BMP GUIDANCE SERIES
For the
CITY OF SAND CITY, CA

Adopted September 18, 2007

As described in Section 13.05.100 of the City's Ordinance No. 13.05 in the Article titled "Requirement to Prevent, Control and Reduce Storm Water Pollutants." the City has adopted this *BMP Guidance Series* containing Best Management Practices for any activity, operation, or facility which may cause or contribute to pollution or contamination of storm water, the storm drain system, or waters of the U.S.

Where Best Management Practices requirements are promulgated by the City or any federal, State of California, or regional agency for any activity, operation, or facility which would otherwise cause the discharge of pollutants to the storm drain system or water of the U.S., every person undertaking such activity or operation, or owning or operating such facility shall comply with such requirements.

The Public Works Director will report to the City Council annually on the status of implementation of BMPs and any new BMPs to be developed for inclusion in the *BMP Guidance Series*.

Notwithstanding the presence or absence of requirements promulgated in this *BMP Guidance Series*, any person engaged in activities or operations, or owning facilities or property which will or may result in pollutants entering storm water, the storm drain system, or waters of the U.S. shall implement Best Management Practices to the extent they are technologically achievable to prevent and reduce such pollutants. The owner or operator of a commercial or industrial establishment shall provide reasonable protection from accidental discharge of prohibited materials or other wastes into the municipal storm drain system or watercourses. Facilities to prevent accidental discharge of prohibited materials or other wastes shall be provided and maintained at the owner or operator's expense.

CONSTRUCTION SITES

This guidance specifies Best Management Practices (BMPs) for construction sites that shall be employed to protect water quality during construction. At a minimum, every construction site shall employ applicable BMPs outlined below. Additional best management practices, measures and controls shall be employed as applicable and to the maximum extent practicable to prevent pollutants from entering stormwater runoff. For additional details on items shown with an asterisk (*), see Section 4 "Sources of Additional Information in this Guidance Series.

Section 1.0 Construction Site Planning BMPs

1.1 ***Site Plan***

1.1.1 Plan the development to fit the topography, soils, drainage pattern and natural vegetation of the site.

1.1.2 Remove existing vegetation only when absolutely necessary.

1.1.3 Delineate clearing limits, easements, setbacks, sensitive or critical areas, trees, drainage courses, and buffer zones to prevent excessive or unnecessary disturbances and exposure.

1.1.4 Avoid construction on steep slopes*

1.1.5 Minimize cuts and fills*

1.1.6 Align temporary and permanent roads and driveways along slope contours*

1.2 ***Other Measures***

1.2.1 Phase grading operations to reduce disturbed areas and time of exposure

1.2.2 Avoid excavation and grading during wet weather

1.2.3 Winterize construction site*

Section 2.0 Erosion and Sediment Control BMPs

2.1 ***Soil Cover***

2.1.1 Install cover materials such as vegetative debris, mulch, crushed stone, geotextile fabric, erosion control blankets*

2.1.2 Use soil stabilizers as appropriate*

2.1.3 Use temporary seeding and planting to reduce erosion potential*

2.2 ***Tracking Control (for sites where on-site room allows for these measures)***

2.2.1 Construct stabilized access roads and entrances*

2.2.2 Construct entrance/exit tire wash*

2.2.3 When cleaning sediments from streets, driveways and paved areas on construction sites, use dry sweeping methods where possible. If water must be used to flush pavement, collect runoff in temporary storage tanks to settle out sediments prior to discharge to the storm drains, and protect storm drain inlets.

2.3 ***Structures to Control and Convey Runoff***

2.3.1 Earth dikes, drainage swales and ditches*
2.3.2 Slope drains and subsurface drains*
2.2.3 Velocity dissipation devices*
2.3.4 Flared culvert end sections*
2.3.5 Check dams*

2.4 *Other Measures*

2.4.1 Slope roughening/terracing/rounding*
2.4.2 Level spreader*

2.5 *BMPs to Capture Sediment*

2.5.1 Use terracing, riprap, sand bags, rocks, straw bales, and/or temporary vegetation on slopes to reduce runoff velocity and trap sediments. Do not use asphalt rubble or other demolition debris for this purpose.
2.5.2 Protect storm drain inlets from sediment-laden runoff. Storm drain inlet protection devices include sand bag barriers, filter fabric fences, block and gravel filters, and excavated drop inlet sediment traps.*
2.5.3 When dewatering the site, remove sediment from the discharge using filtration methods. Mobile units specifically designed for construction site dewatering can be rented for this purpose.

