Groundwater Application Review Summary Form

Application # G- 18466

GW Reviewer DENNIS ORLOWSKI **Date Review Completed:** 8/01/2017

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).

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 08/01/2017

FROM: Groundwater Section Dennis Orlowski
Reviewer's Name

SUBJECT: Application G- 18466 Supersedes review of
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: Connie Coston and Chuck Adams County: Clackamas

A1. Applicant(s) seek(s) 0.20 cfs from one well(s) in the Willamette Basin, Butte Creek subbasin

A2. Proposed use Nursery (10.0 acres) 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	**Proposed**	**1**	**Alluvium**	**0.20**	**T5S/R1W-14 NE-SW**	**280' S, 360' E from SW cor DLC 45**

* 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	**190**		**TBD**		**150**	**TBD**	**TBD**		**TBD**	**TBD**	**TBD**	

Use data from application for proposed wells.

A4. **Comments:** The proposed POA is located within the Elliot Prairie region approximately three miles due east of Woodburn, Oregon.

For the proposed construction of Well 1, the application provided only an estimated completion depth and casing diameter. Wells in this area of similar depth obtain groundwater from water-bearing sand and gravel deposits of the Willamette Aquifer. These coarser deposits are overlain and confined by the Willamette Silt (more discussion in Section B3).

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 well depth indicates it will produce from a confined aquifer, so the pertinent basin 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: Not applicable.

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) **Medium water use reporting, 7c (7-yrs measurements)**;
   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:** In this area the Willamette Aquifer is approximately 60-70 ft thick and overlain by 60-70 feet of Willamette Silt (Conlon and others, 2005; Gannett and Caldwell, 1998; Woodward and others, 1998). Irrigation wells in the area completed in the Willamette Aquifer typically yield from about 100-700 gpm (~0.22-1.5 cfs), and thus the groundwater resource should be capable of providing the requested maximum rate of 0.20 cfs.

Irrigation well density is relatively light in the area, and the low proposed rate should preclude injury to existing rights.

Groundwater levels in some nearby alluvial aquifer exhibited downward trends from about 2001 through 2005, but later data for several of those wells are not available. However, other wells which also exhibited a decline during that period have since exhibited stable or even increasing groundwater levels (see attached hydrograph).

These facts indicate that water for the proposed use is likely available within the capacity of the resource.

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**	☒	☐

Basis for aquifer confinement evaluation: Proposed Well 1 will tap water-bearing sand and gravel deposits that are confined by 60-70 feet of low-permeability, fine-grained sediments (Willamette Silt). In the central Willamette Valley, Conlon and others (2005) report that fine-grained deposits (silt and clay) of 'more than 40 ft' thickness typically create confined conditions in the underlying water-bearing sand/gravel deposits. Furthermore, static groundwater levels in nearby wells are above the top of water-bearing units within the aquifer. These factors suggest that proposed Well 1 will obtain groundwater from a confined aquifer.

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	**Butte Creek**	**120-140**	**110-130**	**1650**	☒	☐	☐	☐	☒
1	2	**Pudding River**	**120-140**	**100-120**	**7200**	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation: Groundwater elevations in the alluvial aquifer are coincident with or above the elevations of SW1 and SW2. Furthermore, water table maps in the area indicate that groundwater in the alluvial aquifer system flows towards and discharges into local streams incised in the Willamette Silt (Conlon and others, 2003, 2005; Gannett and Caldwell, 1998). These facts indicate that the alluvial aquifer and local streams are hydraulically connected.

The depletion of local streams by proposed Well 1 will be attenuated, but not eliminated, by the low vertical hydraulic conductivity (permeability) of the Willamette Silt and other clays and silts that lie between the deeper sands and gravels and the stream beds. Net impacts will be small at the onset of pumping, but will increase with time until a new equilibrium between local recharge and discharge is reached. At that time depletion is expected to be relatively constant throughout the year.

Water Availability Basin the well(s) are located within:
SW1: Butte Creek > Pudding River – at mouth (WID 69799)
SW2: Pudding River > Molalla River – above Mill Creek (WID 151).

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	☐	☐	**IS69799A**	**12.00**	☐	**9.78**	☒	**See note**	☒

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: C3a: The Hunt 1999 and 2003 stream depletion models were used to estimate interference of SW1 at 30 days (Hunt 1999, Hunt 2003). Both versions were evaluated because it is likely that both model conditions exist along varying portions of SW1. That is, at the proposed POA location there is approximately 60-70 feet of confining Willamette Silt (see CLAC 2155, CLAC 2140), extending down to about elev. 120-130 ft. However, nearby reaches of Butte Creek (SW1) are at about elev. 110-130, and thus there are areas where the 'aquitard' is and is not present at SW1 (i.e., creek is incised through much or all of the silt, depending on location).

