 1    | 1    | Butte Creek        | 275-285           | 280-285           | 10150            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>                | <input checked="" type="checkbox"/> |
| 2    | 1    | Butte Creek        | 275-285           | 280-285           | 9930             | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>                | <input checked="" type="checkbox"/> |
|      |      |                    |                   |                   |                  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>                | <input type="checkbox"/>            |

**Basis for aquifer hydraulic connection evaluation:** Local drainages, including the Calapooia River and its tributaries, incise and receive discharge from the Quaternary sediments to elevations where groundwater is encountered within wells. For this reason, elevations of groundwater and surface water are similar over distances of tens of thousands of feet in this area. The closest perennial streams are Butte Creek and the Calapooia River, several intermittent drainages close by will not be evaluated for PSI.

**Water Availability Basin the well(s) are located within:** Calapooia R > Willamette R – AB Mouth (ID# 76)

**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? |
|------|------|--------------------------|--------------------------|-------------------------|------------------------------|--------------------------|------------------------|------------------------------|----------------------------|-----------------------------------------|
|      |      | <input type="checkbox"/> | <input type="checkbox"/> |                         |                              | <input type="checkbox"/> |                        | <input type="checkbox"/>     |                            | <input type="checkbox"/>                |
|      |      | <input type="checkbox"/> | <input type="checkbox"/> |                         |                              | <input type="checkbox"/> |                        | <input type="checkbox"/>     |                            | <input type="checkbox"/>                |
|      |      | <input type="checkbox"/> | <input type="checkbox"/> |                         |                              | <input type="checkbox"/> |                        | <input type="checkbox"/>     |                            | <input type="checkbox"/>                |
|      |      | <input type="checkbox"/> | <input type="checkbox"/> |                         |                              | <input type="checkbox"/> |                        | <input type="checkbox"/>     |                            | <input type="checkbox"/>                |
|      |      | <input type="checkbox"/> | <input type="checkbox"/> |                         |                              | <input type="checkbox"/> |                        | <input type="checkbox"/>     |                            | <input type="checkbox"/>                |
|      |      | <input type="checkbox"/> | <input type="checkbox"/> |                         |                              | <input type="checkbox"/> |                        | <input type="checkbox"/>     |                            | <input type="checkbox"/>                |
|      |      | <input type="checkbox"/> | <input type="checkbox"/> |                         |                              | <input type="checkbox"/> |                        | <input type="checkbox"/>     |                            | <input type="checkbox"/>                |
|      |      | <input type="checkbox"/> | <input type="checkbox"/> |                         |                              | <input type="checkbox"/> |                        | <input type="checkbox"/>     |                            | <input 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"/>                |
|  |      |  | <input type="checkbox"/> |                         |                              | <input type="checkbox"/> |                        | <input type="checkbox"/>     |                            | <input type="checkbox"/>                |
|  |      |  | <input type="checkbox"/> |                         |                              | <input type="checkbox"/> |                        | <input type="checkbox"/>     |                            | <input type="checkbox"/>                |
|  |      |  | <input type="checkbox"/> |                         |                              | <input type="checkbox"/> |                        | <input type="checkbox"/>     |                            | <input type="checkbox"/>                |

Comments: This section does not apply.

