Groundwater Application Review Summary Form

Application # G- 18605

GW Reviewer Aurora Bouchier **Date Review Completed:** 3/19/2018

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 3/19 2018

TO: **Application G-** 18605

FROM: **GW:** Aurora Boschier
(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.

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

MEMO

To: Kristopher Byrd, Well Construction and Compliance Section Manager

From: Joel Jeffery, Well Construction Program Coordinator

Subject: Review of Water Right Application G-18605

Date: September 25, 2018

The attached application was forwarded to the Well Construction and Compliance Section by Water Rights. Aurora Bouchier reviewed the application. Please see Aurora's Groundwater Review and the Well Log.

Applicant's Well #1 (CROO 54563): Based on a review of the Well Report, Applicant's Well #1 seems to protect the groundwater resource.

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

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765 & OAR 690-205-0210)

CROO 54563

12/11/2017

WELL I.D. LABEL# L 128353
START CARD # 1036773
ORIGINAL LOG #

(1) LAND OWNER

Owner Well I.D.
First Name Last Name
Company WAIBEL RANCHES
Address 8055 SW POWELL BUTTE HWY
City POWELL BUTTE State OR Zip 97753

(2) TYPE OF WORK

[X] New Well [ ] Deepening [ ] Conversion [ ] Alteration (complete 2a & 10) [ ] Abandonment(complete 5a)

(2a) PRE-ALTERATION

	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
Casing:									

	Material	From	To	Amt	sacks/lbs
Seal:					

(3) DRILL METHOD

[X] Rotary Air [ ] Rotary Mud [ ] Cable [ ] Auger [ ] Cable Mud
[ ] Reverse Rotary [ ] Other

(4) PROPOSED USE

[ ] Domestic [X] Irrigation [ ] Community
[ ] Industrial/ Commericial [ ] Livestock [ ] Dewatering
[ ] Thermal [ ] Injection [ ] Other

(5) BORE HOLE CONSTRUCTION

Special Standard [ ] (Attach copy)
Depth of Completed Well 645.00 ft.

BORE HOLE

Dia	From	To
14	0	455
10	455	645

SEAL

Material	From	To	Amt	sacks/lbs
Cement	0	455	232	S
		Calculated	181.34	
		Calculated		

How was seal placed: Method [X] A [ ] B [ ] C [ ] D [ ] E
[ ] Other
Backfill placed from ft. to ft. Material
Filter pack from ft. to ft. Material Size
Explosives used: [ ] Yes Type Amount

(5a) ABANDONMENT USING UNHYDRATED BENTONITE

Proposed Amount Actual Amount

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
●	○	10	X	2	455	250	●	○	X	
○	○						○	○		
○	○						○	○		
○	○						○	○		
○	○						○	○		

Shoe [ ] Inside [ ] Outside [ ] Other Location of shoe(s)
Temp casing [X] Yes Dia 14 From +[X] 1 To 59

(7) PERFORATIONS/SCREENS

Perforations Method
Screens Type Material

Perf/ Screen	Casing/ Liner	Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size

(8) WELL TESTS: Minimum testing time is 1 hour

○ Pump ○ Bailer ● Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
1000		640	8

Temperature 64 °F Lab analysis [ ] Yes By
Water quality concerns? [ ] Yes (describe below) TDS amount 113 ppm

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County CROOK Twp 17.00 S N/S Range 21.00 E E/W WM
Sec 4 SW 1/4 of the SE 1/4 Tax Lot 400
Tax Map Number Lot
Lat ° ' " or 44.12095000 DMS or DD
Long ° ' " or -120.21400000 DMS or DD
○ Street address of well ● Nearest address
48357 SE PAULINA HWY

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Pre-Alteration				
Completed Well	12/8/2017	9	X	20.8

Flowing Artesian? [X] Dry Hole? [ ]

WATER BEARING ZONES Depth water was first found 585.00

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
10/26/2017	585	630	1000	9	X	

(11) WELL LOG

Ground Elevation

Material	From	To
Top Soil	0	3
Hard Brown Clay Stone	3	5
Hard Tan Clay Stone	5	43
Sand & Gravel	43	48
Hard Green Clay Stone	48	442
Hard Grey Basalt	442	585
Hard Grey Basalt W/ Quartz Seams	585	630
Hard Grey Basalt	630	645

