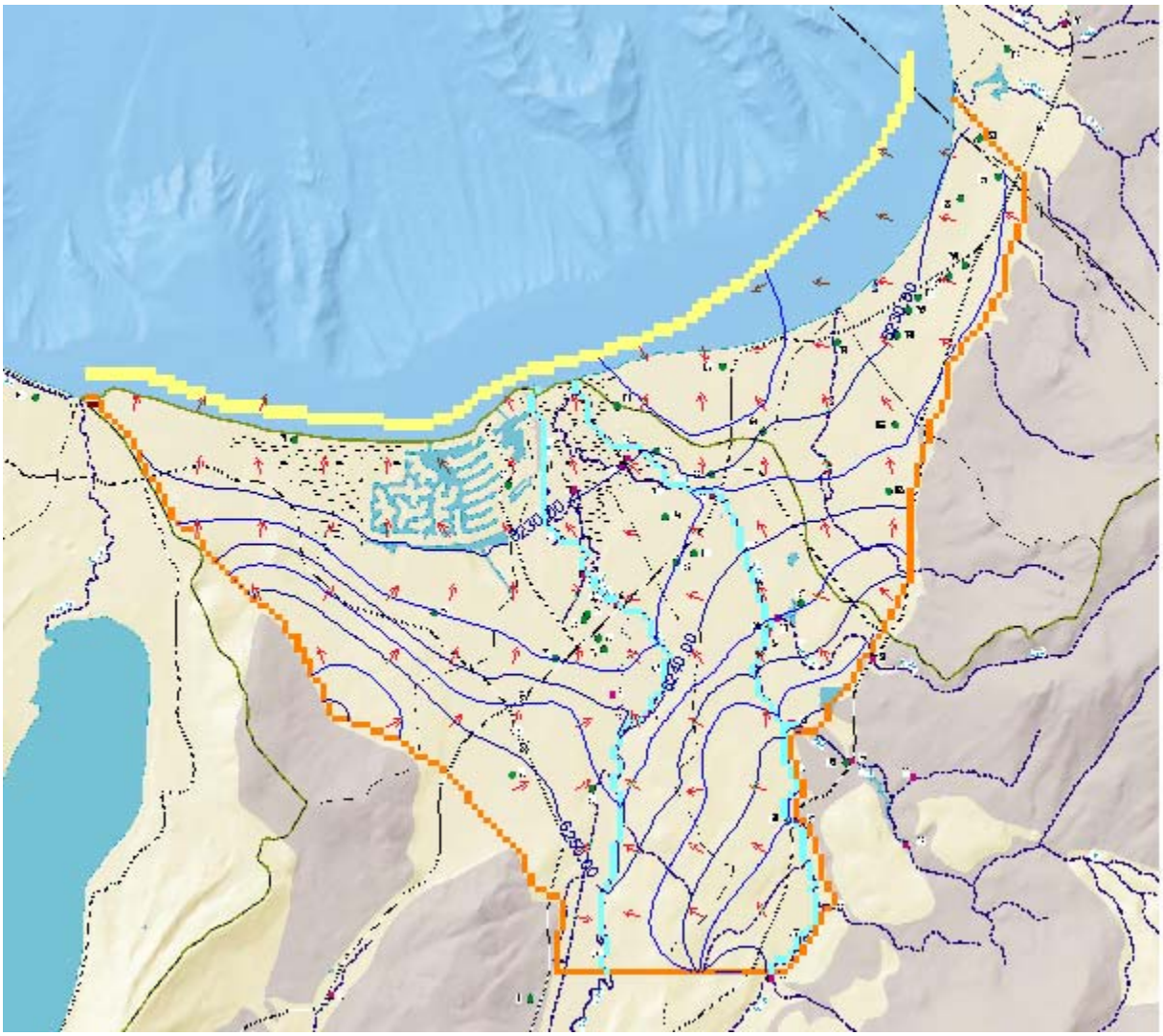
Groundwater elevations have been recorded periodically as well. These elevations were used in the numerical model for calibration in addition to stream gage elevation data. See Appendix B for a comprehensive report of the groundwater modeling effort.

4.3 Nutrient Concentrations

Groundwater wells are spread throughout the area from Christmas Valley to the Lake shore. The groundwater that is likely to discharge directly to the lake is within 1,500 meters (4,900 ft) of the shoreline. Additionally, groundwater located within 2,000 meters (6,600 ft) directly south of the Tahoe Keys is likely to discharge into the Keys and subsequently into Lake Tahoe. Figure 4-8 shows the flow lines and groundwater contours in the model area. To the south and east of Tahoe Keys, the groundwater tends to travel towards the Upper Truckee River and Trout Creek (Fenske 2003). Because of the extensive monitoring system, this discussion will focus on the wells within the area where groundwater likely discharges directly to the Lake.

Figure 4-8. South Lake Tahoe Model Area Groundwater Contours and Flow Lines



Notes:
1. Figure obtained from Fenske (2003)

LRWQCB requires groundwater monitoring at Bijou golf course to establish baseline conditions in early spring, monitor the effects of chemicals applied during the summer season and determine the residual effects once the active season has ceased. LRWQCB also requires the golf course to build a database adequate to provide effective feedback for golf course chemical and irrigation management with respect to environmental protection (LRWQCB 2000b). To build the database, LRWQCB has required that groundwater be monitored on a monthly basis. The golf course is required to sample groundwater for dissolved chemical constituents passing through a 0.45 micron filter. The nutrient constituents requiring analysis are dissolved Kjeldahl Nitrogen, dissolved nitrite plus nitrate, dissolved orthophosphorus and total dissolved phosphorus. TRPA also requires Edgewood Golf Course to collect groundwater samples. Edgewood golf course is required to sample groundwater quality to assure that the fertilizer management plan will meet the water quality thresholds. The sample testing focuses on nutrients representative of types of fertilizers used on the property. Three groundwater sites are monitored on a monthly basis, and the samples are tested for nitrate plus nitrite, ammonia, and total phosphorus.

USGS has been collecting samples periodically for many years. These wells are sampled as part of a Tahoe basin-wide monitoring program. The USGS typically tests for dissolved ammonia, dissolved Kjeldahl nitrogen, dissolved nitrate plus nitrite, dissolved orthophosphorus, and total dissolved phosphorus. The specific analytical profiles per well may vary.

