Appendix E:
Impact Analysis for Alternative B-9
Central San Juan and Trampas Sub-basin
Blind and Talega Sub-basins

Table of Contents

List of Tables

List of Figures

(All figures follow the Appendix)

E-1 INTRODUCTION

A Conceptual WQMP was previously prepared in support of the GPA/ZC application that considered Alternative B-4 and Alternative B-9 (GeoSyntec, 2004). The land uses of specific planning areas within these alternatives are similar to the land uses of specific planning areas of the proposed B-10M Alternative. For this reason, the results of the modeling for certain sub-basins in the B-9 Alternative were used to analyze these sub-basins within the B-10M Alternative. This appendix presents the impact analysis and findings of significance for the Central San Juan and Trampas Sub-basin and the Blind and Talega Sub-basins for the B-9 alternative, as presented in the earlier Conceptual WQMP (GeoSyntec, 2004).

E-2 IMPACT ANALYSIS FOR THE CENTRAL SAN JUAN AND TRAMPAS SUB-BASIN

This section evaluates the effectiveness of the WQMP for the Central San Juan and Trampas Sub-basin and evaluates the impacts of the proposed development on pollutants of concern and hydrologic conditions of concern.

A distinct feature in the Trampas Sub-basin is the existing Oglebay Norton sand mining and washing facilities that include an artificial lake that serves as a tailings reservoir, a desilting pond, and a temporary storage pond. This mining operation would be discontinued with the proposed project. The impact analysis considers conditions with and without the mine in the hydrologic modeling.

The impact analysis is based in part on extrapolation of hydrologic and water quality modeling results of a previously studied development alternative, Alternative B-4 (results are presented Appendix D). Figure E-1 shows the proposed land uses in the B-9 Alternative, and the land use areas of the modeled alternative and the B-9 Alternative are compared in Table E-1. Differences and similarities of the modeled alternative and the B-9 Alternative include the following:

- *Estate*. The modeled alternative B-4 included assessment of estate housing located in PA 4. Under the B-9 Alternative there is no estate housing in PA 4.

- *Proposed Development*. The modeled alternative B-4 included 2529 acres of proposed general development. Under the B-9 Alternative, the proposed general development is approximately 3300 acres, or 30 percent more. The increase in development area is located in PA 4 in the eastern portion of the sub-basin. The proposed development area within PA 3 north of San Juan Creek and within PA 5 to the south of San Juan Creek is approximately unchanged from the development area in the modeled alternative.

Table E-1: Central San Juan & Trampas Sub-basin Land Use Areas by Development Alternative

Land Uses	Land Use Area by Development Alternative (acres)	
	Modeled Alternative B-4 (Appendix D)	**B-9**
Estate	216	0
Proposed Development	2529	3272
Open Space	2099	1556
TOTAL	4844	4828

In PA 3 and PA 5, where the proposed development under the B-9 Alternative is similar to the modeled alternative B-4, the impact analysis is based on extrapolation of hydrologic and water quality modeling results of a previously studied development alternative. All discussion of modeling results in PA 3 and PA 5 specifically refers to the previously modeled development alternative B-4 (see Appendix D).

In PA 4, the proposed development under the B-9 Alternative is greater than the modeled alternative. For this area, the impact analysis is based on a quantitative assessment of development impacts on the pollutants of concern and hydrologic conditions of concern, taking into account the PDFs associated with the WQMP.

E-2.1 IMPACTS ON HYDROLOGIC CONDITIONS OF CONCERN

Hydrologic Condition of Concern #1: Increased Stormwater Runoff Volume, Peak Discharge, and Flow Duration

Flow Duration Analysis

Flow duration matching for pre- and post-development conditions was conducted for all development bubbles. The results of these analyses show that flow duration control and infiltration facilities can be designed and sized to manage the post-development runoff flow rate, peak discharge, and flow duration in a manner that matches, to the extent feasible, the pre-development conditions. This design of the combined flow duration and water quality treatment facilities addresses a range of flows including the 2 and 10 year peak flow events required to be analyzed by the Local WQMP.

Figure E-2 shows an example of the flow duration analysis for one of the two catchments that discharge into Trampas, and the estimated 2 and 10 year peak flows. In Trampas Canyon, the flow duration analysis used the pre-mine condition (the undeveloped condition) as the baseline for matching flow duration. The catchments in Trampas Canyon have very infiltrative soils and Figure E-2 shows that predicted flows in the pre-mining condition were quite limited in magnitude and duration. Matching the pre-mine flow duration condition was reasonable for the more frequent flows, but difficult for infrequent higher flows. This example is provided to show one of the more difficult flow duration matching efforts.

Water Balance Analysis

The water balance analysis for Central San Juan Sub-basin was conducted for each of the planning areas as follows:

- North Central San Juan (PA 3),
- East Central San Juan (PA 4),
- South Central San Juan/Trampas Canyon (PA 5)

Planning Area 5 in South Central San Juan was subdivided into two areas in order to isolate the effects of the proposed development on Trampas Creek. This subdivision of PA 5 also allowed the evaluation of the effects of the existing Oglebay Norton sand mining and washing facilities located in upper Trampas Canyon. Because this facility has such a major effect on hydrology in Trampas Canyon, the water balance was conducted with and without the facility.

The water balance results are provided in terms of inches of runoff and acre-ft of runoff. “Inches” as a volume is interpreted as equivalent to inches of water over the tributary drainage area. Due to the effects of grading, in some cases the pre- and post-development areas often change. When there are large changes between the pre- and post-development tributary areas, the comparison using watershed-inches can be misleading and acre-ft should be used.

The following describes the water balance results by planning area.

North Central San Juan (PA 3). The proposed drainage infrastructure for North Central San Juan would result in a direct discharge to San Juan Creek. On average (based on all years), precipitation is about 15 inches per year and current irrigation, associated primarily with the 150 acres of irrigated nurseries, is estimated to increase the net applied water to about 17.1 inches per year. With development, the additional irrigation is estimated to increase the net applied water to about 24 inches per year for an increase of about 38 percent. The effect of development on surface runoff is minimal due to the effectiveness of the combined control facilities. Runoff to San Juan Creek is estimated to increase by about one to two percent, depending on the climatic period. Thus, the level of control provided by the combined control system in this planning area is such that changes in surface water hydrology are minimal.