2.6 *Other Controls* (as required)

2.6.1 Silt fence*
2.6.2 Straw bale barrier (other than at storm drain inlets)*
2.6.3 Sand bag barrier*
2.6.4 Brush or rock filter*
2.6.5 Sediment trap*
2.6.6 Temporary sediment basin*

*For additional details, see Section 4.0 “Sources of Additional Information” below.

Section 3.0 General Site and Materials Management

3.1 *All Construction Sites*

3.1.1 Identify all storm drains, drainage swales and creeks located near the construction site and make sure all subcontractors are aware of their locations to prevent pollutants from entering them.
3.1.2 Clean up leaks, drips, and other spills immediately.
3.1.3 Refuel vehicles and heavy equipment in one designated location.
3.1.4 Wash vehicles at an appropriate off-site facility. If equipment must be washed on-site, do not use soaps, solvents, degreasers, or steam cleaning equipment, and prevent wash water from entering the storm drain.
3.1.5 Never wash down pavement or surfaces where materials have spilled. Use dry cleanup methods whenever possible.
3.1.6 Avoid contaminating clean runoff from areas adjacent to your site by using

berms and/or temporary or permanent drainage ditches to divert water flow around the site.

3.1.7 Keep materials out of the rain. Schedule clearing or heavy earth moving activities for periods of dry weather. Cover exposed piles of soil, construction materials and wastes with plastic sheeting or temporary roofs. Before it rains, sweep and remove materials from surfaces that drain to storm drains, creeks, or channels.

3.1.8 Place trash cans around the site to reduce litter. Dispose of non-hazardous construction wastes in covered dumpsters or recycling receptacles. Recycle leftover materials whenever possible.

3.1.9 Dispose of all wastes properly. Materials that can not be reused or recycled must be taken to an appropriate landfill or disposed of as hazardous waste.

3.1.10 Cover open dumpsters with plastic sheeting or a tarp during rainy weather. Secure the sheeting or tarp around the outside of the dumpster. If your dumpster has a cover, close it.

3.1.11 Train your employees and inform subcontractors about the stormwater requirements and their own responsibilities.

3.2 *Construction Projects Involving Paint Work*

3.2.1 Non-hazardous paint chips and dust from dry stripping and sand blasting may be swept up or collected in plastic drop cloths and disposed of as trash. Chemical paint stripping residue and chips and dust from marine paints or paints containing lead or tributyl tin must be disposed of as a hazardous waste.

3.2.2 When stripping or cleaning building exteriors with high-pressure water, cover or berm storm drain inlets. If possible (and allowed by your local wastewater authority), collect (mop or vacuum) building cleaning water and discharge to the sanitary sewer.

3.2.3 Never clean brushes or rinse paint containers into a street, gutter, storm drain, or creek.

3.2.4 For water-based paints, paint out brushes to the extent possible and rinse to a drain leading to the sanitary sewer (i.e., indoor plumbing).

3.2.5 For oil-based paints, paint out brushes to the extent possible, and filter and reuse thinners and solvents. Dispose of unusable thinners and residue as hazardous waste.

3.2.6 Recycle, return to supplier or donate unwanted water-based (latex) paint.

3.2.7 Dried latex paint may be disposed of in the garbage.

3.2.8 Unwanted oil-based paint (that is not recycled), thinners, and sludges must be disposed of as hazardous waste.

3.3 *Construction Projects Involving Cement and Concrete Work*

3.3.1 Avoid mixing excess amounts of fresh concrete or cement mortar on-site.

3.3.2 Store dry and wet materials under cover, protected form rainfall and runoff.

3.3.3 Wash out concrete transit mixers only in designated wash-out areas where the water will flow into settling ponds or onto dirt or stockpiles of aggregate base or sand. Pump water from settling ponds to the sanitary sewer, where allowed. Whenever possible, recycle washout by pumping back into mixers for reuse. Never dispose of washout into the street, storm drains, drainage ditches, or creeks.

3.3.4 Whenever possible, return contents of mixer barrel to the yard for recycling. Dispose of small amounts of excess concrete, grout, and mortar in the trash.

3.4 ***Construction Projects Involving Roadwork/Pavement Construction***

3.4.1 Apply concrete, asphalt, and seal coat during dry weather to prevent contaminants from contacting stormwater runoff.

