PUBLIC INTEREST REVIEW FOR GROUND WATER APPLICATIONS

TO: Water Rights Section Date **25 March 2009**

FROM: Ground Water/Hydrology Section **Gerald H. Grondin**
Reviewer's Name

SUBJECT: Application G-**17140** Supersedes review of **N.A. (amendments occurred prior to review)**
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 reviews ground water 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: **Bandon Dunes Limited Partnership** County: **Coos**

A1. Applicant(s) seek(s) (825 gpm) **1.84** cfs from **2** well(s) in the **South Coast** Basin, **Coquille** subbasin Quad Map: **Bullards**

A2. Proposed use: **Primary Irrigation (206.65 acres)** Seasonality: **1 March to 31 October (245 days)**

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	**COOS 54362**	**OM-5**	**Sand & Gravel**	**0.89**	**28S/14E-sec 5 CCC**	**50'N, 555'E fr SW cor S 5**
2	**Not Drilled**	**OM-6**	**Sand & Gravel**	**0.67**	**28S/14E-sec 5 BCC**	**95'N, 715'E fr W qtr cor S 5**
3	**See below**			**0.28**	**Well dropped**	**Rate not re-assigned/dropped**

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	**55**	**3**	**56.8**	**12/05/08**	**274**	**0 – 178**	**+2 – 274**	**None**	**187 – 268**	**299.5**	**25.5**	**P**
2	**60**	**?**	**?**	**N.A.**	**Prop 250**	**Prop 0 - 190**	**Prop +1 – 200**	**None**	**Prop 200 - 250**	**?**	**?**	**N.A.**
3												

Use data from application for proposed wells.

A4. **Comments:**

On 9 February 2009 the application was amended dropping 3 of 5 originally proposed wells and adding a new well (dropped = OM-1, OM-2, OM-3, kept = OM-4, OM-5, added = OM-6)

On 24 March 2009, the application was additionally amended to drop well OM-4. The amendment did not change the acreage or total rate nor did it reassign the rate (0.28 cfs) tied to the well dropped (OM-4). For this review, any calculation involving the remaining 2 wells added the 0.28 cfs rate to the rate assigned to each well.

The application requests 1.84 cfs (825 gpm) which is less than 1/80 cfs per acre
The application requests 2.50 feet per acre duty (516.6 ac-ft, 1.68 x 10^8 gallons)

A5. ☐ **Provisions of the South Coast Basin Program** Basin rules relative to the development, classification and/or management of ground water hydraulically connected to surface water ☐ **are**, *or* ☒ **are not**, activated by this application. (Not all basin rules contain such provisions.)
Comments: **The proposed wells are located less than 1 mile from the Pacific Ocean between Cut Creek to the north and the Coquille River to the south. The South Coast Basin Program applies (see OAR 690-517). There are various classifications; irrigation is apparently allowed for the area identified by the application.**

A6. ☐ **Well(s) #** _____ , _____ , _____ , _____ , _____ , tap(s) an aquifer limited by an administrative restriction.
Name of administrative area:
Comments: **Not Applicable**

B. GROUND WATER AVAILABILITY CONSIDERATIONS, OAR 690-310-130, 400-010, 410-0070

B1. **Based upon available data**, I have determined that ground water* 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 ground water 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 ground water 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 ground water resource; or

d. ☒ **will, if properly conditioned**, avoid injury to existing ground water rights or to the ground water resource:
   i. ☒ The permit should contain condition #(s) **7B and 7N**;
   ii. ☐ The permit should be conditioned as indicated in item 2 below.
   iii. ☐ The permit should contain special condition(s) as indicated in item 3 below;

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

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

c. ☐ **Condition** to allow ground water production only from the _____ ground water 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 Ground Water 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. **Ground water availability remarks:**

Baldwin and others (1973) and Beaulieu and Hughes (1975) indicate the proposed wells are located in an area that includes marine terrace (unconsolidated to semi-consolidated sand, silt, clay, and gravel) and both active and stable dune sand sedimentary deposits. Ground water is noted to occur with yields of low to moderate from the marine terrace deposits and "high" from the dune deposits.

OWRD water well reports (well logs) and hydrographs reviewed indicate and an upper and a lower water bearing zone in the deposits separated by fine grained deposits that include clay. The static water ground water level in the lower water bearing zone is often tens of feet lower than the static water ground water level in the upper water bearing zone. The ground water level hydrograph for well COOS 1252 (T28S/R14E-sec 5) appears to represent the upper water bearing zone and shows ground water levels above 60 feet elevation, seasonal fluctuations of about 5 feet, climate influence on the multi-year trend, and currently no net water level decline. The ground water level hydrograph for well COOS 51622 (T27S/R14E-sec 29) appears to represent the lower water bearing zone and shows ground water levels below 45 feet elevation, seasonal fluctuations of 7 to 15 feet, no apparent climate influence on the multi-year trend, and currently no net water level decline.

The upper and lower water bearing zones likely have some hydraulic connection, but the current differences in static water levels, seasonal ground water level fluctuations, and multi-year ground water level trends allows treating them at this time as separate water bearing zones until future data shows otherwise.

