Groundwater Application Review Summary Form

Application # G- 18502

GW Reviewer Jax Kemper/Jen Woody **Date Review Completed:** 1/4/2018

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:

[X] 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 1/4 ,20 18

TO: **Application G-** 18502

FROM: **GW:** Joe Kemper/Jen Woody
(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-18502

Date: September 14, 2018

The attached application was forwarded to the Well Construction and Compliance Section by Water Rights. Phillip Marcey. reviewed the application. Please see Jen's and Joe's Groundwater Review and the Well Logs.

Applicant's Well #1 (YAMH 557): Based on a review of the Well Report, Applicant's Well #1 appears to protect the groundwater resource.

The construction of Applicant's Well #1 may not satisfy hydraulic connection issues

Applicant's Well #2 (YAMH 6409): Based on a review of the Well Report, Applicant's Well #2 appears to protect the groundwater resource.

The construction of Applicants Well #2 may not satisfy hydraulic connection issues.

Applicant's Well #3 (MARI 2888): Based on a review of the Well Report, Applicant's Well #3 does not appear to comply with current minimum well construction standards (See OAR 690 Division 210). The well log does not indicate that a surface seal was placed in this well. In order to meet minimum well construction standards, the well must be cased and sealed with an approved grout to a minimum depth of 18 feet below ground surface.

Bringing Applicant's Well #3 into compliance with minimum well construction standards may not satisfy hydraulic connection issues.

Applicant's Well #4 (YAMH 6439): Based on a review of the Well Report, Applicant's Well #4 appears to protect the groundwater resource.

The construction of Applicants Well #4 may not satisfy hydraulic connection issues.

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 1/4/2018

FROM: Groundwater Section Joe Kemper/Jen Woody
Reviewer's Name

SUBJECT: Application G- 18502 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: Carlton Nursery Co., LLC co/ Allan Elliot County: Yamhill

A1. Applicant(s) seek(s) **2.66** cfs from **4** well(s) in the **Willamette** Basin, **Yamhill** subbasin

A2. Proposed use **Nursery** Seasonality: **Year round**

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	**YAMH 557**	**Well 1**	**Alluvial**	**2.66**	**5S/3W-16 NW-NW**	**60' N, 60' E of NW cor DLC 56**
2	**YAMH 6409**	**Well 2**	**Alluvial**	**2.66**	**5S/3W-8 SE-SE**	**210' S, 360' E* of NW cor DLC 56**
3	**MARI 2888**	**Well 3**	**Alluvial**	**2.66**	**5S/3W-9 SE-SW**	**330' S, 790' E of SE cor DLC 51**
4	**YAMH 6439**	**Well 4**	**Alluvial**	**2.66**	**5S/3W-9 NW-SW**	**2120' N, 675' W of NW cor DLC 56**
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	**162**	**55**	**22.41**	**3/19/2017**	**146**	**0-20**	**0-146**	**NA**	**60-65, 105-135**	**100**	**110**	
2	**150**		**1.33**	**3/19/2017**	**126**	**0-20, 126-247**	**0-126**	**NA**	**80-101**	**150**	**59**	**air**
3	**162**		**22.3**	**3/21/2017**	**115**	**NA**	**0-118**	**NA**	**60-64, 47-95, 103-118**			
4	**160**		**10.75**	**3/8/2017**	**100**	**0-20**	**0-100**	**NA**	**40-80**	**250**	**45**	

Use data from application for proposed wells.

A4. **Comments:** *Application map lists legal location of YAMH 6409 as 210' S, 360' W of NW cor DLC 56. The actual location is 210' S, 360' E of NW cor DLC 56.

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 wells produce from a confined aquifer 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) **7N. Large Water Use Reporting**;
   ii. ☐ The permit should be conditioned as indicated in item 2 below.
   iii. ☐ The permit should contain special condition(s) as indicated in item 3 below;

B2. a. ☐ **Condition** to allow groundwater production from no deeper than _____ ft. below land surface;

b. ☐ **Condition** to allow groundwater production from no shallower than _____ ft. below land surface;

c. ☒ **Condition** to allow groundwater production only from the **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 are located on a terrace approximately 60 feet above the adjacent floodplain of the Willamette River. The terrace consists of a thick sequence of predominately fine-grained sediments. The upper 50-100 feet of sediments are likely Willamette Silt (Woodward and others, 1998). Thin (5-15 feet), discontinuous beds of sands and gravels are observed within this sediment package at depths greater than 50 feet. According to observed SWLs and published water table maps, the water table occurs at shallow depths within the Willamette Silt, which acts as a leaky confining layer for productive sands and gravel at depth (Conlon and others, 2005). Long term water level trends (see Figure 2) do not show clear evidence of decline as result of over appropriation. Considering the large proposed rate and aquifer conditions, large water use and water-level measurement conditions are prudent.

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**	☒	☐
2	**Alluvial**	☒	☐
3	**Alluvial**	☒	☐
4	**Alluvial**	☒	☐

Basis for aquifer confinement evaluation: Water bearing zones for each well are 50-100 feet BLS and SWLs are 0-20 feet BLS.