3.4.2 Cover storm drain inlets and manholes when paving or applying seal coat, slurry seal, fog seal, etc.

3.4.3 Always park paving machines over drip pans or absorbent materials, since they tend to drip continuously.

3.4.4 When making saw-cuts in pavement, use as little water as possible. Cover each storm drain inlet completely with filter fabric during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the catch basins. Use a wet-dry vacuum to pick up slurry prior to drying or after the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site.

3.4.5 Wash down exposed aggregate concrete only when the wash water can: (1) flow onto a dirt area; (2) drain onto a bermed surface from which it can be pumped and disposed of properly; or (3) be vacuumed from the area along the curb where sediment has accumulated by blocking a storm drain inlet.

3.4.6 Allow aggregate rinse to settle, and pump the water to the sanitary sewer if allowed by your local wastewater authority.

3.4.7 Never wash sweepings from exposed aggregate concrete into a street or storm drain. Collect and return to aggregate base stockpile, or dispose with trash.

3.4.8 Recycle broken concrete and asphalt.

Section 4.0 Sources of Additional Information

Additional information on Construction Site Controls is available in the publications listed below.

4.1 California Stormwater Quality Association (2003) Storm Water Best Management Practice Handbook - Construction.

4.2 Association of Bay Area Governments. 1995. Manual of Standards for Erosion and Sediment Control Measures. A comprehensive filed guide for controlling soil erosion in California.

4.3 BASMAA. 1996. Start at the Source — Residential Site Planning and Design Guidance Manual.

4.4 Caltrans. (2003) Storm Water Quality Handbooks – Construction Contractors Guide
and Specifications. May.

4.5 California RWQCB, San Francisco Region, Erosion and Sediment Control Field Manual (most recent edition).

4.6 Caltrans (2003), Storm Water Quality Handbooks – Project Planning and Design Guide.

NEW DEVELOPMENT AND REDEVELOPMENT

The focus of this guidance is post-construction BMPs for new development or redevelopment projects. Post-construction BMPs are grouped into three types:

- **Site Planning Measures** that avoid or reduce disturbance of the site and limit the addition of impervious surfaces;
- **Pollution Prevention and Source Control Measures** that reduce or eliminate potential future sources of pollutants; and
- **Treatment Control Measures** that treat polluted runoff from new development/redevelopment sites.

This guidance is focused strictly on specific controls that can be incorporated into individual development projects to avoid or reduce the pollutants from the particular project. Where appropriate, pros and cons are described along with typical conditions under which these controls have been found to be effective.

The best opportunities for post-construction controls are available in larger projects or when implemented on a regional basis, and most of this guidance emphasizes controls that can be introduced in larger new development/redevelopment projects through the discretionary approval process. The second section of this guidance presents a list of controls that can be employed for small infill-type projects which are subject only to the ministerial approval process where the opportunities are limited.

Projects requiring discretionary approval from the local jurisdiction include almost all projects except minor infill development. This discretionary approval process is commonly the design review process, although other discretionary approvals such as a use permit or a subdivision map approval may also be triggered depending on the characteristics of the project.

Projects requiring ministerial approval are small improvement projects that conform to the site zoning requirements and include either a new single-family unit or minor modifications to an existing single family unit or a single structure. Such projects typically do not need discretionary approval, but will in all cases need a ministerial permit, such as a building or a grading permit.

Post-Construction BMPs for Projects Requiring Discretionary Approvals

Site Planning BMPs

This group of post-construction controls includes site planning to protect sensitive resources at or near the site and the use of alternate paving and cover materials to reduce the amount of impervious surfaces added by a new development. Studies have shown that in single-family residential areas, streets are the primary producers of runoff, and sidewalks and lawns, if properly vegetated, are a minor source. In multi-family developments, streets, parking lots and roofs generate similar quantities of runoff. In

commercial/industrial areas, parking lots and roofs are the main generators of runoff. It follows then that to reduce impervious surfaces, in single-family residential areas reduction of street width and driveway lengths should be the primary strategy, while in multi-family developments and industrial/commercial areas, strategies should focus on reducing parking lots and the footprint of buildings. *For more information on site planning, refer to "Start at the Source Residential Site Planning and Design Guidance Manual for Stormwater Quality Protection", available from BASMAA.*

Site planning BMPs that minimize impervious surface and maximize infiltration are described below:

