

Groundwater Application Review Summary Form

Application # G- 185-21

GW Reviewer Aurora Bouchier Date Review Completed: 4/12/2018

Summary of GW Availability and Injury Review:

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

Summary of Potential for Substantial Interference Review:

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

Summary of Well Construction Assessment:

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

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

[illegible]

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 4/12/2018
 FROM: Groundwater Section Aurora C Bouchier
 Reviewer's Name
 SUBJECT: Application G- 18521 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: William Radke County: Linn

A1. Applicant(s) seek(s) 0.72 cfs from 2 well(s) in the Willamette Basin,
Upper Willamette subbasin (Riverside quad)

A2. Proposed use Irrigation 57.74 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	proposed	1	Alluvium	0.72	12S/4W-16 SE-NW	1286' N, 82' E of SW cor DLC 55
2	proposed	2	Alluvium	0.72	12S/4W-16 SE-NW	1057' N, 65' E of SW cor DLC 55
3						
4						
5						

* Alluvium, CRB, Bedrock

Well	Well Elev ft msl	First Water ft bls	SWL ft bls	SWL Date	Well Depth (ft)	Seal Interval (ft)	Casing Intervals (ft)	Liner Intervals (ft)	Perforations Or Screens (ft)	Well Yield (gpm)	Draw Down (ft)	Test Type
1	~235				Est 160	Est 0-30	Est 0-60	Na	Est 30-60			
2	~238				Est 160	Est 0-30	Est 0-60	Na	Est 30-60			

Use data from application for proposed wells.

A4. **Comments:** _____

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 proposed wells will be greater than ¼ mile from surface water sources, so the pertinent rules (OAR 690-502-0240) 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;
- ACS
4/12/2018 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:
- ☒ The permit should contain condition #(s) 7N, large water use reporting;
 - ☐ The permit should be conditioned as indicated in item 2 below.
 - ☐ 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 area around proposed wells 1 & 2 is likely underlain by approximately 20 feet of Willamette Silt which is underlain by a series of sand and gravel beds interbedded with silts and clays (Gannett and Caldwell, 1998). The water table occurs near land surface in the Willamette Silt which acts as an extensive confining unit.

The nearest observation well (LINN 10817, located approximately 4 miles up-gradient to the southeast) has been monitored since the early 1960's. The hydrograph for LINN 10817 shows a seasonal fluctuation of approximately 10-15 feet and no apparent decline, suggesting the aquifer is stable at the current level of use. However, there has recently been a large amount of groundwater applied for in this area.

There is a water right on the property immediately to the south and what appears to be a residential property immediately to the west of the proposed wells. The exact location for wells on either of these adjacent properties is uncertain, but a well on the residential property has the potential to be less than 200 feet from the wells proposed on this application. At this proximity there is potential for significant interference caused by pumping at the maximum rate requested. It appears that interference concerns would be eliminated if the proposed well locations were moved to the north boundary of the property along Tangent Dr. as there are no water right POAs or apparent residential properties to be concerned about interfering with at that location.

C. GROUNDWATER/SURFACE WATER CONSIDERATIONS, OAR 690-09-040**C1. 690-09-040 (1):** Evaluation of aquifer confinement:

Well	Aquifer or Proposed Aquifer	Confined	Unconfined
1	Alluvium of Willamette Aquifer	☒	☐
2	Alluvium of Willamette Aquifer	☒	☐
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: The water level in nearby well logs is reported to rise above the water bearing zone at which it was encountered, indicating the aquifer is more confined than unconfined.

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	Muddy Creek	~223	210-220	3,880	☒	☐	☐	☐	☒
2	1	Muddy Creek	~223	210-220	3,660	☒	☐	☐	☐	☒
1	2	Perennial reach Owl Cr	~223	~215	7,830	☐	☐	☐	☐	☐
2	2	Perennial reach Owl Cr	~223	~215	8,000	☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: Groundwater elevation in nearby wells is coincident with/slightly above Muddy Creek, indicating groundwater is connected to nearby streams. Published water table maps show that groundwater flows towards, and discharges into, perennial streams and their tributaries (Woodward et al., 1998). Nearby Owl Creek has an elevation of approximately 215 feet above mean sea level where it begins being mapped as a perennial stream.

Water Availability Basin the well(s) are located within: Physically located within Watershed ID: 30200321 [Willamette R> Columbia R- ab Periwinkle Cr at Gage 14174], however the well is physically closer to Muddy Creek than the perennial reaches of tributaries in above mentioned WAB, therefore production at proposed wells will likely have a greater impact to Watershed ID: 30200303 [Muddy Cr > E Channel- at mouth].

