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M E M O R A N D U M

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SUBJECT: Assessment of Hydrologic and Water Quality Impacts of the B-8 and B-12 Alternatives

PROJ. #: PW0121

Background and Purpose

In June 2004, GeoSyntec Consultants prepared a Conceptual Water Quality Management Plan (WQMP) for proposed development in Rancho Mission Viejo (RMV). This WQMP was a supporting technical appendix to EIR 589 prepared by the County of Orange which examined the potential environmental effects of RMV's request for a General Plan Amendment/Zone Change for the proposed project called The Ranch Plan or B-4 alternative. The B-4 alternative, in addition to other alternatives, including an alternative called B-9 was analyzed in the June 2004 WQMP. In November 2004, the County of Orange Board of Supervisors approved RMV's request for a General Plan Amendment /Zone Change for an alternative called B-10 Modified (B-10M). The GPA/ZC approved project is examined in a revised WQMP (GeoSyntec, 2005). Subsequent to the Board of Supervisors approval of B-10M, another alternative was developed based on input from the USACE, CDFG, USFWS, the environmental community and the general public. This alternative is termed the B-12.

Three alternatives are being examined in greater detail in the environmental documentation to support the ongoing SAMP and NCCP/MSAA/HCP processes: B-8, B-10M and B-12. At the request of RMV, GeoSyntec Consultants has prepared this memorandum to present a qualitative assessment of water quality impacts associated with proposed development under the B-8 and B-12 development alternatives. As noted above, the B-10M alternative is addressed in a separate WQMP (GeoSyntec, 2005).

Approach and Assumptions

The qualitative assessment of water quality impacts of the B-8 and B-12 alternatives is based on quantitative analyses of the previously evaluated B-4 and B-9 alternatives. Assessment of the B-4 and B-9 alternatives included hydrologic modeling (flow duration and water balance studies) and water quality modeling (pollutant loadings modeling) for various sub-basins. The approach and results of these analyses are documented in the Conceptual WQMP (June, 2004).

The knowledge and understanding achieved through this modeling was used as a basis for the qualitative analysis of the B-8 and B-12 alternatives contained herein. The selection of the most representative modeling scenarios to choose was based on the area of development, and the proposed land uses and associated activities under the B-8 and B-12 alternatives compared to that modeled under the B-4 and B-9 alternatives. Also where the proposed development areas and land use were considered less intensive than in the modeled scenarios, the modeled scenarios could again be applied as the resulting impact assessment would be conservative (i.e., result in greater impact than expected).

Table 1 compares the gross acreages of proposed development under the B-8 and B-12 alternatives with that of the previously evaluated B-4 or B-9 alternatives. This table shows that in all planning areas, the scope of proposed development under the B-8 and B-12 alternatives as measured by gross acreage is comparable and in most cases considerably less than that of previously evaluated alternatives.

Table 1: Gross Acreage of Proposed Development

Planning Area	Total Proposed Development (gross acres)		
	B-8	B-12	Previously Evaluated Alternative (B-4 or B-9)
PA 1	540	566	540 (B-4)
PA 2	0	895	1632 (B-4)
PA 3	1949	2171	2212 (B-4)
PA 4	0	550[a]	1300 (B-9)
PA 5	1191	1131	1131 (B-4)
PA 6	0	0	276 (B-4)
PA 7	0	75[b]	1350 (B-4)
PA 8	0	500	1065 (B-4)
PA 9	0	0	338 (B-4)

[a] plus a 175-acre storage reservoir

[b] consists of 50-acre orchard and 25-acre Ranch Headquarters

The specific land uses under the B-8 and B-12 alternatives have not been determined so the land uses were assumed to be comparable to land uses of the previously evaluated alternatives in Table 1. There are two exceptions under the B-12 alternative. PA 4 includes a 175-acre storage reservoir that was not evaluated as part of the B-9 alternative. The proposed development in PA 7 includes 50 acres of orchard, and a 25 acre Ranch Headquarters; land uses that were not evaluated as part of the B-4 alternative. Assessment of impacts for these uses was conducted based on information provided by RMV regarding orchard management, and best professional judgment.

