

Groundwater Review Summary Form

Application # G- 18416

GW Reviewer J. Hackett Date Review Completed: 4/4/2017

Summary of GW availability and Injury Review:

Groundwater for the proposed use is either over appropriated, will not likely be available in the amounts requested without injury to prior water rights, OR will not likely be available within the capacity of the groundwater resource per Section B of the attached review form.

Summary of Potential for Substantial Interference Review:

There is the potential for substantial interference per Section C of the attached review form.

Summary of Well Construction Assessment:

The well does not appear to meet current well construction standards per Section D of the attached review form. Route through Well Construction and Compliance Section.

This is only a summary. Documentation is attached and should be read thoroughly to understand the basis for determinations and for conditions that may be necessary for a permit (if one is issued).

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date April 4, 2017
 FROM: Groundwater Section J. Hackett
Reviewer's Name
 SUBJECT: Application G- 18416 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: Jackass Mtn. Holdings LLC County: Linn

A1. Applicant(s) seek(s) 1.80 cfs from 3 well(s) in the Willamette Basin,
 _____ subbasin

A2. Proposed use Irrigation Seasonality: March 1 – October 31

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

| Well | Logid | Applicant's Well # | 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 | 1.80 | 10S/3W-20 SE-NW | 40' S, 2420' E fr W ¼ cor S 20 |
| 2 | Proposed | 2 | alluvium | 1.80 | 10S/3W-19 SE-NE | 10' N, 320' W fr W ¼ cor S 20 |
| 3 | Proposed | 3 | alluvium | 1.80 | 10S/3W-20 NW-SE | 820' S, 3130' E fr W ¼ cor S 20 |
| 4 | | | | | | |
| 5 | | | | | | |

* 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 | 210 | | 10-30 ^A | | 140 est | 0-18 ^B | 0-18 | | | | | |
| 2 | 200 | | 10-30 ^A | | 140 est | 0-18 ^B | 0-18 | | | | | |
| 3 | 230 | | 10-30 ^A | | 140 est | 0-18 ^B | 0-18 | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

Use data from application for proposed wells.

A4. **Comments:** ^ASWL provided is estimated from range of SWLs reported on driller's logs for nearby wells. This range likely represents seasonal variations as well as differences in elevations (+/- 50 ft in area of interest)

^BNo well construction information was provided so the reviewer assumes minimum case and seal depths

A5. **Provisions of the Willamette (OAR 690-502)** 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: Applicant's proposed wells will not be located within ¼ mile of the nearest surface water source, so the pertinent basin rules 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) 7C (7-yr SWL); 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 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 POAs will be producing from a layer of alluvium where the Willamette River passes between large outcrops of older marine sediment bedrock to the east and west (Scravel Hill and Spring Hill, respectively). In the area of the proposed POAs there is likely only a few 10s of feet (possibly up to 100) of alluvial material overlying bedrock, according to driller’s logs and maps of bedrock elevation by Woodward et al., (1998). OWRD has SWL data from an observation well nearby (BENT 1558) which is on the other side of the river. These data show generally stable trends over the past three decades but lack of sufficient SWL data on the applicant’s side of the river make it difficult to establish groundwater over-appropriation.

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

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

| Well | Aquifer or Proposed Aquifer | Confined | Unconfined |
|------|-----------------------------|--------------------------|-------------------------------------|
| 1 | Alluvium | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 | Alluvium | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 | Alluvium | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| | | <input type="checkbox"/> | <input type="checkbox"/> |
| | | <input type="checkbox"/> | <input type="checkbox"/> |

Basis for aquifer confinement evaluation: Driller’s logs from nearby wells show static water levels (SWL) at or above the water bearing zones (WBZ) suggesting unconfined to semi-confined conditions. Helm and Leonard (1977) describe seasonal confinement in some areas of the Central Willamette Valley alluvium but generally an unconfined aquifer system hydraulically connected to major surface water bodies (e.g., Willamette River).