Using estimated aquifer parameters, the Hunt 1999 results indicate >25% depletion at 30 days of pumping, but the Hunt 2003 results estimate much less than 25% depletion. Due to uncertain model applicability, interference at 30 days of pumping cannot be estimated with appropriate certainty.

C3b: not applicable.

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.

Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Non-Distributed Wells													
		%	%	%	%	%	%	%	%	%	%	%	%
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													
(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: C4a: not evaluated for SW2 (Pudding River) because any surface water contribution to the proposed POA (stream interference) will be derived from SW1 (Butte Creek), which is in between the proposed POA location and SW2 (Pudding River).

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 #

ii. ☐ The permit should contain special condition(s) as indicated in "Remarks" below;

C6. **SW / GW Remarks and Conditions:** **C3a: PSI was determined because the requested allocation of 0.20 cfs exceeds 1% of the 80% natural exceedance flow in Butte Creek (0.0978 cfs). Thus, if the requested allocation is reduced to 0.0978 cfs (~44 gpm) or less, then PSI would not be found on this basis.**

References Used: Application file: G-18466.

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.

Conlon, T.D., Lee, K.K., and Risley, J.R., 2003, Heat tracing in streams in the central Willamette Basin, Oregon, *in* Stonestrom, D.A. and Constantz, Jim, eds., Heat as a tool for studying the movement of groundwater near streams: U.S. Geological Survey Circular 1260, chapter 5, p. 29-34.

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, 32 p.

Hunt, B., 1999, Unsteady stream depletion from ground water pumping: Ground Water, v. 37, no. 1, p. 98-102.

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

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, 82 p.

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #:** _____ **Logid:** _____

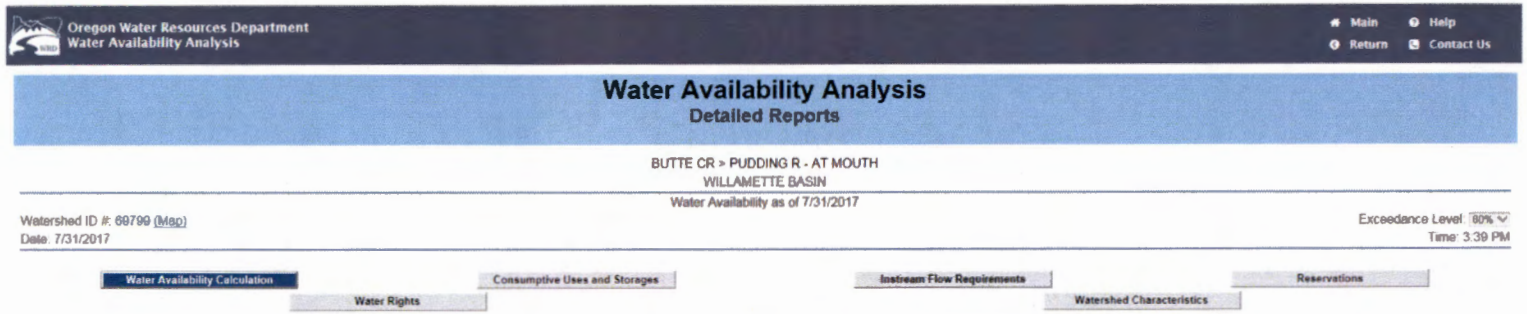
D2. **THE WELL does not appear to meet current well construction standards based upon:**

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



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Detailed Reports

BUTTE CR > PUDDING R - AT MOUTH
WILLAMETTE BASIN
Water Availability as of 7/31/2017

