

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date August 9, 2016
 FROM: Groundwater Section Aurora C Bouchier
Reviewer's Name
 SUBJECT: Application G- 18286 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: Ed Landholding, LLC County: Marion

- A1. Applicant(s) seek(s) 2.33 cfs from 3 well(s) in the Willamette Basin,
Middle Willamette subbasin
- A2. Proposed use Irrigation (186 acres) 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	MARI 3794	1	Alluvium	0.67	6S/2W- 4 SW-NW	1925' S, 100' E fr NW cor S 4
2	PROPOSED	2	Alluvium	0.78	6S/2W- 4 NW-SW	790' N, 120' W fr SW cor S 4
3	PROPOSED	3	Alluvium	0.78	6S/2W- 5 SE-SE	1860' N, 1090' E fr SW cor S 4
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	183	101	28	7/6/1973	260	0-20	0-260		101-106, 121-137, 189-257	300	32	P
2	180				Est 250	Est 0-50	Est 0-250		Est 100-250	Est 350		
3	180				Est 250	Est 0-50	Est 0-250		Est 100-250	Est 350		

Use data from application for proposed wells.

A4. **Comments:** The applicant's existing well 1 (MARI 3794) apparently produced enough sand that a second well was constructed in 1974 in order to add gravel to the borehole in an attempt to clean up the sand.

A5. **Provisions of the** Willamette Basin rules relative to the development, classification and/or management of groundwater hydraulically connected to surface water **are, or** **are not**, activated by this application. (Not all basin rules contain such provisions.)
 Comments: The basin rules (OAR 690-502-0240) apply to groundwater in unconfined alluvium within 1/4-mile of surface water sources. The groundwater encountered in the applicant's wells is confined, so the pertinent 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) 7N;
 - 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 applicant's wells are located in an area that contains fine-grained sediment (Willamette Silt) from land surface to a depth of approximately 100 feet (Gannett and Caldwell, 1998). A sequence of water-bearing sands and gravels beds with inter-fingered silt and clays beds exist under the silt with a combined thickness of approximately 60-70 feet (Gannett and Caldwell, 1998). Beneath this the alluvium becomes dominated by fine-grained material which progressively confines deeper water-bearing zones (Woodward et al., 1998) to a depth of approximately 600 feet below sea level (Gannett and Caldwell, 1998).

Observations from nearby wells indicate relatively stable long-term trends for alluvial wells in the immediate area of the proposed wells (see attached hydrograph), but increased groundwater development in the area indicates a need for additional water-level monitoring.

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

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

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

Basis for aquifer confinement evaluation: The well log for MARI 3794 lists a static water level above the water-bearing zone at which it was encountered, indicating confined conditions.

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	Patterson Creek	~170	162-180	4,220*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	1	Patterson Creek	~170	162-180	3,960*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	1	Patterson Creek	~170	162-180	4,850*	<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"/>

Basis for aquifer hydraulic connection evaluation: Nearby wells (in particular, MARI 3799) with long records of measurement records indicated that the seasonal high water table is likely approximately 170 feet above sea level at the location of the applicant's wells. The water levels in nearby wells are generally above or coincident with nearby perennial stream reaches indicating groundwater discharges to local streams. Published water table maps in the area corroborate this elevation and indicate that groundwater flows towards, and discharges into local streams (Woodward et al., 1998, and Conlon et al., 2005).

* The adjacent reach of Patterson Creek is located less than ¼-mile from each of the proposed wells. However, at the adjacent reach, the elevation of the stream is above the likely seasonal high elevation of the groundwater at the wells. The distance listed on the table above is the distance to the location along Patterson Creek which is coincident with the likely seasonal high groundwater elevation (170 feet above sea level).

Water Availability Basin the well(s) are located within: 182: WILLAMETTE R > COLUMBIA R – AB MOLALLA R

C3a. **690-09-040 (4):** Evaluation of stream impacts for each well that has been determined or assumed to be hydraulically connected and less than 1 mile from a surface water 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"/>	MF182A	1,500	<input type="checkbox"/>	3,830	<input type="checkbox"/>	<<25%	<input type="checkbox"/>
2	1	<input type="checkbox"/>	<input type="checkbox"/>	MF182A	1,500	<input type="checkbox"/>	3,830	<input type="checkbox"/>	<<25%	<input type="checkbox"/>
3	1	<input type="checkbox"/>	<input type="checkbox"/>	MF182A	1,500	<input type="checkbox"/>	3,830	<input type="checkbox"/>	0.55%	<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?
	1	<input type="checkbox"/>	MF182A	1,500	<input type="checkbox"/>	3,830	<input type="checkbox"/>	0.55%	<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: C3a. Interference to Patterson Creek at 30 days was estimated using the Hunt 2003 model and the distance between Well 3 and the adjacent reach of the stream (this represents the maximum impact to the stream). The interference from the other wells will be less than this due to the greater distance to the stream.