C2. **690-09-040 (2) (3):** Evaluation of distance to, and hydraulic connection with, surface water sources. All wells located a horizontal distance less than ¼ mile from a surface water source that produce water from an unconfined aquifer shall be assumed to be hydraulically connected to the surface water source. Include in this table any streams located beyond one mile that are evaluated for PSI.

| Well | SW # | Surface Water Name | GW Elev ft msl | SW Elev ft msl | Distance (ft) | Hydraulically Connected? | | | Potential for Subst. Interfer. Assumed? | |
|------|------|--------------------|----------------|----------------|---------------|-------------------------------------|--------------------------|--------------------------|---|-------------------------------------|
| | | | | | | YES | NO | ASSUMED | YES | NO |
| 1 | 1 | Willamette River | 190 | 165 | 4450 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 | 1 | Willamette River | 190 | 165 | 3650 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 | 1 | Willamette River | 190 | 165 | 4150 | <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"/> |
| | | | | | | <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"/> |

Basis for aquifer hydraulic connection evaluation: Reported static water levels in nearby wells (and assumed SWL in proposed wells) is higher than the river elevation – suggesting groundwater flows to, and discharges to, the Willamette River. Additionally, wells in the area generally respond to seasonal and sub-seasonal changes in river stage suggesting an efficient hydraulic connection between surface water and the aquifer (Helm and Leonard 1977).

Water Availability Basin the well(s) are located within: Willamette R > Columbia R – AB Mill Cr (ID# 183)

C3a. **690-09-040 (4):** Evaluation of stream impacts for each well that has been determined or assumed to be hydraulically connected and less than 1 mile from a surface water source. Limit evaluation to instream rights and minimum stream flows that are pertinent to that surface water source, and not lower SW sources to which the stream under evaluation is tributary. Compare the requested rate against the 1% of 80% natural flow for the pertinent Water Availability Basin (WAB). If Q is not distributed by well, use full rate for each well. Any checked box indicates the well is assumed to have the potential to cause PSI.

| Well | SW # | Well < ¼ mile? | Qw > 5 cfs? | Instream Water Right ID | Instream Water Right Q (cfs) | Qw > 1% ISWR? | 80% Natural Flow (cfs) | Qw > 1% of 80% Natural Flow? | Interference @ 30 days (%) | Potential for Subst. Interfer. Assumed? |
|------|------|--------------------------|--------------------------|-------------------------|------------------------------|--------------------------|------------------------|------------------------------|----------------------------|---|
| 1 | 1 | <input type="checkbox"/> | <input type="checkbox"/> | MF183A | 1300 | <input type="checkbox"/> | 3620 | <input type="checkbox"/> | <25% | <input type="checkbox"/> |
| 2 | 1 | <input type="checkbox"/> | <input type="checkbox"/> | MF183A | 1300 | <input type="checkbox"/> | 3620 | <input type="checkbox"/> | ~9% | <input type="checkbox"/> |
| 3 | 1 | <input type="checkbox"/> | <input type="checkbox"/> | MF183A | 1300 | <input type="checkbox"/> | 3620 | <input type="checkbox"/> | <25% | <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: An analytical model (Hunt, 1999) was used to estimate interference with surface water from Proposed Well #2 (closest to Willamette River) using parameter estimates from Herrera et al., (2014). Impacts from Proposed Wells #1 and #3 are expected to be lower due to their greater distances from the Willamette River. Results (see attachment) confirm conceptual understanding of behavior in an unconfined alluvial aquifer system with high transmissivity.

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 | | | | | | | | | | | | | |
| | | % | % | % | % | % | % | % | % | % | % | % | % |
| 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:** Although the proposed aquifer is strongly hydraulically connected to the Willamette River, the size of the river and nature of the aquifer suggest that there will not be significant interference with surface water per OAR 690-009.