The California DHS, NSHD, STPUD and El Dorado County EM require sampling for nitrate and nitrite in drinking water wells. These samples have been added to the larger data set to combine as much nutrient chemistry collected in the basin as possible.

The average concentrations and top of open interval for wells located near the lake are included in Table 4-3 through Table 4-8. The top of open interval represents the depth below ground surface that groundwater can freely enter the well (e.g. top of screen or bottom of casing in fractured rock). The well locations and land use in each are shown in Figure 4-9 through Figure 4-14.

4.3.1 Emerald Bay to Taylor Creek Nutrient Concentrations

The wells and land use in the area are depicted in Figure 4-9. Well 041 is the only well that has been monitored for all applicable forms of dissolved nitrogen and phosphorus. Well 041 has been sampled since 1995. Wells 027, 058, 059 and 066 have only been sampled to monitor drinking water standard compliance which includes only total nitrate and nitrite testing. No dissolved nitrate samples has been conducted at these wells.

The dissolved ammonia + organic nitrogen concentrations for well 041 range from 0.001 mg/L to 0.09 mg/L, averaging 0.045 mg/L. The dissolved nitrate concentrations, which include nitrite, range from 0.034 mg/L to 0.064 mg/L with an average of 0.051 mg/L. This results in an average total dissolved nitrogen concentration of 0.096 mg/L. The average total nitrate concentrations found in wells 027, 058, 059 and 066 range from 0.012 mg/L to 0.46 mg/L.

Lower concentrations of nitrogen are found in well 041. This may be indicative of denitrification, which occurs as the groundwater travels towards the lake, or the difference in dissolved versus total nitrogen concentrations. Table 4-3 includes the dissolved nitrogen concentrations for well 041.

Orthophosphorus concentrations for well 041 range from 0.022 mg/L to 0.085 mg/L, averaging 0.071 mg/L. The range of total dissolved phosphorus is 0.06 mg/L to 0.10 mg/L, averaging 0.085 mg/L. No phosphorus concentrations have been measured in the other wells in the area. Table 4-3 includes the dissolved phosphorus concentrations for well 041.

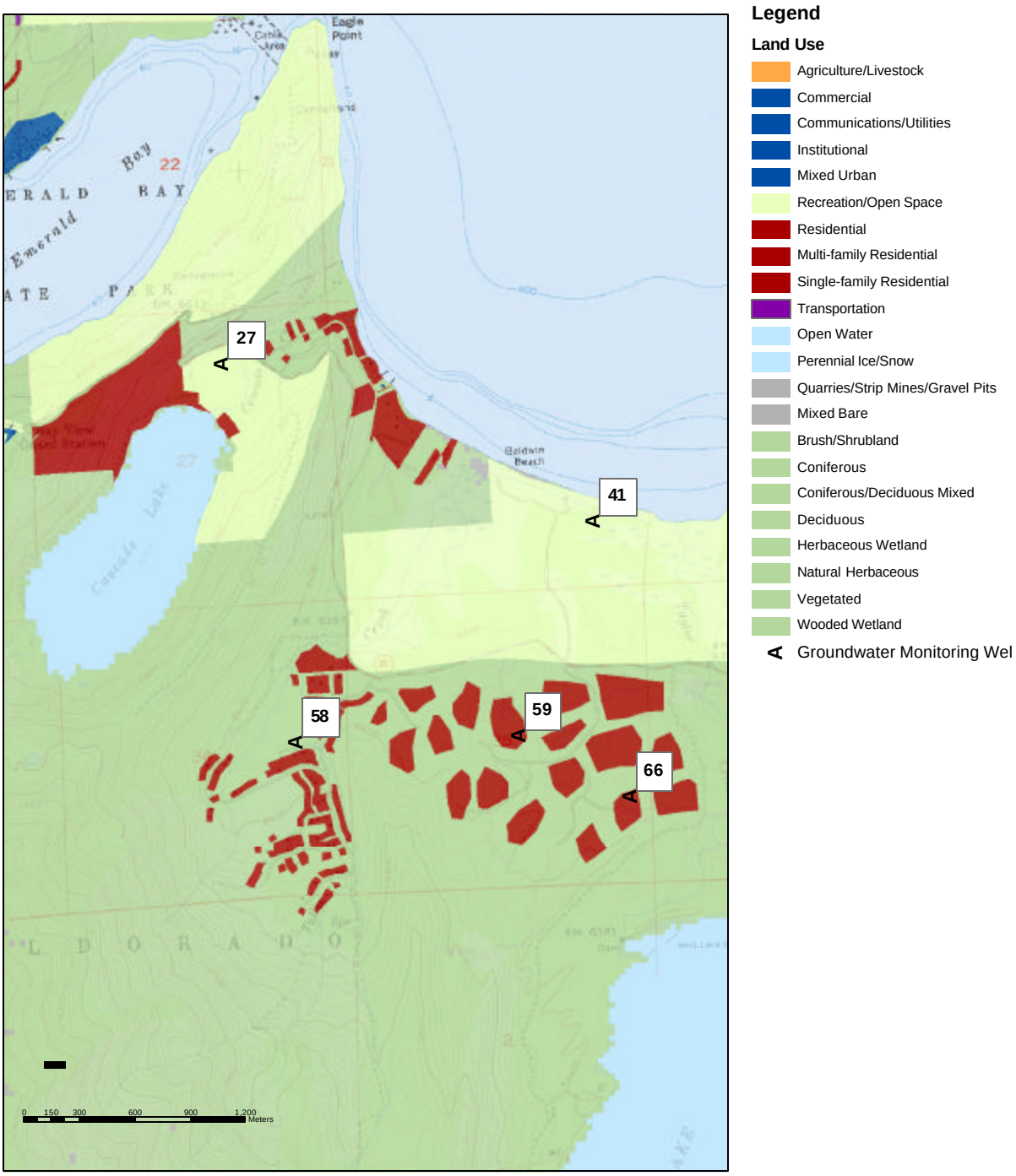
Well 041 is well placed to represent the downgradient conditions for the area. It is likely an accurate reflection of the majority of the groundwater discharging across this area (Figure 4-9).