C3b. The aggregate interference to Patterson at 30 days was estimated using the Hunt 2003 model. To represent the maximum impact to the stream this model included: the distance between Well 3 and the adjacent reach of the stream, and the cumulative pumping rate.

The presence of low permeability Willamette Silt between the aquifer and the streambed results in an inefficient connection between the aquifer and the stream, therefore the interference at 30 days is much less than 25%. However, stream depletion will increase over time until all of the pumped water is reduced stream flow from this and other streams.

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:** _____
The presence of low permeability Willamette Silt between the aquifer and the nearby streambeds will likely result in an inefficient connection between the aquifer and the streams locally. However, stream depletion will increase over time until all of the pumped water is reduced stream flow from Patterson Creek and other streams.

References Used: _____
 Application file: G-18286, and nearby G-16702, G-16842, and G-18100.

Conlon and others, 2005, Ground-water hydrology of the Willamette Basin, Oregon: U.S Geological Survey Scientific Investigations Report 2005-5168.

Gannett and Caldwell, 1998, Geologic framework of the Willamette lowland aquifer system, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-A.

Hunt, B., 2003, Unsteady stream depletion when pumping from semiconfined aquifer: Journal of Hydrologic Engineering, January/February, 2003.

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 #: 1 Logid: MARI 3974

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:**
MARI 3974 was completed in 1973. In 1974 a second well (MARI 3972) was drilled in order to add gravel to the borehole of MARI 3974 to help clear up the sand. The seal material for MARI 3974 is 'cement and puddle clay'. The seal material for MARI 3972 is cement.