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	**Warner Creek**	**139.90**	125	**3970**	☒	☐	☐	☐	☒
2	1	**Warner Creek**	**150.07**	125	**3880**	☒	☐	☐	☐	☒
3	1	**Warner Creek**	**139.70**	125	**3830**	☒	☐	☐	☐	☒
4	1	**Warner Creek**	**150.75**	125	**2100**	☒	☐	☐	☐	☒
1	2	**Lambert Slough**	**139.90**	**75**	**4800**	☒	☐	☐	☐	☒
2	2	**Lambert Slough**	**150.07**	**75**	**5200**	☒	☐	☐	☐	☒
3	2	**Lambert Slough**	**139.70**	**75**	**2850**	☒	☐	☐	☐	☒
4	2	**Lambert Slough**	**150.75**	**75**	**4175**	☒	☐	☐	☐	☒
1	3	**Palmer Creek**	**139.90**	**115**	**5000**	☒	☐	☐	☐	☒
2	3	**Palmer Creek**	**150.07**	**115**	**4600**	☒	☐	☐	☐	☒
3	3	**Palmer Creek**	**139.70**	**115**	**5400**	☒	☐	☐	☐	☒
4	3	**Palmer Creek**	**150.75**	**115**	**3765**	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation: Warner Creek and Palmer Creek have their headwaters in the terrace underlain by thick sequences of fine grained sediment. The streams become perennial as they incise and intersect the water table. This is consistent with published water level maps which indicate that groundwater in this alluvial system flows towards and discharges into the local stream network (Woodward and others, 1998). Low transmissivity of the fine grained sediments will buffer but not eliminate surface water interference from pumping groundwater. To the east, Lambert Slough sits at approximately 75 feet AMSL which corresponds to the elevation of sands and gravels noted in the well logs of proposed POAs. This suggests hydraulic connection between WBZs and Lambert Slough.

As per the application review for G-17294 dated 11/6/2011, aerial photos, water-level contours from USGS Professional Paper 1424-A, and information supplied by the applicant suggest that Warner Creek is not connected to the water table south of a point about ¼-mile south of the NW corner of section 9. Therefore, the available evidence indicates that Warner Creek is generally perennial north of this location but intermittent, except for reservoir seepage in the summer, south of this location. Therefore, distances between the wells and Warner Creek in the above table are revised to reflect the distance to the nearest perennial reach.

Water Availability Basin the well(s) are located within: Yamhill R > Willamette R - At Mouth and 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**	☐	☐			☐	**56.5**	☒	**<1%**	☒
2	**1**	☐	☐			☐	**56.5**	☒	**<1%**	☒
3	**1**	☐	☐			☐	**56.5**	☒	**<1%**	☒
4	**1**	☐	☐			☐	**56.5**	☒	**<1%**	☒
1	**2**	☐	☐	**MF182A**	**1500**	☐	**3830**	☐	**NA**	☐
2	**2**	☐	☐	**MF182A**	**1500**	☐	**3830**	☐	**NA**	☐
3	**2**	☐	☐	**MF182A**	**1500**	☐	**3830**	☐	**NA**	☐
4	**2**	☐	☐	**MF182A**	**1500**	☐	**3830**	☐	**NA**	☐
1	**3**	☐	☐			☐	**56.5**	☒	**<1%**	☒
2	**3**	☐	☐			☐	**56.5**	☒	**<1%**	☒
4	**3**	☐	☐			☐	**56.5**	☒	**<1%**	☒

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: Pumping rates for table C3a are calculated by adding all valid water rights utilizing a given POA. See Figure 6 for a summary of maximum permitted rates from the proposed POAs of Application G-18502.

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
3	**3**	%	%	%	%	%	%	%	%	%	%	%	%
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		0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %

(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: Stream depletion of Palmer Creek from Well 3 is not calculated as section C3a provides a more rigorous comparison of stream depletion from Well 3 in the same WAB.

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:** Stream depletion of Warner and Palmer Creeks is calculated using the Hunt (2003) analytical model. Figures 4 and 5 show model output for stream depletion from Warner and Palmer Creeks as a result of pumping from the closest well, YAMH 6439. Stream depletion is found to be less than 1.0% at 30 days. Because horizontal distance between well and stream is a dominant parameter in stream depletion models, model outputs for other wells on this permit are not included. With respect to Lambert Slough, Holocene gravels in the Willamette floodplain are equivalent in elevation to water-bearing sand beds that occur at depths of around 80-100 feet in YAMH 557 and YAMH 6409. No adequate model exists to quantify stream depletion of Lambert Slough because aquifer conditions change (confined to unconfined and low permeability to high permeability) at the boundary between Pleistocene sediments penetrated by the wells and the Holocene floodplain gravels to the east.

References Used:

Conlon, T.D., Wozniak, K.C., Woodcock, D., Herrera, N.B., Fisher, B.J., Morgan, D.S., Lee, K.K., and Hinkle, S.R., 2005, Ground-water hydrology of the Willamette Basin, Oregon: U.S. Geological Survey Scientific Investigations Report 2005-5168.

Gannett, M.W. and Caldwell, R., 1998, Geologic framework of the Willamette Lowland aquifer system, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-A, 32p.

Price, D., and Johnson, N.A., 1965, Selected ground water data in the Eola-Amity Hills area, northern Willamette Valley, Oregon: Oregon Water Resources Department Ground Water Report No. 7.

Woodward, D.G., Gannett, M.W., and Vaccaro, J.J., 1998, Hydrogeologic framework of the Willamette Lowland aquifer system, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-B, 82p.

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.**

Figure 1. Water Availability Tables.

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION

YAMHILL R > WILLAMETTE R - AT MOUTH

Watershed ID #: 30200801 Basin: WILLAMETTE Exceedance Level: 80
Time: 1:49 PM Date: 07/18/2017

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	1,840.00	68.10	1,770.00	0.00	31.70	1,740.00
FEB	2,070.00	65.90	2,000.00	0.00	31.70	1,970.00
MAR	1,760.00	41.70	1,720.00	0.00	31.70	1,690.00
APR	1,060.00	49.80	1,010.00	0.00	31.70	978.00
MAY	523.00	66.50	456.00	0.00	31.70	425.00
JUN	232.00	88.60	143.00	0.00	31.70	112.00
JUL	108.00	112.00	-3.96	0.00	31.70	-35.70
AUG	66.90	99.50	-32.60	0.00	31.70	-64.30
SEP	56.50	64.40	-7.95	0.00	31.70	-39.60
OCT	72.50	17.00	55.50	0.00	31.70	23.80
NOV	462.00	38.60	423.00	0.00	31.70	392.00
DEC	1,670.00	64.90	1,610.00	0.00	31.70	1,570.00
ANN	1,180,000	46,900	1,130,000	0	23,000	1,110,000

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION

WILLAMETTE R > COLUMBIA R - AB MOLALLA R

Watershed ID #: 182 Basin: WILLAMETTE Exceedance Level: 80
Time: 1:51 PM Date: 07/18/2017

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	7,480.00	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	1,650.00	2,180.00	0.00	1,500.00	685.00
SEP	3,890.00	1,390.00	2,500.00	0.00	1,500.00	997.00
OCT	4,850.00	747.00	4,100.00	0.00	1,500.00	2,600.00
NOV	10,200.00	881.00	9,320.00	0.00	1,500.00	7,820.00
DEC	19,300.00	964.00	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

Figure 2. Well Location Map.