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	☐	☐	na	na	☐	14.90	☒	<25%	☒
2	1	☐	☐	na	na	☐	14.90	☒	<25%	☒
1	2	☐	☐	na	na	☐	2,540.00	☐	<25%	☐
2	2	☐	☐	na	na	☐	2,540.00	☐	<25%	☐
		☐	☐			☐		☐		☐

C3b. **690-09-040 (4):** Evaluation of stream impacts by total appropriation for all wells determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water source. **Complete only if Q is distributed among wells.** Otherwise same evaluation and limitations apply as in C3a above.

	SW #		Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
			☐			☐		☐		☐
			☐			☐		☐		☐
			☐			☐		☐		☐
			☐			☐		☐		☐

Comments: The stream depletion at 30 days was estimated using the Hunt 2003 model. Stream depletion was calculated using the ranges of S, Kv of the streambed, Kh of the Lower Sedimentary Unit as described in Conlon et al. (2005). Results show stream depletion is less than 25% at 30 days for the range of available aquifer parameters. Only the impact from pumping at the location of Well 2 on Muddy Creek was modeled. The greater distance between Well 1 and Muddy Creek or between either well and the perennial reach of Owl Creek, will likely act to further reduce the impact to the streams at 30 days.

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:

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:**

References Used:

Application file: G-18521.

Conlon, T. D., Wozniak, K. C., Woodcock, D., Herrera, N.B., Fischer, 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, Marshall W., and Caldwell, Rodney R., 1998, Geologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington: U. S. Geological Survey Professional Paper 1424-A.

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

Woodward, Dennis G., Gannett, Marshall W., and Vaccaro, John J., 1998 Hydrogeologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington: U. S. Geological Survey Professional Paper 1424-B.

D. WELL CONSTRUCTION, OAR 690-200

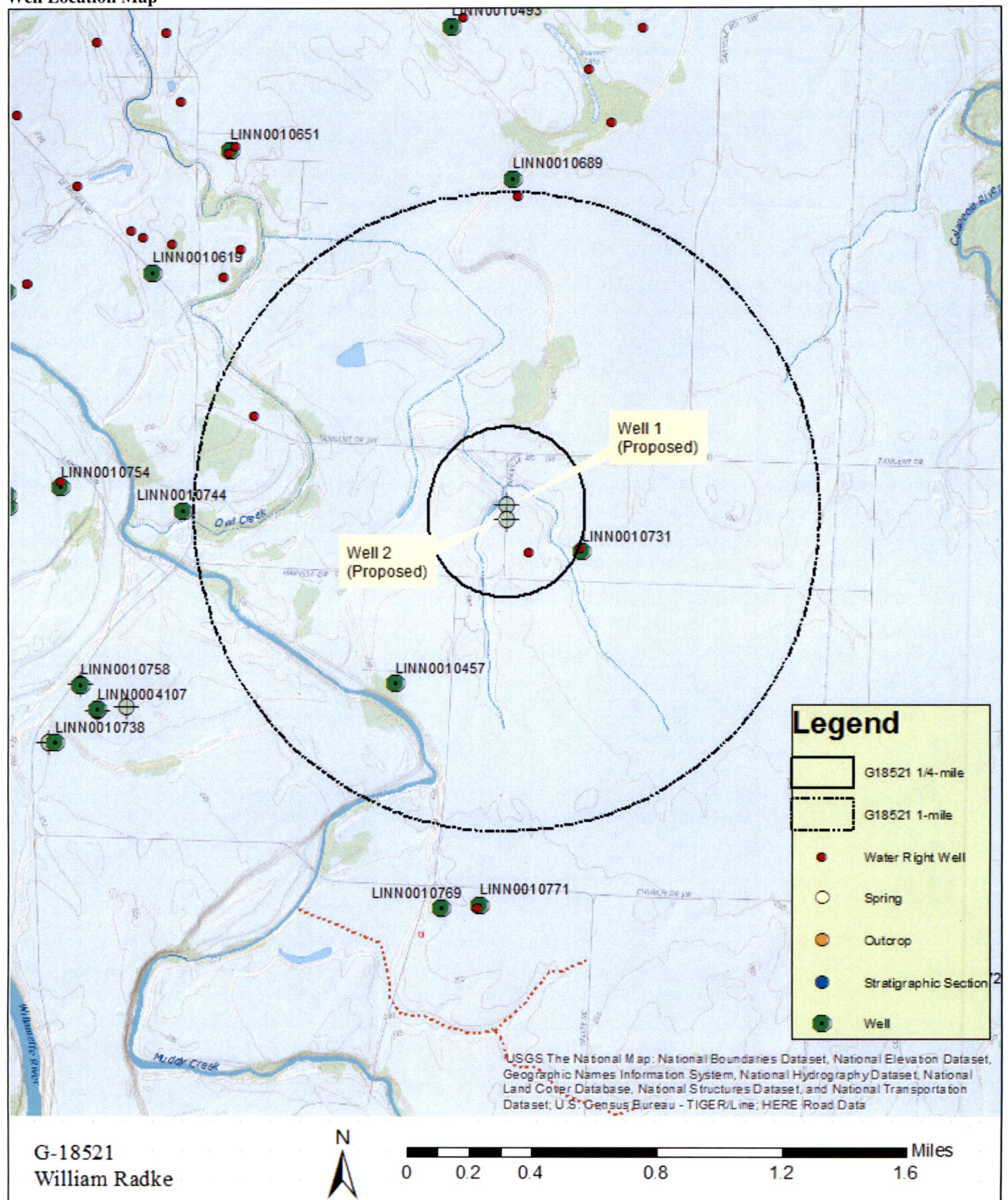
- D1. Well #: _____ Logid: _____
- D2. **THE WELL does not appear to meet current well construction standards based upon:**
- a. ☐ review of the well log;
 - b. ☐ field inspection by _____;
 - c. ☐ report of CWRE _____;
 - d. ☐ other: (specify) _____
- D3. **THE WELL construction deficiency or other comment is described as follows:** _____
- D4. ☐ **Route to the Well Construction and Compliance Section for a review of existing well construction.**

