

- Removal of any trash, debris and sediment removal on regularly scheduled intervals (e.g., 2x per year) and after all rain events.
- Irrigation system inspection and adjustment to ensure proper nourishment of plant palette without excessive watering.
- Minor vegetation removal/thinning and replanting when necessary.
- Integrated pest management (IPM) to reduce reliance on pesticides in accordance with City standards and guidelines.

In accordance with the City LIP and OC DAMP, the project owners and/or POAs of the individual project sites will be responsible for the implementation and maintenance of each applicable non-structural BMP, as well as scheduling inspections and maintenance of all applicable structural BMP facilities through its landscape contractor and any other necessary maintenance contractors for the project site. BMP maintenance shall be in accordance with frequencies outlined in the project-specific WQMPs prepared for the project area.

4.4.3 Water Quality Impacts

The impact assessments are based on the significance criteria established in Section 3 for water quality.

Impact IX.A Would the Project violate any water quality standards or waste discharge requirements?

Impact Analysis: Based on the incorporation of site design, LID features and BMPs as required under the City LIP and OC DAMP, the individual projects within the Planning Area will treat runoff prior to exiting the sites. As a result, water quality exceedances are not anticipated, and pollutants are not expected in Project runoff that would adversely affect beneficial uses in Coyote Creek. Individual assessments are provided below:

- **Sediment:** Sediments are typically characterized into two main categories: course sediment that includes large sand grains, pebbles, etc. and fine particulate sediments that include total suspended solids (TSS). Of concern to water quality are the fine particulate sediments that are more typically associated with urban uses and impervious surfaces. The majority of the land use changes under the CollegeTown plan will allow for minor increases in pervious surfaces compared to existing conditions, but with a significant improvement in the implementation of infiltration and biotreatment BMPs to remove fine sediments from impervious surfaces and runoff. However, during the construction of the individual projects, sediment has the potential to move off-site due to the exposed condition of the site. In order to reduce the amount of sediment discharged off-site due to construction activities, the individual projects that disturb one acre or greater of soil will implement an effective combination of erosion and sediment control BMPs in conformance with the General Construction Permit (GCP). During the post-development condition, any sediment and TSS generated from site-specific developments will be collected in the proposed LID features and BMPs, which are considered effective for targeting pollutants typically associated with these impervious surfaces. Field data indicates sediment removals in

- the range of 90% for bioretention based BMPs and 100% for infiltration and harvest and reuse BMPs since all low flow runoff is retained.²²
- **Trash & Debris:** Urban development can generate significant amounts of trash and debris if not properly managed. The land use changes associated with the Planning Areas including the intensification of residential uses are expected to increase the amount of potential trash and debris generated on the individual Planning Areas as compared to existing conditions. However, the individual projects will implement additional measures, such as source control measures and LID BMPs, to minimize the adverse impacts of trash and debris. Source control measures such as periodic sweeping, litter patrol, and storm drain stenciling will be effective in reducing the amount of trash and debris leaving the site. Site design and LID BMPs also possess moderate to high removal effectiveness for trash and debris. Field data indicates high trash and debris removal using bioretention based BMPs identify more than 95% capture/removal of trash from storm water runoff.²³ Infiltration BMPs typically trap the majority of gross pollutants through pretreatment or a sediment forebay.
 - **Oil and Grease:** Oil and grease limits are defined as a qualitative standard (e.g., no film on surface waters) due to the difficulties in setting single limit or composite sampling water quality standards. However, national monitoring data collected from communities around Los Angeles County demonstrated that the majority of samples taken from open space contain non-detect levels of oil and grease (>80 percent) and that hydrocarbons intermittently observed in runoff from developed areas and when observed, the levels are relatively low.²⁴

Implementation of the CollegeTown project will result in a significant reduction in parking lot surfaces exposed to rainfall and replaced with multi-level parking structures which reduce the amount of exposed parking surfaces to rainfall. In addition, the proposed parking structures and reduced surface area parking will include biotreatment BMPs for treatment of runoff. Maintenance activities, vehicle and equipment fueling and waste handling that have the potential to introduce oil and grease related compounds will be strictly prohibited in outdoor areas where they could potentially come into contact with rain. Based the incorporation of source control and LID BMPs, levels of oil and grease or other hydrocarbons such as PAHs that could adversely affect beneficial uses of the Project's receiving waters or exceed water quality standards are not anticipated. In addition, individual projects will route all low flow storm events through infiltration or biotreatment BMPs which are highly effective at removing oils and grease from storm water. Field data indicates oil and grease removals in the range of 80% for bioretention based BMPs and assumed to be 100% for infiltration facilities since all low flow runoff is retained on-site.²⁵

²² California Stormwater Quality Association. (2003, January). Stormwater Best Management Practices Handbook for New Development and Redevelopment. Retrieved January 27, 2009, from <http://www.cabmphandbooks.com>

²³ Ibid.