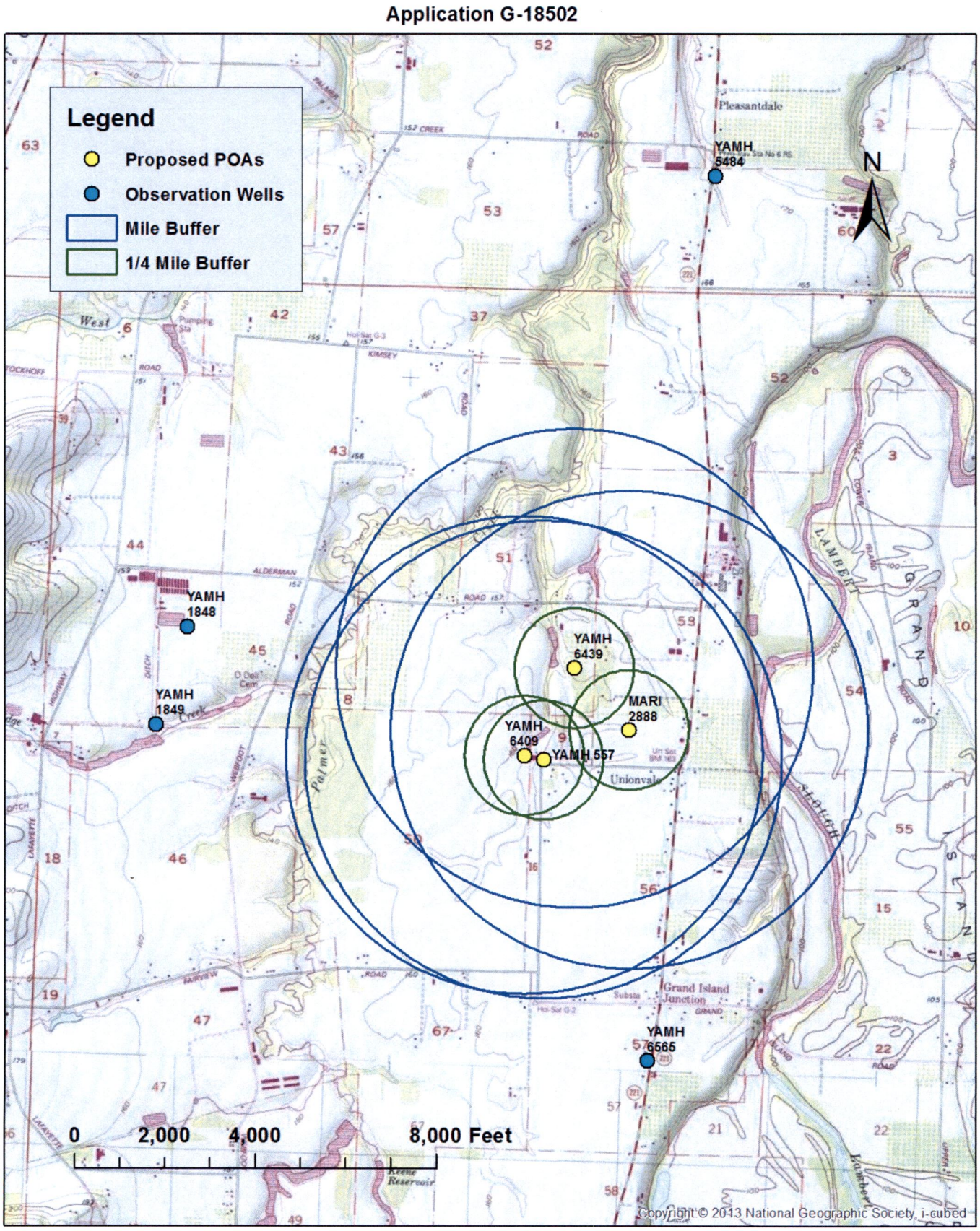


Figure 3. Water-Level Trends in Nearby Wells.