East Central San Juan (PA 4). The water balance analysis was conducted for the East Central San Juan (PA 4) catchments. The water balance results are presented in Table E-2. On average (based on all years), precipitation is about 16 inches per year with only a small contribution from irrigation. There are approximately 15 acres of nurseries in this area. With development, the additional irrigation is estimated to increase the net applied water to about 28.4 inches per year for an increase of about 1,326 acre-ft/yr or 65 percent (Table E-2). In all years, runoff to San Juan Creek is projected to increase from about 268 acre-ft/yr to about 279 acre-ft/yr for an increase of about four percent. During dry years, runoff to San Juan Creek would increase from 178 acre-ft/yr to 186 acre-ft/yr, for an increase of approximately five percent. Thus, the effect of the combined control system is such that changes in surface water hydrology are quite modest.

South Central San Juan/Trampas Canyon (PA5). Recall that water balance analyses for this area were conducted for former development alternative B-4 that is approximately equivalent to proposed development under the B-9 Alternative (see Appendix D for specific modeling results). The proposed development in Trampas Canyon will eliminate the sand mining operation so the water balance analysis was conducted for the following two scenarios:

- Scenario 1: "With Mine Scenario" – Pre-development with mine, post-development without mine
- Scenario 2: "Without Mine Scenario" – Pre- and post-development without mine

The baseline condition is selected as the "with-mine" alternative consistent with the NCCP Guidelines that require flows to be maintained at levels comparable to existing conditions. For the "with-mine" condition, the water balance results indicate that surface runoff to San Juan Creek will increase modestly from the present condition, by about 14 percent. During wet years, the surface runoff is estimated to increase by about 10 percent, and during dry years there is very little runoff projected for either existing or proposed conditions.

The proposed development in the remaining portion of PA 5 would discharge into an unnamed tributary west of Trampas Creek. The water balance for this area indicates that average annual surface runoff to San Juan Creek is about 100 acre-ft/yr. The higher pre-development runoff from this area (100 acre-ft/yr) compared to Trampas is caused by the presence of clay deposits, in contrast to the sandy conditions that prevail in the Trampas catchments. Under development conditions, the surface runoff to San Juan Creek is estimated to increase modestly, by about nine percent for all climatic regimes.

Table E-2: East Central San Juan (PA 4) Average Annual Water Balance (Alternative B-9) (inches (acre-ft))

Climatic Condition	Pre-Development[1]							Post-Development with PDFs[1]						
	INFLOW			OUTFLOW				INFLOW			OUTFLOW			
	Precipitation	Irrigation	Total	Surface Runoff to Creek	GW Outflow	ET	Total	Precipitation	Irrigation	Total	Surface Runoff to Creek	GW Outflow	ET	Total
All Years	15.8 (2028)	0.2 (28)	16.0 (2056)	2.1 (268)	7.6 (972)	6.7 (859)	16.4 (2099)	16.1 (1913)	12.4 (1469)	28.4 (3382)	2.3 (279)	16.0 (1905)	11.0 (1311)	29.4 (3495)
Dry Years	13.3 (1699)	0.2 (28)	13.5 (1727)	1.4 (178)	5.6 (718)	6.8 (873)	13.8 (1769)	13.5 (1602)	12.3 (1468)	25.8 (3070)	1.6 (186)	14.1 (1676)	11.1 (1317)	26.7 (3179)
Wet Years	21.3 (2725)	0.2 (28)	21.5 (2753)	3.6 (459)	11.8 (1509)	6.5 (829)	21.8 (2798)	21.6 (2570)	12.4 (1473)	34.0 (4042)	4.0 (476)	20.1 (2390)	10.9 (1297)	35.0 (4163)

[1]Pre-development tributary area (South Central San Juan in Planning Area 4) = 1539 acres; post-development tributary area = 1427 acres.

Hydrologic Condition of Concern #2: Decreased Infiltration and Groundwater Recharge

North Central San Juan (PA 3). The water balance results for North Central San Juan indicate that for all years, groundwater infiltration would increase significantly, by about 70 percent. For dry years, the estimated increase in groundwater infiltration and outflow is smaller in volume, but is larger in terms of percentage increase, approximately double from pre-development conditions. Conversely, during wet years, the estimated increase in groundwater infiltration and outflow is larger in volume, but is smaller in terms of percentage increase, approximately 50 percent from pre-development conditions. Thus, development is projected to increase infiltration and groundwater recharge and, similar to surface runoff, the effect is more pronounced during dry years on a percentage basis.

East Central San Juan (PA 4). Infiltration in East Central San Juan is projected to increase from about 972 acre-ft/yr to about 1.905 acre-ft/yr or approximately 96 percent in all years (Table E-2). This increase is associated in part with the 65 percent increase in net applied water. During dry weather conditions, the increase is about 958 acre-ft/yr or about 133 percent. During wet years, the estimated 881 acre-ft/yr, or about 58 percent.

South Central San Juan/Trampas Canyon (PA 5). In Trampas Canyon, the “with mine” water balance analysis indicates that infiltration and groundwater outflow would increase by approximately 180 percent under the existing condition with the mine. Thus the discontinuation of the mining operation is projected to increase groundwater infiltration and outflow to Trampas Creek.

Hydrologic Condition of Concern #3: Changed Base Flows

North Central San Juan (PA 3). The water balance analysis discussed above indicates that post-development groundwater outflow will increase by about 50-100 percent, depending on the climatic regime. The greatest percentage increase in during dry periods. This groundwater outflow would ultimately increase base flows in San Juan Creek, which would be utilized to support riparian vegetation, increase levels of the water table, or infiltrate into the channel bottom. Increased base flows in San Juan Creek will further support NCCP Guidelines recommendations addressing downstream aquatic habitat needs.

East Central San Juan (PA 4). Infiltration in East Central San Juan is projected to increase between 880-970 acre-ft/year, or about 60-130 percent (Table E-2). The greatest percentage increase in during dry periods. Similar to PA 3, groundwater outflow would ultimately increase base flows in San Juan Creek, which would be utilized to support riparian vegetation, increase levels of the water table, or infiltrate into the channel bottom.

South Central San Juan/Trampas Canyon (PA 5). In Trampas Canyon, the “with mine” water balance analysis indicates that groundwater outflow would increase approximately 180 percent.

Thus the discontinuation of the mining operation is projected to increase groundwater infiltration and outflow to Trampas Creek. This groundwater outflow would ultimately increase base flows in Trampas Creek, which would be utilized to support riparian vegetation, increase levels of the water table, or infiltrate into the channel bottom.