References Used: _____
Hunt, B. 1999. *Unsteady stream depletion from ground water pumping*. Ground Water v37(1). p 98-102
Herrera, N. B., Burns, E. R., and T. D. Conlon. *Simulation of Groundwater Flow and the Interaction of Groundwater and Surface Water in the Willamette Basin and Central Willamette Subbasin, Oregon*. USGS Scientific Investigations Report 2014-5136
Helm, D. C. and A. R. Leonard. 1977. *Ground-water Resources of the Lower Santiam River Basin, Middle Willamette Valley, Oregon*. Water Resources Department Ground-water Report No. 25
Gannett, Marshall W., and Caldwell, Rodney R., 1998, *Geologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington*: U. S. Geological Survey Professional Paper 1424-A, 32p, 8 plates
Woodward and others, 1998, *Hydrogeologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington*: U.S. Geological Survey Professional Paper 1424-B

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

**Water Availability Analysis
Detailed Reports**

**WILLAMETTE R > COLUMBIA R - AB MILL CR AT GAGE 14191000
WILLAMETTE BASIN**

Water Availability as of 4/4/2017

Watershed ID #: 183 ([Map](#))

Exceedance Level:

Date: 4/4/2017

Time: 10:18 AM

Water Availability Calculation

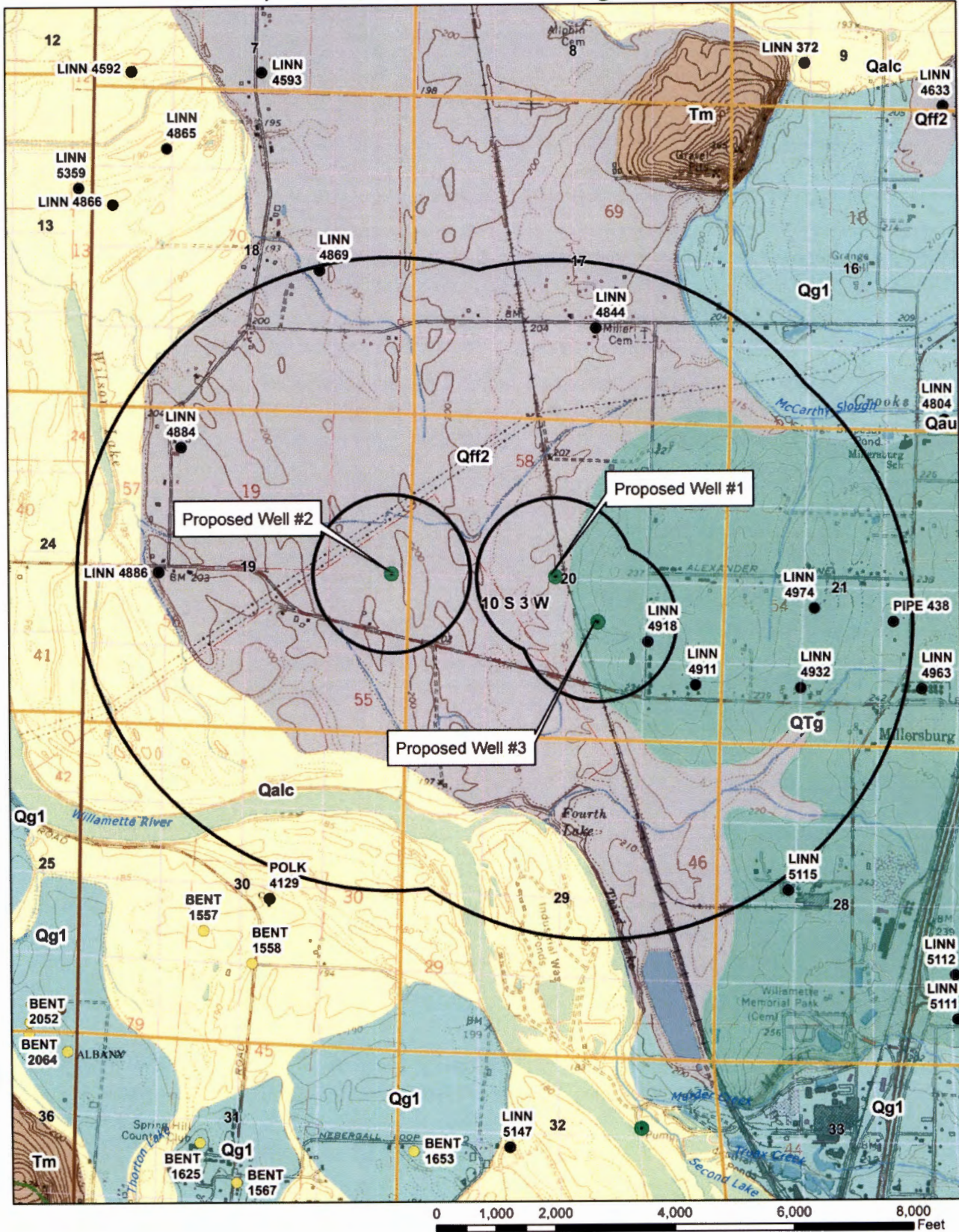
Monthly Streamflow in Cubic Feet per Second
Annual Volume at 50% Exceedance in Acre-Feet

