

Groundwater Application Review Summary Form

Application # G- 18754

GW Reviewer Aaron Bucher Date Review Completed: 12/28/2018

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.

ds 1/3/19

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).

OK
KJ

MEMO

To: Kristopher Byrd, Well Construction and Compliance Section Manager
From: Joel Jeffery, Well Construction Program Coordinator
Subject: Review of Water Right Application G-18754
Date: January 8, 2019

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.

Applicant's Well #1, Well #2, Well #3, Well #4, Well #5 and Well #6 are proposed wells and have not been constructed and therefore there is no way to determine if the wells meet minimum construction standards.

The construction of Applicant's Well #1, Well #2, Well #3, Well #4, Well #5 and Well #6 may not satisfy hydraulic connection issues.

Applicant's Test Well #3 (CROO 54695); Based on a review of the well report, Applicant's Test Well # 3 (CROO 54695) seems to protect the groundwater resource.

The construction of Applicant's Test Well #3 may not satisfy hydraulic connection issues.

AMENDED

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

CROO 54695

WELL I.D. LABEL# L130880
START CARD # 1041133
ORIGINAL LOG #

12/13/2018

(1) LAND OWNER Owner Well I.D. #3
First Name CHUCK Last Name MCGRATH
Company
Address PO BOX 238
City BEND State OR Zip 97709

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

(4) PROPOSED USE [] Domestic [] Irrigation [] Community
[] Industrial/ Commercial [] Livestock [] Dewatering
[] Thermal [] Injection [X] Other TEST HOLE

(5) BORE HOLE CONSTRUCTION Special Standard [] (Attach copy)
Depth of Completed Well 630.00 ft.

Table with columns: Dia, From, To, Material, From, To, Amt, lbs. Row 1: 12, 0, 77.5, Bentonite Chips, 0, 77.5, 51, S. Row 2: 8, 77.5, 630, Calculated, 50.04.

How was seal placed: Method [] A [] B [] C [] D [] E
[X] Other POURED DRY
Backfill placed from [] ft. to [] ft. Material []
Filter pack from [] ft. to [] ft. Material [] Size []
Explosives used: [X] Yes Type PENTEX CE Amount 10

(5a) ABANDONMENT USING UNHYDRATED BENTONITE
Proposed Amount Actual Amount

(6) CASING/LINER
Casing Liner Dia + From To Gauge Stl Plstc Wld Thrd
[] [] 8 [X] 1 77.5 .250 [] [] [X] []
[] [] 6 [X] 1 455 .188 [] [] [X] []
Shoe [] Inside [] Outside [] Other Location of shoe(s) []
Temp casing [] Yes Dia [] From + [] To []

(7) PERFORATIONS/SCREENS
Perforations Method []
Screens Type [] Material []
Perf/ Casing/Screen Scrn/slot Slot # of Tele/
Screen Liner Dia From To width length slots pipe size

(8) WELL TESTS: Minimum testing time is 1 hour
[] Pump [] Bailer [X] Air [] Flowing Artesian
Yield gal/min Drawdown Drill stem/Pump depth Duration (hr)
60 [] 455 1

Temperature 53 °F Lab analysis [] Yes By []
Water quality concerns? [] Yes (describe below) TDS amount 251 ppm
From To Description Amount Units

(9) LOCATION OF WELL (legal description)
County CROOK Twp 16.00 S N/S Range 18.00 E E/W WM
Sec 17 SW 1/4 of the SE 1/4 Tax Lot 1502
Tax Map Number [] Lot []
Lat [] ' " or [] DMS or DD
Long [] ' " or [] DMS or DD
[] Street address of well [X] Nearest address
19405 SE PAULINA HWY

(10) STATIC WATER LEVEL
Date SWL(psi) + SWL(ft)
Existing Well / Pre-Alteration [] []
Completed Well 11/14/2018 [] 54
Flowing Artesian? [] Dry Hole? []

WATER BEARING ZONES Depth water was first found 147.00
SWL Date From To Est Flow SWL(psi) + SWL(ft)
11/14/2018 147 455 60 [] 54