Water Availability Tables

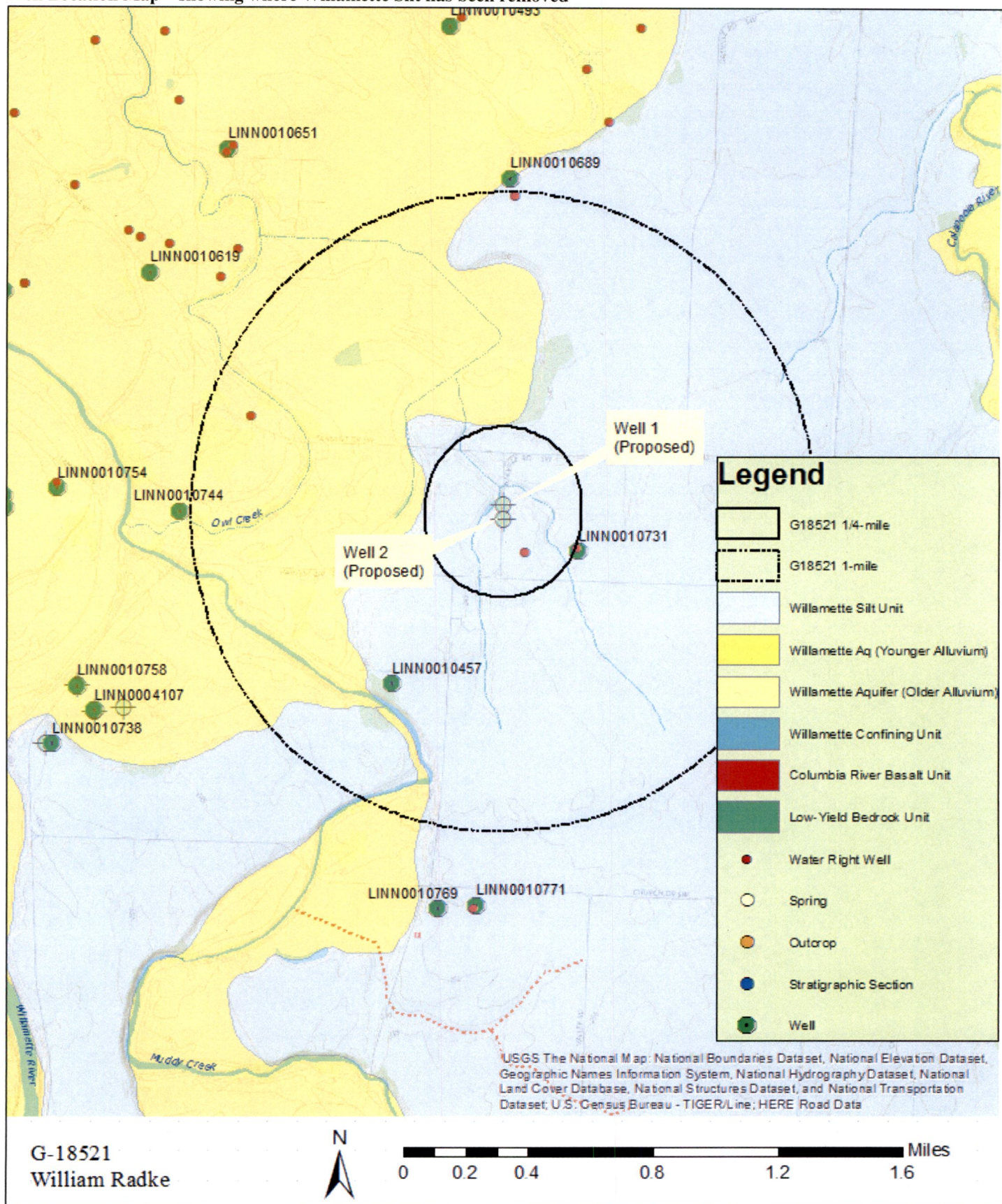
DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION						
Watershed ID #: 30200303		MUDDY CR > E CHANNEL - AT MOUTH			Exceedance Level: 80	
Time: 1:30 PM		Basin: WILLAMETTE			Date: 04/12/2018	
Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net water Available
Monthly values are in cfs. Storage is the annual amount at 50% exceedance in ac-ft.						
JAN	178.00	2.69	175.00	0.00	0.00	175.00
FEB	203.00	2.47	201.00	0.00	0.00	201.00
MAR	174.00	1.26	173.00	0.00	0.00	173.00
APR	91.30	1.13	90.20	0.00	0.00	90.20
MAY	52.50	1.71	50.80	0.00	0.00	50.80
JUN	35.30	2.52	32.80	0.00	0.00	32.80
JUL	26.10	3.36	22.70	0.00	0.00	22.70
AUG	20.30	2.81	17.50	0.00	0.00	17.50
SEP	14.90	1.95	12.90	0.00	0.00	12.90
OCT	15.20	0.85	14.40	0.00	0.00	14.40
NOV	29.00	1.06	27.90	0.00	0.00	27.90
DEC	113.00	2.46	111.00	0.00	0.00	111.00
ANN	114,000	1,470	112,000	0	0	112,000

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION						
Watershed ID #: 30200321		WILLAMETTE R > COLUMBIA R - AB PERIWINKLE CR AT GAGE 14174			Exceedance Level: 80	
Time: 1:29 PM		Basin: WILLAMETTE			Date: 04/12/2018	
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	10,100.00	1,370.00	8,730.00	0.00	1,750.00	6,980.00
FEB	11,600.00	4,290.00	7,310.00	0.00	1,750.00	5,560.00
MAR	11,000.00	4,560.00	6,440.00	0.00	1,750.00	4,690.00
APR	9,760.00	4,260.00	5,500.00	0.00	1,750.00	3,750.00
MAY	8,430.00	2,550.00	5,880.00	0.00	1,750.00	4,130.00
JUN	5,360.00	856.00	4,500.00	0.00	1,750.00	2,750.00
JUL	3,270.00	662.00	2,610.00	0.00	1,750.00	858.00
AUG	2,560.00	601.00	1,960.00	0.00	1,750.00	209.00
SEP	2,540.00	517.00	2,020.00	0.00	1,750.00	273.00
OCT	2,860.00	270.00	2,590.00	0.00	1,750.00	840.00
NOV	4,170.00	355.00	3,820.00	0.00	1,750.00	2,070.00
DEC	8,150.00	380.00	7,770.00	0.00	1,750.00	6,020.00
ANN	7,460,000	1,240,000	6,230,000	0	1,270,000	4,960,000