| Month | Natural Stream Flow | Consumptive Uses and Storages | Expected Stream Flow | Reserved Stream Flow | Instream Flow Requirement | Net Water Available |
|-------|---------------------|-------------------------------|----------------------|----------------------|---------------------------|---------------------|
| JAN | 18,400.00 | 2,240.00 | 16,200.00 | 0.00 | 1,300.00 | 14,900.00 |
| FEB | 20,100.00 | 7,420.00 | 12,700.00 | 0.00 | 1,300.00 | 11,400.00 |
| MAR | 19,600.00 | 7,210.00 | 12,400.00 | 0.00 | 1,300.00 | 11,100.00 |
| APR | 18,000.00 | 6,870.00 | 11,100.00 | 0.00 | 1,300.00 | 9,830.00 |
| MAY | 15,500.00 | 4,160.00 | 11,300.00 | 0.00 | 1,300.00 | 10,000.00 |
| JUN | 8,310.00 | 1,690.00 | 6,620.00 | 0.00 | 1,300.00 | 5,320.00 |
| JUL | 4,710.00 | 1,440.00 | 3,270.00 | 0.00 | 1,300.00 | 1,970.00 |
| AUG | 3,620.00 | 1,330.00 | 2,290.00 | 0.00 | 1,300.00 | 993.00 |
| SEP | 3,680.00 | 1,150.00 | 2,530.00 | 0.00 | 1,300.00 | 1,230.00 |
| OCT | 4,650.00 | 743.00 | 3,910.00 | 0.00 | 1,300.00 | 2,610.00 |
| NOV | 9,400.00 | 851.00 | 8,550.00 | 0.00 | 1,300.00 | 7,250.00 |
| DEC | 16,700.00 | 911.00 | 15,800.00 | 0.00 | 1,300.00 | 14,500.00 |
| ANN | 13,500,000.00 | 2,150,000.00 | 11,300,000.00 | 0.00 | 942,000.00 | 10,400,000.00 |