Table 4-3. Emerald Bay to Taylor Creek Average Nutrient Concentrations (mg/L)

	Well ID
Constituent	041[a]
Land Use	Recreational
Ammonia + Organic	0.045
Nitrate	0.051
Total Nitrogen	0.096
Orthophosphorus	0.071
Total Phosphorus	0.085
Top of Open Interval (ft bgs)	70

Notes:
1. All concentrations reported are dissolved.
2. Data obtained from USGS.
3. Top of Open Interval with a -- indicates the open interval is unknown. A < indicates less than the total depth of the well.
4. na – not analyzed
5. Total Nitrogen is calculated for those wells with both ammonia + organic and nitrate concentrations
6. Nitrate concentrations include nitrite.
7. All wells are used in the development of average nutrient concentrations.
8. [a] – Well used in developing downgradient nutrient concentrations.
9. For each nutrient concentration, averages are based on 8 samples.

Figure 4-9. Emerald Bay to Taylor Creek Groundwater Wells and Land Use



Notes:

1. Land use coverage provided by Tahoe Research Group
2. Only wells with groundwater elevation and/or analytical data are shown.

4.3.2 Subregion 1 Nutrient Concentrations

The wells and land use in the area are depicted in Figure 4-10. Wells 043, 047, 048 and 051 - 057 have been monitored for all forms of dissolved nitrogen and phosphorus that are of concern as part of this evaluation.

The dissolved ammonia + organic nitrogen concentrations range from 0.01 mg/L to 2.8 mg/L, averaging 0.26 mg/L. The dissolved nitrate concentrations, which include nitrite, range from 0.002 mg/L to 0.11 mg/L with an average of 0.031 mg/L. This results in an average total dissolved nitrogen concentration of 0.29 mg/L. Table 4-4 includes the dissolved nitrogen concentrations for wells in subregion 1.

Orthophosphorus concentrations in subregion 1 range from 0.001 mg/L to 0.051 mg/L, averaging 0.025 mg/L. The range of total dissolved phosphorus is 0.012 mg/L to 0.098 mg/L, averaging 0.035 mg/L. Table 4-4 includes the dissolved phosphorus concentrations for wells in subregion 1.

Wells 043, 047 and 048 are considered the downgradient wells in subregion 1. They are well placed to represent the downgradient conditions for the area. The data shows that the concentrations of nutrients are higher in the downgradient wells versus the upgradient wells. The predominant land use near shore in this area is recreational (Camp Richardson) (Figure 4-10). Large numbers of geese that are typically present in this area could contribute to the increased nutrient concentrations. Because all of the wells in this area are shallow, they likely represent the highest nutrient concentrations in this area.

Table 4-4. South Lake Tahoe Subregion 1 Average Nutrient Concentrations (mg/L)

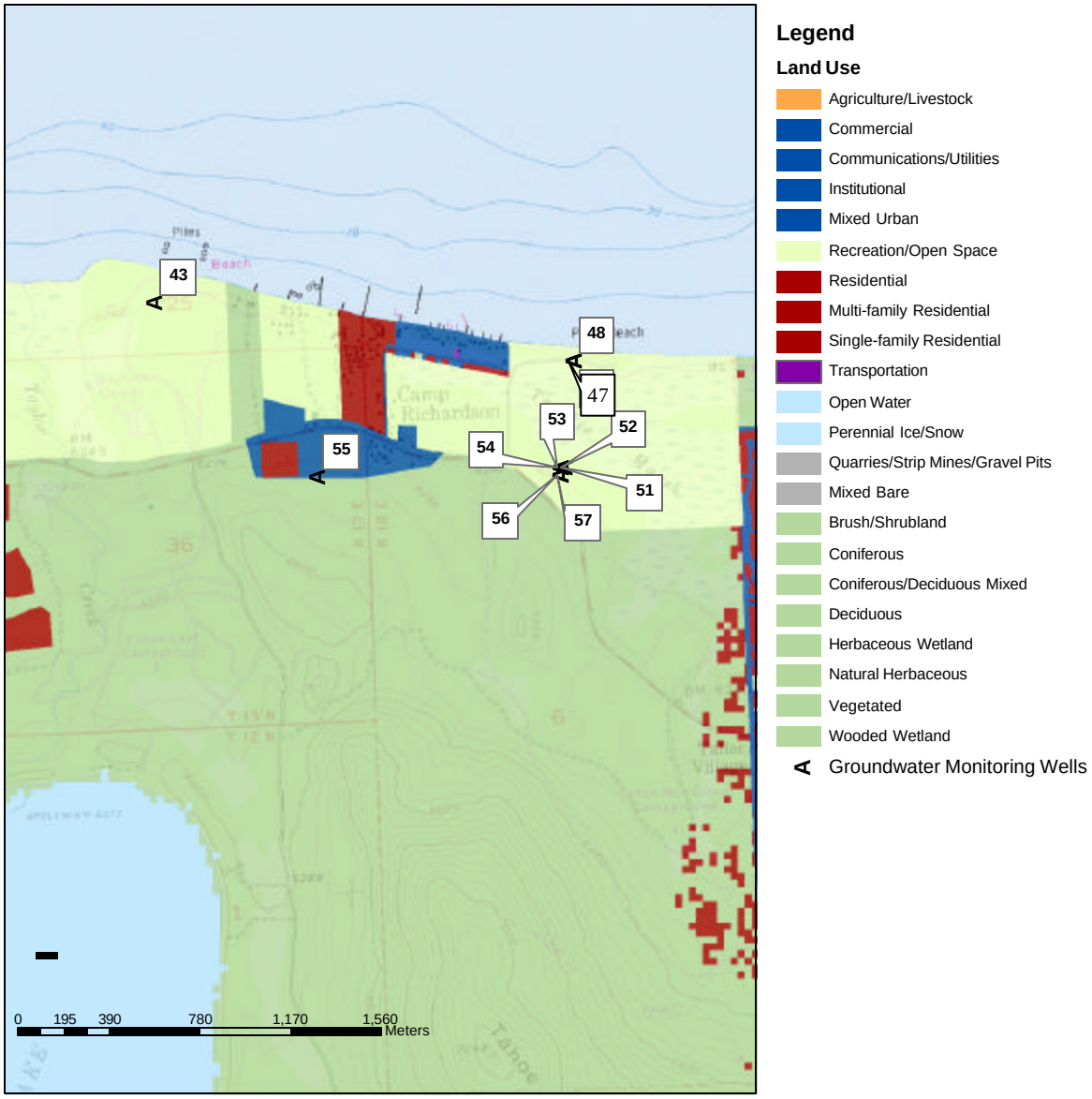
	Well ID				
Constituent	055	056	057	051	052
Land Use	Commercial	Recreational	Recreational	Recreational	Recreational
Ammonia + Organic	na	0.01	0.02	0.07	0.01
Nitrate	0.058	0.023	0.005	0.028	0.02
Total Nitrogen	--	0.033	0.025	0.098	0.03
Orthophosphorus	0.1	0.015	0.003	0.017	0.005
Total Phosphorus	na	0.034	0.018	0.043	0.019
Top of Open Interval (ft bgs)	--	10.25	3.7	8.28	5.15