Water quality management under the B-8 and B-12 Alternatives is assumed to be consistent with the Conceptual WQMP prepared for the B-4 and B-9 Alternatives. Specifically, the WQMP elements will include source control BMPs, site design BMPs, and treatment BMPs described in the Conceptual WQMP. Combined flow and water quality control systems will be implemented to achieve flow duration matching, address the water balance, and provide treatment of dry and wet weather runoff. The combined control systems will include one or more of the following components:

- Site Design BMPs
- Bioinfiltration Swale
- Flow Duration Control and Water Quality Treatment (FD/WQ) Basin
- Infiltration Basins
- Storage Facility for Recycling Water for Non-Domestic Supply
- Diversion Conduit to Export Excess Flows out of the Sub-basin

Impact Assessment

Planning Area 1

PA 1 is located in the western portion of the Narrow and Lower San Juan Sub-basin.

Alternative B-8 & Alternative B-12. Proposed land use under the B-8 and B-12 alternatives is assumed to be comparable to the B-4 alternative which includes a mix of residential, urban activity center, business park, and open space uses.

In this Sub-basin, the WQMP focused on water quality treatment. It was determined flow duration control was not warranted because of the clayey terrain, and because project area discharges would be conveyed to San Juan Creek, which is considered to be able to

accept additional flows without causing erosion, given the size of the watershed and the stream morphology. Water quality of the project discharges would be effectively managed through implementation of the various site design and source control BMPs described in the Conceptual WQMP, and through treatment controls that include vegetated swales and water quality detention basins for treatment of dry- and wet-weather runoff.

The impacts of the B-4 alternative were evaluated qualitatively based on modeling results from the adjacent Central San Juan Sub-basin. Based on the qualitative analyses discussed in the WQMP and with implementation of WQMP elements, the impacts of the proposed development in PA-1 on the hydrologic conditions of concern and on the pollutants of concern are less than significant.

Planning Area 2

PA 2 is primarily located in the Chiquita Canyon Sub-basin, with some development in the southwestern portion of the Gobernadora sub-basin.

Alternative B-8. There is no planned development in PA 2.

Alternative B-12. Land use under the B-12 alternative is as follows

- Residential development in the southeast portion of Chiquita Canyon below the water treatment plant, and in the southwest corner of the Gobernadora sub-basin.
- Residential development, including higher density housing, in Chiquita Canyon south of Tesoro High School.

This alternative is similar to, although less intense, than the B-4 alternative which called for a golf course north of the treatment plant and residential housing on the ridge east of the golf course. The elements of the WQMP include the following:

- Residential development is located to the maximum extent feasible in areas with poorly draining clayey soils. Because pre-development runoff in these areas is comparatively high, the effects of the proposed development on increased runoff volumes is less than if the development were located on more impervious soils.
- Flow duration (FD) and infiltration basins are provided to preserve and protect existing drainage patterns in the main stem of Chiquita Creek and the side canyons. These facilities can be feasibly designed and operated to mimic the pre-development flow duration, as determined by long-term hydrologic simulation.

- To the extent feasible, the FD and infiltration facilities will be located in the upper ends of the side canyons where groundwater levels are deeper and therefore are more suitable areas for locating infiltration basins.

- Excess runoff from that portion of the development in the southern end of the sub-basins will be routed directly to San Juan Creek, which is considered to be able to accept additional flows without causing erosion, given the size of its watershed and geomorphology. There are also potential benefits to habitat in San Juan Creek and supplementing downstream water supply.
- The FD basins will also serve as water quality detention facilities for stormwater treatment. Treatment is estimated to reduce sediment loadings to levels below pre-development. Loadings of nutrients and metals associated with urban development are estimated to increase but concentrations are estimated to remain below benchmark criteria, and/or below measured in-stream levels. Wetlands in the low flow portion of these basins will treat dry-weather runoff.
- Various site design and source control BMPs described in the Conceptual WQMP.

As discussed above, the B-12 alternative is comparable to the B-4 alternative in land use type and distribution, but is smaller is scale. It is expected that the WQMP elements of the B-4 alternative will be incorporated into the B-12 alternative. Therefore, impacts on the hydrologic and pollutants of concern from the B-12 alternative should be comparable or less than impacts from the B-4 alternative, which were found to be less than significant.