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

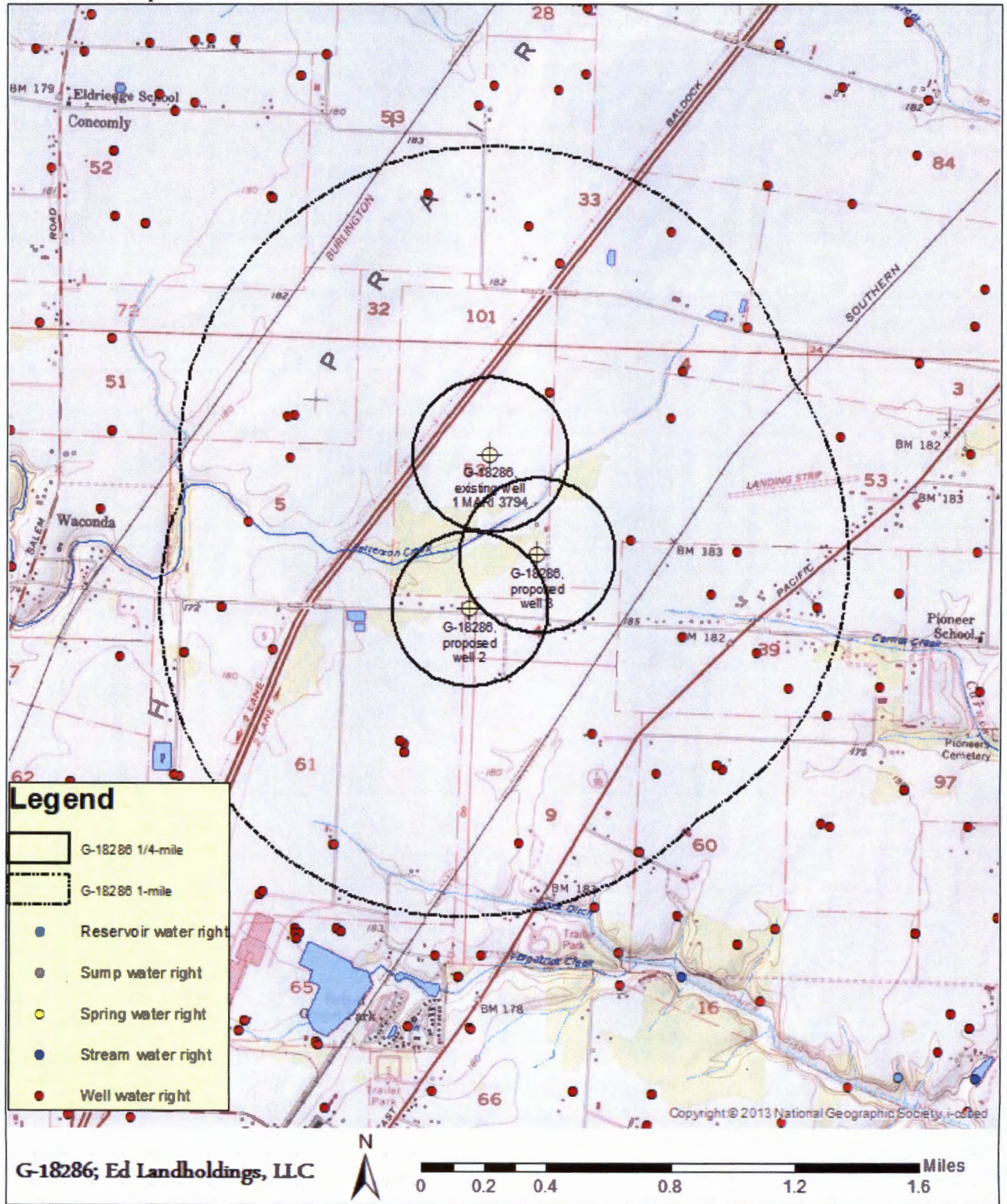
Water Availability Tables

WATER AVAILABILITY TABLE															
Watershed ID #: 182		WILLAMETTE R > COLUMBIA R - AB MOLALLA R							Exceedance Level: 80						
Time: 2:11 PM		Basin: WILLAMETTE							Date: 08/08/2016						
#	Watershed Nest ID Number	Stream Name	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	STOR
1	181	WILLAMETTE R > COLUMBIA R - AT MOUTH	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
2	182	WILLAMETTE R > COLUMBIA R - AB MOLALLA R	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

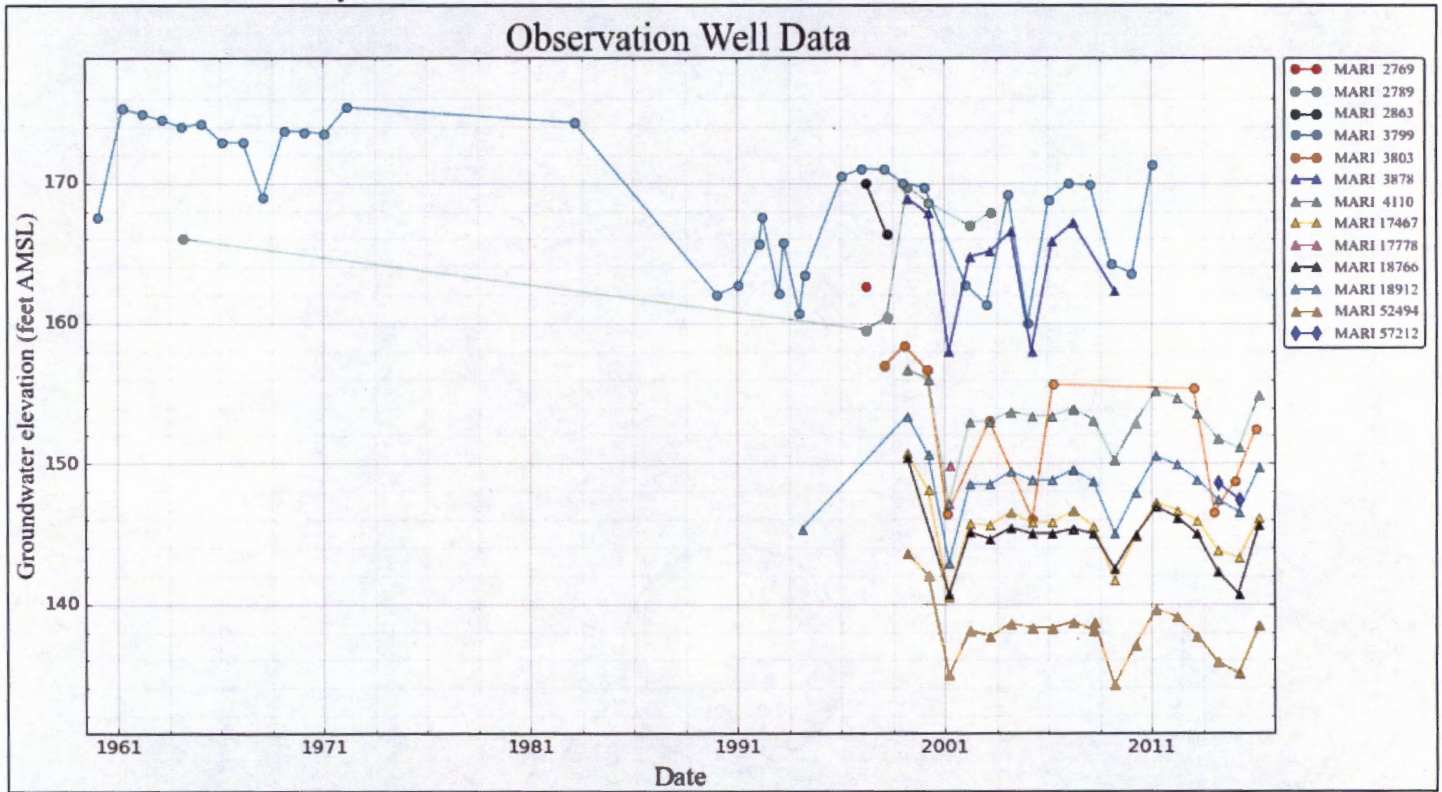
DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION						
Watershed ID #: 182		WILLAMETTE R > COLUMBIA R - AB MOLALLA R				Exceedance Level: 80
Time: 2:11 PM		Basin: WILLAMETTE				Date: 08/08/2016
Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net water Available
Monthly values are in cfs. Storage is the annual amount at 50% exceedance in ac-ft.						
JAN	21,400.00	2,290.00	19,100.00	0.00	1,500.00	17,600.00
FEB	23,200.00	7,470.00	15,700.00	0.00	1,500.00	14,200.00
MAR	22,400.00	7,250.00	15,100.00	0.00	1,500.00	13,600.00
APR	19,900.00	6,910.00	13,000.00	0.00	1,500.00	11,500.00
MAY	16,600.00	4,230.00	12,400.00	0.00	1,500.00	10,900.00
JUN	8,740.00	1,970.00	6,770.00	0.00	1,500.00	5,270.00
JUL	4,980.00	1,800.00	3,180.00	0.00	1,500.00	1,680.00
AUG	3,830.00	1,640.00	2,190.00	0.00	1,500.00	686.00
SEP	3,890.00	1,390.00	2,500.00	0.00	1,500.00	996.00
OCT	4,850.00	748.00	4,100.00	0.00	1,500.00	2,600.00
NOV	10,200.00	879.00	9,320.00	0.00	1,500.00	7,820.00
DEC	19,300.00	962.00	18,300.00	0.00	1,500.00	16,800.00
ANN	15,200,000	2,250,000	13,000,000	0	1,090,000	11,900,000