	Well ID				
Constituent	053	054	047[a]	048[a]	043[a]
Land Use	Recreational	Recreational	Recreational	Recreational	Recreational
Ammonia + Organic	0.05	0.04	1.4	0.64	0.08
Nitrate	0.007	0.002	0.068	0.038	0.064
Total Nitrogen	0.057	0.042	1.5	0.68	0.14
Orthophosphorus	0.011	0.003	0.034	0.031	0.033
Total Phosphorus	0.025	0.012	0.05	0.046	0.069
Top of Open Interval (ft bgs)	17	3.4	15.45	5	--

Notes:

1. All concentrations reported are dissolved.
2. Data obtained from USGS and STPUD.
3. Top of Open Interval with a – indicates the open interval is unknown. A < indicates less than the total depth of the well.
4. na – not analyzed
5. Total Nitrogen is calculated for those wells with both ammonia + organic and nitrate concentrations.
6. Nitrate concentrations include nitrite.
7. All wells are used in the development of average nutrient concentrations.
8. [a] – Well used in developing downgradient nutrient concentrations.
9. For each nutrient concentration, averages are based on 1 sample for wells 048, and 051-057; 4 samples for well 043; and 11 samples for well 047.

Figure 4-10. South Lake Tahoe Subregion 1 Groundwater Wells and Land Use



Notes:
1. Land use coverage provided by Tahoe Research Group
2. Only wells with groundwater elevation and/or analytical data are shown.

4.3.3 Subregion 2 Nutrient Concentrations

The wells and land use in the area are depicted in Figure 4-11. Well 050 has been monitored for all forms of the dissolved nutrients of interest to this evaluation. The remaining wells shown in Table 4-5 have only been sampled for dissolved nitrate and total dissolved phosphorus. Wells 076, 081 and 083 have only been sampled to monitor drinking water standard compliance which includes only total nitrate and nitrite.

The dissolved ammonia + organic nitrogen concentrations for well 050 range from 0.001 mg/L to 0.2 mg/L, averaging 0.043 mg/L. The dissolved nitrate concentrations for all wells shown in Table 4-5, which include nitrite, range from 0.01 mg/L to 2.4 mg/L with an average of 0.68 mg/L. Well 050 has an average total dissolved nitrogen concentration of 0.42 mg/L. The average total nitrate concentrations found in wells 076, 081 and 083 range from 0.42 mg/L to 1.0 mg/L. Table 4-5 includes the dissolved nitrogen concentrations for wells 050, and 084 - 087.

Orthophosphorus concentrations for well 050 range from 0.015 mg/L to 0.02 mg/L, averaging 0.018 mg/L. The range of total dissolved phosphorus for all wells shown in Table 4-5 is 0.01 mg/L to 0.78 mg/L, averaging 0.039 mg/L. No phosphorus concentrations have been measured in the other wells in the area. Table 4-5 includes the dissolved phosphorus concentrations for wells 050, and 084 - 087.

The distribution of wells is not suited to characterize the area (Figure 4-11). The downgradient well, 050, would not detect nutrients migrating from the residential neighborhoods to the southwest. There is a noticeable difference in nitrogen concentrations between the deep wells and those in the upper aquifer. The phosphorus concentrations do not vary much downgradient or from upper to lower aquifer. The distribution of nitrogen concentrations in this area (wells 084 – 087) had no defined trend. Because of this is was assumed that the nutrient concentrations are related to nearby sources. An assessment of cumulative sources is not possible as there are no wells suited to make this assessment.

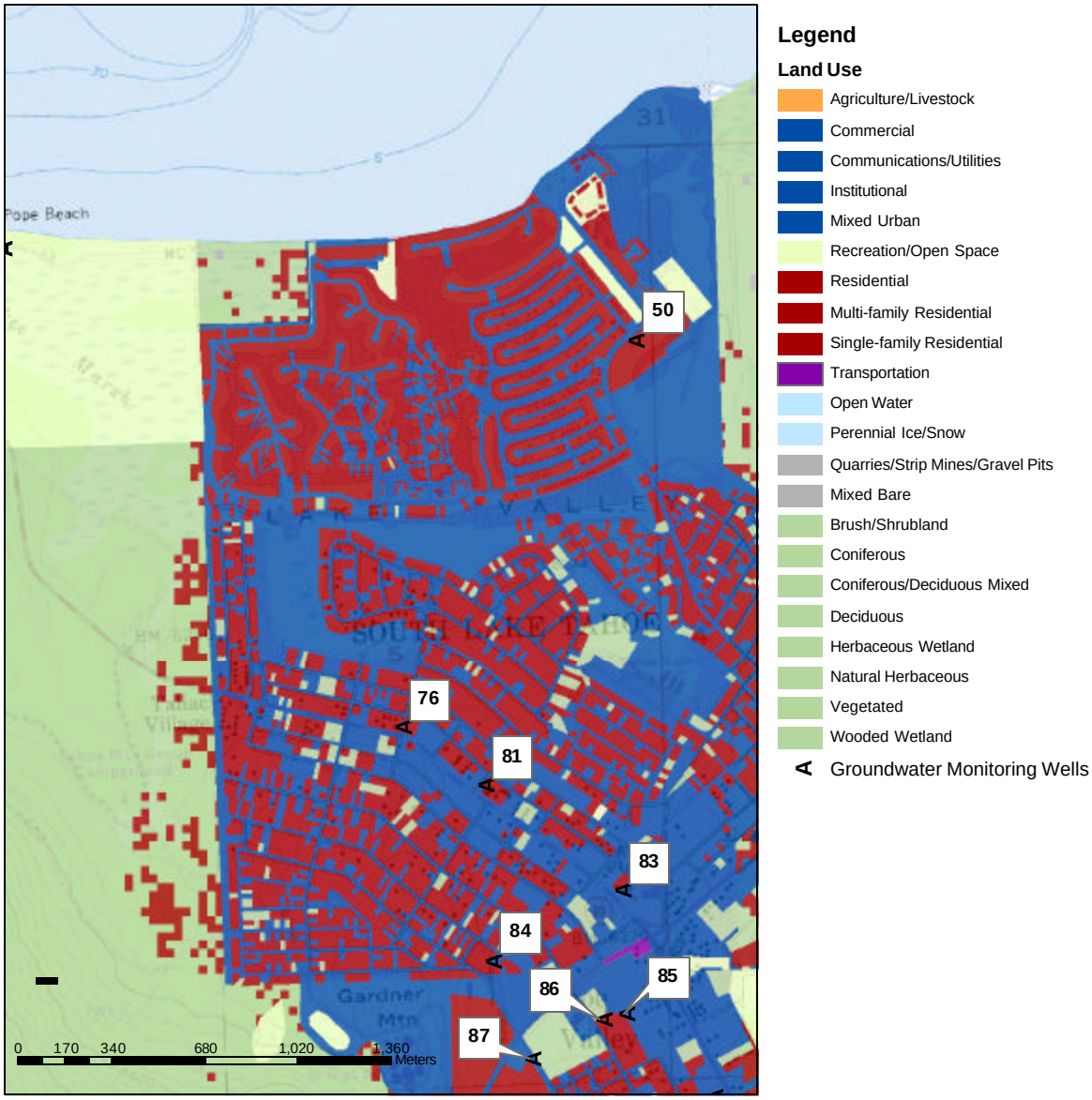
Table 4-5. South Lake Tahoe Subregion 2 Average Nutrient Concentration (mg/L)