Planning Area 3

PA 3 spans the southeastern portion of the Gobernadora sub-basin, and the northern portion of the Central San Juan sub-basin, north of San Juan Creek.

Alternative B-8 & Alternative B-12. Land use under the B-8 and B-12 alternatives is generally comparable to the B-4 alternative. The main differences are that estate housing in the upper portions of the Gobernadora sub-basin are eliminated, and general development in this area is reduced in scope to accommodate a larger wildlife movement corridor. Also general development in the lower portion of Gobernadora and upper Central San Juan sub-basins is slightly larger under the B-8 and B-12 alternatives.

The impacts of the B-4 alternative were evaluated quantitatively based on implementation of the following WQMP elements:

- Residential development is located to the maximum extent feasible in areas with poorly draining clayey, hardpan, and rocky soils in the Gobernadora and Central San Juan Basins.
- Flow duration and infiltration basins will be used to preserve and protect existing drainage patterns in the main stem of Gobernadora Canyon, and to protect arroyo toad breeding habitat in San Juan Creek. It was found that these facilities can be feasibly designed and operated to mimic the pre-development flow duration, as determined by long-term hydrologic simulation.
- The FD basins will also serve as water quality detention facilities for stormwater treatment. Wetlands in the floor of these basins will treat dry-weather runoff.
- Various site design and source control BMPs described in the Conceptual WQMP.

The WQMP elements of the B-4 alternative above will be incorporated into the B-8 and B-12 alternatives. Also, the B-8 and B-12 alternative are generally comparable to the B-4 alternative, in terms of land use type and distribution. Therefore, impacts on the hydrologic conditions and pollutants of concern from the B-8 and B-12 alternatives should be comparable to those of the B-4 alternative, which were found to be less than significant.

Planning Area 4

PA 4 spans the eastern portion of the Central San Juan Basin, southeast of San Juan Creek, and the lower portion of the Verdugo Sub-basin. Runoff from development areas in PA 4 will discharge to San Juan Creek.

Alternative B-8. There is no planned development in PA 4.

Alternative B-12. Proposed development includes 550 acres of gross development acreage and a 175-acre storage reservoir located in the Verdugo Sub-basin.

Gross development acreage under the B-12 alterative is substantially smaller than the development acreage evaluated under the B-9 alternative. Therefore, impacts on the hydrologic conditions and pollutants of concern from the B-12 alternative should be less than those of the B-9 alternative, which were found to be less than significant.

The impacts of the water supply reservoir were not evaluated in the assessment of the B-9 alternative. This reservoir is intended as a non-potable water supply storage facility that will not discharge to San Juan Creek under normal operations. The primary effect of the facility will be to reduce flows and sediment discharges to San Juan Creek from the portion of the Verdugo Sub-basin that is contributory to the reservoir. Reduced flows

could potentially reduce dilution and thereby affect water quality, though this effect is likely to be small given the substantial size of the overall watershed compared to the area affected by the reservoir.

Planning Area 5

PA 5 is in the southern portion of the Central San Juan and Trampas Sub-basin. This area includes an existing sand mining and washing operations, which would be replaced by with implementation of proposed development.

Alternatives B-8 and B-12. Land use under the B-12 alternative is assumed to be comparable to the B-4 alternative, which calls for 1131 acres of general development. Gross development acreage under the B-8 alternative is slightly larger at 1191 acres.

The impacts of the B-4 alternative were evaluated quantitatively. The impacts on the hydrologic conditions of concern and on pollutant of concern assumed implementation of the WQMP element that includes the following:

- Flow duration and infiltration basins will be used to protect habitat in Trampas Creek and the unnamed creek west of Trampas. Because there are no discharges from the existing mining operations, flow duration matching for discharges to Trampas Creek was based on the objective of restoring flows in Trampas Creek to the pre-mine hydrologic regime.
- The FD basins will also serve as water quality detention facilities for stormwater treatment. Wetlands in the floor of these basins will treat dry-weather runoff.
- Various site design and source control BMPs described in the Conceptual WQMP.

Gross development acreage under the B-8 alterative is slightly larger but comparable to the B-4 gross development acreage, and the WQMP elements of the B-4 alternative above will be incorporated into the B-8 alternative. On this basis, impacts on the hydrologic conditions and pollutants of concern from the B-8 and B-12 alternatives should be comparable to those of the B-4 alternative, which were found to be less than significant.