DETAILED REPORT OF INSTREAM REQUIREMENTS													
Watershed ID #: 182		WILLAMETTE R > COLUMBIA R - AB MOLALLA R										Basin: WILLAMETTE	
Time: 2:11 PM												Date: 08/08/2016	
Application Number	Status	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Monthly values are in cfs.													
MF182A	APPLICATION	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0
MAXIMUM		1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0	1500.0

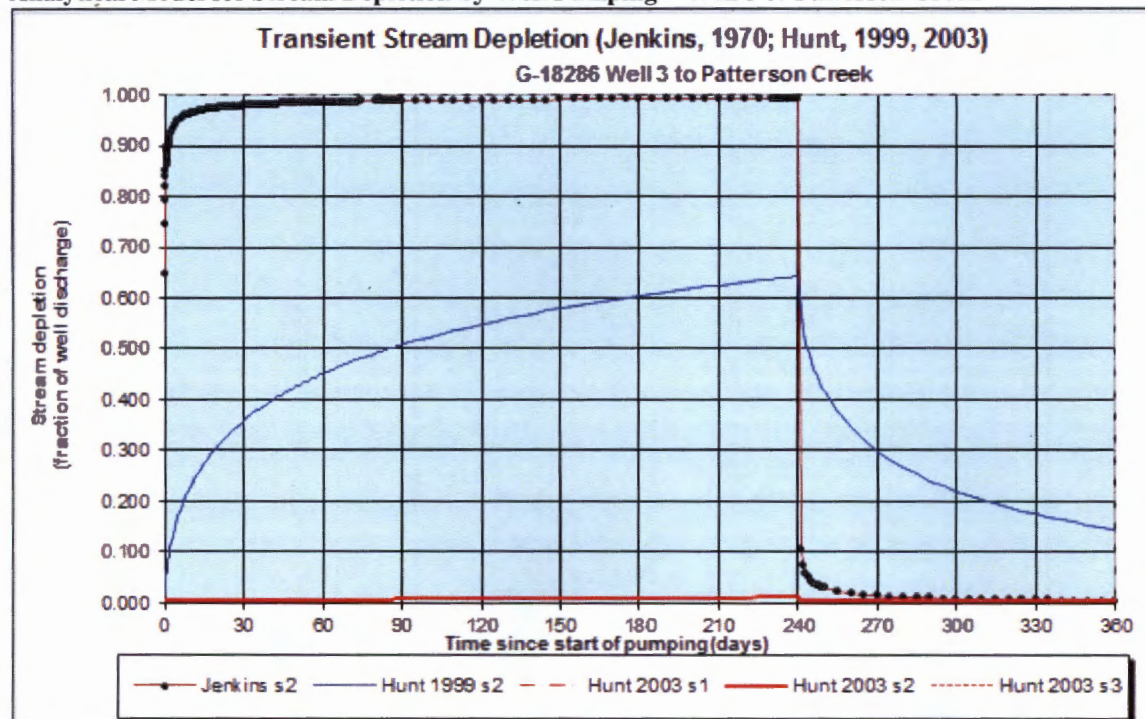
Well Location Map



Water-Level Trends in Nearby Wells



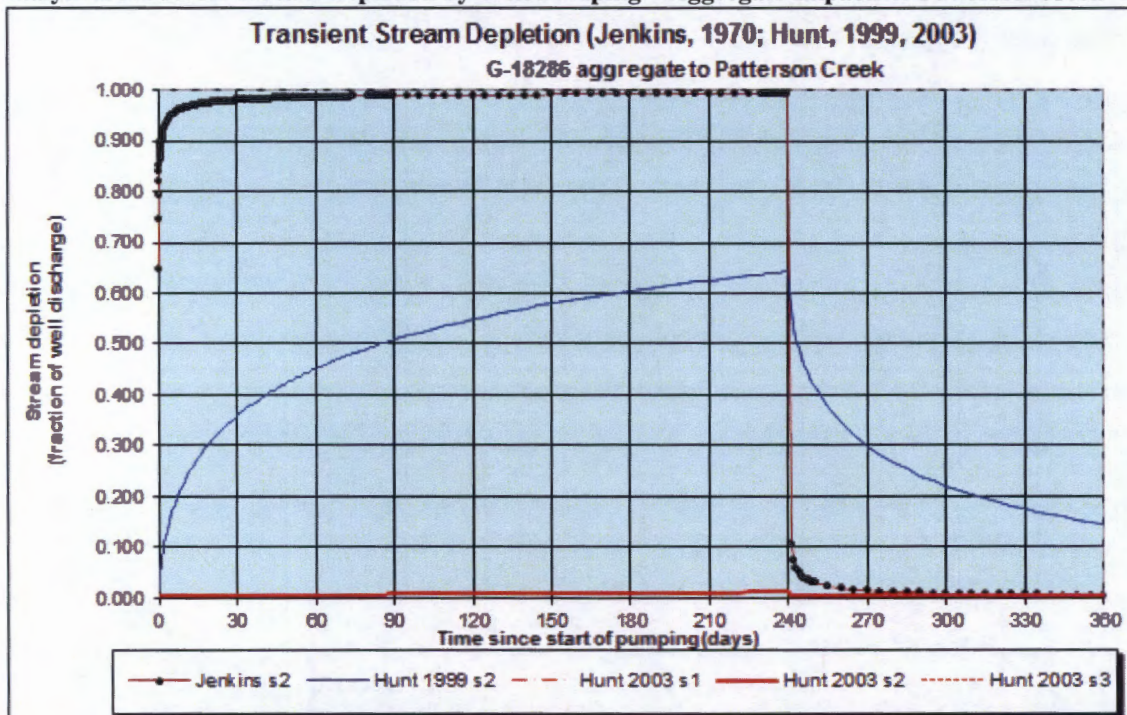
Analytical Model for Stream Depletion by Well Pumping – Well 3 to Patterson Creek



Output for Stream Depletion, Scenerio 2 (s2):					Time pump on (pumping duration) = 240 days							
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	97.9%	98.5%	98.8%	98.9%	99.1%	99.1%	99.2%	99.3%	1.4%	0.8%	0.6%	0.4%
H SD 1999	35.8%	45.1%	50.8%	54.9%	58.0%	60.4%	62.5%	64.3%	30.0%	22.0%	17.5%	14.5%
H SD 2003	0.55%	0.65%	0.74%	0.83%	0.92%	1.00%	1.09%	1.17%	0.70%	0.69%	0.68%	0.66%
Qw, cfs	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780	0.780
H SD 99, cfs	0.279	0.352	0.396	0.428	0.452	0.471	0.488	0.501	0.234	0.172	0.136	0.113
H SD 03, cfs	0.004	0.005	0.006	0.006	0.007	0.008	0.008	0.009	0.005	0.005	0.005	0.005

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	350.00	350.00	350.00	gpm
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	790	790	790	ft
Well depth	d	250	250	250	ft
Aquifer hydraulic conductivity	K	25	30	50	ft/day
Aquifer saturated thickness	b	50	50	50	ft
Aquifer transmissivity	T	1250	1500	2500	ft*ft/day
Aquifer storativity or specific yield	S	0.0001	0.0001	0.0001	
Aquitard vertical hydraulic conductivity	Kva	0.1	0.1	0.1	ft/day
Aquitard saturated thickness	ba	30	30	30	ft
Aquitard thickness below stream	babs	15	15	15	ft
Aquitard porosity	n	0.5	0.5	0.5	
Stream width	ws	10	10	10	ft
Streambed conductance (lambda)	sbc	0.066667	0.066667	0.066667	ft/day
Stream depletion factor	sdf	0.049928	0.041607	0.024964	days
Streambed factor	sbf	0.042133	0.035111	0.021067	
input #1 for Hunt's Q_4 function	t'	20.028842	24.034610	40.057683	
input #2 for Hunt's Q_4 function	K'	1.664267	1.386889	0.832133	
input #3 for Hunt's Q_4 function	epsilon'	0.000200	0.000200	0.000200	
input #4 for Hunt's Q_4 function	lamda'	0.042133	0.035111	0.021067	

Analytical Model for Stream Depletion by Well Pumping – Aggregate Impacts to Patterson Creek