	Well ID				
Constituent	084	087	085	086	050[a]
Land Use	Commercial	Commercial	Commercial	Residential	Residential
Ammonia + Organic	na	na	na	na	0.043
Nitrate	0.720	1.000	0.029	1.300	0.370
Total Nitrogen	--	--	--	--	0.410
Orthophosphorus	na	na	na	na	0.018
Total Phosphorus	0.027	0.077	0.024	0.037	0.029
Top of Open Interval (ft bgs)	40	65	190	87	<341

Notes:

1. All concentrations reported are dissolved.
2. Data obtained from USGS, and STPUD.
3. Top of Open Interval with a – indicates the open interval is unknown. A < indicates less than the total depth of the well.
4. na – not analyzed
5. Total Nitrogen is calculated for those wells with both ammonia + organic and nitrate concentrations.
6. Nitrate concentrations include nitrite.
7. All wells are used in the development of average nutrient concentrations.
8. [a] – Well used in developing downgradient nutrient concentrations.
9. For each nutrient concentration, averages are based on 12 samples for well 084; 15 samples for well 085; 16 samples for well 086, and 16-17 samples for wells 050 and 087.

Figure 4-11. South Lake Tahoe Subregion 2 Groundwater Wells and Land Use



Notes:
1. Land use coverage provided by Tahoe Research Group
2. Only wells with groundwater elevation and/or analytical data are shown.

4.3.4 Subregion 3 Nutrient Concentrations

The wells and land use in the area are depicted in Figure 4-12. Wells 045 and 049 have been monitored for all forms of the dissolved nutrients of interest to this evaluation. The remaining wells shown in Table 4-6 have only been sampled for dissolved nitrate and total dissolved phosphorus. Wells 034 and 044 have only been sampled to monitor drinking water standard compliance which includes only total nitrate and nitrite.

The dissolved ammonia + organic nitrogen concentrations for wells 045 and 049 range from 0.01 mg/L to 0.2 mg/L, averaging 0.12 mg/L. The dissolved nitrate concentrations for all wells shown in Table 4-6, which include nitrite, range from 0.01 mg/L to 1.3 mg/L with an average of 0.35 mg/L. Wells 045 and 049 have an average total dissolved nitrogen concentration of 0.40 mg/L. The average total nitrate concentrations found in wells 034 and 044 are 1.28 mg/L and 3.6 mg/L, respectively. Table 4-6 includes the dissolved nitrogen concentrations for wells 039, 042, 045 and 049.

Orthophosphorus concentrations for wells 049 and 045 range from 0.01 mg/L to 0.04 mg/L, averaging 0.021 mg/L. The range of total dissolved phosphorus for all wells shown in Table 4-6 is 0.012 mg/L to 0.7 mg/L, averaging 0.033 mg/L. No phosphorus concentrations have been measured in the other wells in the area. Table 4-6 includes the dissolved phosphorus concentrations for wells 039, 042, 045 and 049.

The high total nitrate concentrations found in well 044 could be due to groundwater migrating towards the pumping wells from the vicinity of the golf course and residential neighborhood. Unlike the nutrient concentrations found in subregion 2, the higher nitrogen concentrations are found in the deeper aquifer in this subregion. Phosphorus concentrations do not vary much with depth. This may be due to the fact that well 039 is a primary municipal supply well used by STPUD. As shown by the groundwater flow model, the pumping forms a significant cone of depression (Fenske 2003). These wells may be drawing the groundwater, along with the nutrients, towards the wells.