Planning Area 7

PA 7 spans the southeastern portion of the Cristianitos Sub-basin and the southwestern portion of the Gabino Sub-basin.

Alternative B-8. There is no planned development in PA 6

Alternative B-12. Proposed development includes 50-acres of orchards, and relocation of the Ranch Headquarters on 25-acres. Neither of these land uses were previously evaluated in the preparation of the Conceptual WQMP.

Because of need for irrigation, fertilization, and pesticide management associated with agricultural practices, there is a potential of increased loadings of nutrients, toxic chemicals, and possibly metals in runoff from the orchard development area. To reduce potential loadings, RMV has developed and implements an array of agricultural BMPs, including:

- Contour planting to reduce overland flow and erosion from runoff
- Perimeter and internal buffers to separate the orchard from surrounding land uses and to control stormwater runoff
- Evapotranspiration-based irrigation water application to reduce runoff and infiltration from over-watering
- Fertilizer application based on agronomic need, to reduce the potential loadings of nutrients
- An extensive Integrated Pest Management Program

Based on the limited size of the proposed orchard development in comparison to the Cristianitos Sub-basin, and the implementation of the agricultural BMPs listed above, it is expected that potential impacts on the hydrologic conditions and pollutants of concern are less than significant.

The proposed Ranch Headquarters would be relocated in the Gabino Sub-basin. The development would include an administrative building and offices, recreation facilities, a parking lot, landscaping, and necessary infrastructure within a 25-acre footprint.

The proposed Ranch Headquarters would be located on clayey terrains that will help to limit increases in runoff from proposed development in the Cristianitos sub-basin. In addition the Ranch Headquarters will be a low density development with substantial pervious areas. Thus, low-impact site design techniques will be feasible. Such controls would be conducted onsite in landscape areas and parking lot medians, and would include treatment practices such as vegetated swales, planter boxes, and bioretention areas, and filter strips. Because of the clayey conditions, soil amendments and under drains would be employed to encourage infiltration, soil soaking and ET. These practices can be very effective at reducing runoff volumes and providing treatment of dry and wet weather runoff.

Based on the considerations above, it is expected that runoff and pollutant loadings from the proposed headquarters can be effectively managed to pre-development conditions, and to levels that are less than significant.

Planning Area 8

PA 8 spans the Blind Canyon, Talega, and Lower Cristianitos Sub-basins.

Alternative B-8. There is no planned development in PA 8.

Alternative B-12. The proposed development includes residential housing and a business park within a 500 acre development area.

The impacts of development in PA 8 were previously evaluated under both the B-4 and B-9 alternatives. The impacts on the hydrologic conditions of concern and on pollutant of concern were determined to be less than significant, as a result of implementation of the WQMP elements that include the following:

- Flow duration and infiltration basins will be used to preserve and protect existing drainage patterns in Blind Canyon, and sensitive habitat in Talega Creek that support large populations of the arroyo toad. It was found that these facilities can be feasibly designed and operated to mimic the pre-development flow duration, as determined by long-term hydrologic simulation.
- The FD basins would also serve as water quality detention facilities for stormwater treatment. Wetlands in the floor of these basins will treat dry-weather runoff.
- Various site design and source control BMPs described in the Conceptual WQMP.

Proposed developed under the B-12 alternative is limited to 500 acres, which is substantially smaller than gross development acreage evaluated under the B-4 and B-9 alternatives. It is expected that the smaller scale of development will result in less surface runoff conveyed to Blind Canyon in comparison to runoff volumes under the B-4 and B-9 alternatives. This will have the benefit of reducing the required storage capacity for water quality treatment and flow duration matching in Blind Canyon, and would reduce the estimated increases in infiltration and associated base flows in Blind Canyon.

It is expected that most runoff generated from development areas with the Talega sub-basin would be conveyed to the Lower Cristianitos sub-basin. Flow duration matching would be proved for discharges to Talega Canyon in order to protect the sensitive arroyo toad in Talega Canyon. There would be no need for flow duration matching for runoff conveyed to Lower Cristianitos Creek because this runoff is not expected to impact the stability of Lower Cristianitos Creek given the size of the proposed development relative to the size of the overall San Mateo Creek watershed at the point of discharge.