E-2.2 IMPACTS ON POLLUTANTS OF CONCERN

This section addresses impacts of stormwater runoff on sediments, nutrients, and trace metals for Alternative B-9. For this sub-basin, the mean annual loads and mean annual concentrations are provided separately for each planning area. In PA 5 analyses are also distinguished between Trampas Canyon and the unnamed tributary west of Trampas. The water quality analysis for PA 5 includes, as part of the pre-development condition, the Trampas Canyon sand mining operation.

Identical to the analysis approach for hydrologic conditions of concern, quantitative water quality modeling analyses was performed for different development alternatives within different portions of the sub-basin. In PA 4, water quality modeling was performed for proposed land use under the B-9 Alternative. In PA 3 and PA 5 water quality modeling was performed for a former development alternative that is comparable to B-9 Alternative in terms of land use areas (Table E-1). Modeling results for these planning areas are presented in Appendix D.

TSS Loads and Concentrations

Estimated TSS loads and concentrations are presented in Table E-3 for PA 4, and are presented in Appendix D for PA 3 and PA 5, based on the modeled alternative. Water quality modeling results indicate that TSS loads and concentrations will decrease with proposed development in each planning area and for the total sub-basin area. Estimated load reductions range between one to 60 percent, with the greatest reduction in PA 3, and the smallest reduction in the area of PA 5 that drains to the unnamed tributary west of Trampas Creek. The estimated reduction in the mean TSS concentration ranges between 10 to 60 percent, again with the greatest reduction in PA 3, and the smallest reduction in PA 5 west of Trampas Creek.

Table E-4 shows that the predicted post-development runoff TSS concentration is approximately 164 mg/L, which is much lower than in-stream data collected by Wildermuth in the San Juan watershed.

Table E-3: Predicted Average Annual TSS Loads and Concentrations for Planning Area 4 within the Central San Juan and Trampas Sub-basin (Alternative B-9)

Modeled Area	Site Condition	TSS Load (metric tons)			TSS Concentration (mg/L)		
		All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years
East CSJ/PA4	Pre-Developed	71	47	122	215	212	216
	Developed	77	58	119	119	114	125
	Dev w/ PDFs	43	26	77	124	114	132
	Percent Change	-40	-44	-37	-42	-46	-39

Table E-4: Comparison of Predicted TSS Concentration with Water Quality Objectives and Observed In-Stream Concentrations for the Central San Juan and Trampas Sub-basin

Range of Average Annual TSS Concentration[1] (mg/L)	San Diego Basin Plan Water Quality Objectives	Range of Observed In-stream Concentrations[2] (mg/L)
119 - 189	TSS levels shall not cause a nuisance or adversely affect beneficial uses as a result of controllable water quality factors	None Detected – 3,100

[1]Modeled concentration by planning area for developed conditions with PDFs in wet years.
[2]Range of means observed at four San Juan watershed stations during the wet years.
NA – not applicable

Nutrient Loads and Concentrations

Nutrient loads and concentrations were estimated for nitrate-nitrogen, TKN, and total phosphorus. Nitrate-nitrogen is inorganic nitrogen and is considered more bio-available than TKN, which contains both organic and inorganic forms of nitrogen.

Estimated nutrient loads are summarized in Table E-5 for PA 4, and are presented in Appendix D for PA 3 and PA 5, based on the modeled alternative. Nitrate loads are estimated to decrease with development in all planning areas by a range of 15 to 65 percent, except in the portion of PA 5 west of Trampas Canyon, where nitrate loads are estimated to increase slightly by about five percent. TKN loads are estimated to increase in all planning areas. The estimated increase in TKN loads for the entire sub-basin is about 75 percent. Similarly, total phosphorus loads are estimated to increase with development in all planning areas. For the entire sub-basin, total phosphorus loads are estimated to increase by about 25 percent. For all constituents, estimated loads are generally the largest during wet years and the lowest during dry years.

Estimated nutrient concentrations are summarized in Table E-6 for PA 4, and are presented in Appendix D for PA 3 and PA 5, based on the modeled alternative. The concentrations of nitrate-nitrogen are estimated in all planning areas, over a range of about 10 to 65 percent. Conversely, TKN concentrations are estimated to increase in all planning areas over a range of 25 to 140 percent. Total phosphorus concentrations are also expected to increase in all but one of the planning areas. Increases range from about 20 to 110 percent. Total phosphorus concentrations are estimated to decrease in PA 4 by about 20 percent.

Table E-7 compares the range of estimated mean runoff concentrations of nutrients with observed in-stream data from Wildermuth. The water quality impact of concern here is excessive algal growth. The Basin Plan narrative objective is "Concentrations of nitrogen and phosphorous, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth." The comparison in Table E-7indicates the estimated post-development runoff concentration for total phosphorous is less than that observed, where the observed data reflects the contribution from open areas and existing land uses. The higher observed nutrient data is consistent with the geologic information that indicates underlying bedrock may contribute high levels of phosphorous from open areas. Nitrate-nitrogen concentrations tend to be in the lower range of the observed data, and this is important, as mentioned above, as nitrate-nitrogen is more bioavailable than TKN. These results would indicate that projected nutrient concentrations in runoff are comparable to or less than in-stream observations and therefore should not result in an increase in algae growth.

Table E-5: Predicted Average Annual Nutrient Loads for Planning Area 4 in the Central San Juan and Trampas Sub-basin (Alternative B-9) (lbs)

Modeled Area	Site Condition	Nitrate-N Loads			TKN Loads			Total P Loads		
		All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years
East CSJ/PA4	Pre-Developed	870	581	1481	791	539	1326	124	88	201
	Developed	1113	847	1677	3887	3124	5503	546	440	771
	Dev w/ PDFs	599	380	1063	1956	1372	3193	276	195	449
	Percent Change	-31	-35	-28	147	155	141	122	121	123

Table E-6: Predicted Average Annual Nutrient Concentrations for Planning Area 4 in the Central San Juan and Trampas Sub-basin (Alternative B-9) (mg/L)

Modeled Area	Site Condition	Nitrate-N Concentration			TKN Concentration			Total P Concentration		
		All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years
East CSJ/PA4	Pre-Developed	1.2	1.2	1.2	1.1	1.1	1.1	0.2	0.2	0.2
	Developed	0.8	0.8	0.8	2.7	2.8	2.6	0.4	0.4	0.4
	Dev w/ PDFs	0.8	0.8	0.8	2.6	2.7	2.5	0.4	0.4	0.3
	Percent Change	-34	-37	-31	138	144	132	113	111	116

Table E-7: Comparison of Estimated Nutrient Concentrations with Observed In-Stream Concentrations for the Central San Juan and Trampas Sub-basin

Nutrient	Predicted Average Annual Concentration[1] (mg/L)			Observed Range of In-Stream Concentrations[2] (mg/L)
	All Years	Dry Years	Wet Years	
Nitrate	0.7-1.0	0.8-1.0	0.6-1.0	0.15 – 1.5
TKN	1.3-2.7	1.3-2.9	1.3-2.6	None Detected – 3.0
Total Phosphorus	0.2-0.4	0.2-0.4	0.1-0.4	None Detected – 2.8

[1] Modeled concentration by planning areas for developed conditions with PDFs.
[2] Range of means observed at four San Juan watershed stations during the wet years.