Output for Stream Depletion, Scenerio 2 (s2):										Time pump on (pumping duration) = 240 days		
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	97.9%	98.5%	98.8%	98.9%	99.1%	99.1%	99.2%	99.3%	1.4%	0.8%	0.6%	0.4%
H SD 1999	35.8%	45.1%	50.8%	54.9%	58.0%	60.4%	62.5%	64.3%	30.0%	22.0%	17.5%	14.5%
H SD 2003	0.55%	0.65%	0.74%	0.83%	0.92%	1.00%	1.09%	1.17%	0.70%	0.69%	0.68%	0.66%
Qw, cfs	2.228	2.228	2.228	2.228	2.228	2.228	2.228	2.228	2.228	2.228	2.228	2.228
H SD 99, cfs	0.798	1.006	1.132	1.222	1.291	1.347	1.393	1.432	0.667	0.490	0.390	0.323
H SD 03, cfs	0.012	0.014	0.016	0.018	0.020	0.022	0.024	0.026	0.016	0.015	0.015	0.015

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	1000.00	1000.00	1000.00	gpm
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	790	790	790	ft
Well depth	d	250	250	250	ft
Aquifer hydraulic conductivity	K	25	30	50	ft/day
Aquifer saturated thickness	b	50	50	50	ft
Aquifer transmissivity	T	1250	1500	2500	ft*ft/day
Aquifer storativity or specific yield	S	0.0001	0.0001	0.0001	
Aquitard vertical hydraulic conductivity	Kva	0.1	0.1	0.1	ft/day
Aquitard saturated thickness	ba	30	30	30	ft
Aquitard thickness below stream	babs	15	15	15	ft
Aquitard porosity	n	0.5	0.5	0.5	
Stream width	ws	10	10	10	ft
Streambed conductance (lambda)	sbc	0.066667	0.066667	0.066667	ft/day
Stream depletion factor	sdf	0.049928	0.041607	0.024964	days
Streambed factor	sbf	0.042133	0.035111	0.021067	
input #1 for Hunt's Q_4 function	t'	20.028842	24.034610	40.057683	
input #2 for Hunt's Q_4 function	K'	1.664267	1.386889	0.832133	
input #3 for Hunt's Q_4 function	epsilon'	0.000200	0.000200	0.000200	
input #4 for Hunt's Q_4 function	lamda'	0.042133	0.035111	0.021067	

NOTICE TO WATER WELL CONTRACTOR

The original and first copy of this report are to be filed with the

STATE ENGINEER, SALEM, OREGON 97310
within 30 days from the date of well completion.

3794
MARI.

WATER WELL REPORT

STATE OF OREGON

(Please type or print)

(Do not write above this line)

RECEIVED

AUG 2 1973

STATE ENGINEER

SALEM, OREGON

State Well No. LS/RW-5
State Permit No. _____

(1) OWNER:

Name Robert E. Taubman
Address 2153 SW Main Street
Portland, Oregon

(2) TYPE OF WORK (check):

New Well Deepening Reconditioning Abandon
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:

Rotary Driven
Cable Jetted
Dug Bored

(4) PROPOSED USE (check):

Domestic Industrial Municipal
Irrigation Test Well Other

(5) CASING INSTALLED:

Threaded Welded
12" Diam. from top ft. to 260 ft. Gage 250
" Diam. from _____ ft. to _____ ft. Gage _____
" Diam. from _____ ft. to _____ ft. Gage _____

(6) PERFORATIONS:

Perforated? Yes No.
Type of perforator used Mills
Size of perforations 7/16 in. by 2 3/4 in.
72 perforations from 101 ft. to 106 ft.
228 perforations from 121 ft. to 137 ft.
912 perforations from 189 ft. to 257 ft.

(7) SCREENS:

Well screen installed? Yes No
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ Set from _____ ft. to _____ ft.
Diam. _____ Slot size _____ Set from _____ ft. to _____ ft.

(8) WELL TESTS:

Drawdown is amount water level is lowered below static level
Was a pump test made? Yes No If yes, by whom? Driller
Y 300 gal./min. with 32 ft. drawdown after 29 hrs.
400 " 37 " " same "
" 500 " 45 " " same "
600 " 53 " " same "
Ballor test 700 gal./min. with 62 ft. drawdown after same hrs.
Artesian flow g.p.m.
Temperature of water _____ Depth artesian flow encountered _____ ft.

(9) CONSTRUCTION:

Well seal—Material used Cement and Puddle Clay
Well sealed from land surface to 20 ft.
Diameter of well bore to bottom of seal 16 in.
Diameter of well bore below seal 12 in.
Number of sacks of cement used in well seal 12 sacks
Number of sacks of bentonite used in well seal _____ sacks
Brand name of bentonite _____
Number of pounds of bentonite per 100 gallons of water _____ lbs./100 gals.
Was a drive shoe used? Yes No Plus _____ Size: location _____ ft.
Did any strata contain unusable water? Yes No
Type of water? _____ depth of strata _____
Method of sealing strata off _____
Was well gravel packed? Yes No Size of gravel: _____
Gravel placed from _____ ft. to _____ ft.

(10) LOCATION OF WELL:

County Marion Driller's well number 1744
1/4 1/4 Section 5 T. 6S R. 2W W.M.
Bearing and distance from section or subdivision corner _____

(11) WATER LEVEL: Completed well.