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

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

Well	Aquifer or Proposed Aquifer	Confined	Unconfined
1	**Sand with gravel (dune and/or marine terrace)**	☒	☐
2	**Sand with gravel (dune and/or marine terrace)**	☒	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation:

The upper and lower water bearing zones likely have some hydraulic connection, but at this time, the current differences in static water levels, seasonal ground water level fluctuations, and multi-year ground water level trends allows treating them as separate water bearing zones until future data shows otherwise. Current data indicates the lower water bearing zones should be treated as confined, but future data may show the lower water bearing zone should be treated as 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? YES	NO	ASSUMED	Potential for Subst. Interfer. Assumed? YES	NO
1	**1**	**Cut Creek**	**-2**	**30**	**5700**	☐	☒	☐	☐	☒
1	**2**	**Pacific Ocean**	**-2**	**0**	**4000**	☒	☐	☐	☐	☒
1	**3**	**Fahys Creek & Fahys Lake**	**-2**	**60**	**1300**	☐	☒	☐	☐	☒
1	**4**	**Coquille River**	**-2**	**0**	**7500**	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
2	**1**	**Cut Creek**	**20***	**25**	**3100**	☐	☒	☐	☐	☒
2	**2**	**Pacific Ocean**	**20***	**0**	**3200**	☒	☐	☐	☐	☒
2	**3**	**Fahys Creek & Fahys Lake**	**20***	**70**	**1700**	☐	☒	☐	☐	☒
2	**4**	**Coquille River**	**20***	**0**	**9200**	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation:

The ground water elevation shown for proposed well 1 (well COOS 54362) was derived from the topographic map (USGS Bullards quadrangle) land surface elevation at the well location minus the static water level reported on the water well report for the well. The ground water elevation shown for proposed well 2 is intermediate of the ground water elevation derived for two closest deeper wells to the north (COOS 52100 and COOS 53357) and the closest deeper well to the south (COOS 53004).

Currently proposed wells 1 and 2 (COOS 54362 and not drilled) are considered not hydraulically connected to the nearby creeks for the following reasons. They appear to be completed in a lower water bearing zone that available data indicates should be currently treated as confined and separate from an upper water bearing zone. The ground water levels appear to be below the creek bed elevations of Cut Creek and Fahys Creek except for the reaches closest to their discharge area. Limited data suggests ground water flow within the lower water bearing zone in the vicinity of these well sites is west (Pacific Ocean) and south (Coquille River) where hydraulic connection to both likely exists.

Water Availability Basin the well(s) are located within:

Proposed wells 1 and 2 (COOS 54362 and not drilled): COQUILLE R > PACIFIC OCEAN - AT MOUTH (ID #: 384)

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?
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

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 Pacific Ocean is not considered even though both proposed well locations are more than 0.25 mile and less than 1.00 mile from the ocean.

Cut Creek and Fahys Creek are not considered here given the proposed wells (COOS 54362 and not drilled) are considered not hydraulically connected to the creeks for the following reasons. The proposed wells appear to be completed in a lower water bearing zone that available data indicates should be currently treated as confined and separate from an upper water bearing zone. The ground water levels appear to be below the creek bed elevations of Cut Creek and Fahys Creek except for the reaches closest to their discharge area.

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
1	**4**	**1.8%**	**2.0%**	**0.5%**	**0.9%**	**1.0%**	**1.2%**	**1.4%**	**1.6%**	**1.8%**	**2.0%**	**1.9%**	**1.7%**
Well Q as CFS		**0.00**	**0.00**	**1.17**	**1.17**	**1.17**	**1.17**	**1.17**	**1.17**	**1.17**	**1.17**	**0.00**	**0.00**
Interference CFS		**0.021**	**0.023**	**0.006**	**0.011**	**0.012**	**0.014**	**0.016**	**0.019**	**0.021**	**0.024**	**0.022**	**0.020**
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
2	**4**	**0.8%**	**0.9%**	**0.3%**	**0.5%**	**0.5%**	**0.5%**	**0.6%**	**0.7%**	**0.8%**	**0.9%**	**0.8%**	**0.7%**
Well Q as CFS		**0.00**	**0.00**	**0.95**	**0.95**	**0.95**	**0.95**	**0.95**	**0.95**	**0.95**	**0.95**	**0.00**	**0.00**
Interference CFS		**0.008**	**0.009**	**0.002**	**0.004**	**0.005**	**0.005**	**0.006**	**0.006**	**0.007**	**0.008**	**0.008**	**0.006**
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
(A) = Total Interf.		**0.029**	**0.032**	**0.008**	**0.015**	**0.017**	**0.019**	**0.022**	**0.025**	**0.028**	**0.032**	**0.030**	**0.026**
(B) = 80 % Nat. Q		**2180**	**2890**	**2630**	**1520**	**731**	**358**	**165**	**86.4**	**77.0**	**102**	**541**	**1890**
(C) = 1 % Nat. Q		**21.80**	**28.90**	**26.30**	**15.20**	**7.310**	**3.580**	**1.650**	**0.864**	**0.770**	**1.020**	**5.410**	**18.90**
(D) = (A) > (C)		**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
(E) = (A / B) x 100		**0.001 %**	**0.001 %**	**0.000 %**	**0.001 %**	**0.002 %**	**0.005 %**	**0.013 %**	**0.029 %**	**0.036 %**	**0.031 %**	**0.006 %**	**0.001 %**

(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:

Proposed wells 1 and 2 (COOS 54362 and not drilled) are identified as hydraulically connected to the Coquille River located more than 1.00 miles from each well.