Trace Metals

Table E-8 summarizes the estimated loads for total aluminum and dissolved cadmium, copper, lead, and zinc for proposed development in PA 4. Estimated trace metal loads for proposed development in PA 3 and PA 5 are based on modeling results of a former development alternative, whose results are presented in Appendix D. Overall for the entire sub-basin, the aluminum, cadmium, and zinc loads are projected to decrease slightly, while copper and lead loads are predicted to increase by about 30 and 80 percent for all years. In general, loads are higher in wet years and lower during dry years, and are higher from PA 4. The highest loads are associated with aluminum, then in descending order zinc, copper, lead, and cadmium.

Estimated trace metal concentrations are summarized in Table E-9 for PA 4, and are presented in Appendix D for PA 3 and PA 5, based on the modeled alternative. Overall, concentrations tend to decrease slightly for total aluminum, dissolved cadmium, and dissolved zinc, in the range of about 10 percent or less. Concentrations of dissolved copper and lead are estimated to increase moderately. These concentration changes reflect changes associated with urbanization, the effects of bypassing higher flows around the water quality control facilities, and contributions from untreated open areas.

Table E-10 compares the range of estimated mean runoff concentrations of trace metals applicable criteria and observed in-stream data. The CTR criteria were used for all metals except total aluminum, which does not have a CTR criterion. The NAWQC criterion was used for comparison to the estimated total aluminum concentration. The CTR criteria apply to acute aquatic toxicity and assume a hardness of 120 mg/L, which was the minimum observed hardness. As criteria increase with hardness, applying the minimum observed hardness is conservative, that is, would result in the minimum criteria. The table indicates that the projected mean runoff concentrations are well below the application CTR or NAWQC criteria. The predicted runoff values tend to be higher than the observed in-stream data and this may reflect the fact that we are comparing dissolved forms. The partitioning between dissolved and particulate forms of metals is influenced by the availability of solids and the organic content of the solids. Where solids concentrations are high, such as in the streams, partitioning will tend to reduce the dissolved fraction, and where solids concentrations tend to be low, such as in the runoff, partitioning will tend to increase the dissolved fraction. Consequently the low observed in-stream concentration may be a consequence of the higher TSS values in the stream.

Table E-8: Predicted Average Annual Trace Metal Loads for Planning Area 4 in the Central San Juan and Trampas Sub-basin (Alternative B-9) (lbs)

Modeled Area	Site Condition	Total Aluminum			Dissolved Cadmium			Dissolved Copper			Dissolved Lead			Dissolved Zinc		
		All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years
East CSJ/PA4	Pre-Developed	460	299	800	0.48	0.33	0.77	5.2	3.7	8.4	1.0	0.7	1.7	33	23	55
	Developed	790	609	1173	0.88	0.70	1.27	14.9	12.0	21.2	6.5	5.2	9.1	56	44	81
	Dev w/ PDFs	419	272	730	0.48	0.33	0.80	7.9	5.6	12.8	3.2	2.3	5.2	31	21	51
	Percent Change	-9	-9	-9	2	0	3	51	49	53	218	230	208	-8	-10	-6

Table E-9: Predicted Average Annual Trace Metal Concentrations for Planning Area 4 in the Central San Juan and Trampas Sub-basin (Alternative B-9) (µg/L)

Modeled Area	Site Condition	Total Aluminum			Dissolved Cadmium			Dissolved Copper			Dissolved Lead			Dissolved Zinc		
		All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years
East CSJ/PA4	Pre-Developed	631	618	641	0.65	0.69	0.62	7	8	7	1.4	1.4	1.4	46	48	44
	Developed	551	545	559	0.62	0.62	0.61	10	11	10	4.5	4.7	4.4	39	39	38
	Dev w/ PDFs	552	538	564	0.64	0.66	0.62	10	11	10	4.3	4.5	4.1	41	42	40
	Percent Change	-12	-13	-12	-2	-5	0	46	43	48	206	215	197	-11	-13	-9

Table E-10: Comparison of Estimated Trace Metals Concentrations with Water Quality Criteria and Observed In-Stream Concentrations for the Central San Juan and Trampas Sub-basin

Trace Metals	Predicted Average Annual Concentration[1] (µg/L)			California Toxics Rule Criteria[2] (µg/L)	Observed Range of In-Stream Concentrations[3] (µg/L)
	All Years	Dry Years	Wet Years		
Total Aluminum	439 - 631	558 - 618	360 - 641	750[4]	Not Monitored
Dissolved Cadmium	0.4 - 0.65	0.57 - 0.67	0.3 - 0.63	5.2	None Detected – 0.09
Dissolved Copper	5 - 10	8 – 11	3 – 10	15.9	2.1 – 4.0
Dissolved Lead	2.1 – 4.3	2.1 – 4.5	0.7 – 4.1	78.7	None Detected – 3.9
Dissolved Zinc	25 - 41	35 - 42	19 - 40	137	None Detected – 15.0

[1] Modeled concentration for planning areas for developed conditions with PDFs.
[2] Hardness = 120 mg/L, minimum value of monitoring data.
[3] Range of means observed at four San Juan watershed stations during the wet years.
[4] NAWQC criteria for pH 6.5 – 9.0.

E-2.3 FINDINGS OF SIGNIFICANCE

Hydrologic Conditions of Concern and Significance Thresholds

The following discusses the implications of the water balance results on the hydrologic conditions of concern.

1. Increased Stormwater Runoff Flowrate, Volume and Flow Duration

Significance Threshold A: Substantially alter the existing drainage pattern of the site or area, including alteration of the course of a stream or river, in a manner that would cause substantial erosion or siltation.

The WQMP was designed specifically to preserve and protect the existing drainage patterns, and sediment transport regime. Drainage patterns within the development bubbles will be modified by the installation of drainage infrastructure, but to the extent feasible (for example, in low density development areas) more natural swale-type drainage will be considered. Drainage patterns will be modified in the Trampas Creek drainage by virtue of removing the sand mining operation; however, flow management is designed to mimic natural hydrologic conditions in Trampas Creek.