Date Started 10/16/2017 Completed 12/8/2017

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number Date

Signed

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

License Number 1583 Date 12/11/2017

Signed DAVID A SCHLICHTING (E-filed)

Contact Info (optional)

ORIGINAL - WATER RESOURCES DEPARTMENT

THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK Form Version:

WATER SUPPLY WELL REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

CROO 54563

12/11/2017

Map of Hole

STATE OF OREGON
WELL LOCATION MAP

This map is supplemental to the WATER SUPPLY WELL REPORT

Oregon Water Resources Department
725 Summer St NE, Salem OR 97301
(503)986-0900

LOCATION OF WELL

Latitude: 44.12095 Datum: WGS84

Longitude: -120.214

Township/Range/Section/Quarter-Quarter Section:
WM 17S 21E 4 SWSE

Address of Well:
48357 SE PAULINA HWY

Well Label: 128353

Printed: December 11, 2017

DISCLAIMER: This map is intended to represent the approximate location the well. It is not intended to be construed as survey accurate in any manner.

Provided by well constructor

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765 & OAR 690-205-0210)

CROO 54563

12/11/2017

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Casing:									

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(•)	( )	10	[X]	2	455	250	(•)	( )	[X]	[ ]
( )	( )		[ ]				( )	( )	[ ]	[ ]
( )	( )		[ ]				( )	( )	[ ]	[ ]
( )	( )		[ ]				( )	( )	[ ]	[ ]
( )	( )		[ ]				( )	( )	[ ]	[ ]

Shoe [ ] Inside [ ] Outside [ ] Other Location of shoe(s)
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	Date	SWL(psi)	+	SWL(ft)
Existing Well / Pre-Alteration			[ ]	
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SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
10/26/2017	585	630	1000	9	[X]	
					[ ]	
					[ ]	
					[ ]	
					[ ]	

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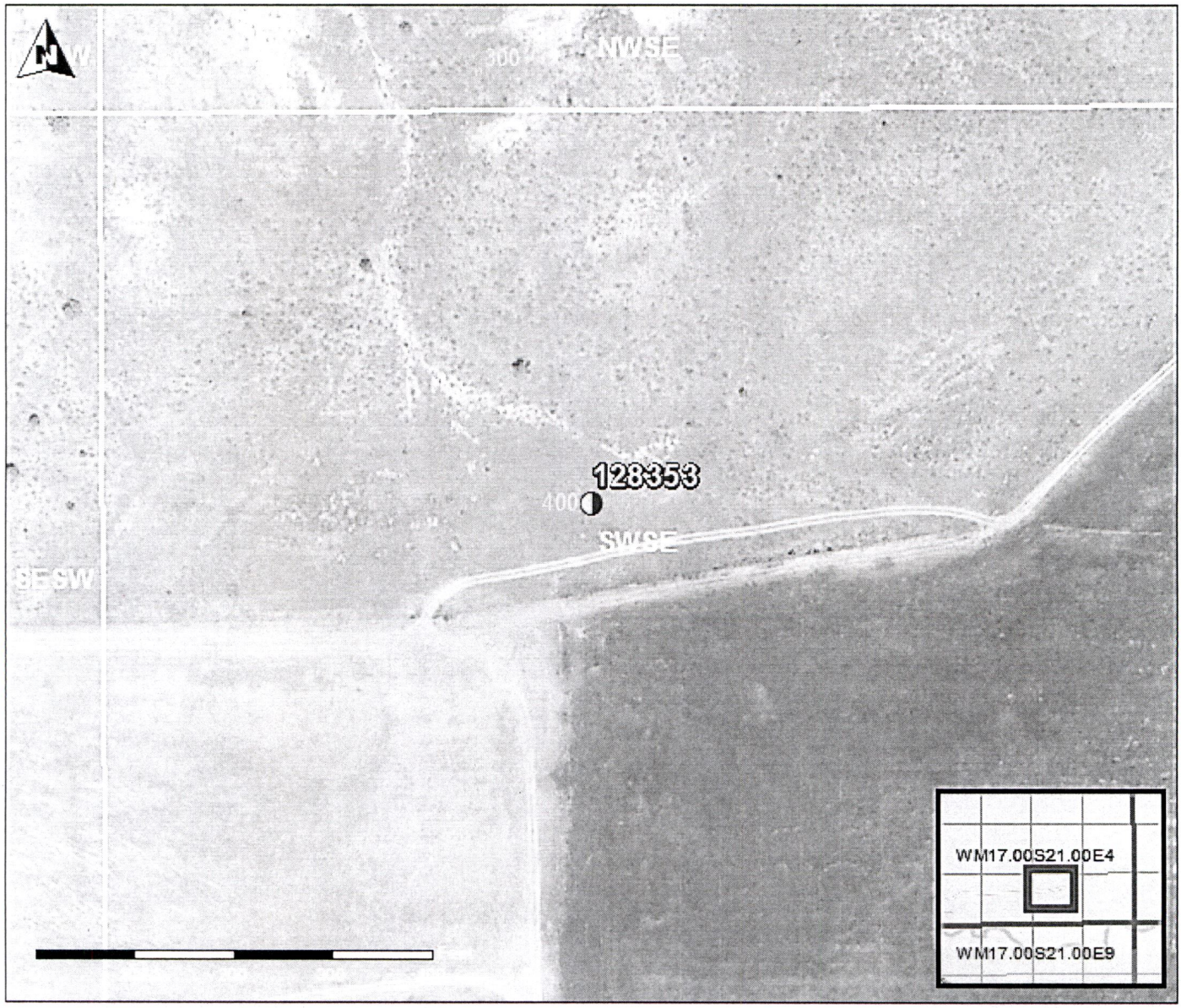
Provided by well constructor



PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date March 19, 2018

FROM: Groundwater Section Aurora C Bouchier
Reviewer's Name

SUBJECT: Application G- 18605 Supersedes review of na
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: **Waibel Ranches LLC** County: **Crook**

A1. Applicant(s) seek(s) 3 cfs from 1 well(s) in the Deschutes Basin, Crooked River subbasin

A2. Proposed use Supp Irr (285.2 acres) Seasonality: April 15 – 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	CROO 54563	1	Vol Seds and Basalts	3.0	17S/21E-4 SW-SE	1040' N, 140' E S ¼ cor S 4
2						
3						
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	3551	585	20.8	12/8/2017	645	0-455	-2-455	Na	Na	1000	Na	A

Use data from application for proposed wells.

A4. **Comments:** The well is constructed into water bearing zones with middle to late Miocene volcaniclastic sediment and lava flows (units Tts and Tcp). Groundwater flow is likely towards the Crooked River.

A5. ☐ **Provisions of the** Deschutes 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 well is located outside the USGS Deschutes Ground Water Study Area.

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, 7J**;
   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:** _____

There is limited data in this area to characterize groundwater availability. However, many nearby wells have high yields (100 to 1000 gpm) listed on their well logs. Nearby by wells have relatively stable water level trends over their period of record. These wells appear to be located near the bottom of a syncline (Swanson, D.A. 1969).

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	**Volaniclastic Sediment and Lava Flows**	☒	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: The water bearing zones/units are likely only semi-confined due to the heterogeneity of the volcaniclastic deposits and spatial variability in permeability inherent to the lava flows. The water level in this well is listed at ~565 feet above the zone at which it was first encountered according to the well log.

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**	**Crooked River**	**3530**	**3480-3505**	**1500**	☐	☒	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: The Crooked River is likely a regional groundwater sink as evidenced by base flow in the stream flow record and the hydraulic head in this well and other wells likewise located along the valley floor. However, the water bearing zone identified on the well log for this application is over 500 feet below land surface. The overlying units consist of hundreds of feet of relatively fine-grained (low permeability) material. Although the POA is relatively close (1500-feet) from the Crooked River, and the hydraulic head in the well is high (20.8-feet), the aquifer confinement likely precludes short-term interference.