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    |
| 2                     | 1   | 1.92 % | 2.20 % | .03 %  | .09 %  | .16 %  | .28 %  | .42 %  | .61 %  | .83 %  | 1.09 % | 1.35 % | 1.63 % |
| Well Q as CFS         |     |        |        | 0.92   | 0.92   | 0.92   | 0.92   | 0.92   | 0.92   | 0.92   | 0.92   |        |        |
| Interference CFS      |     | 0.018  | 0.020  | 0      | 0.001  | 0.002  | 0.003  | 0.004  | 0.006  | 0.008  | 0.010  | 0.012  | 0.015  |
| 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      |     |        |        |        |        |        |        |        |        |        |        |        |        |
|                       |     | %      | %      | %      | %      | %      | %      | %      | %      | %      | %      | %      | %      |
| Well Q as CFS         |     |        |        |        |        |        |        |        |        |        |        |        |        |
| Interference CFS      |     |        |        |        |        |        |        |        |        |        |        |        |        |
|                       |     | %      | %      | %      | %      | %      | %      | %      | %      | %      | %      | %      | %      |
| Well Q as CFS         |     |        |        |        |        |        |        |        |        |        |        |        |        |
| Interference CFS      |     |        |        |        |        |        |        |        |        |        |        |        |        |
|                       |     | %      | %      | %      | %      | %      | %      | %      | %      | %      | %      | %      | %      |
| Well Q as CFS         |     |        |        |        |        |        |        |        |        |        |        |        |        |
| Interference CFS      |     |        |        |        |        |        |        |        |        |        |        |        |        |
|                       |     | %      | %      | %      | %      | %      | %      | %      | %      | %      | %      | %      | %      |
| Well Q as CFS         |     |        |        |        |        |        |        |        |        |        |        |        |        |
| Interference CFS      |     |        |        |        |        |        |        |        |        |        |        |        |        |
| (A) = Total Interf.   |     | 0.018  | 0.020  | 0      | 0.001  | 0.002  | 0.003  | 0.004  | 0.006  | 0.008  | 0.010  | 0.012  | 0.015  |
| (B) = 80 % Nat. Q     |     | 592    | 650    | 575    | 423    | 234    | 111    | 49     | 26     | 22.7   | 29.6   | 133    | 499    |
| (C) = 1 % Nat. Q      |     | 5.92   | 6.50   | 5.75   | 4.23   | 2.34   | 1.11   | 0.49   | 0.26   | 0.227  | 0.296  | 1.33   | 4.99   |
| (D) = (A) > (C)       |     | ✓      | ✓      | ✓      | ✓      | ✓      | ✓      | ✓      | ✓      | ✓      | ✓      | ✓      | ✓      |
| (E) = (A / B) x 100   |     | <0.1 % | <0.1 % | <0.1 % | <0.1 % | <0.1 % | <0.1 % | <0.1 % | <0.1 % | <0.1 % | <0.1 % | <0.1 % | <0.1 % |

(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:** Given the distance to the nearest perennial stream, the presence of low-permeability materials near the land surface in this area (Willamette Silt) and the likely presence of fine-grained materials lining stream bottoms, the expected stream depletion within one year is minimal.

---

---

---

---

---

---

---

---

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

- C5. ☐ **If properly conditioned**, the surface water source(s) can be adequately protected from interference, and/or groundwater use under this permit can be regulated if it is found to substantially interfere with surface water:
- ☐ The permit should contain condition #(s) \_\_\_\_\_;
  - ☐ The permit should contain special condition(s) as indicated in "Remarks" below;

C6. **SW / GW Remarks and Conditions:** See Section B for conditions.

---

---

---

---

---

---

---

---

**References Used:**

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.

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.

Piper, A.M., 1942, Ground-water resources of the Willamette Valley, Oregon: U.S. Geological Survey Water-Supply Paper 890.