Interference at the river due to pumping each well at their proposed rates was calculated separately. Hunt (2003) was used given ground water at the proposed wells is currently identified as in a lower confined sand with gravel water bearing zone. The calculations used a transmissivity of 2700 ft2/day based on well COOS 54362 specific capacity, an assumed storage coefficient of 0.002, an assumed streambed thickness of 25 feet with a hydraulic conductivity of 0.135 ft/day (1/100 of the aquifer hydraulic conductivity). The interference values should be considered high given each calculation assumes the interference is with the river only. In reality, the interference is likely distributed to both the river and the Pacific Ocean making the actual interference smaller than calculated.

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 ground water 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**

If a permit is issued, it should contain conditions 7B and 7N.

References Used:

Baldwin, E.M., Beaulieu, J.D., Ramp, L., Gray, J.J., Newton, V.C., and Mason, R.S., 1973, Geology & mineral resources of Coos County, Oregon: Oregon Department of Geology and Mineral Industries Bulletin 80, 82 p., 4 plates.

Beaulieu, J., and Hughes, P., 1975, Environmental geology of western Coos & Douglas Counties, Oregon: Oregon Department of Geology and Mineral Industries Bulletin 87, 148 p, 16 plates.

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.

Oregon Administrative Rule (OAR 690-517): South Coast Basin Program

OWRD ground water level hydrographs for wells: COOS 1252, COOS 50514, COOS 51622,

OWRD water right file G-13577 (permit G-13498) and related permit amendments

OWRD water well reports (well logs): COOS 330, COOS 720, COOS 3757, COOS 1252, COOS 1253, COOS 1254, COOS 1255, COOS 3758, COOS 3759, COOS 3760, COOS 50508, COOS 50514, COOS 50970, COOS 51152, COOS 51622, COOS 51626, COOS 51628, COOS 51649, COOS 52100, COOS 52151, COOS 52802, COOS 52847, COOS 52850, COOS 52851, COOS 52852, COOS 52864, COOS 52887, COOS 53004, COOS 53275, COOS 53277, COOS 53357, COOS 53798, COOS 53799, COOS 53800, COOS 54170, COOS 54208, COOS 54287, COOS 54310, COOS 54356, COOS 54362

Theis, C.V. 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using ground water storage. American Geophysical Union Transactions, 16 annual meeting, vol. 16, pg. 519-524.

USGS 1:24,000 scale quadrangle maps: Bullards, Oregon and Riverton, Oregon

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #**: **1** **Logid:** **COOS 54362**
Well #: **2** **Logid:** **not drilled yet**

D2. **THE WELL does not 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**:
a. ☐ constitutes a health threat under Division 200 rules;
b. ☐ commingles water from more than one ground water reservoir;
c. ☐ permits the loss of artesian head;
d. ☐ permits the de-watering of one or more ground water reservoirs;
e. ☐ other: (specify) _____

D4. **THE WELL construction deficiency is described as follows:** _____

D5. **THE WELL #1** a. ☒ **was**, *or* ☐ **was not** constructed according to the standards in effect at the time of original construction or most recent modification.

b. ☐ I don't know if it met standards at the time of construction.

THE WELL #2 Not drilled yet

D6. ☐ **Route to the Enforcement Section.** I recommend withholding issuance of the permit until evidence of well reconstruction is filed with the Department and approved by the Enforcement Section and the Ground Water Section.