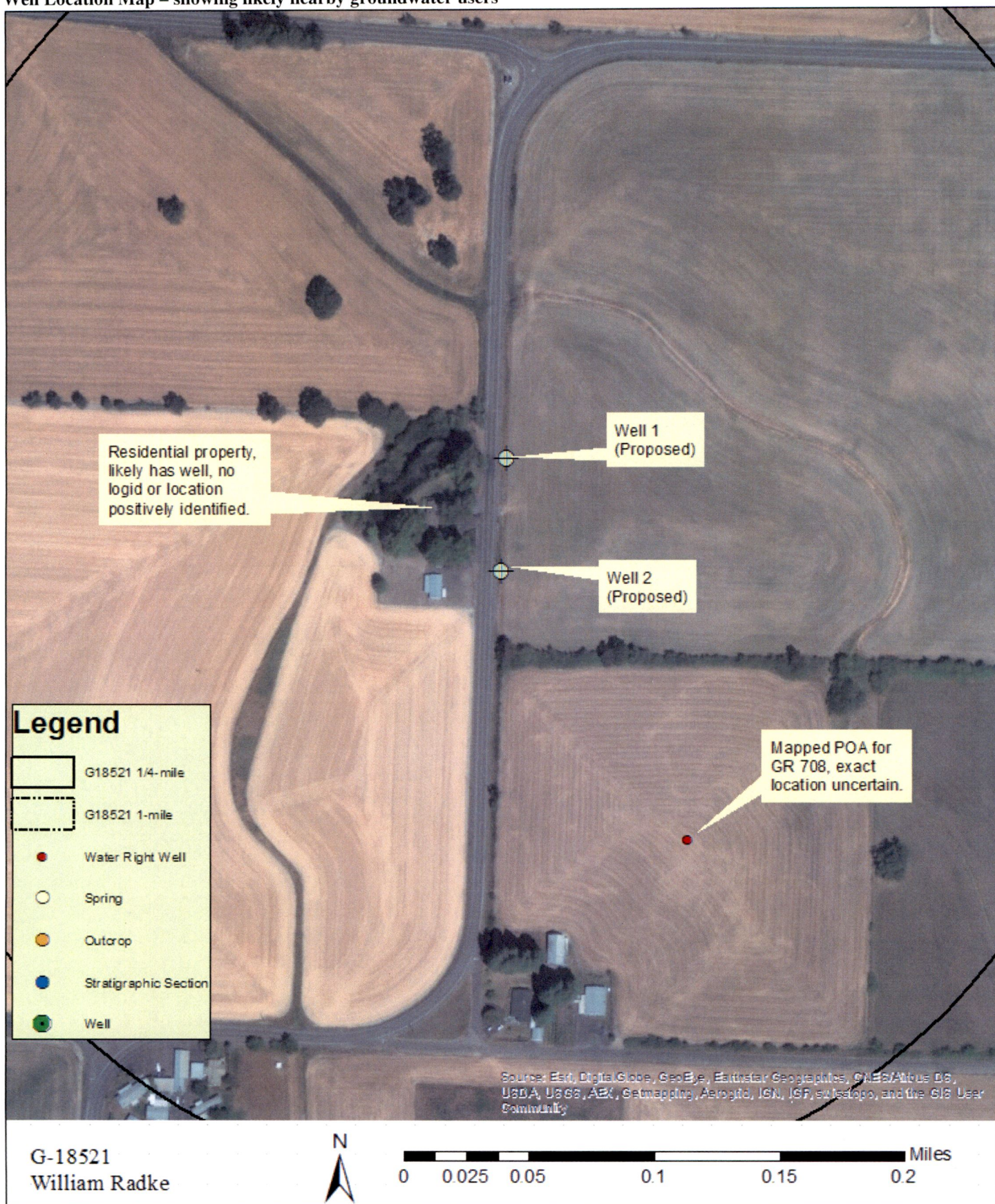
Well Location Map



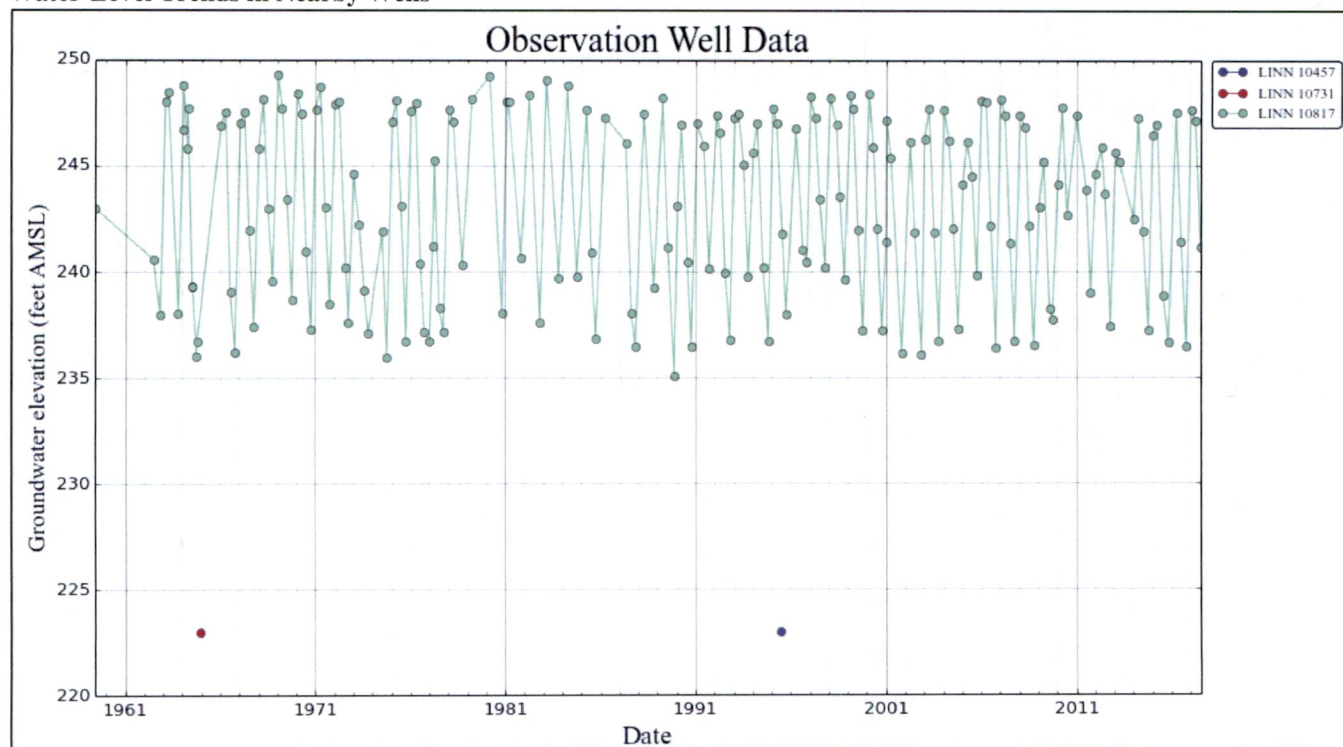