²⁴ Pitt, R., Maestre, A., & Morquecho, R. (2003, February). The National Stormwater Quality Database. Presented at the National Conference on Urban Stormwater, Chicago Botanical Gardens and the US EPA, Chicago.

²⁵ California Stormwater Quality Association. (2003, January). Stormwater Best Management Practices Handbook for New Development and Redevelopment. Retrieved January 27, 2009, from <http://www.cabmphandbooks.com>

- **Bacteria/Pathogens:** Based on the existing conditions, and land use/pollutant categories, the existing and proposed Project may be a source of pathogens, especially during storm water runoff conditions. There are numerous potential natural and anthropogenic sources of bacteria indicators including birds, other wildlife, soils and plant material, domesticated animals and pets and improper human waste disposal. Since natural sources of pathogens are difficult to control (such as wild animal waste), the focus of the source control measures for the project sites is on human-related (anthropogenic) and mixed use sources. In order to reduce the proposed pathogen contributions from the Planning Areas, the following source control measures are recommended for implementation at the individual project sites:
 - Landscaping with efficient irrigation design at the project sites to control runoff and allowing for maximum infiltration opportunities;
 - Proper monitoring and maintenance of landscaped areas to remove accumulated dead plant material and debris;
 - Landscape maintenance activities that include the removal of animal feces;
 - Activity restrictions on outdoor mat washing and equipment cleaning related to restaurant and dining activities, which potentially contribute bacteria entrained in storm water, as well as waste accumulation and disposal methods; and
 - Site design features and LID BMPs (e.g., pervious pavements, bioretention) further treat bacteria in storm water runoff via infiltration and filtration.

The available data on the effectiveness of the treatment control BMPs for bacteria indicators is limited. The 2003 California BMP Handbook rates bioretention areas and infiltration BMPs as having high removal efficiencies for bacteria and organics.²⁶ Bioretention based BMPs and infiltration typically reduce bacteria by 90%.

- **Pesticides:** Pesticides can be of a concern based on potential uses as well as previous uses in the past. Using only native drought-tolerant species for landscaping purposes minimizes the use of pesticides and uses less irrigation that could potentially runoff. Low demand irrigation systems should also be used on-site to ensure minimal runoff from irrigation that has the potential to transport pesticides in runoff. In addition, source control measures such as provisions against applying pesticides prior to expected rain events, and the use of properly certified pesticide workers are recommended. As a result of these and similar source control measures, it is anticipated that water quality standards for pesticides will not be exceeded.
- **Nutrients:** Nutrients, particularly nitrogen and phosphorous found within common fertilizers, can be of a concern based on the potential for over-application and over use. Similar to the source control measures for pesticides, using only native drought-tolerant species for landscaping purposes typically requires less fertilizers and irrigation and thereby reduces runoff potential. Low demand irrigation systems with slow release fertilizers are recommended to be used on-site to ensure minimal runoff from irrigation that has the potential to transport nutrients in runoff. Slow-release fertilizers are inorganic fertilizers that slowly release nutrients at a slower rate and are less susceptible to leaching and loss of fertilizer in runoff from rain events. In addition,

²⁶ Ibid.

source control measures such as provisions against applying fertilizers proximate to expected rain events are also recommended. Further, filtration-based LID BMPs (e.g., rain gardens, bioretention with underdrains, etc.) can provide some removal rates although nutrient removal is challenging with commonly accepted LID BMPs based on the design necessity for internal water storage zones and anoxic conditions.

Through the proper implementation of source control design measures, native drought-tolerant landscaping, public education materials to commercial property management, and infiltration/biotreatment BMPs, excessive nutrient loads from the project site are not anticipated or expected. Field data indicates nutrient pollutant removals in the range of 70% – 80% for phosphorous and 40% for nitrogen for bioretention based BMPs.²⁷ Similarly, infiltration BMP removal effectiveness for total phosphorus (TP) and total Kjeldahl nitrogen (TKN) has been shown to be 51% and 65%, respectively. Based on the control measures and infiltration and biotreatment BMPs, nutrients are not expected in Project runoff at levels that could adversely affect water quality or beneficial uses in downstream receiving waters.