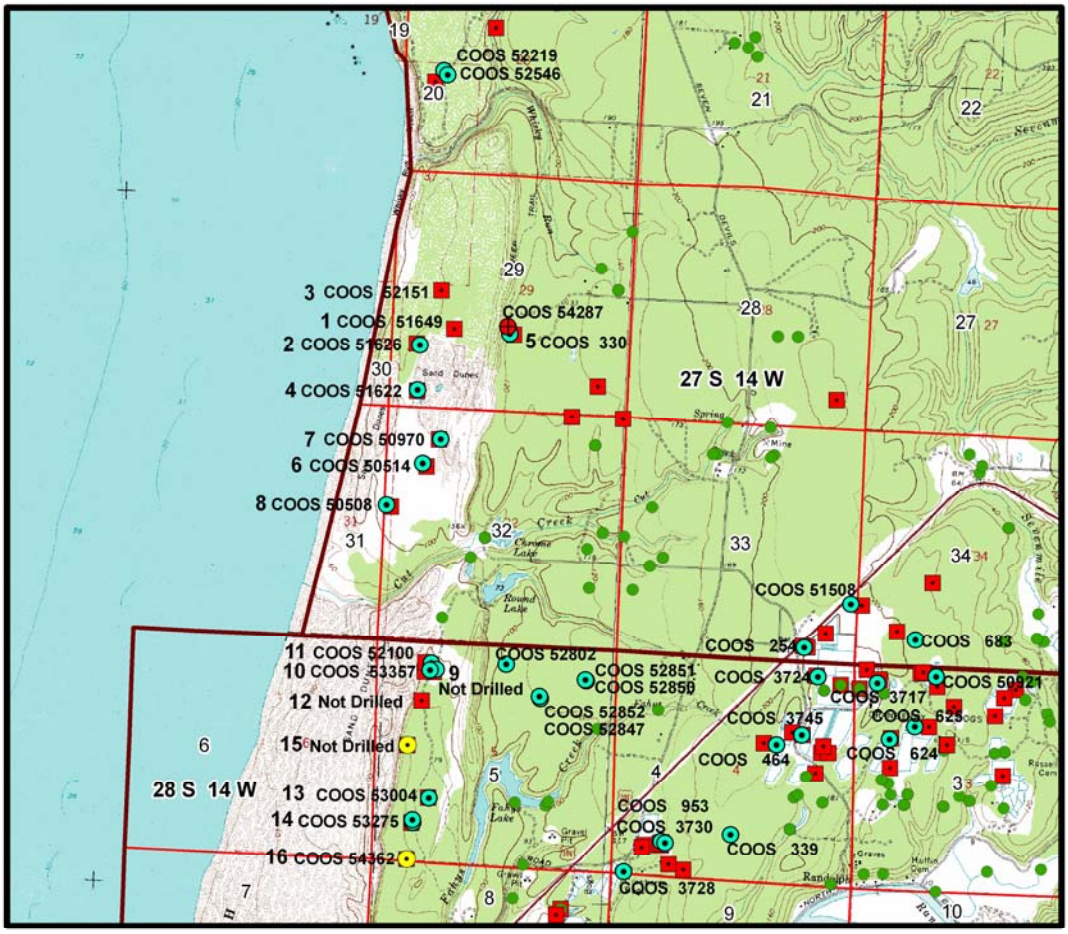
THIS SECTION TO BE COMPLETED BY ENFORCEMENT PERSONNEL

D7. ☐ Well construction deficiency has been corrected by the following actions: _____

_____ _____, 200____.
(Enforcement Section Signature)

D8. ☐ **Route to Water Rights Section (attach well reconstruction logs to this page).**

Ground Water Application G-17140
Bandon Dunes

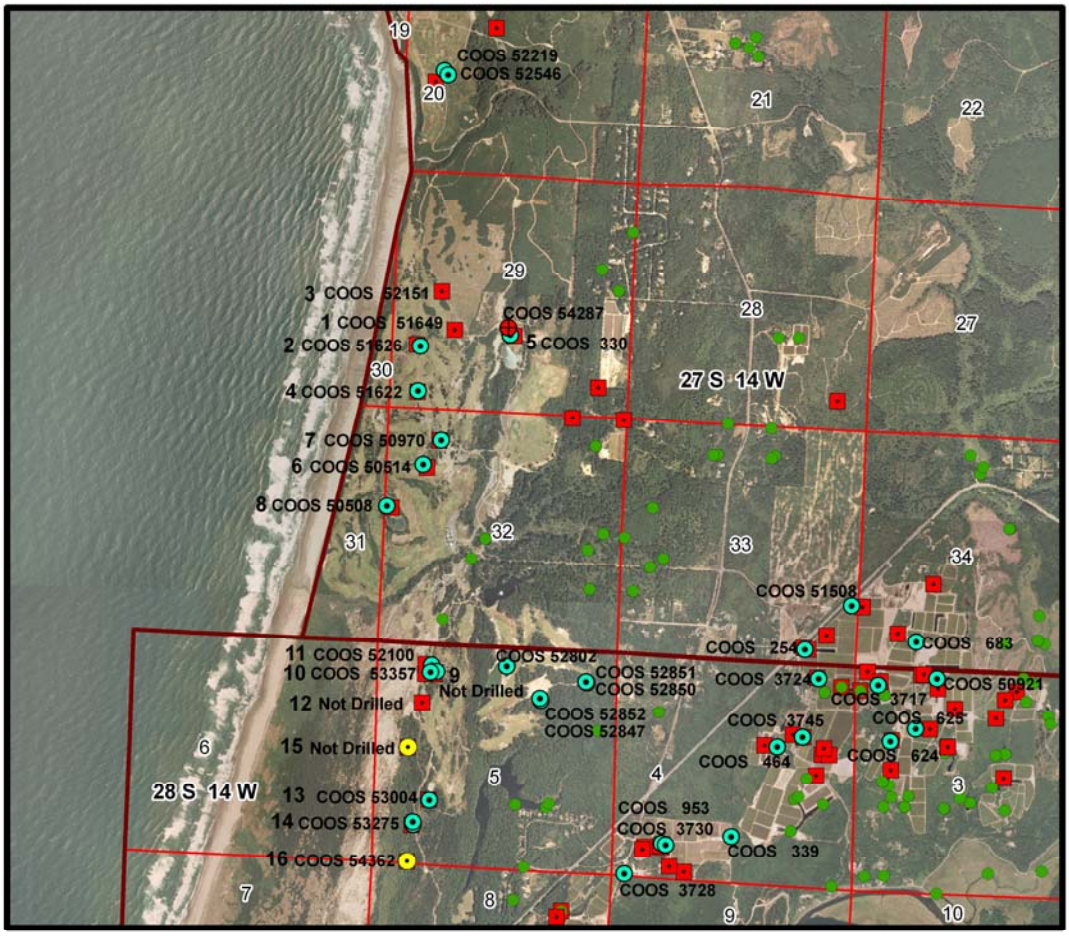


Yellow Circles = Proposed Wells
Red and Blue = Other Wells

Green = Surface Water Rights

Note: Number before well ID = G-13577 POAs

Ground Water Application G-17140
Bandon Dunes



COOS 54362

12-19-2008

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765 & OAR 690-205-0210)