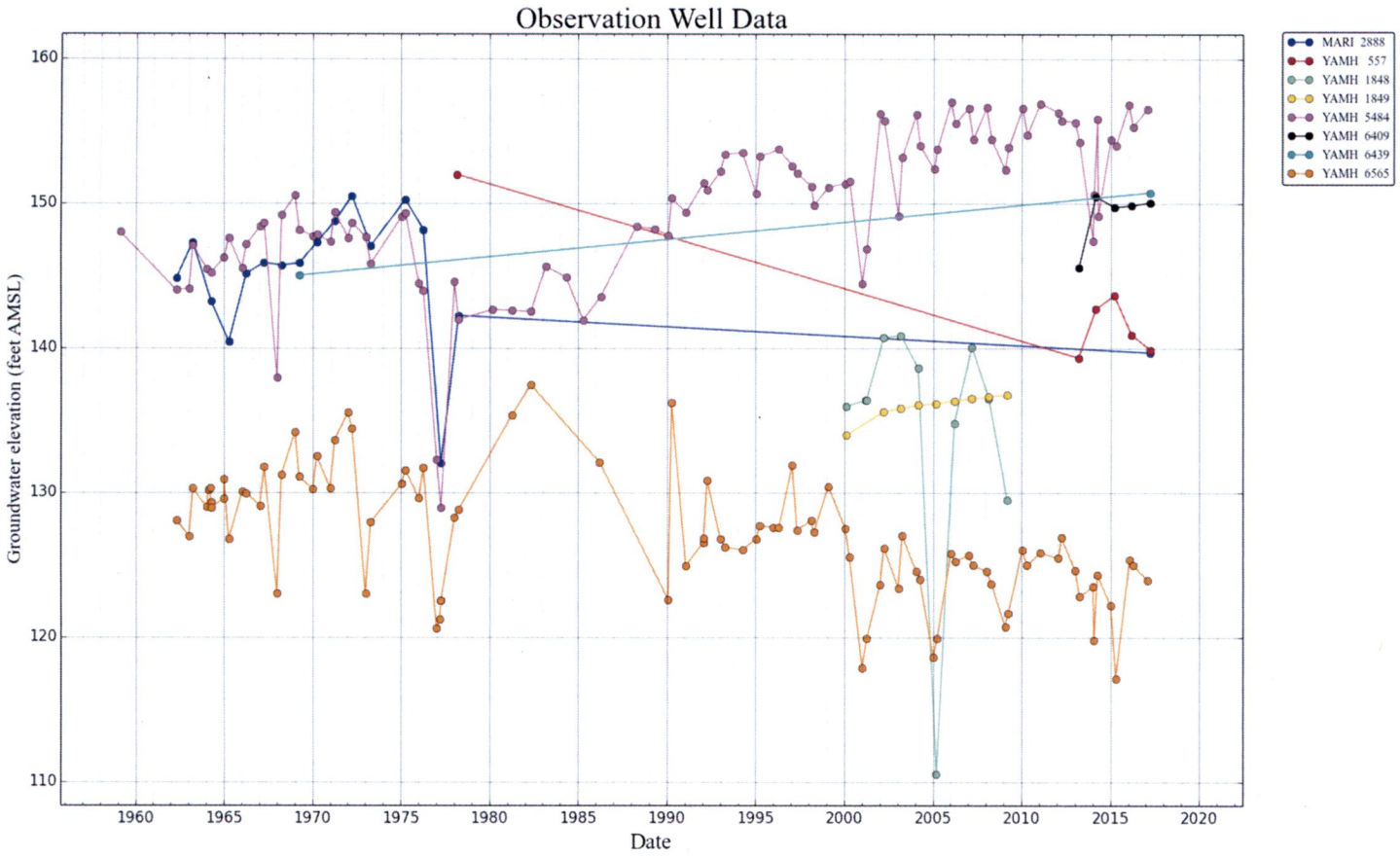
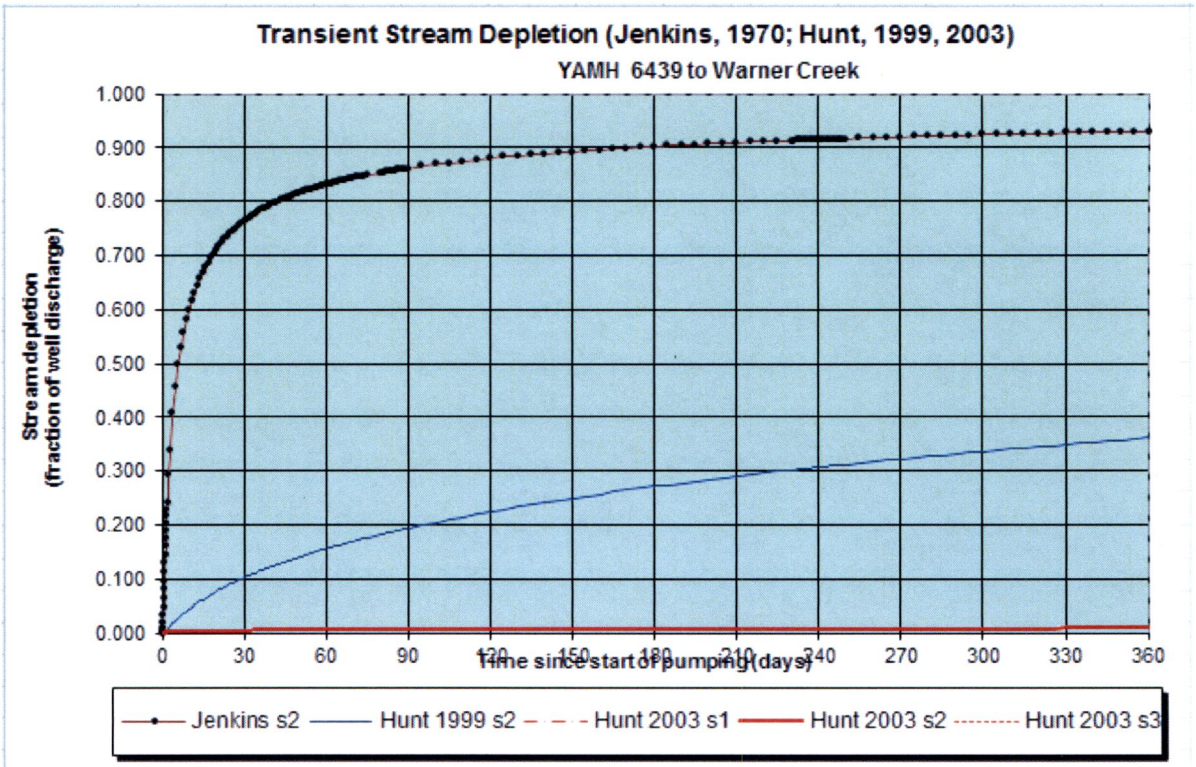