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: \_\_\_\_\_

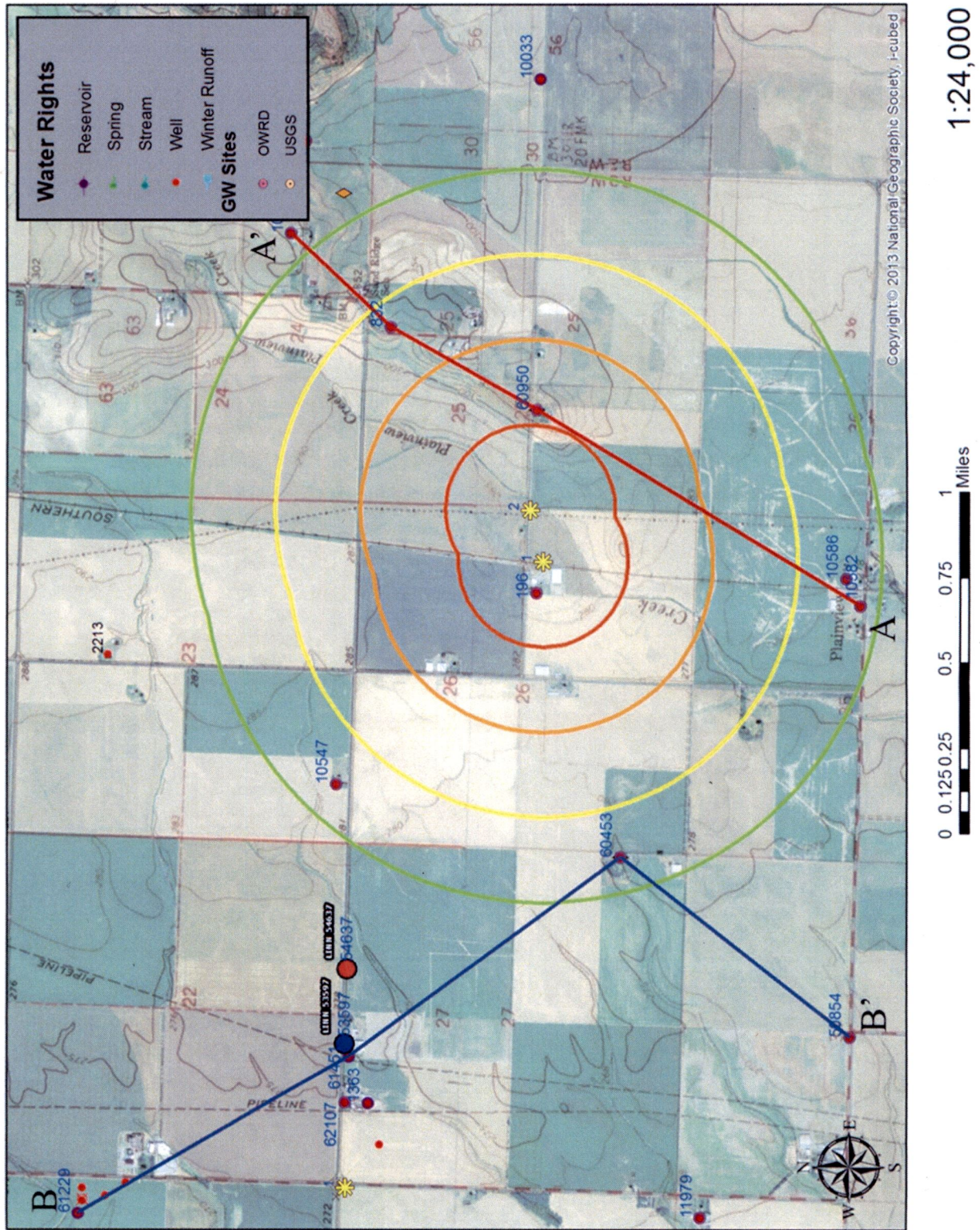
D2. **THE WELL does not appear to meet current well construction standards based upon:**