WELL LABEL # L 91210

START CARD # 1003392

(1) LAND OWNER

Owner Well I.D. 1264 (OM4)

First Name Michael Last Name Keiser

Company Bandon Dunes/Old McDonald

Address 55744 Round Lake Drive

City Bandon State OR Zip 97411

(2) TYPE OF WORK

☒ New Well ☐ Deepening ☐ Conversion ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD

☐ Rotary Air ☒ Rotary Mud ☐ Cable ☐ Auger ☐ Cable Mud ☐ Reverse Rotary ☐ Other

(4) PROPOSED USE

☐ Domestic ☒ Irrigation ☐ Community ☐ Industrial/ Commericial ☐ Livestock ☐ Dewatering ☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION

Special Standard ☐ (Attach copy)

Depth of Completed Well 273.50 ft.

BORE HOLE Dia	From	To	SEAL Material	From	To	Amt	sacks/ lbs
23	0	95	Cement	0	95	90	S
17.5	95	274	Cement	95	178	85	S

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E

☐ Other

Backfill placed from ft. to ft. Material

Filter pack from 178 ft. to 273 ft. Material Gravel Size pea gravel

Explosives used: ☐ Yes Type Amount

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
●	○	17.5	☒	1.5	83.66	.250	●	○	☒	☐
●	○	10	☒	2	186.77	.250	●	○	☒	☐
●	○	10	☐	199.02	206.08	.250	●	○	☒	☐
●	○	10	☐	216.25	256	.250	●	○	☒	☐
●	○	10	☐	268	273.5	.250	●	○	☒	☐

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s)

Temp casing ☐ Yes Dia From To

(7) PERFORATIONS/SCREENS

Perforations Method

Screens Type Johnson V-Wire Material StainlessSteel

Perf/Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Screen		10	186.77	199.02	.101			10
Screen		10	206.08	216.25	.101			10
Screen		10	256	268	.101			10

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

◉ Pump ○ Bailer ○ Air ○ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
99.9	7.6	231	1
202	16.6	231	1
299.5	25.5	231	1

Temperature 55 °F Lab analysis ☒ Yes By Bandon Well & Pump Co.

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County Coos Twp 28.00 S N/S Range 14.00 W E/W WM

Sec 5 SE 1/4 of the NW 1/4 Tax Lot 400

Tax Map Number Lot

Lat 0 ° 0 ' " or DMS or DD

Long 0 ° 0 ' " or DMS or DD

◉ Street address of well ○ Nearest address

55744 Round Lake Drive, Bandon

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening			☐	
Completed Well	12-05-2008		☐	56.8

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 3

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
10-07-2008	3	73	50		☐	3
10-21-2008	95	120	50		☐	56.8
10-22-2008	147	151	20		☐	56.8
12-23-2008	166	168	20		☐	56.8
12-24-2008	182	184	20		☐	56.8

(11) WELL LOG

Ground Elevation 200

Material	From	To
Sand fine-medium gray brown	0	14
Sand fine-medium gray brown w/ peat	14	15
Sand fine-medium gray brown	15	16
Sand fine-medium gray brown w/wood	16	18
Sand fine-medium gray brown	18	19
Peat w/wood	19	20
Wood w/sand fine-medium & peat lenses	20	22
Sand fine-medium gray brown w/wood	22	35
Wood w/peat & sand fine gray	35	38
Sand fine-medium gray w/wood & peat	38	52
Peat w/wood	52	55
Sand fine-medium gray	55	58
Peat w/wood & sand fine-medium gray	58	61
Sand fine-medium gray	61	73
Sandy clay gray	73	75
Silty clay green gray	75	77
Silty clay gray	77	80
Sandy clay gray	80	95
Continued on page 2	80	95

Date Started 05-05-2008 Completed 12-05-2008

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number 1759 Date 12-19-2008

Electronically Filed

Signed CHRISTOPHER L KERSEY (E-filed)

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

License Number 1493 Date 12-19-2008

Electronically Filed

Signed JAMES A MACK SR (E-filed)

Contact Info (optional) BANDON WELL & PUMP COMPANY (541) 347-7867

ORIGINAL - WATER RESOURCES DEPARTMENT

THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK

Form Version: 0.89

WATER SUPPLY WELL REPORT - continuation page

COOS 54362

12-19-2008

WELL I.D. # L 91210

START CARD # 1003392

(5) BORE HOLE CONSTRUCTION

BORE HOLE Dia	From	To	SEAL Material	From	To	Amt	sacks/ lbs

FILTER PACK

From	To	Material	Size

(6) CASING/LINER

Casing Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd

(7) PERFORATIONS/SCREENS

Perf/Screen	Casing/Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/pipe size