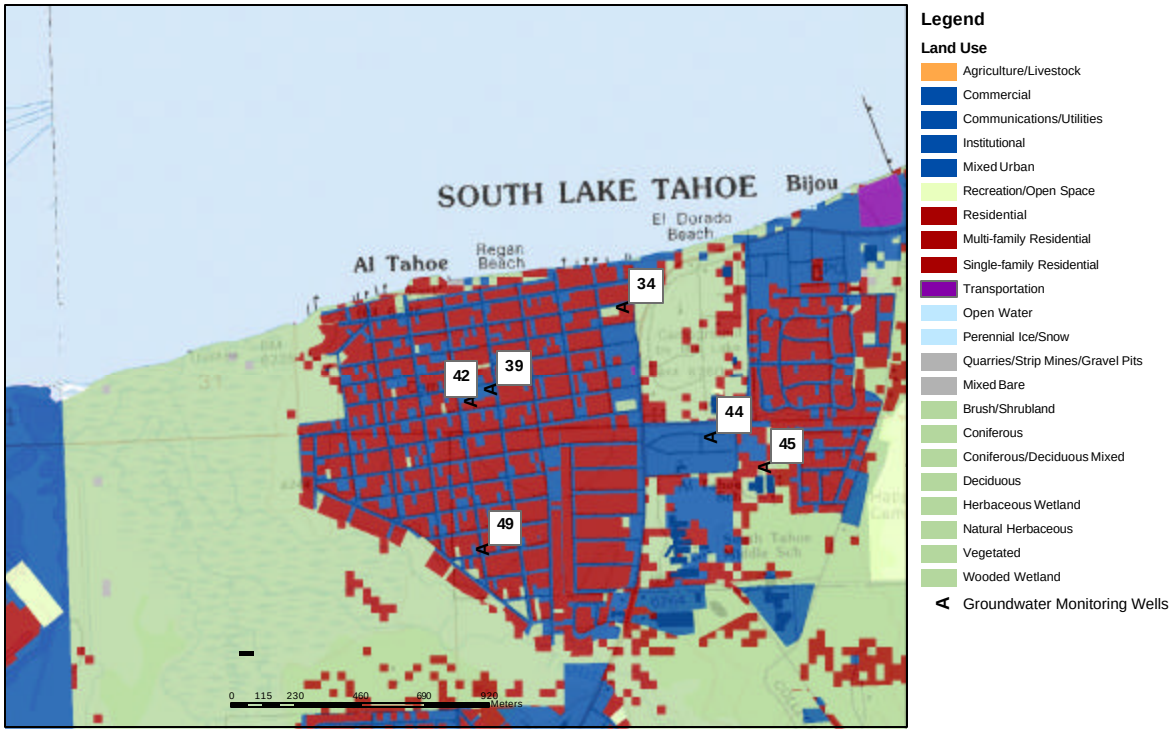
Table 4-6. South Lake Tahoe Subregion 3 Average Nutrient Concentration (mg/L)

	Well ID			
Constituent	049	042	039[a]	045
Land Use	Resdiential	Commercial	Commercial	Residential
Ammonia + Organic	0.2	na	na	0.048
Nitrate	0.16	0.29	0.55	0.39
Total Nitrogen	0.36	--	--	0.44
Orthophosphorus	0.028	na	na	0.014
Total Phosphorus	0.028	0.038	0.039	0.029
Top of Open Interval (ft bgs)	188	170	110	86

Notes:

1. All concentrations reported are dissolved.
2. Data obtained from USGS, STPUD, and El Dorado EM.
3. Top of Open Interval with a – indicates the open interval is unknown. A < indicates less than the total depth of the well.
4. na – not analyzed
5. Total Nitrogen is calculated for those wells with both ammonia + organic and nitrate concentrations
6. Nitrate concentrations include nitrite.
7. All wells are used in the development of average nutrient concentrations.
8. [a] – Well used in developing downgradient nutrient concentrations.
9. For each nutrient concentration, averages are based on 3-7 samples for well 049; 7-8 samples for well 039; 17 samples for well 045, and 17-18 samples for well 042.

Figure 4-12. South Lake Tahoe Subregion 3 Groundwater Wells and Land Use



Notes:
1. Land use coverage provided by Tahoe Research Group
2. Only wells with groundwater elevation and/or analytical data are shown.

4.3.5 Subregion 4 Nutrient Concentrations

The wells and land use in subregion 4 are depicted in Figure 4-13. Wells 024 - 026, 031, 032, 040, and 046 have been monitored for all forms of the dissolved nutrients of interest to this evaluation. The remaining wells shown in Table 4-7 have only been sampled for dissolved nitrate and total dissolved phosphorus. All other wells shown on Figure 4-13 have only been sampled to monitor drinking water standard compliance which includes only total nitrate and nitrite.

The dissolved ammonia + organic nitrogen concentrations for wells 024 - 026, 031, 032, 040, and 046 range from 0.01 mg/L to 4.8 mg/L, averaging 0.54 mg/L. The dissolved nitrate concentrations for all wells shown in Table 4-7, which include nitrite, range from 0.01 mg/L to 10 mg/L with an average of 0.75 mg/L. The average total dissolved nitrogen for wells 024 - 026, 031, 032, 040, and 046 ranges from 0.29 mg/L to 5.3 mg/L, averaging 1.5 mg/L. The total nitrate concentrations range from are 0.009 mg/L and 3.6 mg/L, averaging 0.35 mg/L. Table 4-7 includes the dissolved nitrogen concentrations for wells 024 - 026, 031, 032, 040, and 046.

Orthophosphorus concentrations for wells 024 - 026, 031, 032, 040, and 046 range from 0.006 mg/L to 4.1 mg/L, averaging 0.12 mg/L. The range of total dissolved phosphorus for all wells shown in Table 4-6 is 0.006 mg/L to 0.97 mg/L, averaging 0.052 mg/L. No phosphorus concentrations have been measured in the other wells in the area. Table 4-7 includes the dissolved phosphorus concentrations for wells 024 - 026, 031, 032, 040, and 046. Wells 024 and 025 have elevated total phosphorus concentrations. These wells were installed specifically to monitor because of fertilizer application. The elevated levels of phosphorus may be due to the fertilization activities.

Again, subregion 4 shows high levels of nitrogen in both the shallow and deep aquifers and a slight difference in the phosphorus concentrations (Table 4-7). A majority of the wells located within the subregion are designed to measure groundwater quality from specific sources. These areas do show an increased nutrient concentration related to those sources. The most notable is well 046 which is located within the Bijou golf course.