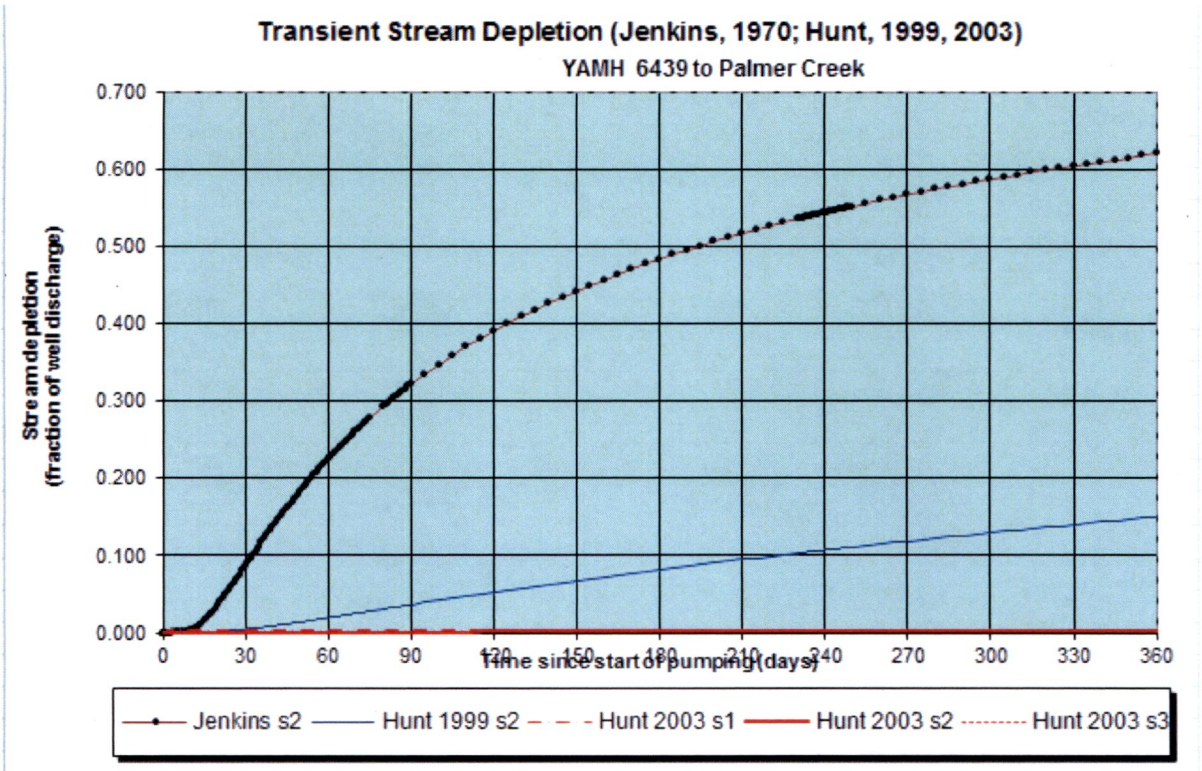
Figure 4. Hunt (2003) Analytical Model Parameters and Results for Well 4 to Warner Creek.



Output for Stream Depletion, Scenerio 2 (s2):						Time pump on (pumping duration) = 365 days						
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	76.2%	83.0%	86.1%	88.0%	89.2%	90.2%	90.9%	91.5%	92.0%	92.4%	92.7%	93.0%
H SD 1999	10.2%	15.6%	19.4%	22.4%	24.9%	27.1%	29.0%	30.7%	32.2%	33.6%	34.9%	36.1%
H SD 2003	0.52%	0.55%	0.59%	0.62%	0.66%	0.69%	0.73%	0.77%	0.80%	0.84%	0.87%	0.91%
Qw, cfs	4.390	4.390	4.390	4.390	4.390	4.390	4.390	4.390	4.390	4.390	4.390	4.390
H SD 99, cfs	0.449	0.684	0.852	0.984	1.094	1.189	1.273	1.347	1.415	1.476	1.533	1.585
H SD 03, cfs	0.023	0.024	0.026	0.027	0.029	0.030	0.032	0.034	0.035	0.037	0.038	0.040

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	4.39	4.39	4.39	cfs
Time pump on (pumping duration)	tpon	365	365	365	days
Perpendicular from well to stream	a	2100	2100	2100	ft
Well depth	d	140	140	140	ft
Aquifer hydraulic conductivity	K	10	10	10	ft/day
Aquifer saturated thickness	b	40	40	40	ft
Aquifer transmissivity	T	400	400	400	ft*ft/day
Aquifer storativity or specific yield	S	0.0001	0.0005	0.001	
Aquitard vertical hydraulic conductivity	Kva	0.001	0.005	0.01	ft/day
Aquitard saturated thickness	ba	15	15	15	ft
Aquitard thickness below stream	babs	10	10	10	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	50	50	50	ft
Streambed conductance (lambda)	sbc	0.005000	0.025000	0.050000	ft/day
Stream depletion factor	sdf	1.102500	5.512500	11.025000	days
Streambed factor	sbf	0.026250	0.131250	0.262500	
input #1 for Hunt's Q_4 function	t'	0.907029	0.181406	0.090703	
input #2 for Hunt's Q_4 function	K'	0.735000	3.675000	7.350000	
input #3 for Hunt's Q_4 function	epsilon'	0.000500	0.002500	0.005000	
input #4 for Hunt's Q_4 function	lamda'	0.026250	0.131250	0.262500	

Figure 5. Hunt (2003) Analytical Model Parameters and Results for Well 4 to Palmer Creek.