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

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
398.7	35.4	231	1
400.2	48	231	72

Water Quality Concerns

From	To	Description	Amount	Units

(10) STATIC WATER LEVEL

Water Bearing Zones

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
10-24-2008	189	200	200			56.8
11-04-2008	207	214.5	150			56.8
11-05-2008	225	228	50			56.8
11-05-2008	242	243	20			56.8
11-05-2008	248	250	50			56.8
11-07-2008	255	267	250			56.8

(11) WELL LOG

Material		From	To
Gravel fine-medium w/sand coarse-fine gray		95	100
Gravel coarse-fine w/sand coarse-fine green gray		100	105
Gravel m-f-c w/sand coarse-fine green gray		105	120
Sandy clay green gray		120	147
Gravel coarse-fine w/sand coarse-fine green gray		147	151
Sandy clay green gray		151	166
Gravel medium-fine w/sand coarse-fine green gray		166	168
Silty clay green gray		168	175
Silty clay gray		175	182
Gravel coarse-fine green gray		182	184
Sandy clay gray		184	188
Gravel coarse-fine w/sand coarse-fine green black	*	188	199
Gravel coarse-fine w clay gray		199	207
Gravel coarse-fine w/sand coarse -fine green black	*	207	214.5
Silty clay gray		214.5	220
Sandy clay gray w/wood		220	222
Sandy clay gray		222	225
Shell w/gravel coarse-fine		225	228
Sandy clay gray		228	238
Sandy clay gray w/gravel fine & wood		238	242
Gravel medium-fine gray black w/sand & shell		242	243
Sandy clay gray		243	248
Gravel medium-fine gray black w/shell		248	250
Sandy clay gray		250	253
Silty clay green		253	255
Gravel coarse-fine w/sand c-f gray green black	*	255	262
Gravel coarse-fine w/clay gray	*	262	264
Gravel coarse-fine w/clay gray & wood	*	264	265
Continued in comment section		265	274

Comments/Remarks

Gravel coarse-fine w/sandy clay gray brown * 265 -- 268
Silty clay gray 268 _ 269
Sandstone gray 269 _ 274

Cement seal between 17.5" & 10" casing is set at 70'. 1 1/4 gravel tube set @ 180' to surface between 17.5" & 10" casing
8.33 gal/ft of dd

Transmissivity from Specific Capacity using the Theis Equation

Adapted from Vorhis (1979)

Theis Equation: T = [Q/(4*s*pi)][W(u)]
u = (r*r*S)/(4*T*t)
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...

T = transmissivity (L*L/T)
s = drawdown (L)
S = storage coefficient (dimensionless)
pi = 3.141592654
r = radial distance (L)
t = time (T)
u = dimensionless
W(u) = well function

Note: Transmissivity is derived using an iterative process
The calculations use a known or assumed Storage Coeficient (S) provided by the user
Specific Capacity (Q/s) is used to first approximate the Transmissivity (T) used to calculate u in the first Theis equation iteration
The Transmissivity of the previous iteration is used to calculate u in a given Theis equation iteration
Total Theis Equation iterations = 25 iterations
Can accept answer if difference in calculated Transmissivity for the last 2 iterations is < 0.0001
Can accept answer if u in the last iteration is < 7.1

Note: Well efficiency is not included in the calculations

References:

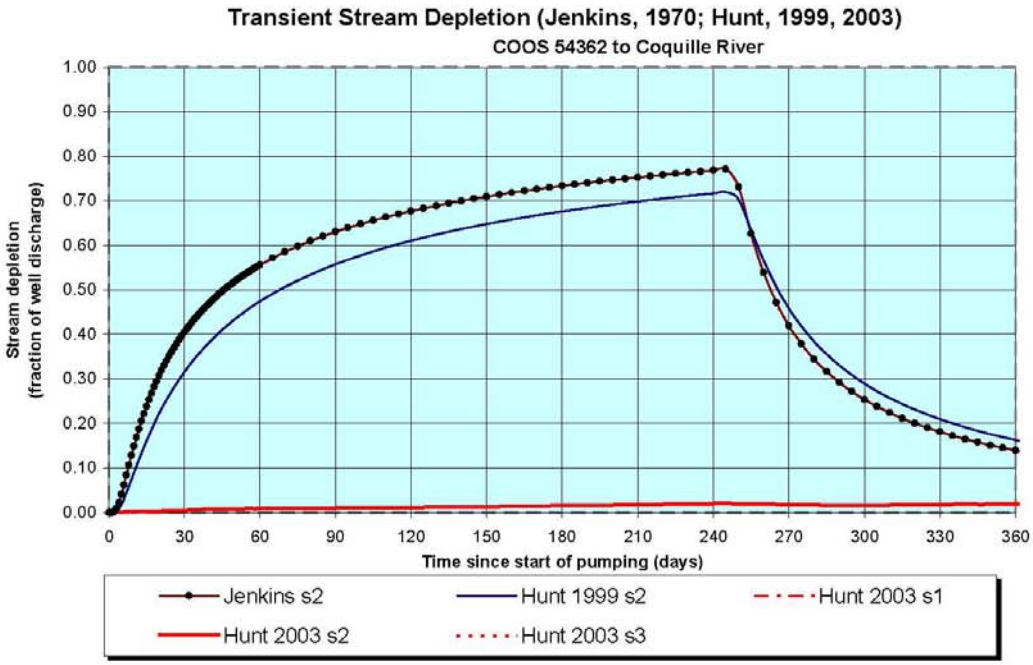
Theis, C.V. 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using ground water storage. American Geophysical Union Transactions, 16 annual meeting, vol. 16, pg. 519-524.