- **Cluster development** - Concentrate the development on a limited portion of the site and leave the remaining portion undisturbed. This should be used where appropriate without creating other hazards such as those of access during emergencies.
- **Preserve natural drainages** - This measure includes not filling in the natural drainage features at the site, maintaining invert/streambeds to maximize capacity, and providing vegetated setbacks or buffer strips outside of the maximum water surface level. Main concerns are related to safety especially of children and future need for mosquito/pest control.
- **Reduce sidewalk widths, especially in low-traffic areas** - This control provides limited runoff reduction benefits, and reduction of width may not possible due to Americans with Disabilities Act (ADA) requirements.
- **Avoid curb and gutter along driveways and streets where appropriate** -This is recommended in areas where flooding and ponding of water creating mosquito habitat is not a problem. Replace with swales.
- **Use alternate paving materials/porous/permeable materials, where appropriate** - This measure includes use of alternate paving materials (e.g., porous asphalt, pervious concrete, pavers), landscaping, mulch, gravel and cobbles where appropriate to provide ground cover, and reduce the use of asphalt or other impervious pavement. Pavers are recommended for driveways, walkways, and patios in single-family residences where the site does not generate highly polluted runoff (that could contaminate groundwater if it were to infiltrate) and where ADA requirements do not have to be met. In non-residential areas, pavers are recommended for emergency access roads, overflow parking areas, and non-handicapped parking stalls. (Note: Some types of alternate paving materials may not be suitable where heavy loads (e.g. truck movement) are anticipated.) *For more information on alternate paving materials, see Post-Construction Controls for New Development Fact Sheets available from BASMAA.*
- **Reduce the length of driveways or infiltrate driveway runoff** - This control applies mainly to single-family residential units. If reduction of the driveway length is not possible, grade and construct driveway so that runoff from driveway is directed to the adjacent landscaped areas.
- **Reduce street width by eliminating on-street parking (where such actions do not pose a safety hazard)** - This measure can be generally used in new residential areas. In addition to reducing the impervious area, this control has the added benefit of removing cars from streets and making street sweeping easier and more effective.

If on-street parking in residential areas is eliminated, the developer must provide adequate off-street visitor parking.

- **Reduce alley width or use alternate materials for paving alleys** -If alleys are included in a proposed development, width should be minimized or alternate paving materials should be used.
- **Set aside open space -** This control is recommended for all developments (residential and non-residential). The main concern with open space relates to maintenance, weed control, and fire prevention. This group includes controls that can be incorporated into new development/redevelopment projects to avoid pollution in the long run by eliminating sources.

Pollution Prevention and Source Control BMPs

This group of BMPs includes controls that can be incorporated into new development/redevelopment projects to avoid pollution by eliminating sources.

- **Provide green areas where pets can be exercised** - Pet excrement is a major source of bacteria in urban runoff. Provide green areas in new residential developments where people can walk their pets and keep pet excrement away from sidewalks and streets.
- **Install landscaping or other cover** - Clearing and grading of surfaces in new development can increase potential for erosion. Install landscaping or other cover materials to minimize erosion from graded surfaces. Use of native plant materials is recommended because native plants require less maintenance and irrigation, and are typically more resistant to fires than non-native grasses. Native plants do take longer to cover slopes, therefore during the first few years, supplemental protection (erosion blanket, mulch, etc.) will be necessary.
- **Incorporate low-maintenance landscaping** - At sites where erosion may not be a concern but landscaping is proposed as part of the development, use low-maintenance landscaping that does not require frequent fertilizer, pesticide and herbicide application. Assistance in identifying the types of trees, shrubs, and ground cover that would work in the community, based on local climatic and soil conditions, can be obtained from garden centers, landscapers, and other sources.
- **Label storm drains to discourage dumping** - Label all storm drain inlets and catch basins within the project area with prohibitive language (such as: "NO DUMPING – DRAINS TO OCEAN") and/or graphical icons to discourage illegal dumping. Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area.· Legibility of stencils and signs must be maintained.
- **Where possible, eliminate gutters/roof drains or direct runoff to landscaped areas** - Roof drains can be eliminated only in one to two-story buildings. Where these cannot be eliminated, direct the downspout of the gutter to a landscaped area or into an infiltration trench. Install several gutters to distribute the flow.
- **Construct designated vehicle wash area** - In new residential developments involving more than 50 units, construct a designated vehicle wash area so that the runoff from vehicle washing can be property treated and/or disposed. Contact the local wastewater authority to determine if the discharge can be plumbed to the sanitary sewer. If not, provide appropriate treatment and disposal of this runoff.