Water Availability Basin the well(s) are located within: 70353: Crooked River > Deschutes River – Above Sand Creek

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?
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

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: The water bearing zone identified on the well log for this application is over 500 feet below land surface. The overlying units consist of hundreds of feet of relatively fine-grained (low permeability) material. Although the POA is relatively close (1500-feet) to the Crooked River, and the hydraulic head in the well is high (20.8-feet), the aquifer confinement likely precludes short-term interference. The unknown distance to any discharge feature and the intervening hydrogeologic complexities make the use of any analytical model inappropriate.

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													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(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:

The water bearing zone identified on the well log for this application is over 500 feet below land surface. The overlying unites consist of hundreds of feet of relatively fine-grained (low permeability) material. Although the POA is relatively close (1500-feet) to the Crooked River, and the hydraulic head in the well is high (20.8-feet), the aquifer confinement likely precludes short-term interference. The unknown distance to any discharge feature and the intervening hydrogeologic complexities make the use of any analytical model inappropriate.

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 groundwater/surface water interaction with the nearest reach of the Crooked River is unknown. However, the thickness of confining material probably diminishes most interference in the sedimentary material adjacent to the surface water caused by pumping the water bearing zones within the volcanic units. The unknown distance to the nearest possible groundwater discharge probably significantly reduces the interference effects. That being said, wells located along the valley floor appear to have water levels slightly above the elevation of the Crooked River at the adjacent reach and have relatively stable water level trends, whereas wells located outside the valley of the Crooked River valley have water levels far above the elevation of the Crooked River and display a downward water level trend. It is likely the river acts as a groundwater sink.

References Used:

Application file: G-18605.

Gonthier, J.B. 1985. A description of aquifer units in eastern Oregon: U.S. Geological Survey Water Resources Investigations Report 84-4095, 39 p., maps.

OWRD Groundwater Review for Application File: G-16212, and G-18112.

Swanson, D.A. 1969. Reconnaissance geologic map of the east half of the Bend quadrangle, Crook, Wheeler, Jefferson, Wasco, and Deschutes Counties, Oregon: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-568.

Walker, G. W. (editor) 1990. Geology of the Blue Mountains region of Oregon, Idaho, and Washington; Cenozoic geology of the Blue Mountains region: U.S. Geological Survey Professional Paper 1437, 135 p.

Waters, A. C. 1968. Reconnaissance Geologic map of the Post quadrangle, Crook County Oregon: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-542.

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 TABLE

CROOKED R > DESCHUTES R - AB SAND CR
Watershed ID #: 70353 Basin: DESCHUTES Exceedance Level: 80
Time: 2:33 PM Date: 03/19/2018

Nest	# Watershed ID Number	Stream Name	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	STOR
1	70087	DESCHUTES R > COLUMBIA R - AB MOUTH AT GAGE 14103000	NO	NO	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	YES
2	30530627	DESCHUTES R > COLUMBIA R - AB EAGLE CR	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	NO	NO	YES
3	30530643	DESCHUTES R > COLUMBIA R - AB SHITIKE CR	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	YES
4	30530508	CROOKED R > DESCHUTES R - AB OSBORNE CAN	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES
5	30530507	CROOKED R > DESCHUTES R - AB DRY R	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES
6	70353	CROOKED R > DESCHUTES R - AB SAND CR	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES

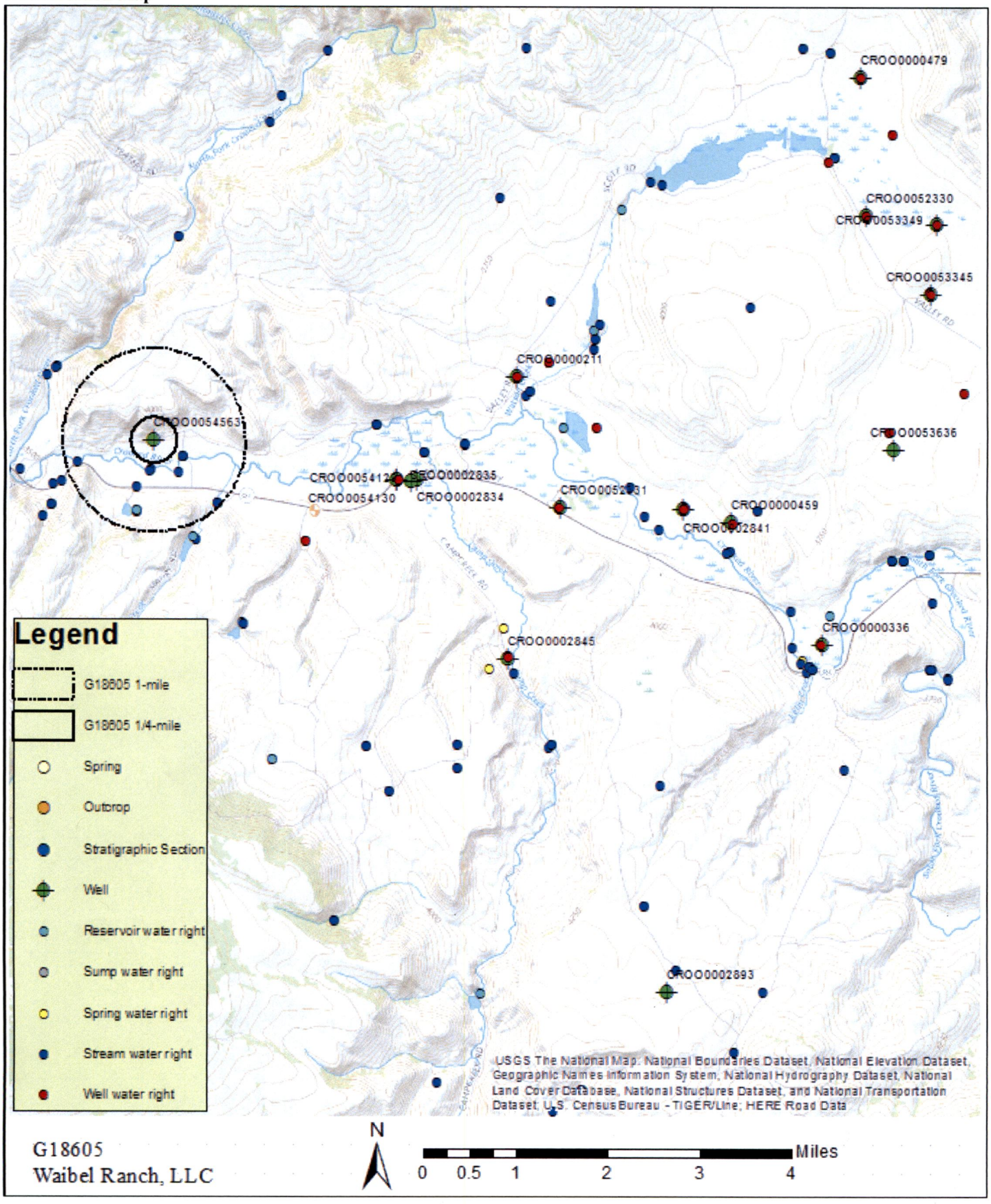
DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION

CROOKED R > DESCHUTES R - AB SAND CR
Watershed ID #: 70353 Basin: DESCHUTES Exceedance Level: 80
Time: 2:32 PM Date: 03/19/2018

Monthly values are in cfs.
Storage is the annual amount at 50% exceedance in ac-ft.

Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net Water Available
JAN	78.90	7.74	71.20	0.00	50.00	21.20
FEB	175.00	15.50	160.00	0.00	75.00	84.50
MAR	337.00	145.00	192.00	0.00	113.00	79.10
APR	598.00	332.00	266.00	0.00	113.00	153.00
MAY	404.00	370.00	34.20	0.00	113.00	-78.80
JUN	261.00	295.00	-34.50	0.00	75.00	-109.00
JUL	80.10	85.00	-4.86	0.00	50.00	-54.90
AUG	38.70	43.20	-4.47	0.00	47.80	-52.30
SEP	45.20	44.80	0.37	0.00	50.00	-49.60
OCT	47.30	22.90	24.40	0.00	50.00	-25.60
NOV	60.60	3.44	57.20	0.00	50.00	7.16
DEC	76.50	5.50	71.00	0.00	50.00	21.00
ANN	223,000	82,800	140,000	0	50,500	101,000

Well Location Map



Water-Level Trends in Nearby Wells