

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date January 7, 2016

FROM: Groundwater Section Michael J. Thoma
Reviewer's Name

SUBJECT: Application G- 18173 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: Osprey Corner LLC County: Linn

A1. Applicant(s) seek(s) 0.95 cfs from 2 well(s) in the Willamette Basin,
Santiam River subbasin

A2. Proposed use Irrigation (75.86 ac Primary) Seasonality: March 1 – October 31 (245 d)

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	PROP	1	Alluvium	0.95	11S/02W-8 NENW	95'S, 2120'E of SW cor S 5
2	PROP	2	Alluvium	0.95	11S/02W-8 NENW	900'S, 2340'E of SW cor S 5
3						
4						

* 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	~260		255 ^A		100-150							
2	~260		255 ^A		100-150							

Use data from application for proposed wells.

A4. **Comments:** Applicant's wells are proposed. Only depth range is provided on application so the reviewer assumes minimum case and seal depth of 18 ft.

^ASWL was estimated from well logs nearby and published water table maps (Woodward and Gannett, 1998).

A5. **Provisions of the Willamette (OAR 690-502)** 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: _____

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) 7c (7-year SWL Reporting); 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 0 ft. and 200 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 in an area underlain by approximately 150-200 ft of alluvial material composed of mixed sand, clay, and gravel (Woodward and Gannett, 1998). Well yields in this material are generally low to moderate (< 50 gpm) but wells yielding > 100 gpm are not uncommon. There are few observation wells in the area and those show SWLs that fluctuate seasonally (likely due to changes in river stage and/or pumping) and have stable long-term trends. There are numerous groundwater POAs to the east of the proposed POA toward the Santiam River but significantly fewer to the west. There are a few groundwater rights within 1/2 mile of the proposed POAs that could potentially be affected by the applicant’s proposed use, but impacts will not likely be significant in this type of aquifer systems (thick, mixed material sediments) – standard interference conditions should apply.

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 of Willamette Aquifer / Willamette Confining Unit	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Alluvial of Willamette Aquifer / Willamette Confining Unit	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer confinement evaluation: SWLs reported on driller's logs for wells in the area are generally slightly higher than reported 'first water'; mixed-sediment nature of aquifer (layered sand/gravel/clay)

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	Mill Cr	250-260	250-260	3420	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	1	Mill Cr	250-260	250-260	3520	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	2	South Santiam R	250-260	245-265	5980	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	2	South Santiam R	250-260	245-265	6150	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer hydraulic connection evaluation: Coincident groundwater and surface water elevations

Water Availability Basin the well(s) are located within: Willamette R. > Columbia R – AB Mill Cr at Gage 14191000 but the majority of hydraulic connection will be to S Santiam R > Santiam R – AB Mouth which is evaluated against below

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"/>	none		<input type="checkbox"/>	253	<input type="checkbox"/>	<< 1%	<input type="checkbox"/>
2	1	<input type="checkbox"/>	<input type="checkbox"/>	none		<input type="checkbox"/>	253	<input type="checkbox"/>	<< 1%	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

Comments: There are no instream water rights in the WAB. Interference @ 30d was estimated using the Hunt (2003) stream-depletion model with parameter values based on Herrera et al., (2014). Model results are shown below.

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

SW #	Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

Comments: _____

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	***Impacts to surface waters > 1 mile (i.e., S Santiam River) were not evaluated against because estimated impacts to Mill Cr where significantly below the threshold for PSI and impacts to S Santiam River will also be well below the threshold due to the increased distance.***												
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 proposed POAs are in an area where there is likely strong hydraulic connection between the aquifer and nearby surface water sources. However, the nature of the aquifer system (mixed-sediments) and surface water bodies (large perennial rivers and numerous seasonal creeks) suggest that interference will not rise to the level of PSI under current Division 9 Rules (OAR 690-0009).

References Used:

Gannet, M. W. and R. R. Caldwell. 1998. *Geologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington*. USGS Professional Paper 1424-A.

Hunt, B. 2003. *Unsteady Stream Depletion when Pumping from a Semiconfined Aquifer*. Journal of Hydrologic Engineering. Vol 8(1), pp 12-19

Herrera, N. B., Burns, E. R., and T. D. Conlon. 2014. *Simulation of Groundwater Flow and the Interaction of Groundwater and Surface Water in the Willamette Basin and Central Willamette Subbasin, Oregon*. USGS Scientific Investigations Report 2014-5136.