Watershed ID #: 68799 (Map)
Date: 7/31/2017

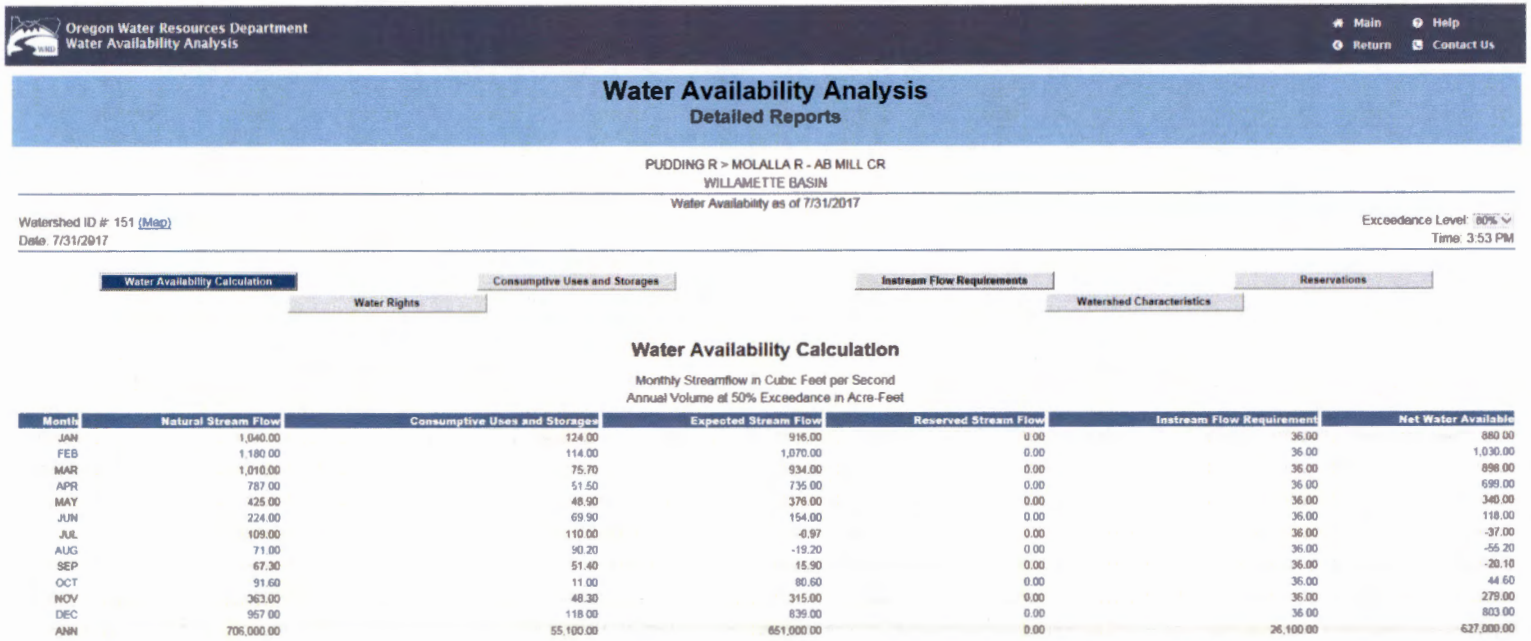
Exceedance Level: 80%
Time: 3:39 PM

Water Availability Calculation | Consumptive Uses and Storages | Instream Flow Requirements | Reservations
Water Rights | Watershed Characteristics

Water Availability Calculation

Monthly Streamflow in Cubic Feet per Second
Annual Volume at 50% Exceedance in Acre-Feet

Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	169.00	3.81	165.00	0.00	75.00	90.20
FEB	181.00	3.64	177.00	0.00	75.00	102.00
MAR	172.00	2.73	169.00	0.00	75.00	94.30
APR	142.00	2.27	140.00	0.00	75.00	64.70
MAY	89.20	6.59	83.60	0.00	75.00	8.61
JUN	39.00	10.30	28.70	0.00	75.00	-46.30
JUL	15.10	17.00	-1.87	0.00	25.00	-26.90
AUG	9.90	13.60	-3.70	0.00	12.00	-15.70
SEP	9.78	6.97	2.81	0.00	20.00	-17.20
OCT	15.10	1.00	14.10	0.00	75.00	-60.90
NOV	66.00	1.86	64.10	0.00	75.00	-10.90
DEC	170.00	3.96	166.00	0.00	75.00	91.00
ANN	121,000.00	4,410.00	117,000.00	0.00	44,100.00	79,000.00



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PUDDING R > MOLALLA R - AB MILL CR
WILLAMETTE BASIN
Water Availability as of 7/31/2017

Watershed ID #: 151 (Map)
Date: 7/31/2017

Exceedance Level: 80%
Time: 3:53 PM

Water Availability Calculation | Consumptive Uses and Storages | Instream Flow Requirements | Reservations
Water Rights | Watershed Characteristics

