Appendix F:
IMPACTS ON GROUNDWATER QUALITY

IMPACTS ON GROUNDWATER

The impacts of the proposed development on groundwater quality will depend on a number of factors including the local soils and geology, groundwater levels, runoff volume and quality from the proposed development, and the nature and effectiveness of the proposed Water Quality Management Plan, which includes, where appropriate, the utilization of BMPs that rely in part on infiltration.

Groundwater quality is particularly important because groundwater in the San Juan Groundwater Basin is utilized for municipal supply, and local groundwater is utilized for nursery, agricultural, and ranching purposes. Pumping from the alluvium of lower San Juan Creek by the San Juan Basin Authority and other large pumpers is projected to increase from about 7,800 acre-ft/year to about 9,000 acre-ft/yr; the increase in supply is anticipated as a result of the proposed project (Hecht, 2001).

The concern for potential impacts to groundwater quality is emphasized in the San Diego RWQCB MS4 Orange County Permit (Order No. R9-2002-0001) under the Standard Urban Storm Water Mitigation Plans (SUSMPs) Section F.1.b(2)(h) titled “Infiltration and Groundwater Protection”, and in the Orange County DAMP Section 7.II-3.3.4 Treatment Control BMPs under the sub-section titled “Restrictions on Use of Infiltration BMPs”. These restrictions address such requirements as need for pretreatment, soil characteristics that are suitable for infiltration, minimum depth to seasonal high groundwater (10 feet), avoidance of infiltration from areas with high pollutant potential (e.g., industrial areas), and avoiding infiltration of dry weather flows.

The WQMP has been designed to meet these requirements and is based on the following multi-tiered approach: (1) site design and source control BMPs will be implemented to prevent the discharge of pollutants to the maximum extent practicable, (2) the proposed combined control system will incorporate infiltration only where there is at least a 10 foot separation to groundwater, and (3) where infiltration is proposed, the water will be pretreated in a water quality treatment basin sized to meet MS4 Permit requirements.

The pretreatment will occur in the flow control/water quality basins upstream of the infiltration basins. In the low flow portions of these basins, vegetation would be allowed to grow and decay, which will provide an adsorptive organic layer on the bottom of these basins that will assist in pollutant uptake. The upstream flow control/water quality basins are designed to achieve a residence time of approximately 7-10 days for dry weather flows, and will have a 48 hour drain time for wet weather flows. These residence times have been chosen to provide good pretreatment prior to discharging into the infiltration basins. As discussed below, pretreatment also will be provided in the infiltration basins themselves as the soils will provide filtration and sites for adsorption.

Pollutants of concern are those that tend to be more in the dissolved form, have high mobility (low sorption potential), and are prevalent in stormwater runoff or dry weather nuisance flows (Pitt et. al., 1994). Sorption potential is important because data indicate that chemicals with high sorption potential tend to accumulate in the top few centimeters of soil in retention basins studied in Fresno, California (Nightingale, 1987). With pretreatment that includes sedimentation, and assuming a worst case of sandy soils, Pitt et. al. identify the following pollutants as having at least a low/moderate to high potential for affecting groundwater quality: nitrates (low/moderate), fluoranthene (moderate), pyrene (moderate), Shigella and Psuedomonas aeruginosa (low/moderate), protozoa (low/moderate), chromium (low/moderate), and chloride (high). Shigella and Psuedomonas aeruginosa are pathogenic bacteria, and fluoranthene and pyrene are polycylic aromatic hydrocarbons (PAHs).

The only pollutant of concern for which there is a groundwater quality objective is nitrate. The water quality objective for nitrate-nitrogen is 10 mg/L; however, this level is much higher than observed concentrations of nitrate-nitrogen in urban runoff. For example, the range of observed nitrate-nitrogen concentrations from urban land uses in LA County are about 0.3 to 1.4 mg/L. Projected effluent concentrations from the FD/WQ basin would be about 0.3 mg/L.

Dissolved solids is also a drinking water issue, however urban runoff TDS concentrations typically range between about 100-200 mg/l which are low compared to anticipated groundwater TDS concentrations. Wildermuth measured TDS in local streams that ranged between 100-500 mg/L with the higher values associated with dry weather flows fed by shallow groundwater.

Impacts from treated stormwater runoff or dry weather nuisance flows on bacteria or hydrocarbon concentrations in groundwater are generally considered limited where pretreatment and effective source controls are implemented, especially for residential development. Andrew Potts (Cahill Associates), in email correspondence, cites a study conducted by Dierkes and Geiger (1999) that showed that PAHs in highway runoff were effectively removed in the upper four inches of soil.

In summary, the combination of source controls, pretreatment in upstream water quality treatment basins, and pretreatment in the upper soils profile of the infiltration basins will substantially limit the release of pollutants to the groundwater. On this basis, the potential for adversely affecting groundwater quality for these pollutants of concern is considered less than significant.

REFERENCES

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