(11) WELL LOG Ground Elevation []
Material From To
BROKEN BASALT 0 67
TAN CLAYSTONE 67 83
W/B BLUE CLAYSTONE CONGLOMERATE 83 147
TAN CLAYSTONE 147 155
FRACTURED BLUE CLAYSTONE 155 180
FRACTURED BASALT CONGLOMERATE 180 257
FRACTURED BLUE CLAYSTONE 257 425
FRACTURED BASALT CONGLOMERATE 425 430
FRACTURED BLUE CLAYSTONE 430 505
GRAY BASALT CONGLOMERATE 505 630

Date Started 10/31/2018 Completed 11/14/2018

(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 1987 Date 12/13/2018
Signed MATHEW ROGERS (E-filed)

(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 1720 Date 12/13/2018
Signed JACK ABBAS (E-filed)
Contact Info (optional) JACK ABBAS

**WATER SUPPLY WELL REPORT -
continuation page**

CRO064695

WELL I.D. LABEL# L

130880

START CARD #

1041133

ORIGINAL LOG #

12/13/2018

(2a) PRE-ALTERATION

Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
Material				From	To	Amt	sacks/lbs	

(5) BORE HOLE CONSTRUCTION

BORE HOLE			SEAL				sacks/
Dia	From	To	Material	From	To	Amt	lbs
						Calculated	
						Calculated	
						Calculated	
						Calculated	

FILTER PACK			
From	To	Material	Size

(6) CASING/LINER

Casing Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd

(7) PERFORATIONS/SCREENS

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

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

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

Water Quality Concerns

From	To	Description	Amount	Units

(10) STATIC WATER LEVEL

SWL Date	From	To	Est Flow	SWL(psi)	+ SWL(ft)

(11) WELL LOG

Material	From	To

Comments/Remarks

BOTTOM OF HOLE IS 455' LOST HAMMER,BIT,STABILIZER AND DRILL STEM FROM 460 TO 630' USED DYNAMITE EXPLOSIVE TO BLOW OFF TOOLS

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 12/28/2018
 FROM: Groundwater Section Aurora C Bouchier
 Reviewer's Name
 SUBJECT: Application G- 18754 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: Charles M. McGrath County: Crook

- A1. Applicant(s) seek(s) 2.87 cfs from 6 well(s) in the Deschutes Basin,
Upper Crooked subbasin
- A2. Proposed use Irrigation: 28.7 P, 201.0 S Seasonality: Irrigation season
- 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	bedrock	2.87	16S/18E-17 SE-SW	80' N, 500' W fr S ¼ cor S 17
2	proposed	2	bedrock	2.87	16S/18E-17 SE-SW	170' N, 340' W fr S ¼ cor S 17
3	Proposed**	3	bedrock	2.87	16S/18E-17 SE-SW	230' N, 200' W fr S ¼ cor S 17
4	proposed	4	bedrock	2.87	16S/18E-18 SE-NW	100' N, 2950' W fr E ¼ cor S 18
5	proposed	5	bedrock	2.87	16S/18E-18 SW-NE	400' N, 2210' W fr E ¼ cor S 18
6	proposed	6	bedrock	2.87	16S/18E-18 SW-NE	2' S, 2000' W fr E ¼ cor S 18

* 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	3365				Est 500	Est 0-400	Est 0-400					
2	3355				Est 500	Est 0-400	Est 0-400					
3	3360				Est 500	Est 0-400	Est 0-400					
4	3310				Est 500	Est 0-400	Est 0-400					
5	3345				Est 500	Est 0-400	Est 0-400					
6	3325				Est 500	Est 0-400	Est 0-400					

Use data from application for proposed wells.

- A4. **Comments:** Proposed wells 1-3 are located on an elevated alluvial terrace above the Crooked River on the south side. Proposed wells 4-6 are located on the flank of the valley on the north side of the Crooked River. The proposed well construction includes a seal interval of 0-400 feet for all 6 proposed wells, with total well depths estimated to be 500 feet. It is anticipated that the wells will be constructed into water-bearing zones within volcanic/volcaniclastic rocks of the Clarno Formation.

**A well (CROO 54695 - marked as Well 3 and identified as a test well), has been constructed since the application was submitted. This well does NOT meet special permit condition listed in section 3B and is NOT acceptable for production under this evaluation.