Significance Threshold B: Substantially increase the frequencies and duration of channel adjusting flows.

Changes in the frequency and duration of flows were analyzed for all of the catchments that would be affected by development as proposed under the B-9 Alternative, or similar to the B-9 Alternative as proposed in a previously modeled alternative. The combined control system were sized and configured to match, to the extent possible, the flow durations over the entire range of channel adjusting flows, including the 2 ands 10 year peak flows. A water balance also was conducted that took into account the effects of anticipated irrigation and the operation of the BMPs. The results of the water balance indicated that the volume of surface water runoff volume to Trampas Creek, to the unnamed creek west of Trampas Creek, and to San Juan Creek would effectively match the existing condition.

On this basis, the effect of the proposed development on altering existing drainage or increasing the frequency and duration of channel adjusting flows is determined to be less than significant.

2. Decreased Infiltration and Groundwater Recharge

Significance Threshold A: Substantially deplete groundwater supplies or interfere substantially with groundwater recharge that would cause a net deficit in aquifer volumes or lowering of the local groundwater table.

The water balance indicates that infiltration volumes will likely increase over pre-development conditions. Therefore groundwater levels, particularly in and around San Juan Creek, would increase rather than decrease.

On this basis, the potential effect of the proposed development on infiltration and groundwater recharge are considered less than significant.

Hydrologic Condition of Concern #3: Changed Base Flows

Significance Threshold A: Substantially increase or decrease base flows as to negatively impact riparian habitat.

The projected increase in infiltration and groundwater outflow is likely to lead to increases in base flows in Trampas Creek, the unnamed creek, and San Juan Creek. The magnitude of the increase is estimated to be about 1 cfs, which could potentially benefit arroyo toad habitat, especially during the breeding season when water is a significant factor affecting recruitment.

Significance Threshold B: Substantially increase or decrease low flow estimates where high groundwater elevations are considered important.

To the extent that the projected increase in base flows enter San Juan Creek, the effect could potentially raise the groundwater elevations downstream which would be beneficial to downstream water supply pumping operations.

On this basis, the effect of the proposed development in altering base flows such as to adversely affect habitat or downstream groundwater levels for water supply purposes is considered less than significant.

Pollutants of Concern

The following are the conclusions regarding the significance of impacts for the pollutants of concern.

Sediments: Mean total suspended solids concentrations are estimated to be less in the post development condition than in the existing conditions.

Nutrients (Nitrogen and Phosphorous): Despite the predicted increases in TKN and total phosphorus loadings, the post-developed nutrient concentrations are either well below or within the observed range of in-stream concentrations and therefore should not increase algal growth..

Trace Metals: Mean concentrations of total aluminum and dissolved cadmium and zinc are estimated to decrease with development, while mean concentrations of dissolved copper and lead are estimated to increase relative to estimated concentrations under existing conditions. However, mean concentrations of aluminum, cadmium, copper, lead, and zinc are well below benchmark NAWQC and CTR criteria.

On this basis, the impact of the B-9 Alternative on sediments, nutrients, and trace metals is considered less than significant.

E-3 IMPACT ANALYSIS FOR THE BLIND AND TALEGA SUB-BASINS

This section evaluates the effectiveness of the WQMP for the Blind Canyon and Talega Canyon Sub-basins and evaluates the impacts of the proposed development on pollutants of concern and hydrologic conditions of concern.

In this section we evaluate the effects of runoff from PA 8 as it affects Talega and Blind Canyons. This area includes the Northrop-Grumman (formerly TRW) facilities. Because of concerns for arroyo toad habitat in Talega Creek, the proposed development plan is to grade PA 8 such that all excess runoff from PA 8 would discharge into either Blind Canyon to the north or lower Cristianitos to the west. The area of that portion of PA 8 that would be graded to discharge to Blind Canyon is approximately 473 acres. It is for this reason that the Blind and Talega Sub-basins are addressed in this section together.

In contrast to previous sections where entire sub-basins were modeled, the water balance and water quality modeling in these sub-basins were conducted for all the catchments in Blind Canyon and only for developed catchments in Talega Canyon. The decision to only model the developed portion of the Talega is reasonable given the grading plan.

E-3.1 IMPACTS ON HYDROLOGIC CONDITIONS OF CONCERN

Hydrologic Condition of Concern #1: Increased Stormwater Runoff Volume, Peak Discharge, and Flow Duration

Flow Duration Analysis

The flow duration analysis was conducted for all catchments subject to development. With controls, the runoff flows and durations are managed so as to essentially match the pre-development condition, and, as part of that matching, the 2 and 10 peak flows are reduced to values consistent with the pre-development condition.

Water Balance Analysis

Table E-11 and Table E-12 show the water balance results for the three climatic conditions for Blind Canyon and for the Talega development area, respectively. As indicated in Table E-12, the only outflow from the graded area to Talega is some surface runoff (36 acre-ft) to approximately mimic existing conditions.

The column titled "Runoff to Blind Canyon" in Table E-11 is the projected total surface runoff generated in the sub-basin consisting primarily of that portion of PA 8 that is located in Blind Canyon. These results indicate that runoff to Blind Canyon Creek would decrease slightly from about 48 acre-ft/yr under the pre-development case to about 41 acre-ft/yr, a decrease of 7 acre-ft or 15 percent. Approximately 106 acre-ft/yr of runoff from the golf course would be stored in non-domestic water supply reservoirs and used for irrigating the golf course and common areas.

Hydrologic Condition of Concern #2: Decreased Infiltration and Groundwater Recharge

Because of the heavy reliance on groundwater infiltration to manage potentially erosive flows, groundwater outflow to Blind Canyon increases substantially. The total groundwater outflow consists of three components: (1) surface runoff from Talega Canyon that is being directed into the infiltration basins located in an alluvium area near the confluence of Blind Creek and Gabino Creek, (2) groundwater diverted from Talega by the grading, and (3) groundwater from within Blind Canyon. The total projected post-development groundwater outflow to Blind Creek, the sum of these three components, is about 829 acre-ft/yr. This is an increase of about 518 acre-ft over pre-development conditions. The effects of this infiltration would be to increase local groundwater table elevations, primarily in the lower portion of Blind Canyon.

Note than in this analysis we are assuming that groundwater flows in the graded portion of Talega Canyon will be redirected to Blind Canyon. The assumption is that the water table elevations will adjust to conform approximately to the land surface. However the direction of groundwater flows could be influenced by subsurface geologic formations such as clay lenses.