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

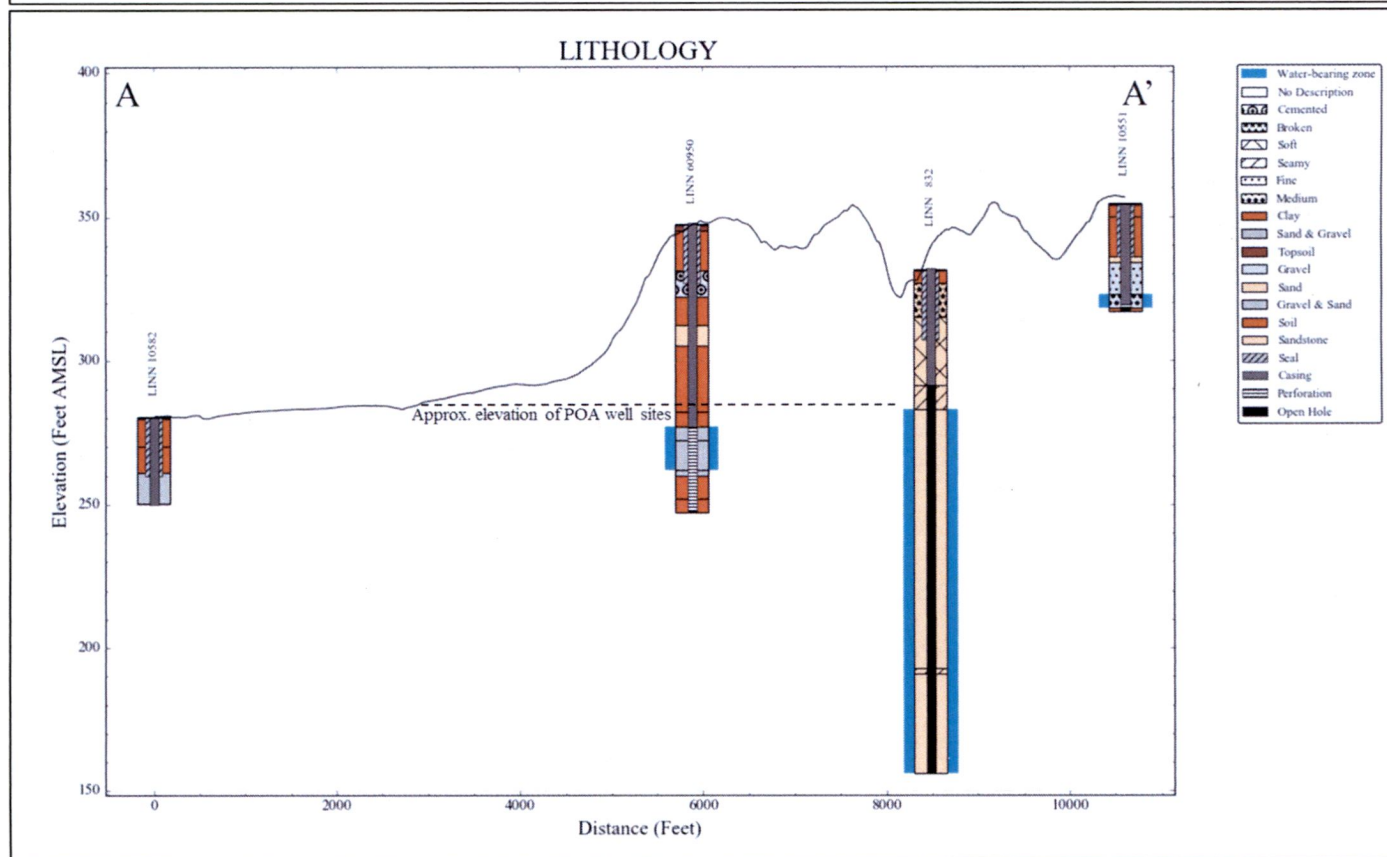
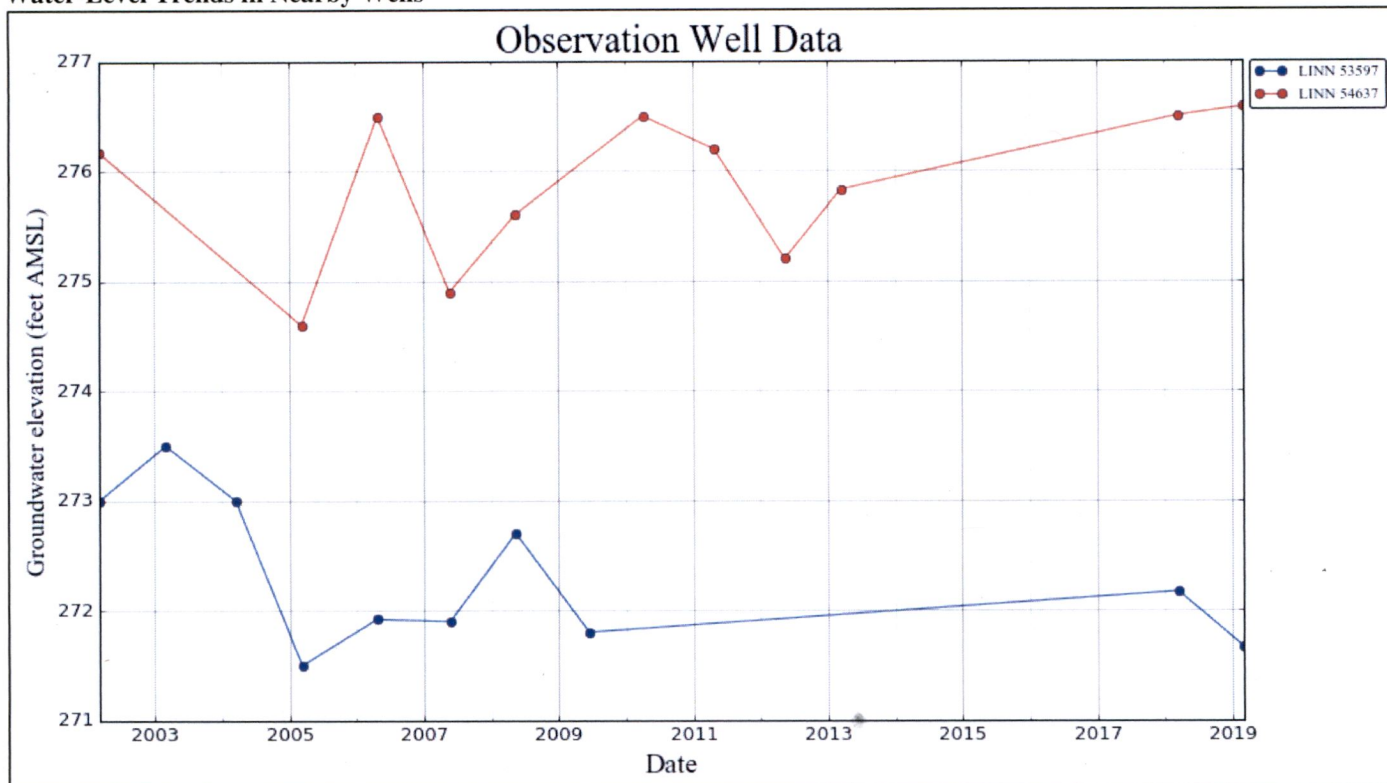
D3. **THE WELL construction deficiency or other comment is described as follows:** \_\_\_\_\_D4. ☐ **Route to the Well Construction and Compliance Section for a review of existing well construction.****Water Availability Tables**

| DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION                                  |                           |                                       |                            |                            |                          |                           |
|----------------------------------------------------------------------------------------|---------------------------|---------------------------------------|----------------------------|----------------------------|--------------------------|---------------------------|
| Watershed ID #: 76                                                                     |                           | CALAPOOIA R > WILLAMETTE R - AB MOUTH |                            |                            | Exceedance Level: 80     |                           |
| Time: 3:38 PM                                                                          |                           | Basin: WILLAMETTE                     |                            |                            | Date: 04/23/2019         |                           |
| Month                                                                                  | Natural<br>Stream<br>Flow | Consumptive<br>Use and<br>Storage     | Expected<br>Stream<br>Flow | Reserved<br>Stream<br>Flow | Instream<br>Requirements | Net<br>water<br>Available |
| Monthly values are in cfs.<br>Storage is the annual amount at 50% exceedance in ac-ft. |                           |                                       |                            |                            |                          |                           |
| JAN                                                                                    | 592.00                    | 3.37                                  | 589.00                     | 0.00                       | 20.00                    | 569.00                    |
| FEB                                                                                    | 650.00                    | 3.32                                  | 647.00                     | 0.00                       | 20.00                    | 627.00                    |
| MAR                                                                                    | 575.00                    | 2.25                                  | 573.00                     | 0.00                       | 20.00                    | 553.00                    |
| APR                                                                                    | 423.00                    | 2.03                                  | 421.00                     | 0.00                       | 20.00                    | 401.00                    |
| MAY                                                                                    | 234.00                    | 18.80                                 | 215.00                     | 0.00                       | 20.00                    | 195.00                    |
| JUN                                                                                    | 111.00                    | 14.00                                 | 97.00                      | 0.00                       | 20.00                    | 77.00                     |
| JUL                                                                                    | 49.00                     | 21.70                                 | 27.30                      | 0.00                       | 20.00                    | 7.33                      |
| AUG                                                                                    | 26.00                     | 15.70                                 | 10.30                      | 0.00                       | 20.00                    | -9.75                     |
| SEP                                                                                    | 22.70                     | 8.17                                  | 14.50                      | 0.00                       | 20.00                    | -5.47                     |
| OCT                                                                                    | 29.60                     | 1.98                                  | 27.60                      | 0.00                       | 20.00                    | 7.62                      |
| NOV                                                                                    | 133.00                    | 2.39                                  | 131.00                     | 0.00                       | 20.00                    | 111.00                    |
| DEC                                                                                    | 499.00                    | 3.33                                  | 496.00                     | 0.00                       | 20.00                    | 476.00                    |
| ANN                                                                                    | 404,000                   | 5,900                                 | 398,000                    | 0                          | 14,500                   | 384,000                   |