Depth at which water was first found 101 ft.
Static level 28 ft. below land surface. Date 7-6-73
Artesian pressure _____ lbs. per square inch. Date _____

(12) WELL LOG:

Diameter of well below casing _____
Depth drilled 260 ft. Depth of completed well 260 ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level and indicate principal water-bearing strata.

MATERIAL	From	To	SWL
Top Soil	0	2	
Brown silty clay	2	27	
Gray silty clay	27	82	
Blue Sticky Clay	82	99	
Black sand and gravel	99	106	
Gray sandy clay	106	117	
Brown cemented sand and gravel	117	137	
Blue gravelly clay	137	149	
XXXXXXXXXXXX	149	166	
Gray sandy clay	149	166	
Blue Gravelly Clay	166	179	
Gray sandy clay	179	185	
Blue gravelly clay	185	220	
Brown gravelly clay	220	260	

Work started June 9, 19 73 Completed July 5, 19 73
Date well drilling machine moved off of well July 5, 19 73

Drilling Machine Operator's Certification:

This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.

[Signed] James J. Rod Date July 6, 19 73
(Drilling Machine Operator)

Drilling Machine Operator's License No. 752

Water Well Contractor's Certification:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Name WILLAMETTE DRILLING COMPANY
(Person, firm or corporation) (Type or print)

Address 7641 35th Ave. NE Salem, Oregon

[Signed] Emil O. Bues
(Water Well Contractor)

Contractor's License No. 2 Date July 6, 19 73

This is to replace the log sent to you
in the name of Carl Ditchen, job #1744.
Mr. Ditchen just farms this land and
Mr. Taubman owns it , t is was an error
of our part.

Willamett Drilling Company

RECEIVED
AUG 2 1973
STATE ENGINEER
SALEM OREGON

NOTICE TO WATER WELL CONTRACTOR
The original and first copy
of this report are to be
filed with the

STATE ENGINEER, SALEM, OREGON 97310
within 30 days from the date
of well completion.

RECEIVED
WATER WELL REPORT JUL 1 01973

STATE OF OREGON STATE ENGINEER
(Please type or print) SALEM OREGON

(Do not write above this line)

Site Well No. 45/2W-5
Permit No. _____

(1) OWNER:

Name Carl Ditchen
Address Rt. 2 Box 254 Silverton, Oregon

(2) TYPE OF WORK (check):

New Well Deepening Reconditioning Abandon
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:

Rotary Driven
Cable Jetted
Dug Bored

(4) PROPOSED USE (check):

Domestic Industrial Municipal
Irrigation Test Well Other

(5) CASING INSTALLED:

Threaded Welded
12" Diam. from top ft. to 260 ft. Gage 250
" Diam. from _____ ft. to _____ ft. Gage _____
" Diam. from _____ ft. to _____ ft. Gage _____

(6) PERFORATIONS:

Perforated? Yes No.
Type of perforator used Mills
Size of perforations 7/16 in. by 2 3/4 in.
536 72 perforations from 101 ft. to 106 ft.
228 perforations from 121 ft. to 137 ft.
912 perforations from 189 ft. to 257 ft.

(7) SCREENS:

Well screen installed? Yes No
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ Set from _____ ft. to _____ ft.
Diam. _____ Slot size _____ Set from _____ ft. to _____ ft.

(8) WELL TESTS:

Drawdown is amount water level is lowered below static level
Was a pump test made? Yes No If yes, by whom? Driller
Yield: 300 gal./min. with 32 ft. drawdown after 20 hrs.
400 " " 37 " " same
" 500 " " 45 " " same
600 gal./min. with 53 ft. drawdown after same hrs.
Artesian flow 700 g.p.m. 62 same
Temperature of water _____ Depth artesian flow encountered _____ ft.

(9) CONSTRUCTION:

Well seal—Material used Cement and Puddle Clay
Well sealed from land surface to 20 ft.
Diameter of well bore to bottom of seal 16 in.
Diameter of well bore below seal 12 in.
Number of sacks of cement used in well seal 12 sacks
Number of sacks of bentonite used in well seal _____ sacks
Brand name of bentonite _____
Number of pounds of bentonite per 100 gallons
of water _____ lbs./100 gals.
Was a drive shoe used? Yes No Plugs _____ Size: location _____ ft.
Did any strata contain unusable water? Yes No
Type of water? _____ depth of strata _____
Method of sealing strata off _____
Was well gravel packed? Yes No Size of gravel: _____
Gravel placed from _____ ft. to _____ ft.

(10) LOCATION OF WELL:

County Marion Driller's well number 1744
Section T. 6S R. 2W W.M.
Bearing and distance from section or subdivision corner _____

(11) WATER LEVEL: Completed well.