The hydraulic head in both CROO 54695 and nearby CROO 3163 is coincident with/slightly above the elevation of the Crooked River at the adjacent reach.

- 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 wells are located outside the USGS Groundwater 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, 7T, large water-use reporting, 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:** _____

Special Condition: the wells must be continuously cased and continuously sealed from land surface to a depth of 400 feet below land surface.

The reported yield for wells constructed in the Clarno Formation approximately 10-15 miles east of this location are much higher than expected. However, the yield estimates for wells near the proposed wells range from 3 to 60 gpm, much less than the requested rate even if the rate is distributed between the 6 wells.

The Clarno rocks appear to be vertically fractured locally, and groundwater in the volcanic fractures may be hydraulically connected to the overlying sediments, when saturated, and subsequently to surface water (see the log for CROO 54695).

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	Clarno Volcanics	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Clarno Volcanics	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Clarno Volcanics	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Clarno Volcanics	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	Clarno Volcanics	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Clarno Volcanics	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer confinement evaluation:

The recently constructed test well (CROO 54695) lists a static water level nearly 100 feet above the zone at which it was encountered, indicating confined conditions. If the proposed wells are constructed as stipulated in special condition B3, then it is likely the wells will be tapping into a confined source, assuming water is encountered at depth.

Many wells along the Crooked River corridor have minimum seal depths and appear to be tapping into a mostly unconfined source as evidenced by the close relation between first water bearing zone and final hydraulic head as listed on 18 out of 26 well logs located in nearby townships and ranges close to the Crooked River (see Well Stats below).

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	Crooked River	Unknown*	3235-3256	1,520	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	1	Crooked River	Unknown*	3235-3256	1,550	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	1	Crooked River	Unknown*	3235-3256	1,570	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	1	Crooked River	Unknown*	3235-3256	1,490	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	1	Crooked River	Unknown*	3235-3256	2,150	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6	1	Crooked River	Unknown*	3235-3256	1,850	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Basis for aquifer hydraulic connection evaluation: The elevation of the hydraulic head in nearby wells is coincident with or above the surface water elevation. However, the existing nearby wells all have well seal depths MUCH less than 400 feet. The well log for nearby test well (CROO 54695) indicates a water bearing zone from 147 to 455 feet below land surface in a series of fractured basalt and fractured claystone layers. Based on the well log, no additional water was found from 455 to 630 feet. The hydraulic head in CROO 54695 is above the surface water elevation. The Crooked River likely represents a regional hydrologic sink.

****There are no wells with construction similar to what is proposed on the application or stipulated in section 3B. If water is found at depth it will likely be confined, but the hydraulic head is unknown.** It is possible that the head in the proposed wells will be similar to that in CROO 54695, and it is also possible that no/minimal water will be found at depth. The fractured nature of the Clarno formation likely results in a hydraulic connection between the aquifer at depth and the Crooked River – although it is likely it is an inefficient connection. The special permit conditions requiring continuous casing and continuous seal from land surface to a depth of 400 feet should attenuate any hydraulic connection.

Water Availability Basin the well(s) are located within: 70353: CROOKED R> DESCHUTES R- AB SAND CR

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"/>

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:

Not applicable – AS LONG AS THE WELLS ARE CONSTRUCTED AS STIPULATED IN SECTION 3B.

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													
(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: Not applicable.

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:** _____
If a permit is issued: condition with 7B, 7N, 7J, and special well construction stipulated in section B3. The nearby test well (CROO 54695) does NOT meet the well construction stipulated above and is not acceptable for use under this evaluation.

Production from the wells will likely impact surface water along the Crooked River. However, the nature of the aquifer unit precludes the use of available analytical models to evaluate the timing of interference. The 400 foot continuous seal requirement should attenuate any hydraulic connection

References Used: _____

Application File: G-18754 and nearby apps G-15946, G-17412, G-17814, G-18112, and G-18604.

Pilot Butte quadrangle map (USGS map, 1:24,000 scale).

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.

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

OWRD Well Log and Water Level database.