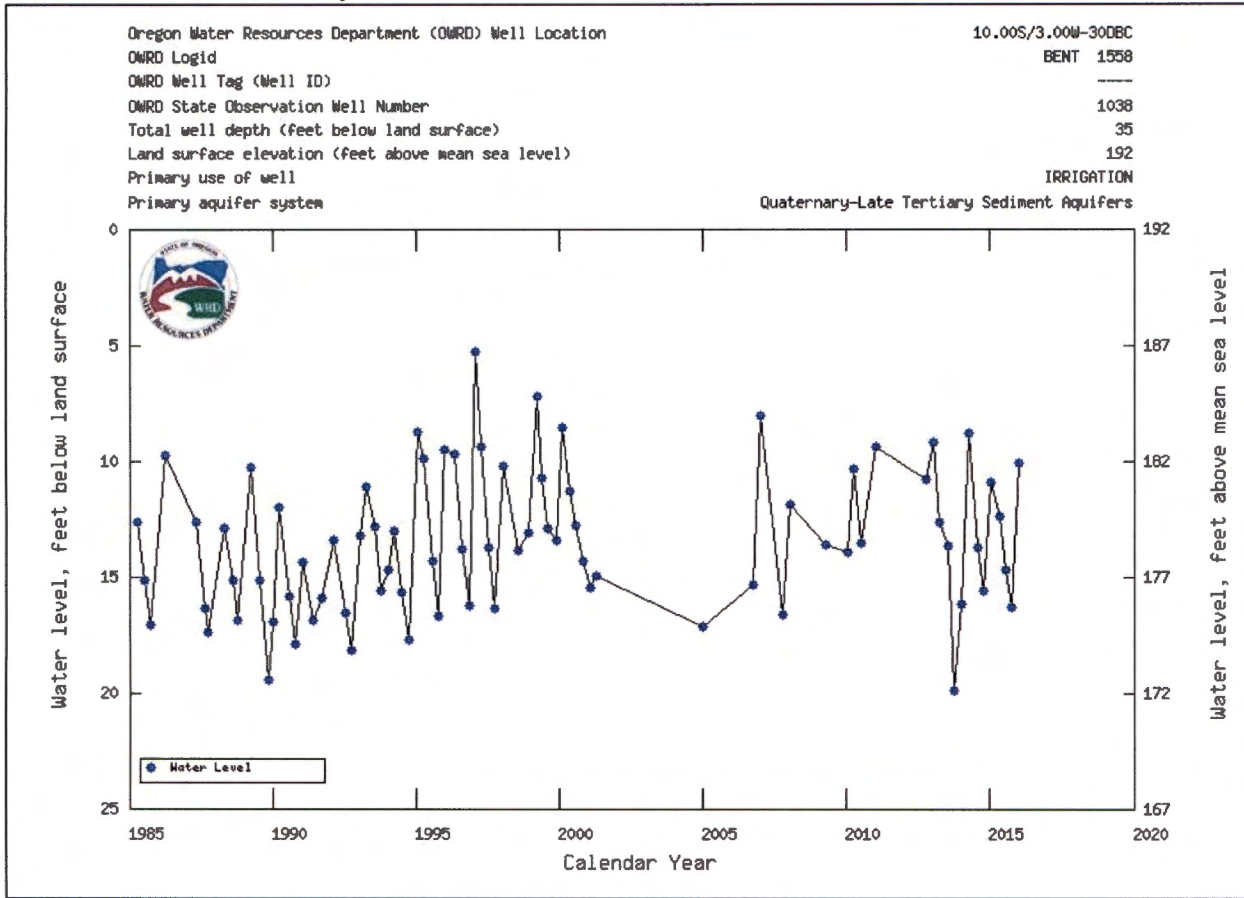
Well Location Map

G-18416, Jackass Mtn. Holdings, LLC

1:24,000 scale



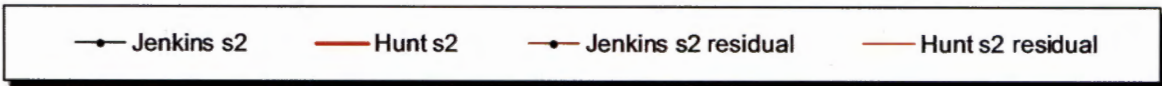
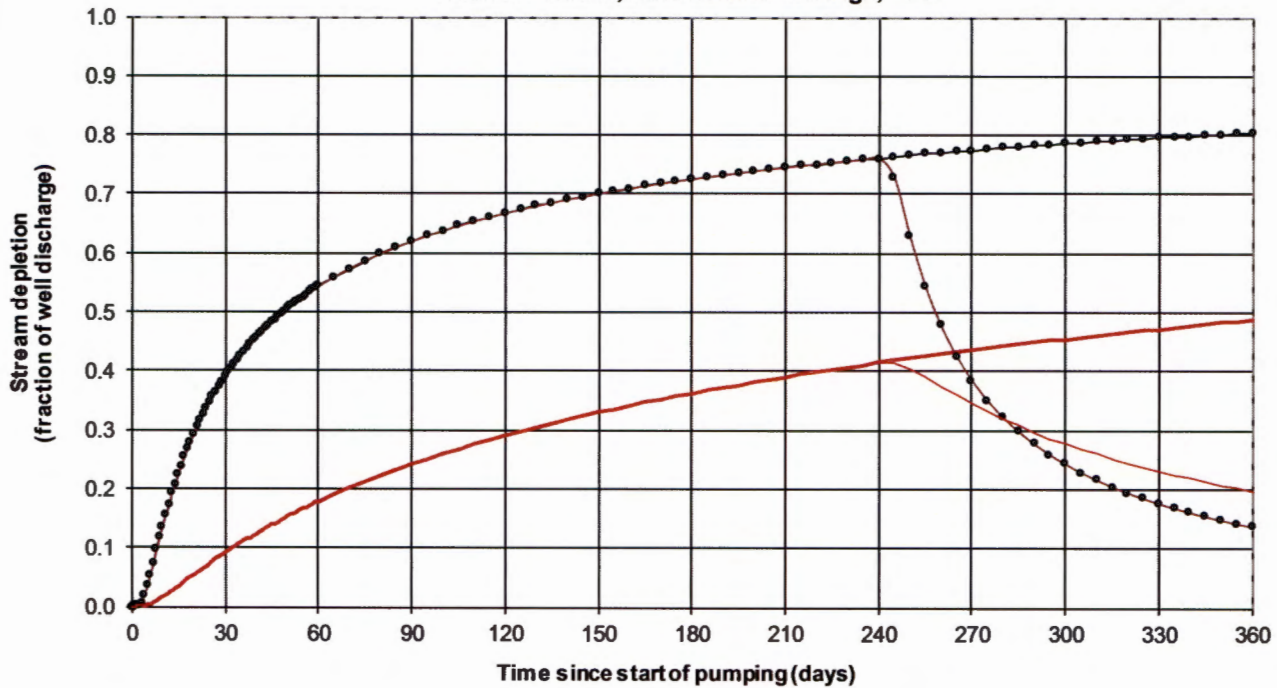
Water-Level Trends in Nearby Wells