Vorhis, R.C. 1979. Transmissivity from pumped well data. Well Log, National Water Well Association newsletter, vol. 10, no. 11, Dec. 1979, pg. 50-52.

Data Entry	Enter Data Below (yellow boxes only)	
Well Log ID or Comment for Records	COOS 54362	
Pumping Rate (gpm) = Q =	99.90	(gpm)
Drawdown (feet) = s =	7.60	(feet)
Time (hours) = t =	1.0000	(hours)
Storage Coefficient = S =	0.002000	(dimensionless)
Well Diameter (inches) = d =	10.0000	(inches)
	Press F9 to Calculate	

Calculated Results	Calculated Results	
Transmissivity (ft2/day) = T =	2,719.30	(ft2/day)
Transmissivity (gpd/ft) = T =	20,341.81	(gpd/ft)
Transmissivity Difference = (last 2 iterations)	0.0000E+00 okay to use T if diff < 0.0001	(ft2/day)
u = (last iteration)	7.6613E-07 okay to use T if u <7.1	

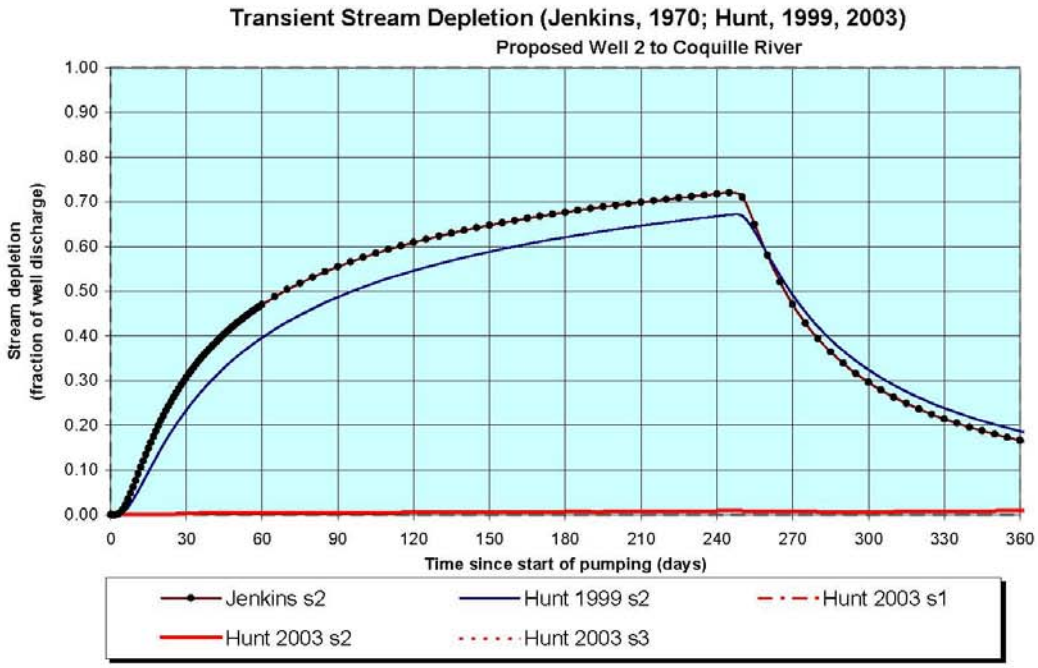
Drawdown s (feet)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r = d/2 (feet)	u	W(u)	Transmissivity T (ft2/day)	Transmissivity difference from previous	Comments	Theis Equation Iteration
Note:	yellow grid areas are where values are calculated					Note : W(u) calculation valid when u < 7.1					
						7.0000	1.1545E-04			W(u) calculation test	
7.60	0.00200	99.90	0.22	0.04	0.42			2,530.36		T = Q/s	
7.60	0.00200	99.90	0.22	0.04	0.42	8.2333E-07	13.4327	2,704.80	1.7444E+02	T = Theis Equation	1.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.7023E-07	13.4994	2,718.23	1.3424E+01	T = Theis Equation	2.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6643E-07	13.5043	2,719.22	9.9588E-01	T = Theis Equation	3.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6615E-07	13.5047	2,719.30	7.3833E-02	T = Theis Equation	4.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	5.4673E-03	T = Theis Equation	5.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	4.0484E-04	T = Theis Equation	6.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	2.9978E-05	T = Theis Equation	7.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	2.2198E-06	T = Theis Equation	8.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	1.6437E-07	T = Theis Equation	9.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	1.2172E-08	T = Theis Equation	10.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	9.0176E-10	T = Theis Equation	11.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	6.6393E-11	T = Theis Equation	12.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	5.0022E-12	T = Theis Equation	13.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	0.0000E+00	T = Theis Equation	14.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	0.0000E+00	T = Theis Equation	15.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	0.0000E+00	T = Theis Equation	16.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	0.0000E+00	T = Theis Equation	17.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	0.0000E+00	T = Theis Equation	18.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	0.0000E+00	T = Theis Equation	19.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	0.0000E+00	T = Theis Equation	20.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	0.0000E+00	T = Theis Equation	21.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	0.0000E+00	T = Theis Equation	22.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	0.0000E+00	T = Theis Equation	23.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	0.0000E+00	T = Theis Equation	24.00
7.60	0.00200	99.90	0.22	0.04	0.42	7.6613E-07	13.5047	2,719.30	0.0000E+00	T = Theis Equation	25.00