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:** _____

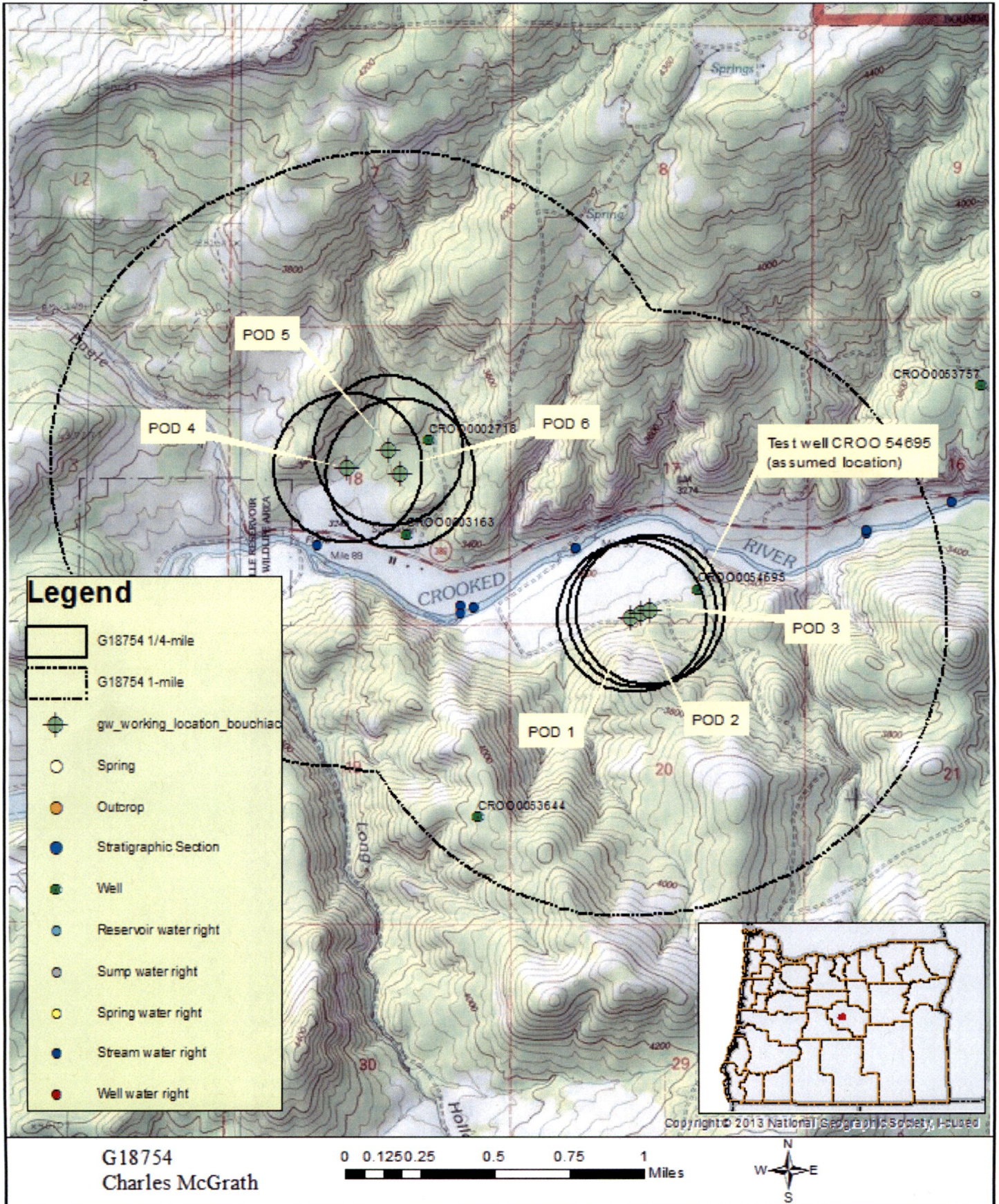
D4. **Route to the Well Construction and Compliance Section for a review of existing well construction.**