Woodward, D. G., M. W. Gannett, and J. J. Vaccaro. 1998. *Hydrogeologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington*. USGS 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) _____

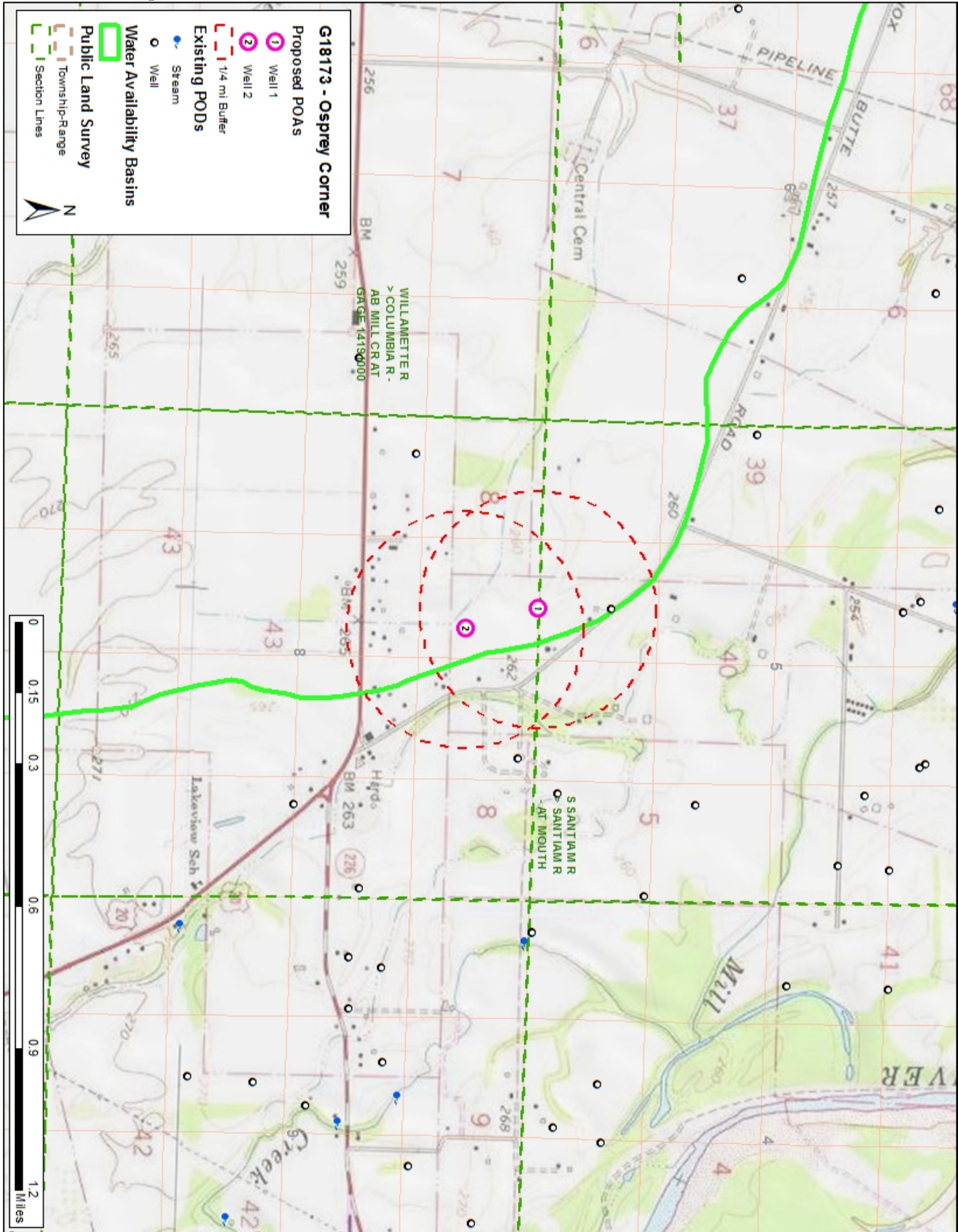
D3. **THE WELL construction deficiency or other comment is described as follows:** _____