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	40.5%	55.6%	63.0%	67.7%	70.9%	73.4%	75.3%	76.8%	42.0%	25.4%	18.1%	14.0%
H SD 1999	31.6%	47.4%	55.8%	61.0%	64.8%	67.6%	69.9%	71.7%	45.9%	29.0%	21.0%	16.3%
H SD 2003	0.5%	0.9%	1.0%	1.2%	1.4%	1.6%	1.8%	2.0%	1.9%	1.7%	1.8%	2.0%
Qw, cfs	1.170	1.170	1.170	1.170	1.170	1.170	1.170	1.170	1.170	1.170	1.170	1.170
H SD 99, cfs	0.370	0.555	0.652	0.714	0.758	0.791	0.817	0.839	0.537	0.339	0.246	0.191
H SD 03, cfs	0.006	0.011	0.012	0.014	0.016	0.019	0.021	0.024	0.022	0.020	0.021	0.023

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	1.17	1.17	1.17	cfs
Time pump on (pumping duration)	tpon	245	245	245	days
Perpendicular from well to stream	a	7500	7500	7500	ft
Well depth	d	274	274	274	ft
Aquifer hydraulic conductivity	K	13.5	13.5	13.5	ft/day
Aquifer saturated thickness	b	200	200	200	ft
Aquifer transmissivity	T	2700	2700	2700	ft*ft/day
Aquifer storativity or specific yield	S	0.002	0.002	0.002	
Aquitard vertical hydraulic conductivity	Kva	0.135	0.135	0.135	ft/day
Aquitard saturated thickness	ba	100	100	100	ft
Aquitard thickness below stream	babs	25	25	25	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	600	600	600	ft
Streambed conductance (lambda)	sbc	3.240000	3.240000	3.240000	ft/day
Stream depletion factor	sdf	41.666667	41.666667	41.666667	days
Streambed factor	sbf	9.000000	9.000000	9.000000	
input #1 for Hunt's Q_4 function	t'	0.024000	0.024000	0.024000	
input #2 for Hunt's Q_4 function	K'	28.125000	28.125000	28.125000	
input #3 for Hunt's Q_4 function	epsilon'	0.010000	0.010000	0.010000	
input #4 for Hunt's Q_4 function	lamda'	9.000000	9.000000	9.000000	

G_17140_Bandon_Dunes_Hunt_2003_1.01_depletion.xls



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	30.7%	47.0%	55.5%	60.9%	64.8%	67.6%	69.9%	71.8%	47.0%	29.6%	21.4%	16.6%
H SD 1999	23.4%	39.6%	48.7%	54.6%	58.9%	62.1%	64.7%	66.8%	49.1%	32.4%	23.9%	18.7%
H SD 2003	0.3%	0.5%	0.5%	0.5%	0.6%	0.7%	0.8%	0.9%	0.8%	0.7%	0.8%	0.9%
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	0.223	0.377	0.463	0.519	0.559	0.590	0.614	0.634	0.467	0.308	0.227	0.178
H SD 03, cfs	0.002	0.004	0.005	0.005	0.006	0.006	0.007	0.008	0.008	0.006	0.008	0.009

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	9200	9200	9200	ft
Well depth	d	274	274	274	ft
Aquifer hydraulic conductivity	K	13.5	13.5	13.5	ft/day
Aquifer saturated thickness	b	200	200	200	ft
Aquifer transmissivity	T	2700	2700	2700	ft*ft/day
Aquifer storativity or specific yield	S	0.002	0.002	0.002	
Aquitard vertical hydraulic conductivity	Kva	0.135	0.135	0.135	ft/day
Aquitard saturated thickness	ba	100	100	100	ft
Aquitard thickness below stream	babs	25	25	25	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	600	600	600	ft
Streambed conductance (lambda)	sbc	3.240000	3.240000	3.240000	ft/day
Stream depletion factor	sdf	62.696296	62.696296	62.696296	days
Streambed factor	sbf	11.040000	11.040000	11.040000	
input #1 for Hunt's Q_4 function	t'	0.015950	0.015950	0.015950	
input #2 for Hunt's Q_4 function	K'	42.320000	42.320000	42.320000	
input #3 for Hunt's Q_4 function	epsilon'	0.010000	0.010000	0.010000	
input #4 for Hunt's Q_4 function	lamda'	11.040000	11.040000	11.040000	

G_17140_Bandon_Dunes_Hunt_2003_1.01_depletion.xls