Water Availability Tables

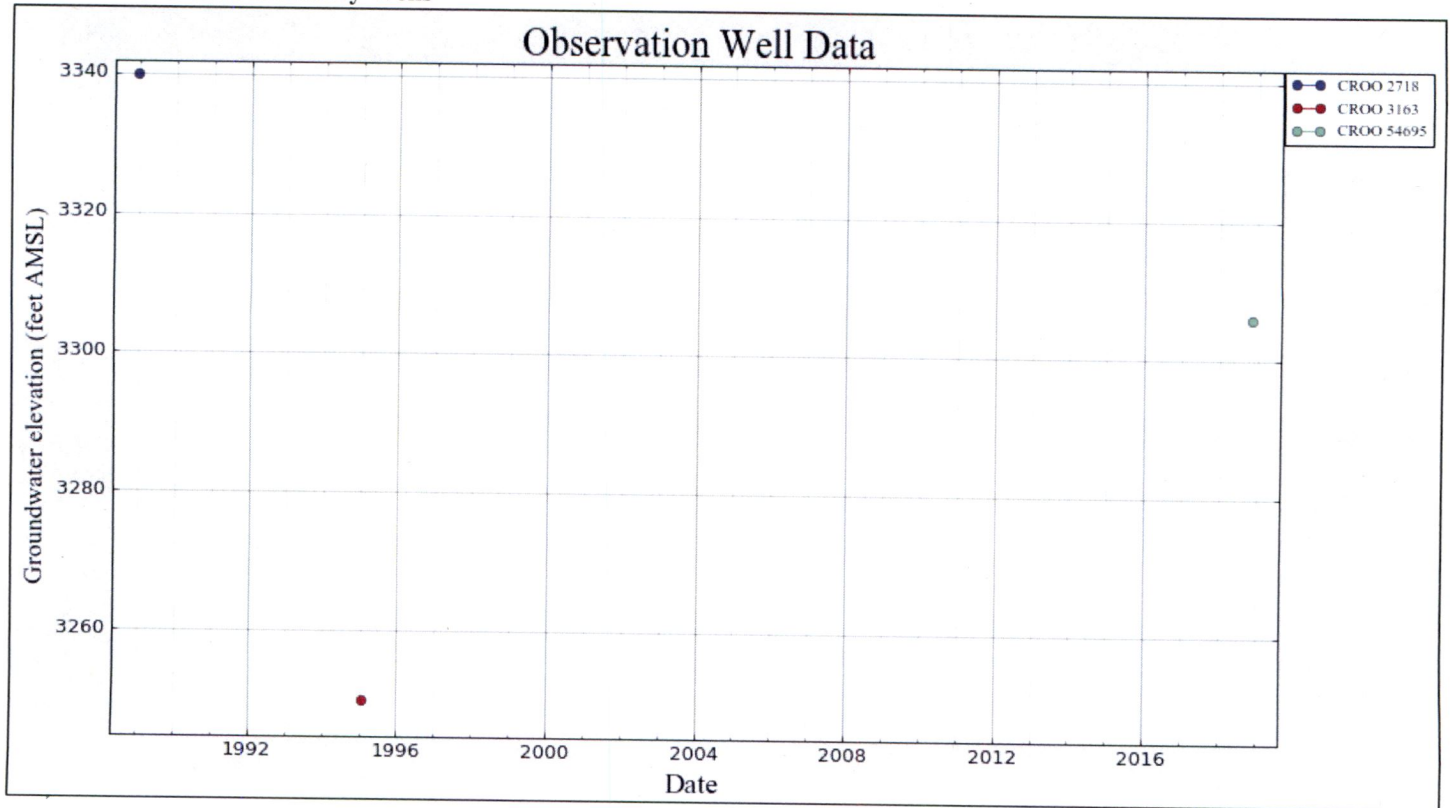
DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION						
Watershed ID #: 70353 Time: 10:10 AM		CROOKED R > DESCHUTES R - AB SAND CR Basin: DESCHUTES			Exceedance Level: 80 Date: 12/28/2018	
Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net water Available
Monthly values are in cfs. Storage is the annual amount at 50% exceedance in ac-ft.						
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	78.80
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	82,900	140,000	0	50,500	100,000

DETAILED REPORT OF INSTREAM REQUIREMENTS													
Watershed ID #: 70353 Time: 10:10 AM		CROOKED R > DESCHUTES R - AB SAND CR										Basin: DESCHUTES Date: 12/28/2018	
Application Number	Status	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Monthly values are in cfs.													
IS70353A	CERTIFICATE	50.0	75.0	113.0	113.0	113.0	75.0	50.0	47.8	50.0	50.0	50.00	50.0
	MAXIMUM	50.0	75.0	113.0	113.0	113.0	75.0	50.0	47.8	50.0	50.0	50.0	50.0