Output for Stream Depletion, Scenerio 2 (s2):						Time pump on (pumping duration) = 365 days						
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	8.6%	22.4%	32.1%	39.0%	44.2%	48.3%	51.6%	54.3%	56.7%	58.7%	60.4%	62.0%
H SD 1999	0.5%	1.9%	3.6%	5.2%	6.8%	8.2%	9.5%	10.7%	11.9%	13.0%	14.0%	15.0%
H SD 2003	0.06%	0.09%	0.11%	0.13%	0.14%	0.16%	0.18%	0.20%	0.22%	0.24%	0.26%	0.28%
Qw, cfs	4.390	4.390	4.390	4.390	4.390	4.390	4.390	4.390	4.390	4.390	4.390	4.390
H SD 99, cfs	0.020	0.085	0.159	0.230	0.297	0.359	0.417	0.471	0.522	0.570	0.615	0.658
H SD 03, cfs	0.003	0.004	0.005	0.005	0.006	0.007	0.008	0.009	0.009	0.010	0.011	0.012

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	4.39	4.39	4.39	cfs
Time pump on (pumping duration)	tpon	365	365	365	days
Perpendicular from well to stream	a	3765	3765	3765	ft
Well depth	d	140	140	140	ft
Aquifer hydraulic conductivity	K	10	10	10	ft/day
Aquifer saturated thickness	b	40	40	40	ft
Aquifer transmissivity	T	400	400	400	ft*ft/day
Aquifer storativity or specific yield	S	0.0001	0.005	0.001	
Aquitard vertical hydraulic conductivity	Kva	0.001	0.005	0.01	ft/day
Aquitard saturated thickness	ba	10	10	10	ft
Aquitard thickness below stream	babs	5	5	5	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	50	50	50	ft
Streambed conductance (lambda)	sbc	0.010000	0.050000	0.100000	ft/day
Stream depletion factor	sdf	3.543806	177.190313	35.438063	days
Streambed factor	sbf	0.094125	0.470625	0.941250	
input #1 for Hunt's Q_4 function	t'	0.282182	0.005644	0.028218	
input #2 for Hunt's Q_4 function	K'	3.543806	17.719031	35.438063	
input #3 for Hunt's Q_4 function	epsilon'	0.000500	0.025000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	0.094125	0.470625	0.941250	

Figure 6. Summary of Cumulative Permitted Rates (in cfs) for proposed POAs in Application G-18502.

	Water Right						
Well LOGID	**Certificate 43948**	**T-11400/ GR-2034**	**Certificate 86019**	**Permit G-17653**	**Certificate 31650**	**Application G-18502**	**Total Max Rate (cfs)**
YAMH 557	x	x	0.35	0.56	x	2.66	**3.57**
YAMH 6409	x	x	0.35	0.56	x	2.66	**3.57**
MARI 2888	x	x	x	x	1.1	2.66	**3.76**
YAMH 6439	0.45	0.72	x	0.56	x	2.66	**4.39**

File Original and First Copy with the STATE ENGINEER, SALEM, OREGON

MARI..... 2888

#4 5

OBSERVATION WELL
WATER WELL REPORT
STATE OF OREGON

State Well No. 5/3W-9P(1)

State Permit No. .....

(1) OWNER:
Name Howard Baker
Address R#3 Dayton, Ore

(2) LOCATION OF WELL:
County ..... Owner's number, if any—
¼ ¼ Section T. R. W.M.
Bearing and distance from section or subdivision corner

(3) TYPE OF WORK (check):
New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) TYPE OF WELL:
Rotary ☒ Driven ☐
Cable ☐ Jetted ☐
Dug ☐ Bored ☐

(6) CASING INSTALLED:
Threaded ☐ Welded ☒
10 " Diam. from 0 ft. to 118 ft. Gage ¼ wall
..... " Diam. from ..... ft. to ..... ft. Gage .....
..... " Diam. from ..... ft. to ..... ft. Gage .....

(7) PERFORATIONS:
Perforated? ☒ Yes ☐ No
Type of perforator used Torch
SIZE of perforations 12 in. by ¼ X ½ in. 10
100 perforations from 64 ft. to 70 ft.
200 perforations from 74 ft. to 95 ft.
150 perforations from 103 ft. to 118 ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

(8) SCREENS:
Well screen installed ☐ Yes ☐ No
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... Set from ..... ft. to ..... ft.
..... Slot size ..... Set from ..... ft. to ..... ft.

(9) CONSTRUCTION:
Was well gravel packed? ☒ Yes ☐ No Size of gravel: 1½" P
Gravel placed from ..... ft. to ..... ft.
Was a surface seal provided? ☐ Yes ☐ No To what depth? ..... ft.
Material used in seal—
Did any strata contain unusable water? ☐ Yes ☐ No
Type of water? Depth of strata
Method of sealing strata off

(10) WATER LEVELS:
Static level ft. below land surface Date
Artesian pressure lbs. per square inch Date

Log Accepted by:
[Signed] ..... Date ....., 19.....
(Owner)

(11) 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. Date
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No

(12) WELL LOG:
Diameter of well 16 inches.
Depth drilled 115 ft. Depth of completed well 115 ft.
Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Top Soil	0	2
Brown Clay	2	26
Silty Blue Clay	26	45
Blue Clay	45	64
Compacted Fine Sand w/ wood	64	70
Tuff Blue clay	70	74
Fine Blk Sand	74	95
Blue Clay	95	103
Sand & Fine Gravel	103	112
Boulders & Gravel	112	118

Work started 5/31 1941. Completed 6/17 1941

(13) PUMP:
Manufacturer's Name .....
Type: ..... H.P. .....

Well Driller's Statement:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
NAME Wilcox Drilling Co. (Person, firm, or corporation) (Type or print)
Address P.O. Box 569 McMinnville, Ore.
Driller's well number Well #4
[Signed] James H. Wilcox (Well Driller)
License No. 53 Date 6/28, 1941

(USE ADDITIONAL SHEETS IF NECESSARY)

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the
WATER RESOURCES DEPARTMENT
SALEM, OREGON 97310
within 30 days from the date of well completion.

557 Yamhill

WATER WELL REPORT
STATE OF OREGON
(Please type or print)
(Do not write above this line)

RECEIVED
MAR 10 1978
WATER RESOURCES DEPT.
SALEM, OREGON

State Well No. 5S/3W-8
State Permit No.