Well Location Map – showing where Willamette Silt has been removed



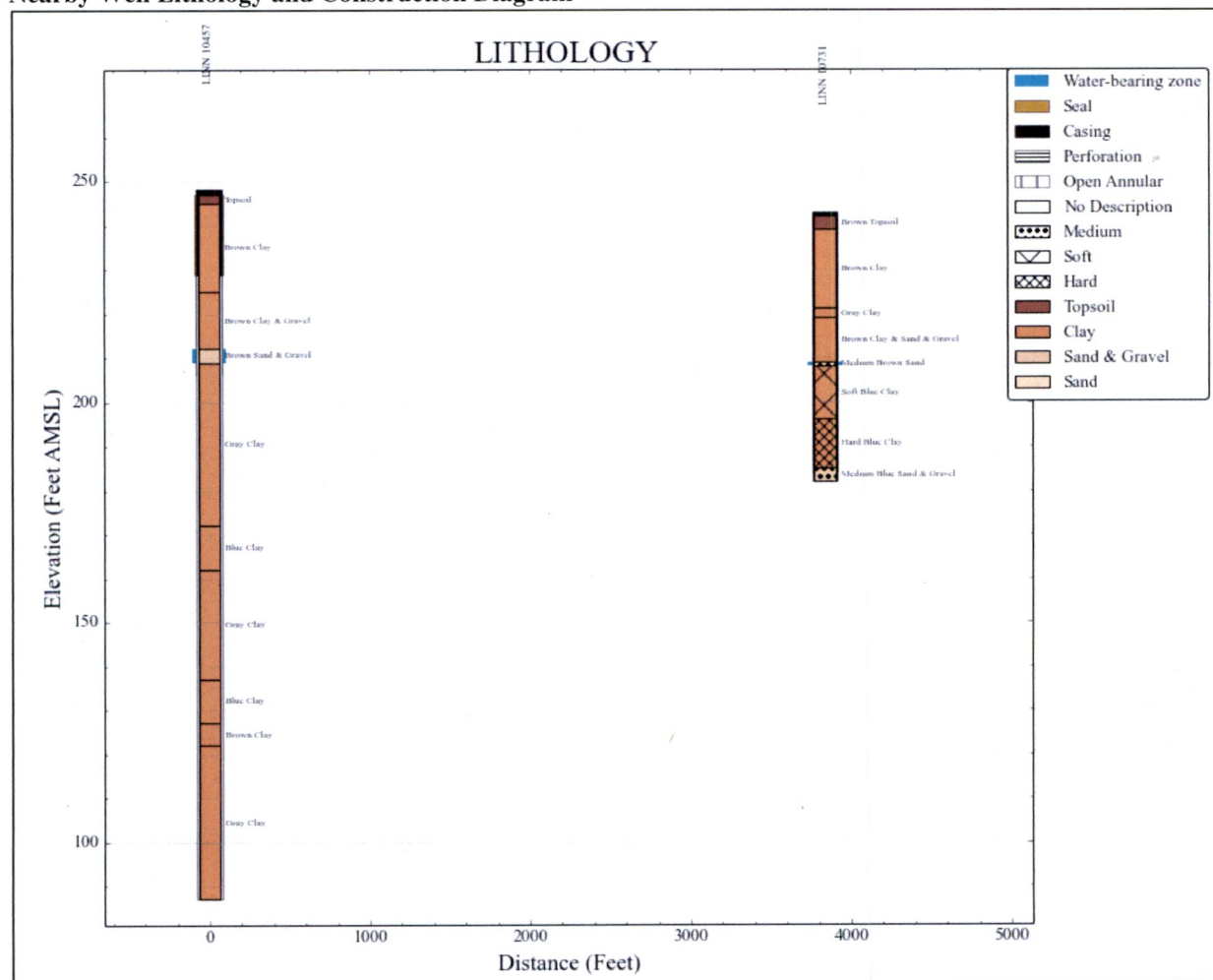
Well Location Map – showing likely nearby groundwater users