Based on the considerations above, and that the proposed areas is substantially smaller than the previously evaluated B-4 and B-9 alternatives, it is expected that impacts from development under the B-12 alternative on the hydrologic conditions and pollutants will be less than significant.

Cumulative Water Quality Impacts in the San Juan Watershed

The mouth of San Juan Creek is listed as a bacteria-impaired water on the California 303(d) list. A Technical Draft for bacteria-impaired TMDL has been developed by the RWQCB, San Diego Region, and is currently under review. With regard to pathogens, the B-8 and B-12 alternatives may result in increases in pathogens in runoff depending on the adequacy of source control BMPs, but neither existing nor post-development levels are likely to meet REC-1 standards for fecal coliform consistently, other than for flows that are infiltrated (see WQMP at pp. 132). According to the Conceptual WQMP, pathogens represent a potential impact on REC-1 (body contact uses). The Conceptual WQMP proposes to incorporate Detention Basins with associated wetland swales that would discharge into infiltration basins as major water quality treatment train features. In combination, these would be very effective in treating pathogens associated with dry weather flows, small storm flows, and the initial portion of large storm events. During large storm events, when large amounts of bacteria, viruses and protozoans (some of which are pathogenic) are mobilized, flows will bypass the infiltration basin. During such periods, pathogen levels are not likely to meet the REC-1 standards for fecal coliform on a consistent basis under either alternative.

The literature on the effectiveness of infiltration and filtration systems for treating pathogen indicators such as total and fecal coliform indicates that filtration as a treatment mechanism achieves removals in the range of 60 to 90 percent. This removal rate tends to be large relative to other stormwater treatment BMPs (e.g., extended detention basins) and therefore treatment trains which include a filtration component will provide effective removal of pathogen indicators. Since infiltration is an effective BMP up to the point of soil saturation, pathogens associated with dry weather flows, small storm flows and the initial portion of large storm events will be effectively treated in the combined control system. However, because there is no feasible method for infiltrating storm water flows from large storms due to saturated soils conditions and it is not economically feasible to construct storage and treatment facilities for the large volumes of stormwater generated by major storms, pathogen indicators cannot be removed to below a level of significance as defined by the REC-1 standard for such major storms. Through the use of source and treatment controls identified above and in the Conceptual WQMP, the B-8 and B-12 alternatives would employ BMPs meeting the “Maximum Extent Practicable (MEP) standard established by the State Water Resources Control Board and accordingly reduces impacts to the maximum extent practicable.

Due to the amount of development proposed within the San Juan Watershed under either alternative, REC-1 standards are more likely to not be met in this watershed than in the San Mateo Watershed.

Cumulative Water Quality Impacts in the San Mateo Creek Watershed

No development is proposed in the San Mateo Watershed under the B-8 alternative therefore no cumulative water quality impacts would occur. As described above, proposed development in the portion of the San Mateo Watershed under the B-12 alternative would be limited to 500 acres located in Planning Area 8, a 25-acre Rancho Mission Viejo headquarter site and an additional 50 acres of orchards. The 500 acre development area is focused on an area that has already been substantially altered by an existing industrial use. With regard to the San Mateo watershed, any increase in surface water flows would help offset the impacts of groundwater pumping in Camp Pendleton identified by CDFG as a major impact on aquatic resources (see "Geomorphic and Hydrologic Needs" Report at p. 99). At present there is no pathogen TMDL proposed for San Mateo Creek, and no indication that pathogens are an issue for aquatic species. Development of 525 acres plus 50 acres of orchards within the San Mateo Creek watershed is not likely to generate significant direct or cumulative pathogen impacts.

Conclusion

Based on the evaluated contained in this technical memorandum, it is anticipated that the B-8 and B-12 alternatives would not result in significant impacts to water quality, with the exception of potential cumulative impacts related to pathogens within the San Juan Watershed.

References

GeoSyntec, 2004. Rancho Mission Viejo Conceptual Water Quality Management Plan, prepared by GeoSyntec Consultants, Oakland , California, June 9, 2004.