(1) OWNER:
Name Carlton Nursery
Address Dayton

(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 ☑
8 " Diam. from 0 ft. to 146 ft. Gage 14
" Diam. from ft. to ft. Gage
" Diam. from ft. to ft. Gage

(6) PERFORATIONS: Perforated? ☑ Yes ☐ No.
Type of perforator used torch
Size of perforations 1/8 in. by 6 in.
160 perforations from 105 ft. to 135 ft.
30 perforations from 60 ft. to 65 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? Comp Driller
Yield: 100 gal./min. with 110 ft. drawdown after 4 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 12 in.
Diameter of well bore below seal 12 in.
Number of sacks of cement used in well seal 10 sacks
How was cement grout placed? Jumped
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: 3/8
Gravel placed from 20 ft. to 146 ft.

(10) LOCATION OF WELL:
County Yamhill Driller's well number 553
¼ ¼ Section 8 T. 5S R. 3W W.M.
Bearing and distance from section or subdivision corner

(11) WATER LEVEL: Completed well.
Depth at which water was first found 55 ft.
Static level 10 ft. below land surface. Date 2-27-78
Artesian pressure lbs. per square inch. Date

(12) WELL LOG: Diameter of well below casing 0
Depth drilled 146 ft. Depth of completed well 146 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 clay	2	10	
sticky brown clay	10	32	
blue clay	32	55	
black sand	55	58	
blue clay	58	90	
brown clay	90	105	
black sandy	105	110	
sandy blue clay	110	129	
blue clay	129	146	

Work started 2-20 1978 Completed 2-27 1978
Date well drilling machine moved off of well 2-27 1978

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] Robert E. Shelburne (Drilling Machine Operator) Date 3-7, 1978
Drilling Machine Operator's License No. 337

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 BLUE WATER DRILLING CO. (Person, firm or corporation) (Type or print)
Address RT 1 BX 23 DAYTON, ORE
[Signed] Robert E. Shelburne (Water Well Contractor)
Contractor's License No. 417 Date 3-7, 1978

(USE ADDITIONAL SHEETS IF NECESSARY)

SP*45656-119

RECEIVED
YAMH 6409
SEP 15 1986
WATER RESOURCES DEPT
SALEM, OREGON

YAMH 6409

5S/3W-8dd

STATE OF OREGON

WATER WELL REPORT

(as required by ORS 537.765)

(1) OWNER:

Owner's Well Number:

Name Carlton Plants

Address P. O. Box 398

City Dayton State Oregon Zip 97114

(2) TYPE OF WORK:

☒ New Well ☐ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD:

☒ Rotary Air (Reverse) ☐ Rotary Mud ☐ Cable ☐ Other

(4) PROPOSED USE:

☐ omestic ☐ Community ☐ Industrial ☒ Irrigation

☐ hermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:

Depth of Completed Well 107 ft.

Special Standards date of approval 4/21/86

HOLE neter	From	To	SEAL Material	From	To	Amount sacks or pounds
20	0	40	*Conc	0	22	5 cu yards
18	40	261	Clay	125		As required
			& bent		247	30 sacks

~~Lower seal poured & probed~~

How was seal placed? Method ☐ A ☐ B ☐ C ☐ D ☐ E

☒ Other *Tremied as temp. casing removed

Backfill placed from 247 ft. to 261 ft. Material Clay slough

Gravel placed from 22 ft. to 125 ft. Size of gravel 1/4-3/4

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	8	+1.5	126	.250	☒	☐	☒	☐
	3	+1	23.5	.216	☒	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

location of shoe(s)

(7) PERFORATIONS/SCREENS:

☒ Perforations Method Mills knife

☐ Screens Type Material

m	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
80	101	¼x2	504			☒	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

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

☒ Pump (Air lift) ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Pumping level	Drill stem at	Time
190	46		½ hr
175	50		1 hr
150	59		7 hrs

Temperature of water 52°F Depth Artesian Flow Found

Was a water analysis done? ☒ Yes By whom W,F&R Lab of 250' aquifer

Did any strata contain water not suitable for intended use? ☐ Too little

☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☒ Other See water analysis

Depth of strata: 249-261

(9) LOCATION OF WELL by legal description:

County Yamhill Latitude ' " Longitude ' "

Township 5S N or S, Range 3W E or W, WM.

Section 8 SE ¼ SE ¼

Tax Lot Lot Block Subdivision

Street Address of Well (or nearest address)

(10) STATIC WATER LEVEL:

13 ft. below land surface. Date 7/22/86

Artesian pressure lb. per square inch. Date

(11) WELL LOG:

Ground elevation Apprx. 150

Material	From	To	WB?	SWL
See Attached				

Date started 4/7/86 Completed 7/28/86

(unbonded) Water Well Constructor Certification:

I constructed this well in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

Signed Donald S Davis Date 9-10-86

(bonded) Water Well Constructor Certification:

I accept responsibility for construction of this well and its compliance with all Oregon water well standards. This report is true to the best of my knowledge and belief.