Stream Depletion Modeling Results

Transient Stream Depletion (Jenkins, 1970; Hunt, 1999)

10S/03W-19&20, Jackass Mtn. Holdings, LLC



Output for Hunt Stream Depletion, Scenario 2 (s2): Time pump on = 240 days

| Days | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 |
|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Qw, cfs | 1.800 | 1.800 | 1.800 | 1.800 | 1.800 | 1.800 | 1.800 | 1.800 | 1.800 | 1.800 | 1.800 | 1.800 |
| Jenk SD s2 % | 38.96 | 54.30 | 61.94 | 66.71 | 70.04 | 72.54 | 74.51 | 76.10 | 38.47 | 24.26 | 17.59 | 13.68 |
| Jen SD s2 cfs | 0.701 | 0.977 | 1.115 | 1.201 | 1.261 | 1.306 | 1.341 | 1.370 | 0.692 | 0.437 | 0.317 | 0.246 |
| Hunt SD s2 % | 9.11 | 17.84 | 24.16 | 29.04 | 32.97 | 36.26 | 39.06 | 41.49 | 34.52 | 27.69 | 23.08 | 19.76 |
| Hunt SD s2 cfs | 0.164 | 0.321 | 0.435 | 0.523 | 0.594 | 0.653 | 0.703 | 0.747 | 0.621 | 0.498 | 0.416 | 0.356 |

| Parameters: | | Scenario 1 | Scenario 2 | Scenario 3 | Units |
|-----------------------------------|-----|------------|-------------|-------------|-----------|
| Net steady pumping rate | Qw | 1.8 | 1.8 | 1.8 | cfs |
| Distance to stream | a | 3650 | 3650 | 3650 | ft |
| Aquifer hydraulic conductivity | K | 100 | 600 | 600 | ft/day |
| Aquifer thickness | b | 100 | 100 | 100 | ft |
| Aquifer transmissivity | T | 10000 | 60000 | 60000 | ft*ft/day |
| Aquifer storage coefficient | S | 0.2 | 0.2 | 0.2 | |
| Stream width | ws | 450 | 450 | 450 | ft |
| Streambed hydraulic conductivity | Ks | 0.01 | 0.1 | 0.1 | ft/day |
| Streambed thickness | bs | 3 | 3 | 3 | ft |
| Streambed conductance | sbc | 1.5 | 15 | 15 | ft/day |
| Stream depletion factor (Jenkins) | sdf | 266.45 | 44.40833333 | 44.40833333 | days |
| Streambed factor (Hunt) | sbf | 0.5475 | 0.9125 | 0.9125 | |