- **Metals:** Copper, lead and zinc are the most common metals found in urban runoff. Other trace metals such as chromium, mercury and nickel are not usually detected in urban runoff or are measured at very low levels. The incorporation of the site design measures and LID BMPs throughout the individual project sites will provide a means for the settling of metals attached to particulates as well as vegetative uptake of metals. Field data indicates pollutant removals in the range of 93-98% for bioretention based BMPs and 85-90% for infiltration BMPs.²⁸ Additional source control measures, such as street and parking lot sweeping, will also reduce the potential for metals to reach the storm drain system. As a result, it is anticipated that water quality standards will not be exceeded.
- **Oxygen Demanding Substances:** Oxygen-demanding substances include all organic materials, which consume oxygen as they decompose. Animal droppings, sewage overflows, fallen leaves, and grass clippings are a few examples of oxygen-demanding substances. The combination of site design features, source control measures LID BMPs at the individual project sites are aimed at reducing the potential for these types of substances to be created on the individual project sites, and the structural measures including the LID BMPs will provide a means to remove the potential for these substances to enter the downstream water bodies. Field data indicates organics removals in the range of 90% for bioretention based BMPs and complete removal can be assumed for infiltration BMPs as discharges are eliminated. In certain cases, additional pretreatment devices (screens, filters, etc.) may be necessary upstream of the proposed biotreatment BMPs to reduce the potential for clogging..
- **Dry Weather Flow:** Although the previous discussions have focused on wet weather flows, dry weather flows are also important. Dry weather flows due to anthropogenic sources have the potential to impact local receiving water bodies. Dry weather flows

²⁷ California Stormwater Quality Association. (2003, January). Stormwater Best Management Practices Handbook for New Development and Redevelopment. Retrieved January 27, 2009, from <http://www.cabmphandbooks.com>

²⁸ California Stormwater Quality Association. (2003, January). Stormwater Best Management Practices Handbook for New Development and Redevelopment. Retrieved January 27, 2009, from <http://www.cabmphandbooks.com>

are typically low in coarse sediment due to the low flow rates but pollutants associated with suspended solids such as phosphorous, trace metals, pesticides are typically found in low concentrations in dry weather flows. The land use changes associated with the Planning Areas are not expected to generate significant amounts of dry weather flows due to the drought tolerant landscaping, the use of efficient irrigation systems, the lack of high intensive water use activities on-site, and the use of integrated storm water landscaping features to collect, hold and treat these flows and eliminate dry flow discharges from the individual project sites (site design features and LID BMPs).

- **Vector Control:** The use of integrated storm water landscaping (e.g., LID features) for storm water treatment may increase the potential for vector issues due to the potential for standing water in these features. The potential for mosquito breeding is considered a risk when ponding water exists greater than 72 hours. Thus, any site design features and LID BMPs will be designed to infiltrate and/or discharge from the facility within 24-48 hours, in accordance with City and OC DAMP requirements. In the event additional vector control is needed, a number of abatement measures will be used, including habitat reduction (reconfiguring of plant palettes), temporary flooding and drying (draining) of the ponds, trapping and killing pests, and biochemical pesticides (i.e., the bacteria *Bacillus sphaericus* [Bs] and *Bacillus thuringiensis israeliensis* [Bti]).
- **Groundwater Impacts:** Literature regarding infiltration BMPs indicates that most pollutants in infiltrated water are effectively treated in the uppermost soil layers of infiltration type BMPs. A component of the Nationwide Urban Runoff Program Project conducted in Fresno, CA, indicated that chemicals tend to absorb to particulates (e.g., trace metals) are effectively removed in the upper few centimeters of the soil column. This study was supplemented by a more recent study that also concluded that even chemicals such as organochlorine pesticides and polycyclic aromatic hydrocarbons in an industrial catchment in Fresno were found to be adsorbed in the upper 4 centimeters of sediment.²⁹

Infiltration BMPs, such as pervious pavement and infiltration trenches, require a depth of 10 feet or greater to groundwater to minimize the impacts from storm water pollutants. Groundwater elevations within the project site are in the range of 80 feet below ground surface indicating sufficient depths for the protection of groundwater quality. Based on these design requirements, no pollutants from project runoff are expected to reach groundwater at adverse concentrations.

Impact IX.F *Would the Project otherwise substantially degrade water quality?*

Impact Analysis: As a result of the construction-related, site design, LID and source control BMPs, water quality exceedances are not anticipated and pollutants are not expected in Project runoff that would adversely affect beneficial uses in downstream receiving waters. See Impact Analysis to Impact IX.A for additional details.

²⁹ Schroeder, R.A. (1995) Potential for Chemical Transport Beneath a Storm-Runoff Recharge (*Retention*) Basin for an Industrial Catchment in Fresno, CA. United States Geological Survey (USGS) Water-Resource Investigations Report 93-4140.

5. CONCLUSION

The proposed land use changes under the CollegeTown plan will increase the demand of potable water and sewer flows over existing conditions. The proposed design indicates both sewer and water lines will require upsizing and reconfiguration to support the proposed land uses. In all cases, project specific analyses will be required during final design to evaluate storm drain, water and sewer capacities related to the individual project to ensure impacts are less than significant.

Based on the existing built out condition and the proposed land use changes under the CollegeTown Planning Areas including the implementation of low impact development features, no substantial additional sources of pollutants or significant increases in Project runoff are anticipated. Based on the findings of this technical study, the incorporation of site design/LID features, and infiltration/biotreatment BMPs as required under the City LIP and OC DAMP, the individual projects will adequately reduce project related impacts to hydrology and water quality to a level less than significant.

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