Signed Stephen Schneider Date 9/10/86

Company Schneider Equip, Inc Co. Job No. 8625

9809C 10/85

YAMH 6409

RECEIVED
SEP 15 1986
WATER RESOURCES DEPT
SALEM, OREGON

Carlton Plants Nursery
Well Log

0	2	Clay, sticky, dark green
2	8	Clay, greyish brown, firm
8	15	Clay, blue, sandy-silty
15	19	Clay, blue & dark brown, some sandy-silty
19	26	Clay, grey, blue & brown streaked, some sandy-silty
26	52	Clay, dark grey, soft
52	55	Sand, black, medium
55	61	Clay, blue-grey, sticky
61	67	Clay, dark grey, soft
62	71	Clay, brown, sticky
71	77	Clay, brown, medium, fine sandy
77	78	Clay, brown, sticky
78	79	Clay, light brown, yellow
79	83	Clay, blue, fine sandy
83	90	Sand, black, medium-fine w/wood
90	92	Clay, blue, soft, sandy w/wood
92	95	Sand, medium-coarse w/wood & some clay
95	100	Clay, blue w/wood & medium-coarse, sand
100	102	Clay, blue w/wood
102	104	Clay, blue, medium
104	107	Clay, dark grey, soft
107	118	Clay, blue-green, firm
118	128	Clay, green, firm
128	137	Clay, brown & grey streaked, fine sandy
137	143	Clay, greenish-brown, medium, sandy
143	150	Clay, grey & brown streaked, firm
150	153	Clay, green & brown steaked, firm
153	155	Clay, grey, firm
155	158	Clay, dark brown, medium
158	161	Clay, brown & grey, medium
161	163	Clay, light brown
163	170	Clay, light brown & grey, medium
170	183	Clay, grey & brown, medium
183	190	Clay, grey
190	194	Clay, blue-green, flakey
194	198	Clay, green, fine sandy, medium
198	201	Clay, brown & green, fine sandy, medium
201	217	Clay, blue-green, firm
217	222	Clay, brown & grey streaked
222	230	Clay, grey, firm
230	232	Clay, grey & brown streaked
232	239	Clay, grey
239	240	Clay, brown, medium-soft
240	244	Clay, grey, medium
244	248	Clay, grey & brown steaked
248	249	Clay, light brown
249	252	Gravel, cemented 1" minus, rusty
252	261	Gravel, 2" minus, cemented, hard

W0011.CPN

YAMH 6409

Water, Food & Research Lab, Inc.

Problem Solvers

Laboratory: 13015 S.W. Pacific Hwy., Tigard, Oregon 97223
Mailing Address: P.O. Box 19700, Portland, Oregon 97219
Telephone (503) 639-9311

SCHNEIDER EQUIPMENT COMPANY, INC.
21881 RIVER ROAD N.E.
ST. PAUL, OR 97137

SAMPLE NO # 3509

LOCATION: DAYTON

CHEMICAL CONTAMINANTS LABORATORY REPORT
********** 23 MAY 1986 **********

SAMPLE: WATER SAMPLE FROM DAYTON

DATE COLLECTED: 05-07-86

DATE RECEIVED: 05-07-86 BY MSE

CONTAMINANT	METHOD	LIMIT	RESULTS	ANAL DATE	ANALYST
**********	******	*PPM*	* ****PPM****	*********	*******
pH pH	SM-423	6 to 9	7.39	05-07-86	DSM
HARDNESS	SM-314	250	1,283.0	05-07-86	DSM
TOTAL SOLIDS	SM-209-A	500	4,145.0	05-08-86	DSM
CHLORIDE (Cl)	SM-407	250	1,850.0	05-07-86	DSM
ALKALINITY	SM-403		120.0	05-07-86	PBS
TOTAL DISSOLVED SOLIDS	205		3,850.0	05-07-86	PBS

****

< = LESS THAN OR NONE DETECTED PARTS PER MILLION = MILLIGRAM PER LITER

REFERENCE LIMITS ABOVE FOR DRINKING WATER.

CERTIFIED BY:

Donald S. May

DONALD S. MAY
Analytical Chemist
CHEM LAB SUPV (EPA/OSHD #24)

CERTIFIED

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 MAY 8 1969 STATE ENGINEER SALEM OREGON

WATER WELL REPORT
STATE OF OREGON
(Please type or print) (Do not write above this line)

YAMH 6439
State Well No. 5/3W-9cb
App. G-5132
App. G-5584
State Permit No.

(1) OWNER:
Name Joe Hallcock
Address RT 1 Box 140 Dayton

(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 ☐

CASING INSTALLED:
Threaded ☐ Welded ☑
10 " Diam. from 0 ft. to 100 ft. Gage 14
" Diam. from ft. to ft. Gage
" Diam. from ft. to ft. Gage

PERFORATIONS:
Perforated? ☑ Yes ☐ No.
Type of perforator used Torch
Size of perforations 1/4 in. by 6 in.
480 perforations from 40 ft. to 80 ft.
perforations from ft. to ft.
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) WATER LEVEL: Completed well.
Static level 15 ft. below land surface Date 4-1-69
Artesian pressure lbs. per square inch Date

(9) WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? ☑ Yes ☐ No If yes, by whom? Owner
Yield: 250 gal./min. with 45 ft. drawdown after 8 hrs.
" " "
" " "
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? ☐ Yes ☑ No

(10) CONSTRUCTION:
Well seal—Material used Cement
Depth of seal 20 ft.
Diameter of well bore to bottom of seal 16 in.
Were any loose strata cemented off? ☐ Yes ☑ No Depth
Was a drive shoe used? ☐ Yes ☑ No
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: 3/4
Gravel placed from 20 ft. to 100 ft.

(11) LOCATION OF WELL:
County Yamhill Driller's well number 123
¼ ¼ Section 9 T. 5S R. 3W W.M.
Bearing and distance from section or subdivision corner

(12) WELL LOG:
Diameter of well below casing 0
Depth drilled 148 ft. Depth of completed well 100 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 as drilling proceeds. Note drilling rates.

MATERIAL	From	To	SWL
Top soil	0	2	
Brown clay	2	25	
blue clay	25	47	
black sand	47	80	
blue clay	80	140	

Work started 3-16 1969 Completed 4-1 1969
Date well drilling machine moved off of well 4-1 1969

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] Robert Shelburn (Drilling Machine Operator) Date 5-7, 1969
Drilling Machine Operator's License No. 337

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 Blue Water Drilling Co (Person, firm or corporation) (Type or print)
Address RT 1 BX 75 DAYTON
[Signed] Robert Shelburn (Water Well Contractor)
Contractor's License No. 417 Date 5-7, 1969

(USE ADDITIONAL SHEETS IF NECESSARY)