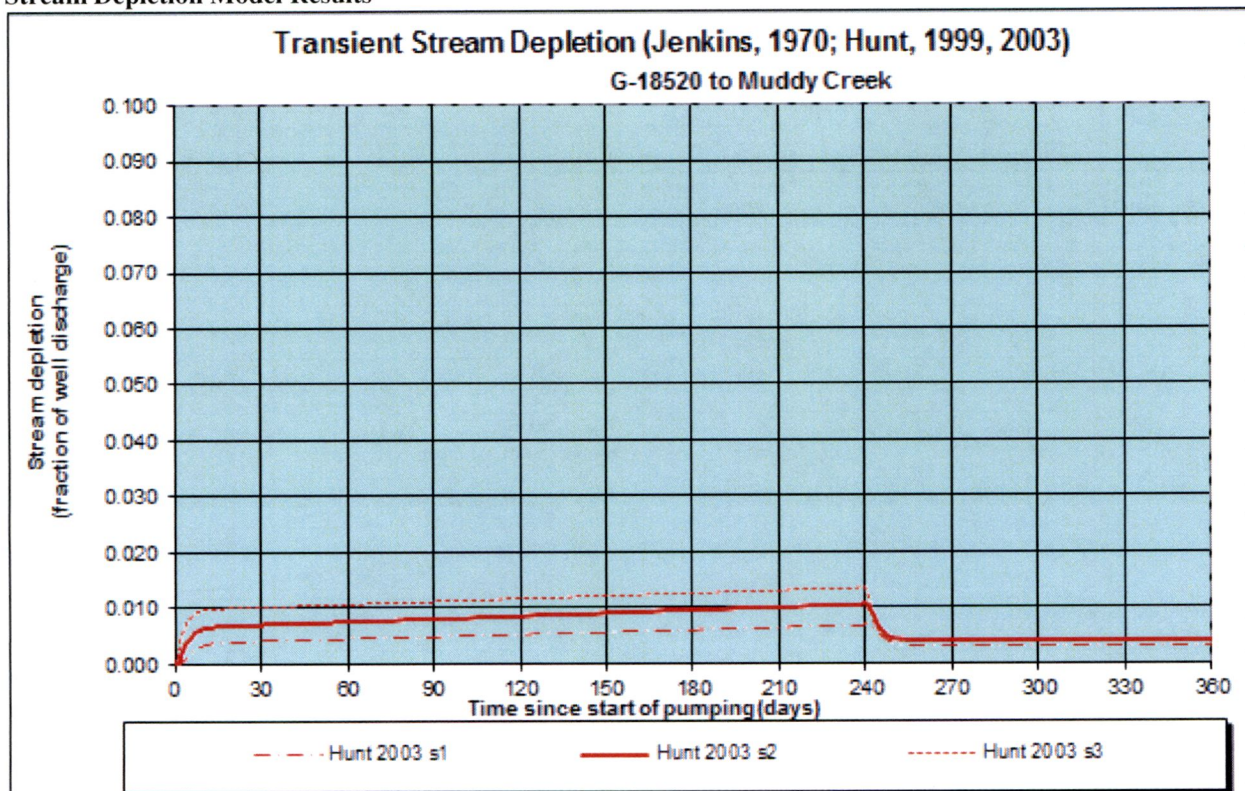
Water-Level Trends in Nearby Wells



Nearby Well Lithology and Construction Diagram



Stream Depletion Model Results



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	63.7%	73.8%	78.5%	81.3%	83.3%	84.7%	85.8%	86.7%	23.8%	14.3%	10.2%	7.8%
H SD 1999	9.3%	15.3%	19.6%	23.0%	25.8%	28.2%	30.4%	32.2%	24.6%	20.1%	17.2%	15.1%
H SD 2003	0.70%	0.75%	0.80%	0.85%	0.90%	0.95%	1.01%	1.06%	0.41%	0.41%	0.41%	0.41%
Qw, cfs	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720	0.720
H SD 99, cfs	0.067	0.110	0.141	0.166	0.186	0.203	0.219	0.232	0.177	0.145	0.124	0.109
H SD 03, cfs	0.005	0.005	0.006	0.006	0.006	0.007	0.007	0.008	0.003	0.003	0.003	0.003
Parameters:												
		Scenario 1		Scenario 2		Scenario 3		Units				
Net steady pumping rate of well	Qw	0.72		0.72		0.72		cfs				
Time pump on (pumping duration)	tpon	240		240		240		days				
Perpendicular from well to stream	a	3660		3660		3660		ft				
Well depth	d	160		160		160		ft				
Aquifer hydraulic conductivity	K	25		50		200		ft/day				
Aquifer saturated thickness	b	20		20		20		ft				
Aquifer transmissivity	T	500		1000		4000		ft*ft/day				
Aquifer storativity or specific yield	S	0.001		0.001		0.001						
Aquitard vertical hydraulic conductivity	Kva	0.01		0.01		0.01		ft/day				
Aquitard saturated thickness	ba	30		30		30		ft				
Aquitard thickness below stream	babs	3		3		3		ft				
Aquitard porosity	n	0.2		0.2		0.2						
Stream width	ws	20		20		20		ft				