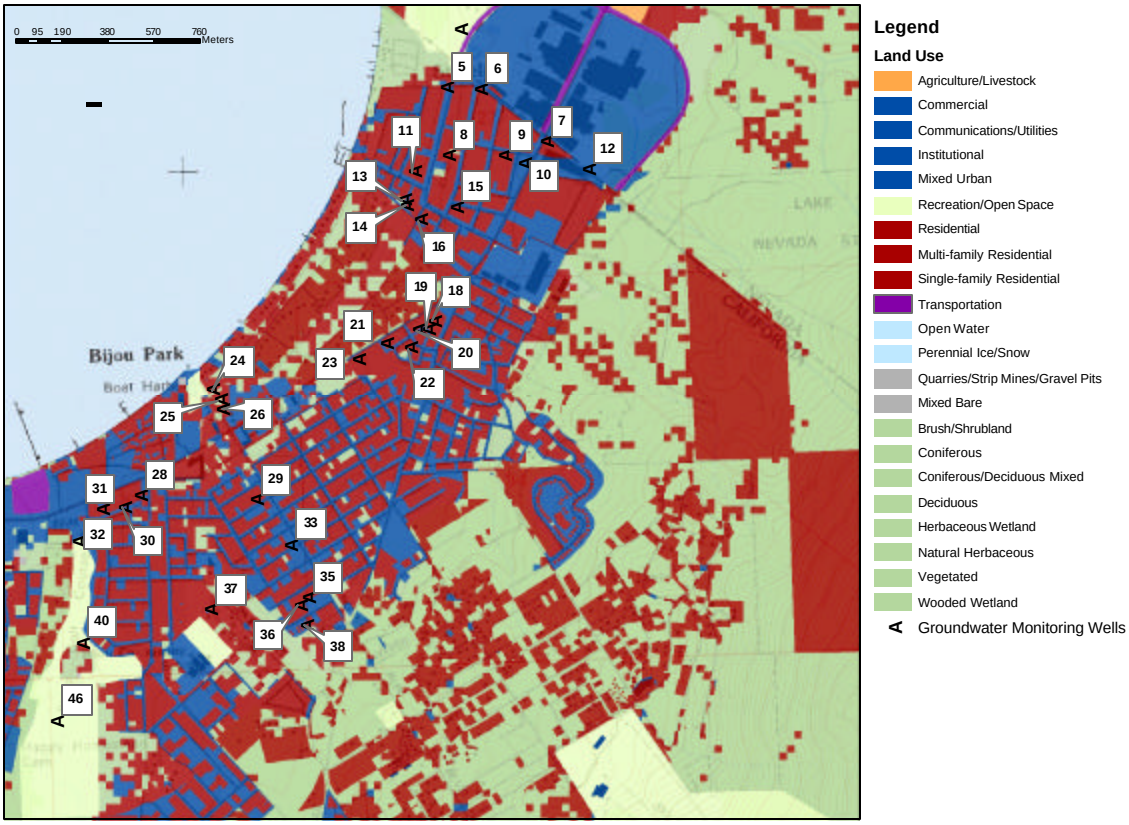
Table 4-7. South Lake Tahoe Subregion 4 Average Nutrient Concentration (mg/L)

	Well ID					
Constituent	031[a]	026	013	014	016	046
Land Use	Residential	Residential	Vegetated	Commercial	Commercial	Recreational
Ammonia + Organic	0.064	0.2	na	na	na	0.27
Nitrate	0.78	0.092	0.48	0.082	0.29	5
Total Nitrogen	0.84	0.29	--	--	--	5.3
Orthophosphorus	0.021	0.006	na	na	na	0.029
Total Phosphorus	0.0354	0.006	0.018	0.013	0.01	0.031
Top of Open Interval (ft bgs)	50	<142	168	136	181	Shallow
	Well ID					
Constituent	032	040	007	012	024[a]	025
Land Use	Commercial	Recreational	Commercial	Commercial	Residential	Residential
Ammonia + Organic	0.26	0.54	na	na	0.65	1.8
Nitrate	0.51	0.38	1.3	0.045	0.014	0.014
Total Nitrogen	0.77	0.92	--	--	0.66	1.8
Orthophosphorus	0.52	0.026	na	na	na	na
Total Phosphorus	0.054	0.021	na	na	0.2	0.13
Top of Open Interval (m bgs)	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow

Notes:

1. All concentrations reported are dissolved.
2. Data obtained from USGS, LRWQCB, STPUD, El Dorado EM.
3. Top of Open Interval with a – indicates the open interval is unknown. A < indicates less than the total depth of the well.
4. na – not analyzed
5. Total Nitrogen is calculated for those wells with both ammonia + organic and nitrate concentrations.
6. Nitrate concentrations include nitrite.
7. All wells are used in the development of average nutrient concentrations.
8. [a] – Well used in developing downgradient nutrient concentrations.
9. For each nutrient concentration, averages are based on 1 sample for wells 026 and 040; 8-9 samples for well 016; 11 samples for wells 013 and 025, 13 samples for well 024, 14 samples for well 031, 13-15 samples for well 046, 18-19 samples for well 014, 13-37 samples for well 032, 92 samples for well 012 and 93 samples for well 007.

Figure 4-13. South Lake Tahoe Subregion 4 Groundwater Wells and Land Use



Notes:
1. Land use coverage provided by Tahoe Research Group
2. Only wells with groundwater elevation and/or analytical data are shown.

4.3.6 Stateline Nutrient Concentrations

The wells and land use in the Stateline area are depicted in Figure 4-14. All wells included in Table 4-8 have been monitored for all forms of the dissolved nutrients of interest to this evaluation.

The dissolved ammonia + organic nitrogen concentrations for Stateline wells range from 0.01 mg/L to 1.1 mg/L, averaging 0.37 mg/L. The dissolved nitrate concentrations for Stateline wells, which include nitrite, range from 0.001 mg/L to 16 mg/L with an average of 0.97 mg/L. The average total dissolved nitrogen for Stateline wells ranges from 0.13 mg/L to 8.9 mg/L, averaging 1.3 mg/L. Table 4-8 includes the dissolved nitrogen concentrations for Stateline wells.

Orthophosphorus concentrations for Stateline wells range from 0.001 mg/L to 0.049 mg/L, averaging 0.015 mg/L. The range of total dissolved phosphorus for Stateline wells is 0.005 mg/L to 0.069 mg/L, averaging 0.023 mg/L. Table 4-8 includes the dissolved phosphorus concentrations for Stateline wells.

The Stateline area wells demonstrate a difference between the deep and shallow groundwater nutrient concentrations. The nitrogen concentrations in the golf course increase downgradient, indicating that the golf course is acting as a source of additional nutrients to the groundwater. The area in the northern portion of the golf course shows significant detections of nitrogen. This is likely due not only to the golf course, but also the upgradient residential land use (Figure 4-14). Due to the placement of the wells, no other upgradient or downgradient trends in phosphorus or nitrogen could be evaluated.