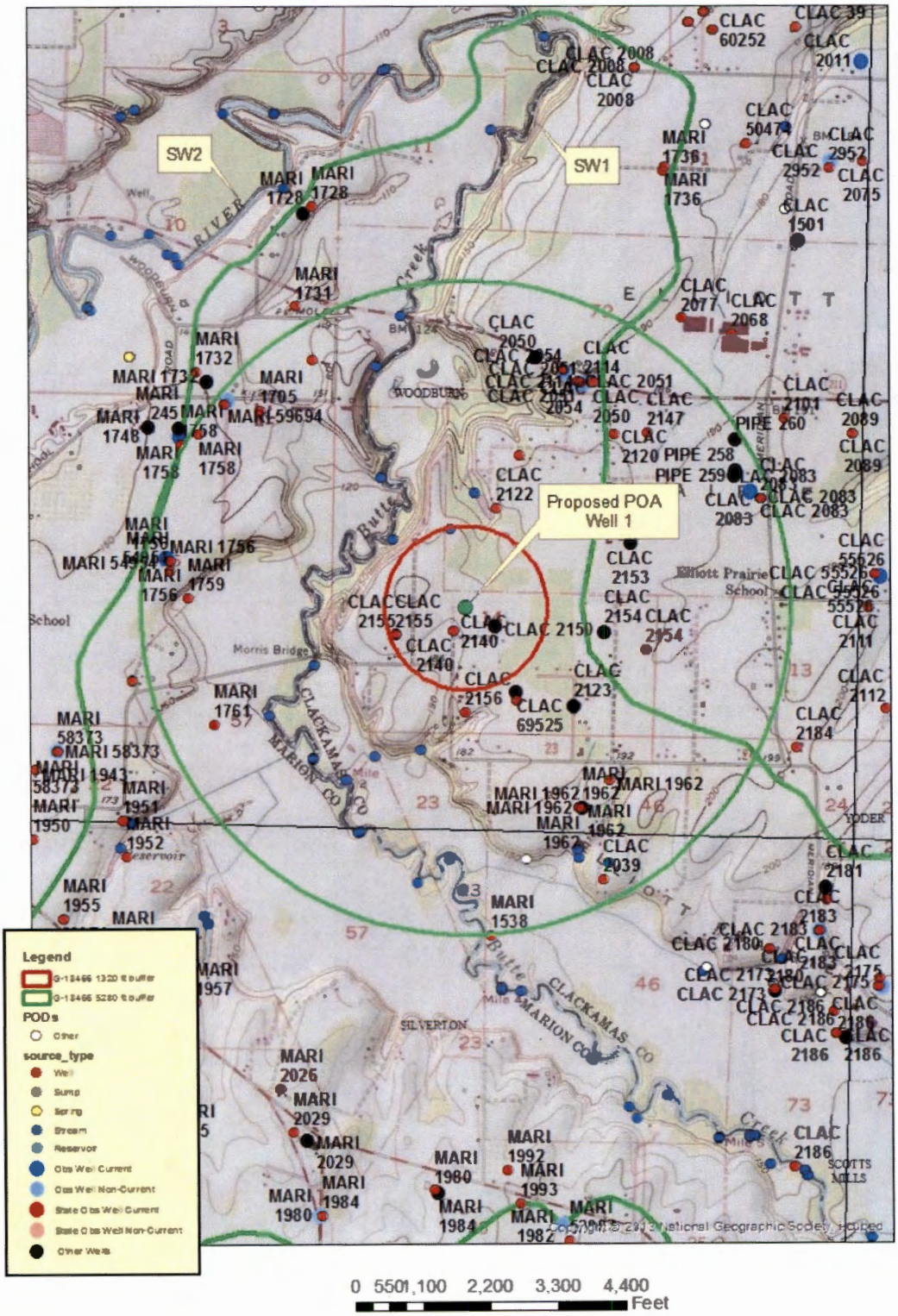
Water Availability Calculation

Monthly Streamflow in Cubic Feet per Second
Annual Volume at 50% Exceedance in Acre-Feet