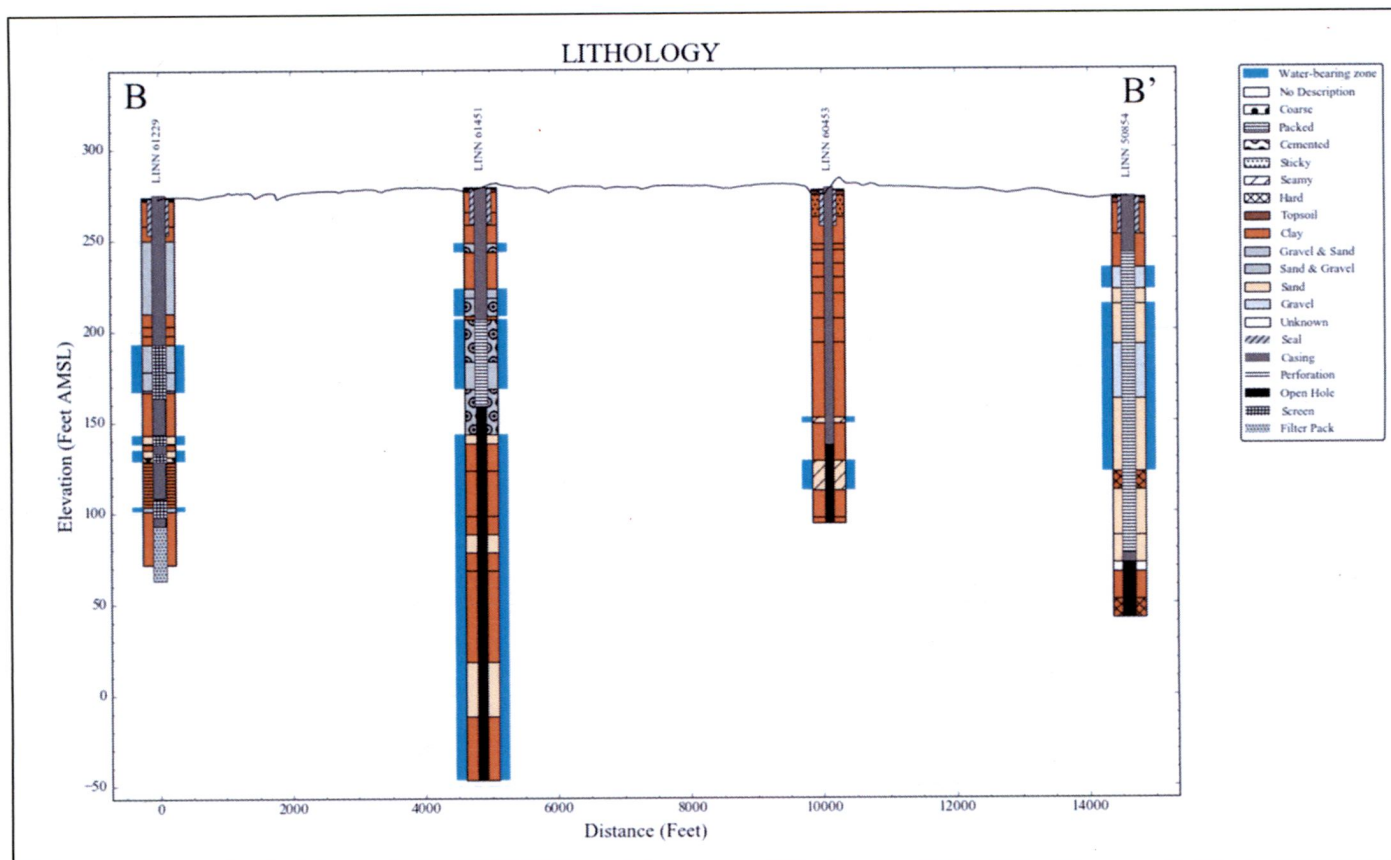
## Well Location Map



## Water-Level Trends in Nearby Wells



The proposed production zones within the POA wells is well below that of domestic well LINN 60950. Logs in this area vary considerably in their description of subsurface lithologies in addition to the elevations at which they are encountered.



A cross-section of the alluvial valley from N-S illustrates the discontinuous distribution of coarse-grained, water-bearing lithologies. It cannot be assumed that there is a significant low-permeability horizon that serves to prevent vertical migration of groundwater here.

| Input Data:                       | Var Name | Scenario 1 | Scenario 2 | Scenario 3 | Units                |               |
|-----------------------------------|----------|------------|------------|------------|----------------------|---------------|
| Total pumping time                | t        |            | 245        |            | d                    |               |
| Radial distance from pumped well: | r        |            | 1570.00    |            | ft                   | Q conversions |
| Pumping rate                      | Q        |            | 0.9        |            | cfs                  | 412.90 gpm    |
| Hydraulic conductivity            | K        | 50         | 150        | 350        | ft/day               | 0.92 cfs      |
| Aquifer thickness                 | b        |            | 60         |            | ft                   | 55.20 cfm     |
| Storativity                       | S_1      |            | 0.01000    |            |                      | 79,488.00 cfd |
|                                   | S_2      |            | 0.00100    |            |                      | 1.82 af/d     |
| Transmissivity Conversions        | T_f2pd   | 3,000      | 9,000      | 21,000     | ft <sup>2</sup> /day |               |
|                                   | T_ft2pm  | 2.0833     | 6.2500     | 14.5833    | ft <sup>2</sup> /min |               |
|                                   | T_gpdpt  | 22,440     | 67,320     | 157,080    | gpd/ft               |               |

### Theis Drawdown and Recovery at r = 1570 ft From Pumping Well

Pump on = 352800 minutes = 245.00 days