Depth at which water was first found 101 ft.
Static level 28 ft. below land surface. Date 7-6-73
Artesian pressure _____ lbs. per square inch. Date _____

(12) WELL LOG:

Diameter of well below casing _____
Depth drilled 260 ft. Depth of completed well 260 ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level and indicate principal water-bearing strata.

MATERIAL	From	To	SWL
Top Soil	0	2	
Brown silty Clay	2	27	
Gray Silty Clay	27	82	
Blue Sticky Clay	82	99	
Black sand and gravel	99	106	
Gray sandy clay	106	117	
Brown cemented sand and gravel	117	137	
Blue Gravelly Clay	137	149	
Gray sandy clay	149	166	
Blue Gravelly clay	166	179	
Gray sandy clay	179	185	
Blue Gravelly clay	185	220	
Brown gravelly clay	220	260	

Work started June 9, 1973 Completed July 5, 1973
Date well drilling machine moved off of well July 5, 1973

Drilling Machine Operator's Certification:

This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.

[Signed] Dallas & Davis Date 7-6-73, 19____
(Drilling Machine Operator)

Drilling Machine Operator's License No. 752

Water Well Contractor's Certification:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Name WILLAMETTE DRILLING COMPANY
(Person, firm or corporation) (Type or print)

Address 7641 35th Ave. NE Salem, Oregon

[Signed] Emil O. Beiler
(Water Well Contractor)

Contractor's License No. 2 Date 7-6-73, 19____

NOTICE TO WATER WELL CONTRACTOR

The original and first copy of this report are to be filed with the

STATE ENGINEER, SALEM, OREGON 97310
within 30 days from the date of well completion.

WATER WELL REPORT

STATE OF OREGON JUL 16 1974

(Please type or print)

STATE ENGINEER
SALEM, OREGON

State Well No. 65/2W-5

State Permit No. _____

3792
MAR 1974

(1) OWNER:

Name Robert E. Taubman
Address 2153 SW Main Street
Portland, Oregon

(2) TYPE OF WORK (check): Repair

New Well Deepening Reconditioning Abandon
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL: **(4) PROPOSED USE (check):**

Rotary Driven Domestic Industrial Municipal
Cable Jetted Irrigation Test Well Other
Dug Bored

CASING INSTALLED: Threaded Welded

6 " Diam. from top ft. to 80 ft. Gage 250
" Diam. from _____ ft. to _____ ft. Gage _____
" Diam. from _____ ft. to _____ ft. Gage _____

PERFORATIONS: Perforated? Yes No

Type of perforator used _____
Size of perforations in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

(7) SCREENS: Well screen installed? Yes No

Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ Set from _____ ft. to _____ ft.
Diam. _____ Slot size _____ Set from _____ ft. to _____ ft.

(8) WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? Yes No If yes, by whom?
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.
" " " " " "
" " " " " "
Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Artesian flow _____ g.p.m.
Temperature of water _____ Depth artesian flow encountered _____ ft.

(9) CONSTRUCTION:

Well seal—Material used Cement
Well sealed from land surface to 20 ft.
Diameter of well bore to bottom of seal 10 in.
Diameter of well bore below seal 6 in.
Number of sacks of cement used in well seal 7 sacks
Number of sacks of bentonite used in well seal _____ sacks
Brand name of bentonite _____
Number of pounds of bentonite per 100 gallons of water _____ lbs./100 gals.
Was a drive shoe used? Yes No Plug _____ Size: location _____ ft.
Did any strata contain unusable water? Yes No
Type of water? _____ depth of strata _____
Method of sealing strata off _____
Was well gravel packed? Yes No Size of gravel: _____
Gravel placed from _____ ft. to _____ ft.

(10) LOCATION OF WELL:

County Marion Driller's well number 1841
1/4 1/4 Section 5 T. 6S R. 2W W.M.
Bearing and distance from section or subdivision corner _____

(11) WATER LEVEL: Completed well.

Depth at which water was first found _____ ft.
Static level _____ ft. below land surface. Date _____
Artesian pressure _____ lbs. per square inch. Date _____

(12) WELL LOG: Diameter of well below casing _____

Depth drilled 107 ft. Depth of completed well _____ ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level and indicate principal water-bearing strata.

MATERIAL	From	To	SWL
Brown Top Soil	0	2	
Brown silty clay	2	27	
Gray Silty Clay	27	82	
Blue Sticky clay	82	92	
Open cavity (filled with gravel)	92	107	
Black sand and gravel	107		

Work started June 11 19 74 Completed June 18 19 74
Date well drilling machine moved off of well June 18, 1974 ¹⁹

Drilling Machine Operator's Certification:

This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.

[Signed] Dr. J. P. [Signature] Date June 18, 19 74
(Drilling Machine Operator)

Drilling Machine Operator's License No. 752

Water Well Contractor's Certification:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Name WILLAMETTE DRILLING COMPANY
(Person, firm or corporation) (Type or print)

Address 7641 35th Ave. NE Salem, Oregon

[Signed] Emil O. Beier
(Water Well Contractor)

Contractor's License No. 2 Date June 18, 1974, 19