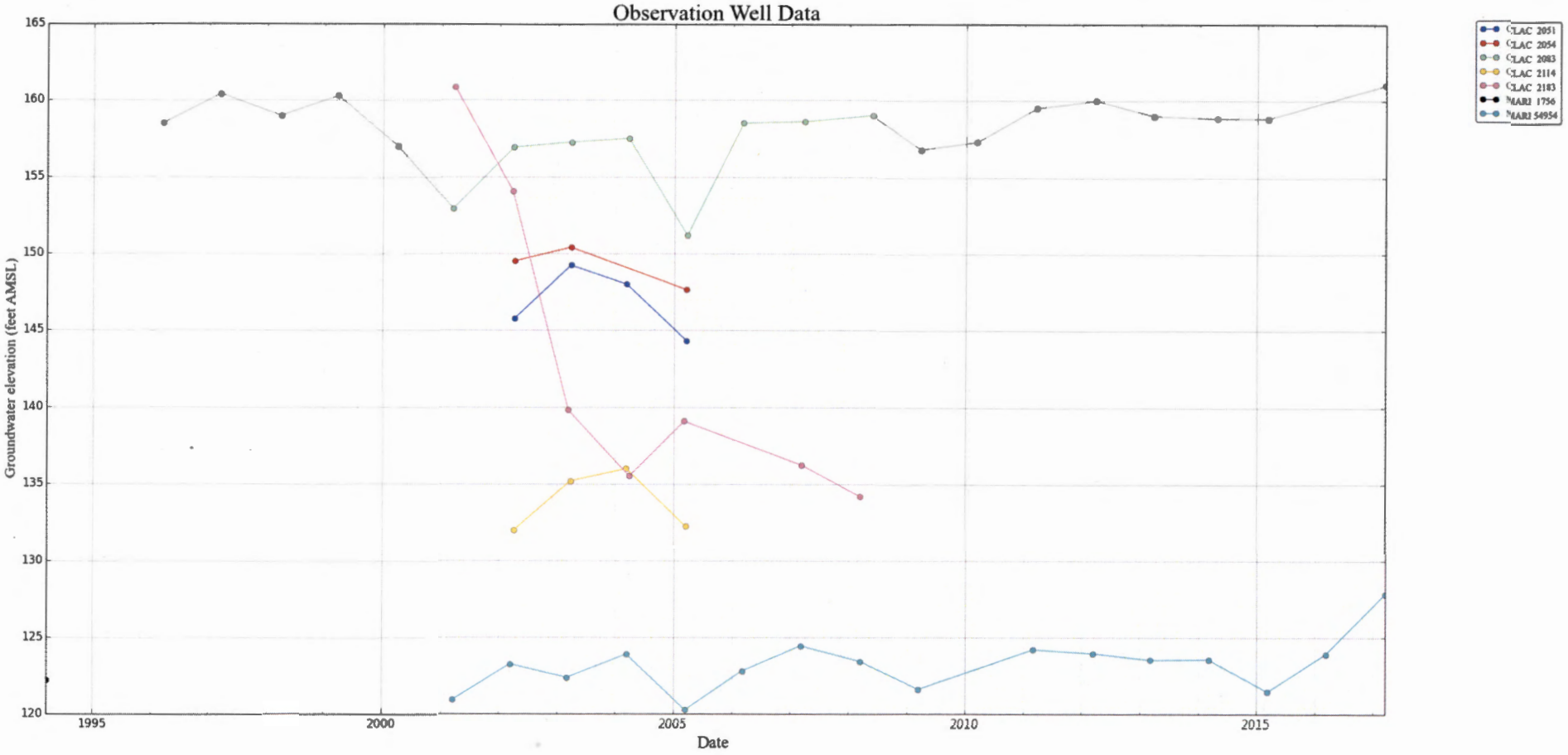
Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	1,040.00	124.00	916.00	0.00	36.00	880.00
FEB	1,180.00	114.00	1,070.00	0.00	36.00	1,030.00
MAR	1,010.00	75.70	934.00	0.00	36.00	898.00
APR	787.00	51.50	735.00	0.00	36.00	699.00
MAY	425.00	48.90	376.00	0.00	36.00	340.00
JUN	224.00	69.90	154.00	0.00	36.00	118.00
JUL	109.00	110.00	-0.97	0.00	36.00	-37.00
AUG	71.00	90.20	-19.20	0.00	36.00	-55.20
SEP	67.30	51.40	15.90	0.00	36.00	-20.10
OCT	91.60	11.00	80.60	0.00	36.00	44.60
NOV	363.00	48.30	315.00	0.00	36.00	279.00
DEC	957.00	118.00	839.00	0.00	36.00	803.00
ANN	706,000.00	55,100.00	651,000.00	0.00	26,100.00	627,000.00