Hydrologic Condition of Concern #3: Changed Base Flow

The projected increase in groundwater infiltration and outflow into Blind Canyon is approximately 518 acre-ft/yr, which translates into an annual mean change in base flow of about 0.7 cfs. This increase would occur near the mouth of Blind Creek and the effect could extend into lower Cristianitos Creek.

E-3.2 IMPACTS ON POLLUTANTS OF CONCERN

This section presents the water quality modeling results used to address impacts of stormwater runoff on sediments, nutrients, and trace metals for Alternative B-9. The results are provided for the three development scenarios, for three climatic conditions, and for Blind Canyon and the development area in Talega Canyon.

TSS Loads and Concentrations

Table E-13 shows the mean annual loads and concentrations for TSS for the Blind and Talega sub-basins. The “developed condition” row for Talega is assumed to be zero because of grading. However, it is assumed under the post-development with PDF scenario that some water will be directed from the graded area back into Talega Creek to maintain the existing water balance.

Table E-13 indicates that concentrations and loads are projected to be quite low in both Blind Canyon and Talega Canyon. This effect reflects the relatively small areas proposed for development, soil stabilization achieved with urban landscaping, the increase in impervious cover, and the effect of treatment, and in particular, treatment by infiltration.

Table E-14 shows the mean annual TSS concentration of 52 mg/L for runoff into Blind Canyon during wet years and how it compares with water quality criteria and observed in-stream concentrations. The criterion for TSS in the San Diego Basin Plan is narrative and states that “levels shall not cause a nuisance or adversely affect beneficial uses as a result of controllable water quality factors”. Observed concentrations reported by Wildermuth for two stations in the San Mateo Creek watershed range between about 4,000 to 9,000 mg/L. Consequently runoff will not adversely affect TSS levels in receiving streams.

Table E-11: Blind Sub-basin Average Annual Water Balance (Alternative B-9) (inches (acre-ft))

Climatic Period	Pre-Development[1]					Post-Development with PDFs[2]							
	INFLOW	OUTFLOW				INFLOW			OUTFLOW				
	Precipitation	Runoff to Blind Canyon Creek	GW Outflow	ET	Total	Precipitation	Irrigation	Total	Runoff to Blind Canyon Creek	Runoff Stored for GC Irrigation[3]	GW Outflow[4]	ET	Total
All Years	16.8 (1026)	0.8 (48)	5.1 (311)	11.0 (672)	16.9 (1031)	16.1 (1573)	10.7 (1042)	26.8 (2616)	0.4 (41)	1.1 (106)	8.5 (829)	16.1 (1577)	26.5 (2589)
Dry Years	14.1 (862)	0.6 (37)	2.8 (171)	10.8 (662)	14.2 (870)	13.5 (1320)	10.7 (1041)	24.2 (2362)	0.3 (27)	1.1 (105)	6.3 (618)	16.1 (1572)	24.0 (2349)
Wet Years	22.5 (1375)	1.1 (70)	10.0 (609)	11.3 (693)	22.4 (1372)	21.6 (2110)	10.7 (1045)	32.3 (3155)	0.7 (71)	1.1 (107)	13.0 (1275)	16.2 (1587)	31.7 (3099)

[1]The pre-development catchments are: 64, 65, 66, 67. Pre-development area = 734 acres.
[2]The post-development catchments are: 64, 65, 66, 67, T-1. Post-development area = 1173 acres.
[3]Assumed golf course storage volume was 20 AF.
[4]Includes GW flows from Blind Cyn, GW flows from development areas in Talega Cyn, and treated surface runoff discharged to infiltration facilities.

Table E-12: Talega Sub-basin Average Annual Water Balance (Alternative B-9) (inches (acre-ft))

Climatic Period	Pre-Development[1]					Post-Development with PDFs[2]			
	INFLOW	OUTFLOW				INFLOW			OUTFLOW
	Precipitation	Runoff to Talega Creek[3]	GW Outflow[4]	ET	Total	Precipitation	Irrigation	Total	Runoff to Talega Creek[5]
All Years	14.9 (526)	1.0 (36)	4.3 (153)	9.6 (340)	15.0 (529)	14.9 (525)	6.3 (220)	21.2 (745)	1.0 (36)
Dry Years	12.5 (441)	0.8 (30)	2.3 (81)	9.5 (334)	12.6 (445)	12.5 (440)	6.2 (220)	18.8 (660)	0.7 (26)
Wet Years	20.1 (707)	1.4 (50)	8.7 (305)	9.9 (350)	20.0 (705)	20.1 (705)	6.3 (220)	26.3 (925)	1.7 (59)

[1]The predevelopment catchments are 3, 4, 5, 6, 7, 8, 9a, and 9b. Pre-development area = 423 acres.
[2]Post-development area = 0 acres.
[3]Because only the development areas are modeled, runoff may not represent actual volumes that reach the stream. Surface runoff could infiltrate in open space areas between the development area and the stream.
[4]Because only the development areas are modeled, groundwater flows may not represent actual volumes that reach the stream. Some groundwater flows could be lost to ET, or groundwater flows could be greater if there is significant infiltration in the open space areas.
[5]Assumes that all flows from the developed catchments (PA8-3 to PA8-9) are collected in a pipe. There would be a flow splitter to divert some flows to Talega Creek (via a swale), and the remaining flows are diverted to Blind Canyon Creek.

Table E-13: Predicted Average Annual TSS Loads and Concentrations for the Blind and Talega Sub-basins (Alternative B-9)

Modeled Area	Site Condition	TSS Load (metric tons)			TSS Concentration (mg/L)		
		All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years
Blind	Pre-Developed	11	9	17	190	188	192
	Developed	56	46	78	116	116	116
	Dev w/ PDFs	3	2	5	54	57	52
	Percent Change	-74	-77	-72	-71	-70	-73
Talega	Pre-Developed	8	7	11	178	178	178
	Developed*	0	0	0	0	0	0
	Dev w/ PDFs	1	1	2	24	24	24
	Percent Change	-87	-89	-84	-87	-87	-87

*For the Talega developed without PDFs condition, no flows will occur to Talega Creek from the development bubble.