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

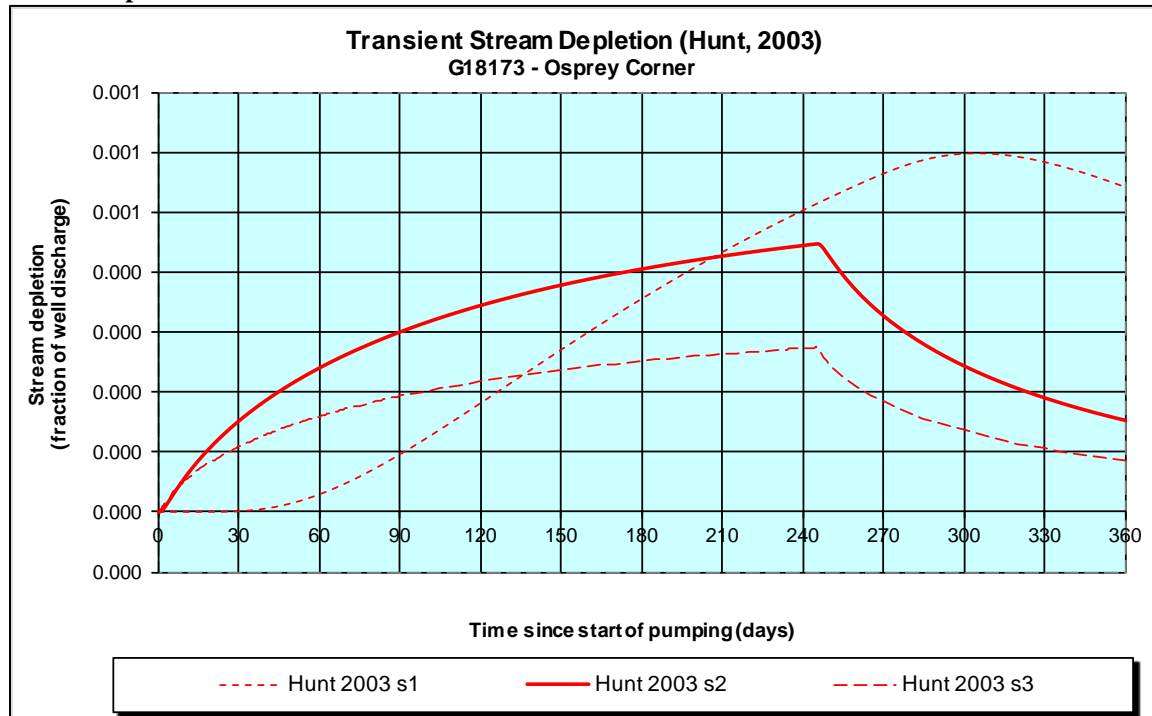
Water Availability Tables

S SANTIAM R > SANTIAM R - AT MOUTH WILLAMETTE BASIN							
Water Availability as of 1/7/2016							
Watershed ID #: 30200601 (Map)				Exceedance Level: 80% ▾			
Date: 1/7/2016				Time: 2:37 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	3,090.00	266.00	2,820.00	0.00	0.00	2,820.00	
FEB	3,360.00	1,530.00	1,830.00	0.00	0.00	1,830.00	
MAR	3,170.00	1,260.00	1,910.00	0.00	0.00	1,910.00	
APR	2,950.00	1,050.00	1,900.00	0.00	0.00	1,900.00	
MAY	2,050.00	713.00	1,340.00	0.00	0.00	1,340.00	
JUN	968.00	184.00	784.00	0.00	0.00	784.00	
JUL	450.00	206.00	244.00	0.00	0.00	244.00	
AUG	275.00	191.00	84.00	0.00	0.00	84.00	
SEP	253.00	161.00	92.20	0.00	0.00	92.20	
OCT	363.00	139.00	224.00	0.00	0.00	224.00	
NOV	1,450.00	140.00	1,310.00	0.00	0.00	1,310.00	
DEC	3,040.00	142.00	2,900.00	0.00	0.00	2,900.00	
ANN	2,330,000.00	356,000.00	1,980,000.00	0.00	0.00	1,980,000.00	

Well Location Map



Stream-depletion Model Results



Output for Stream Depletion, Scenerio 2 (s2):						Time pump on (pumping duration) = 245 days						
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	68.7%	77.6%	81.6%	84.0%	85.7%	86.9%	87.9%	88.7%	23.4%	13.3%	9.3%	7.0%
H SD 1999	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%
H SD 2003	0.02%	0.02%	0.03%	0.03%	0.04%	0.04%	0.04%	0.04%	0.03%	0.02%	0.02%	0.02%
Qw, cfs	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950	0.950
H SD 99, cfs	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.000
H SD 03, cfs	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.95	0.95	0.95	cfs
Time pump on (pumping duration)	tpon	245	245	245	days
Perpendicular from well to stream	a	3420	3420	3420	ft
Well depth	d	200	200	200	ft
Aquifer hydraulic conductivity	K	1	60	200	ft/day
Aquifer saturated thickness	b	200	200	200	ft
Aquifer transmissivity	T	200	12000	40000	ft*ft/day
Aquifer storativity or specific yield	S	0.01	0.01	0.01	
Aquitard vertical hydraulic conductivity	Kva	0.001	0.001	0.001	ft/day
Aquitard saturated thickness	ba	20	20	20	ft
Aquitard thickness below stream	babs	10	10	10	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	10	10	10	ft
Streambed conductance (lambda)	sbc	0.001	0.001	0.001	ft/day
Stream depletion factor	sdf	584.820	9.747	2.924	days
Streambed factor	sbf	0.017	0.000	0.000	
input #1 for Hunt's Q_4 function	t'	0.002	0.103	0.342	
input #2 for Hunt's Q_4 function	K'	2.924	0.049	0.015	
input #3 for Hunt's Q_4 function	epsilon'	0.050	0.050	0.050	
input #4 for Hunt's Q_4 function	lamda'	0.017	0.000	0.000	