Streambed conductance (lambda)	sbc	0.066667		0.066667		0.066667		ft/day				
Stream depletion factor	sdf	26.791200		13.395600		3.348900		days				
Streambed factor	sbfb	0.488000		0.244000		0.061000						
input #1 for Hunt's Q_4 function	t'	0.037326		0.074651		0.298606						
input #2 for Hunt's Q_4 function	K'	8.930400		4.465200		1.116300						
input #3 for Hunt's Q_4 function	epsilon'	0.005000		0.005000		0.005000						
input #4 for Hunt's Q_4 function	lamda'	0.488000		0.244000		0.061000						

Potential Interference Model Results**Theis Time-Drawdown Worksheet v.3.00**

Calculates Theis nonequilibrium drawdown and recovery at any arbitrary radial distance, r , from a pumping well for 3 different T values and radial distance, r , from a pumping well for 3 different T values and 2 different S values.

Written by Karl C. Wozniak September 1992. Last modified December 30, 2014

Input Data:	Var Name	Scenario 1	Scenario 2	Scenario 3	Units	
Total pumping time	t		7		d	
Radial distance from pumped well:	r		200.00		ft	Q conversions
Pumping rate	Q		0.7		cfs	323.14 gpm
Hydraulic conductivity	K	25	50	200	ft/day	0.72 cfs
Aquifer thickness	b		20		ft	43.20 cfm
Storativity	S_1		0.00100			62,208.00 cfd
	S_2		0.00100			1.43 af/d
Transmissivity Conversions	T_ft2pd	500	1,000	4,000	ft2/day	
	T_ft2pm	0.3472	0.6944	2.7778	ft2/min	
	T_gpdpt	3,740	7,480	29,920	gpd/ft	

Recalculate Use the Recalculate button if recalculation is set to manual