Table E-14: Comparison of Predicted TSS Concentration with Water Quality Objectives and Observed In-Stream Concentrations for the Blind Sub-basin (Alternative B-9)

Predicted Average Annual TSS Concentration[1] (mg/L)	San Diego Basin Plan Water Quality Objectives	Range of Observed In-stream Concentrations[2] (mg/L)
52	TSS levels shall not cause a nuisance or adversely affect beneficial uses as a result of controllable water quality factors	3,900 – 9,400

[1]Modeled concentration for developed conditions with PDFs in wet years.
[2]Range of concentrations observed at two San Mateo Creek watershed stations during the wet years.

Nutrient Loads and Concentrations

Table E-15 and Table E-16 show the mean annual loads and concentrations for nitrate-nitrogen, TKN, and total phosphorus. Nitrate-nitrogen and ammonia-nitrogen (a portion of the TKN measurement) are important bio-available forms of nitrogen that can cause excessive algal growth in streams. TKN also contains organic nitrogen which is considered less bioavailable, and in this respect nitrate-nitrogen is the more important nitrogen species when considering effects on algal growth. Overall loads and concentration for nitrate-nitrogen and TKN will decrease in both Talega Canyon and Blind Canyon. Total phosphorus will increase slightly in all years (six percent) and by approximately 30 percent in wet years. The substantial load reductions in Blind Canyon between “developed” and “developed with PDFs” reflect the effectiveness of infiltration.

Table E-17 shows a comparison of the average annual concentrations of nutrients in runoff into Blind Canyon Creek with observed in-stream data from Wildermuth. All of the nutrients are within the observed range. Therefore, it is unlikely that these concentrations would lead to excessive algal growth.

Table E-15: Predicted Average Annual Nutrient Loads for the Blind and Talega Sub-basins (Alternative B-9) (lbs)

Modeled Area	Site Condition	Nitrate-N Loads			TKN Loads			TP Loads		
		All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years
Blind	Pre-Developed	99	74	150	251	202	357	34	27	48
	Developed	893	732	1234	3031	2487	4183	412	338	568
	Dev w/ PDFs	70	48	117	138	92	234	36	24	61
	Percent Change	-29	-36	-22	-45	-54	-34	6	-12	28
Talega	Pre-Developed	60	50	83	226	186	310	30	25	42
	Developed*	0	0	0	0	0	0	0	0	0
	Dev w/ PDFs	51	36	83	118	83	191	34	24	55
	Percent Change	-16	-28	0	-48	-55	-38	12	-4	32

*For the Talega developed without PDFs condition, no flows will occur to Talega Creek from the development bubble.

Table E-16: Predicted Average Annual Nutrient Concentrations for the Blind and Talega Sub-basins (Alternative B-9) (mg/L)

Modeled Area	Site Condition	Nitrate-N Concentration			TKN Concentration			TP Concentration		
		All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years
Blind	Pre-Developed	0.76	0.73	0.79	1.94	1.99	1.87	0.26	0.27	0.25
	Developed	0.83	0.83	0.83	2.83	2.83	2.82	0.38	0.38	0.38
	Dev w/ PDFs	0.60	0.61	0.59	1.18	1.18	1.19	0.31	0.30	0.31

Modeled Area	Site Condition	Nitrate-N Concentration			TKN Concentration			TP Concentration		
		All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years
	Percent Change	-21	-17	-25	-39	-41	-37	18	14	23
Talega	Pre-Developed	0.61	0.61	0.61	2.28	2.28	2.28	0.31	0.31	0.31
	Developed*	0	0	0	0	0	0	0	0	0
	Dev w/ PDFs	0.52	0.52	0.52	1.19	1.19	1.19	0.35	0.35	0.35
	Percent Change	-16	-16	-16	-48	-48	-48	12	12	12

*For the Talega developed without PDFs condition, no flows will occur to Talega Creek from the development bubble.

Table E-17: Comparison of Predicted Nutrient Concentrations with Observed In-Stream Concentrations for the Blind Sub-basin (Alternative B-9)

Nutrient	Predicted Average Annual Concentration[1] (mg/L)			Observed Range of In-Stream Concentrations[2] (mg/L)
	All Years	Dry Years	Wet Years	
Nitrate	0.60	0.61	0.59	0.29 – 1.1
TKN	1.18	1.18	1.19	0.39 – 1.2
Total Phosphorus	0.31	0.30	0.31	None Detected – 6.2

[1]Modeled concentration for developed conditions with PDFs.
[2]Range of concentrations observed at two San Mateo watershed stations during the wet years.
NA – not applicable

Trace Metals

Table E-18 and Table E-19 show the predicted mean annual loads and mean annual concentrations for aluminum, cadmium, copper, lead, and zinc for the three development scenarios and for the three climatic conditions. Except for aluminum, the concentrations are all in the dissolved form, which is the form addressed in the California Toxics Rule.

Overall concentrations and loads are projected to decrease in Blind Canyon and in the runoff to Talega Canyon.

Table E-18: Predicted Average Annual Trace Metal Loads for the Blind and Talega Sub-basins (Alternative B-9) (lbs)

Modeled Area	Site Condition	Total Aluminum			Dissolved Cadmium			Dissolved Copper			Dissolved Lead			Dissolved Zinc		
		All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years
Blind	Pre-Developed	103	81	150	0.05	0.04	0.08	1.80	1.46	2.53	0.84	0.69	1.17	27	22	37
	Developed	604	495	835	0.54	0.44	0.75	9.62	7.89	13.28	4.85	3.98	6.70	36	29	49
	Dev w/ PDFs	67	46	114	0.03	0.02	0.06	0.72	0.48	1.23	0.40	0.27	0.68	3	2	5
	Percent Change	-35	-44	-24	-32	-40	-23	-60	-67	-52	-52	-61	-41	-88	-90	-85
Talega	Pre-Develop	83	68	113	0.04	0.03	0.05	1.69	1.39	2.32	0.83	0.68	1.14	26	22	36
	Developed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dev w/ PDFs	56	40	91	0.02	0.02	0.04	0.61	0.43	0.98	0.39	0.27	0.63	3	2	4
	Percent Change	-32	-41	-19	-31	-41	-19	-64	-69	-57	-53	-60	-44	-90	-92	-89

*For the Talega developed without PDFs condition, no flows will occur to Talega Creek from the development bubble.