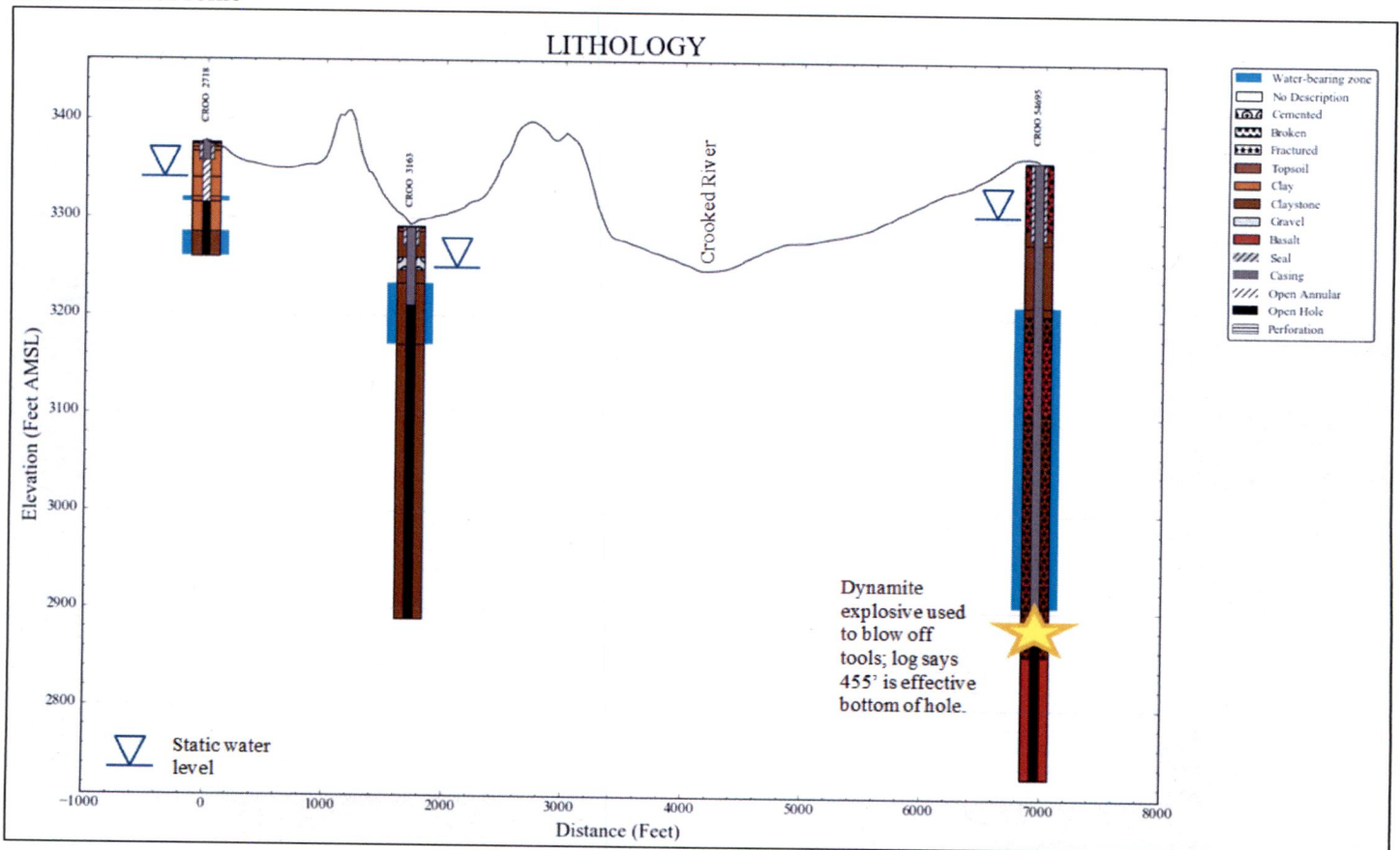
Well Location Map



Water-Level Trends in Nearby Wells



Cross Section/Profile



Well Stats