Well Location Map

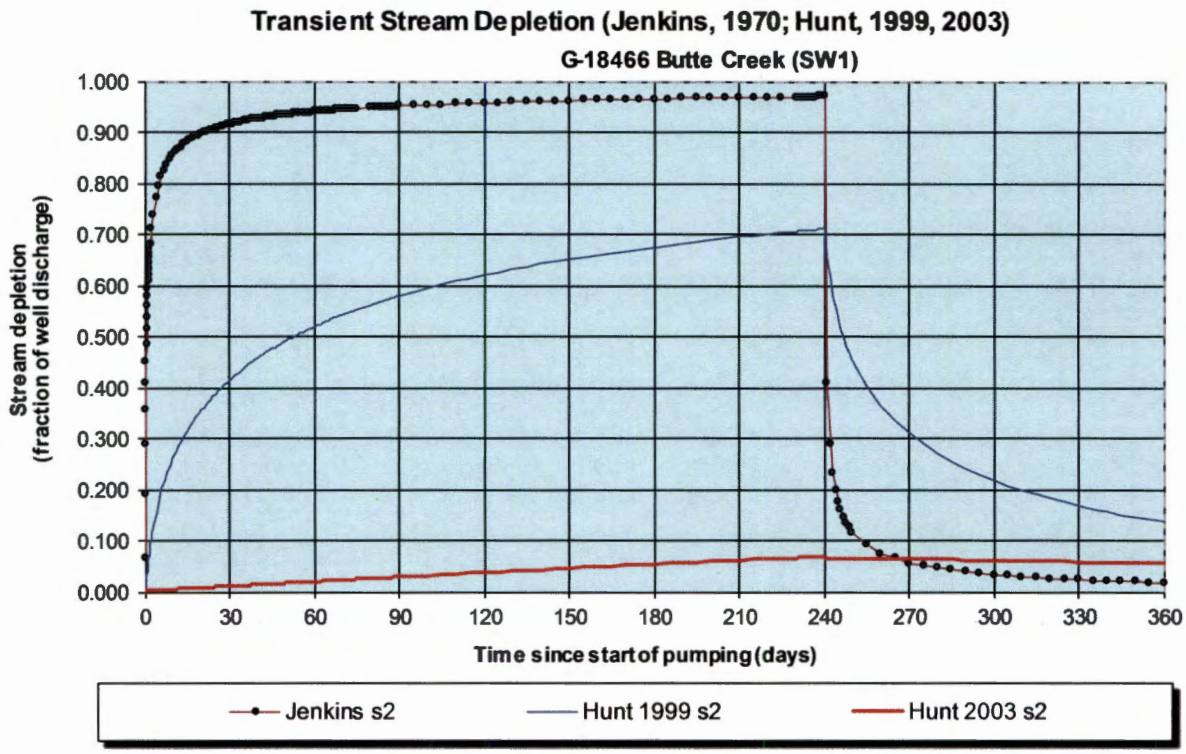
Application G-18466 Coston and Adams
T5S, R1W, Section 14



Water-Level Trends in Nearby Wells (static levels only)



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	91.5%	94.0%	95.1%	95.8%	96.2%	96.5%	96.8%	97.0%	5.6%	3.3%	2.3%	1.8%
H SD 1999	41.5%	51.9%	57.9%	62.1%	65.1%	67.5%	69.4%	71.1%	31.0%	21.7%	16.8%	13.6%
H SD 2003	1.10%	2.01%	2.91%	3.78%	4.61%	5.39%	6.13%	6.83%	6.39%	6.13%	5.83%	5.54%
Qw, cfs	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
H SD 99, cfs	0.083	0.104	0.116	0.124	0.130	0.135	0.139	0.142	0.062	0.043	0.034	0.027
H SD 03, cfs	0.002	0.004	0.006	0.008	0.009	0.011	0.012	0.014	0.013	0.012	0.012	0.011

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.20	0.20	0.20	cfs
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	1650	1650	1650	ft
Well depth	d	140	140	140	ft
Aquifer hydraulic conductivity	K	10	50	500	ft/day
Aquifer saturated thickness	b	80	80	80	ft
Aquifer transmissivity	T	800	4000	40000	ft*ft/day
Aquifer storativity or specific yield	S	0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva	0.1	0.1	0.1	ft/day
Aquitard saturated thickness	ba	10	10	10	ft
Aquitard thickness below stream	babs	3	3	3	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	15	15	15	ft
Streambed conductance (lambda)	sbc	0.500000	0.500000	0.500000	ft/day
Stream depletion factor	sdf	3.403125	0.680625	0.068063	days
Streambed factor	sbf	1.031250	0.206250	0.020625	
input #1 for Hunt's Q_4 function	t'	0.293848	1.469238	14.692378	
input #2 for Hunt's Q_4 function	K'	34.031250	6.806250	0.680625	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	1.031250	0.206250	0.020625	