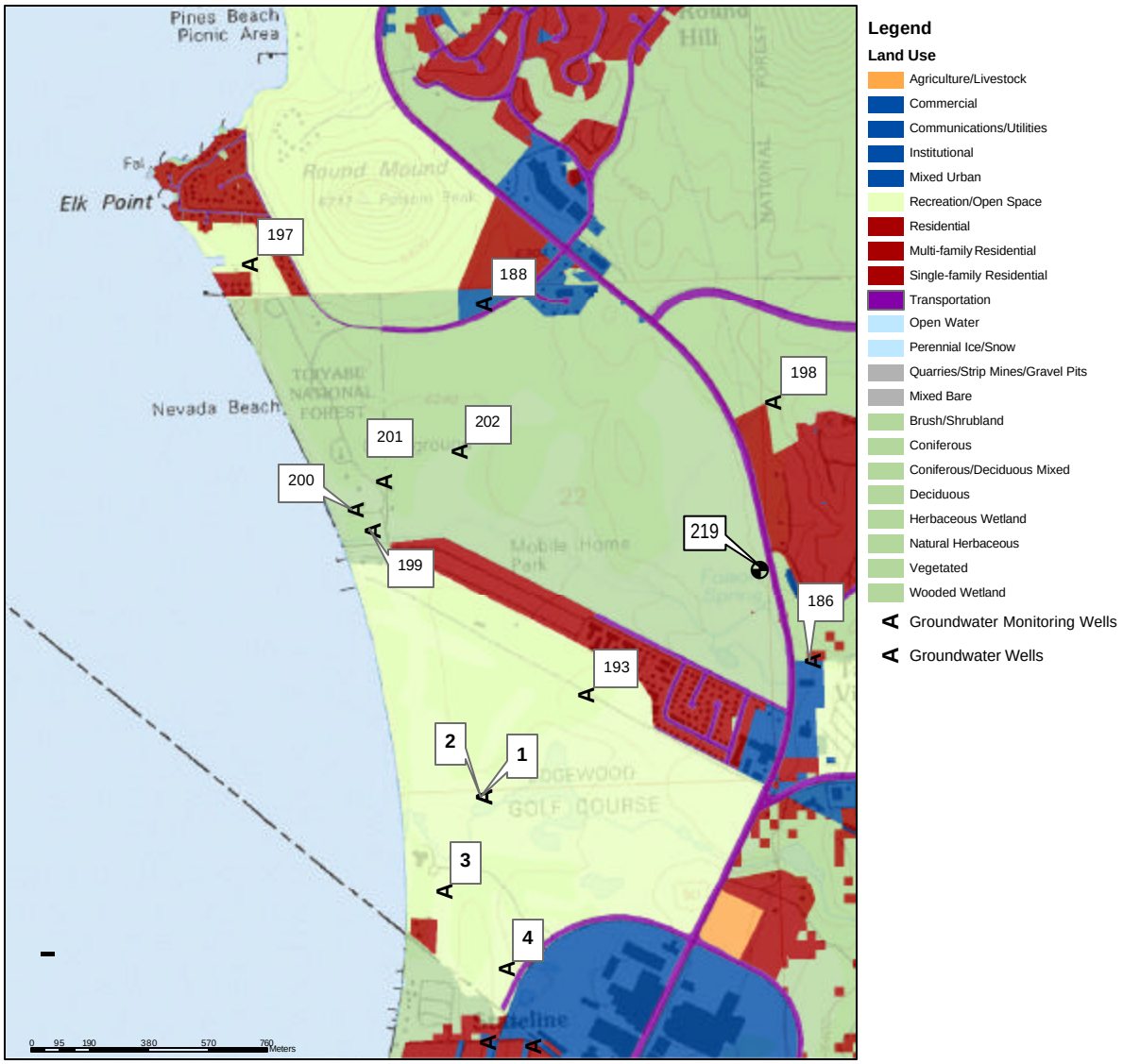
Table 4-8. Stateline Average Nutrient Concentration (mg/L)

	Well ID				
Constituent	004	003[a]	001	002	198
Land Use	Recreational	Recreational	Recreational	Recreational	Vegetated
Ammonia + Organic	0.12	1.1	0.14	0.3	0.45
Nitrate	0.0069	0.01	1.4	2.8	0.055
Total Nitrogen	0.13	1.1	1.5	3.1	0.51
Orthophosphorus	0.014	0.024	0.003	0.005	0.006
Total Phosphorus	0.032	0.033	0.008	0.005	0.014
Top of Open Interval (ft bgs)	<23	<6	<8	<10	<18
	Well ID				
Constituent	193	186	219	199[a]	200[a]
Land Use	Recreational	Residential	Vegetated	Vegetated	Vegetated
Ammonia + Organic	0.21	0.6	0.04	0.6	0.8
Nitrate	8.7	0.01	0.14	0.08	0.01
Total Nitrogen	8.9	0.61	0.18	0.68	0.81
Orthophosphorus	0.009	0.049	0.015	0.012	0.037
Total Phosphorus	0.024	0.054	0.017	0.016	0.065
Top of Open Interval (ft bgs)	<25	<8	0	<11	<9
	Well ID				
Constituent	201	202	188	197[a]	
Land Use	Vegetated	Vegetated	Commercial	Recreational	
Ammonia + Organic	0.4	0.2	0.074	0.069	
Nitrate	0.01	0.01	0.063	0.34	
Total Nitrogen	0.41	0.21	0.14	0.41	
Orthophosphorus	0.008	0.007	0.009	0.008	
Total Phosphorus	0.005	0.01	0.024	0.023	
Top of Open Interval (ft bgs)	<9	<13	<200	<58	

Notes:

1. All concentrations reported are dissolved.
2. Data obtained from USGS.
3. Top of Open Interval with a – indicates the open interval is unknown. A < indicates less than the total depth of the well.
4. na – not analyzed
5. Total Nitrogen is calculated for those wells with both ammonia + organic and nitrate concentrations
6. Nitrate concentrations include nitrite.
7. All wells are used in the development of average nutrient concentrations.
8. [a] – Well used in developing downgradient nutrient concentrations.
9. For each nutrient concentration, averages are based on 1 sample for wells 002, 003, 186, 199-202 and 219; 2 samples for wells 001 and 198; 17 samples for wells 193 and 197, 17-18 samples for well 188, and 18 samples for well 004.

Figure 4-14. Stateline Groundwater Wells and Land Use



Notes:

1. Land use coverage provided by Tahoe Research Group
2. Only wells with groundwater elevation and/or analytical data are shown.