Table E-19: Predicted Average Annual Trace Metal Concentrations for the Blind and Talega Sub-basins (Alternative B-9) (μg/L)

Modeled Area	Site Condition	Total Aluminum			Dissolved Cadmium			Dissolved Copper			Dissolved Lead			Dissolved Zinc		
		All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years	All Years	Dry Years	Wet Years
Blind	Pre-Developed	795	802	787	0.40	0.39	0.40	14	14	13	6.48	6.79	6.13	206	216	194
	Developed	564	563	564	0.51	0.51	0.51	9	9	9	4.52	4.52	4.52	33	33	33
	Dev w/ PDFs	579	583	576	0.30	0.30	0.30	6	6	6	3.44	3.41	3.46	28	28	28
	Percent Change	-27	-27	-27	-24	-22	-26	-55	-57	-53	-47	-50	-43	-87	-87	-86
Talega	Pre-Developed	837	837	837	0.36	0.36	0.36	17	17	17	8.38	8.38	8.38	267	267	267
	Developed*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dev w/ PDFs	570	570	570	0.25	0.25	0.25	6	6	6	3.93	3.93	3.93	26	26	26
	Percent Change	-32	-32	-32	-31	-31	-31	-64	-64	-64	-53	-53	-53	-90	-90	-90

*For the Talega developed without PDFs condition, no flows will occur to Talega Creek from the development bubble.

Table E-20: Comparison of Predicted Trace Metals Concentrations with Water Quality Criteria and Observed In-Stream Concentrations for the Blind Sub-basin (Alternative B-9)

Trace Metals	Predicted Average Annual Concentration[1] (μg/L)			California Toxics Rule Criteria[2] (μg/L)	Observed Range of In-Stream Concentrations[3] (μg/L)
	All Years	Dry Years	Wet Years		
Total Aluminum	579	583	576	750[4]	Not Monitored
Dissolved Cadmium	0.30	0.30	0.30	6.1	None Detected – 0.37
Dissolved Copper	6	6	6	18	1.3 – 4.7
Dissolved Lead	3.44	3.41	3.46	93	None Detected – 0.19
Dissolved Zinc	28	28	28	160	None Detected – 26

[1] Modeled concentration for developed conditions with PDFs.
[2] Hardness = 140 mg/L, minimum value of monitoring data.
[3] Range of concentrations observed at two San Mateo watershed stations during the wet years.
[4] NAWQC criteria for pH 6.5 – 9.0.

The important comparison with respect to potential effects on aquatic species is with the benchmark CTR criteria, and in the case of aluminum, the NAWQA criteria. Table E-20 compares the projected mean concentrations with the benchmark CTR and NAWQA criteria. A hardness of 140 mg/L has been used to estimate the CTR criteria of those metals whose criteria are hardness dependent. This value of hardness was the minimum hardness observed in the in-stream data collected at the two monitoring stations in the San Mateo Creek watershed by Wildermuth. Therefore the criteria may be viewed as a lower bound, and in this respect the comparison is conservative (i.e., more likely to indicate an exceedance). The table indicates that the projected mean concentrations of all the metals are well below the benchmark criteria.

E-3.3 FINDINGS OF SIGNIFICANCE

Hydrologic Conditions of Concern and Significance Thresholds

The following discusses the implications of the water balance results on the hydrologic conditions of concern.

1. Increased Stormwater Runoff Flowrate, Volume and Flow Duration

Significance Threshold A: Substantially alter the existing drainage pattern of the site or area, including alteration of the course of a stream or river, in a manner that would cause substantial erosion or siltation.

The WQMP was designed specifically to preserve and protect the existing drainage patterns, and sediment transport regime. Drainage patterns within the development bubbles will be modified by the grading and installation of drainage infrastructure. Some of the grading is specifically designed to divert runoff from the Talega Sub-basin to Blind Canyon and ultimately to lower Cristianitos, where stream conditions are considered more stable and resistant to the anticipated increase in flows.

Significance Threshold B: Substantially increase the frequencies and duration of channel adjusting flows.

Runoff volume in lower Blind Canyon is projected to decrease on average by about 7 acre-ft due to the effectiveness of the combined control system.

On this basis, the effect of the proposed development on altering existing drainage or increasing the frequency and duration of channel adjusting flows is determined to be less than significant.

2. Decreased Infiltration and Groundwater Recharge

Significance Threshold A: Substantially deplete groundwater supplies or interfere substantially with groundwater recharge that would cause a net deficit in aquifer volumes or lowering of the local groundwater table.

Because of the reliance on infiltration as a volume control measure, groundwater infiltration is projected to increase in Blind Canyon and especially near the confluence with Gabino and lower Cristianitos Creeks. On this basis, the potential effect of the proposed development on infiltration and groundwater recharge are considered less than significant.

3. Changed Base Flows

Significance Threshold A: Substantially increase or decrease base flows as to negatively impact riparian habitat.

Groundwater outflow into lower Blind Canyon Creek is projected to increase by about 518 acre-ft/yr, which translates into a mean increase in base flows of about 0.7 cfs. This effect would be mostly in lower Cristianitos Creek. Because of its size, substrate, and habitat, lower Cristianitos Creek is considered more suitable for accepting additional flows than Talega Creek. The base flow will decrease with distance downstream as some water will infiltrate into the stream bed and some water may be used to support riparian vegetation, especially in Lower Cristianitos Creek which, in certain reaches, is heavily vegetated.

Significance Threshold B: Substantially increase or decrease low flow estimates where high groundwater elevations are considered important.

As discussed above, the projected effect of the development would, if anything, increase base flows and local groundwater elevations. The effect would be most pronounced in lower Cristianitos Creek where existing habitat could potentially benefit from the additional water. On this basis, the effect of the proposed development in altering groundwater levels is considered less than significant.

Pollutants of Concern

The following are the conclusions regarding the significance of impacts for the pollutants of concern under wet and dry weather conditions.

Sediments: Mean total suspended solids loads and concentrations are predicted to be less in the post-development condition.

Nutrients (Nitrogen and Phosphorous): Post-developed nitrogen loads and concentrations are predicted to decrease and total phosphorus concentrations are predicted to increase slightly. Post-development concentrations are within the observed range of in-stream concentrations. Moreover the treatment system will include constructed wetlands to treat dry weather and small storm flows. Wetland systems such as those at the San Joaquin Marsh and Prado Reservoir have been shown to be quite effective in treating nitrate-nitrogen. On this basis, the impact of the B-9 Alternative on nutrients is considered less than significant.

Trace Metals: Mean concentrations of total aluminum and dissolved cadmium, copper, lead, and zinc are predicted to decrease relative to predicted concentrations under existing conditions and are well below benchmark NAWQC and CTR criteria. On this basis, the impact of the B-9 Alternative on trace metals is less than significant.

E-4 REFERENCES

GeoSyntec Consultants, 2004. Rancho Mission Viejo Conceptual Water Quality Management Plan. June 7, 2004.