- **Where possible use underground parking and the construction of multi-storied parking structures** - For commercial projects build underground or multi-story parking structures so that not only is impervious surface minimized but the parking surfaces are under a roof and not exposed to storm water.
- **Where possible use cooperative or shared parking** - For commercial areas this may be a cooperative effort between commercial entities or between commercial entities and the City.
- **Use alternate paving materials for parking lots** - This control is recommended for overflow parking areas and for less frequently used parking spaces (typically these are spaces along the periphery of the parking lot that will not have to meet ADA requirements and due to low usage there will be less concern regarding pollution of groundwater through infiltration of stall runoff).
- **Use measures to reduce building footprint and increase use of taller structures (where appropriate)** - This control is recommended for commercial and municipal structures, where it would also be consistent with other City planning and building requirements.
- **Berm waste storage areas** - Grade and pave outdoor waste receptacle areas to prevent run-on of storm water, and install a low containment berm around it. Alternately, construct a covered enclosure with wash-down capabilities plumbed into the sanitary sewer, after first contacting the local wastewater authority to verify that this practice will be acceptable.
- **Install valves on storm drain inlets in loading dock areas** - At commercial/industrial facilities where loading docks are proposed, install a valve(s) to control runoff in the event of spills.

Treatment BMPs

This group of BMPs includes controls that can be built at new development and redevelopment sites to capture and treat the polluted runoff before it enters the City's storm drain system or other receiving waters. Those BMPs which are feasible for the proposed development should be incorporated into its design.

Treatment control design standards, depending on the type of units, are based on either treating a given volume of runoff (e.g., first 0.5 inch of runoff) or a peak flowrate associated with a design storm. The volume approach is often utilized for small catchments where there tends to be a "first flush" condition (e.g., a parking lot). Design storms for storm water controls may be small (e.g. recurrence intervals of 3 months to 2 years) compared to flood control designs standards because of the need to minimize the size and cost of the unit, and because most runoff is associated with the more frequent smaller events. Treatment controls must be designed such that volumes and flows in excess of the design standard bypass the unit, otherwise there is the possibility of aggravating flooding and also causing resuspension of previously captured sediments or other constituents. Also, all of the treatment BMPs described below require some inspection, maintenance, and disposal of solids to ensure optimum performance and often to avoid flooding.

- **Rooftop Catchment Systems** - These are rooftops which can sometimes be designed into large commercial and industrial sites to pool stormwater which, following the storm, evaporates. This effectively eliminates rooftop runoff from the storm drain system, and thereby reduces the hydraulically-connected impervious area. Another function of these systems is to slow down the runoff to reduce peaks. Problems with rooftop catchment systems are mainly related to leakage.
- **Vegetated Filter Strips** - Vegetated filter strips, buffer strips, or riparian buffer zones are strips of vegetation placed between receiving waters (e.g., along streams) and pollutant sources. The effectiveness of the strips depend primarily on the width of the strip, and the vegetation type and condition. Strips of 100-300 feet in width are often considered. Such strips have been successfully applied to urban, agricultural, and forestry situations. Vegetation type selection must take into account the climate and usually should be drought-resistant. Maintenance is primarily annual cutting. Such strips are recommended for developments located along receiving waters such as streams, rivers and lakes, but outside the flood control boundary.
- **Vegetated Swales** - Swales are shallow low gradient channels that are vegetated. They are commonly applied in rural residential areas in lieu of traditional curb/gutters and underground stormwater drainage pipes. Water quality improvement is achieved primarily through filtration, and performance is dependent on the swale hydraulic capacity and vegetation type and condition. Influent water should be relatively free of coarse sediment to avoid burying the vegetation. Where sediment loads are of concern, sediment settling basins can be provided upstream of the swales. Maintenance consists primarily of vegetation management and settling basin cleanouts. Swales are generally recommended for low-density residential developments located in relatively flat terrain.
- **Infiltration Basins** - Infiltration basins store and infiltrate stormwater into the surficial groundwater aquifer. Performance is critically dependent on soil porosity and adequate depth to groundwater. Such conditions are typical of inland valleys, in contrast to low lying coastal areas. In order to maintain recharge rates, influent water may require pretreatment to remove sediments. Infiltration basins are effective at reducing runoff rates and volumes and can provide water supply benefits through aquifer recharge. Maintenance primarily consists of periodic removal of accumulated trash, debris and sediments to maintain recharge rates. Infiltration basins are generally recommended in areas where the depth to groundwater is relatively high and the soils are highly pervious. Where such conditions exist, this technology is generally applicable to the entire range of urban development, although the potential for groundwater contamination is often of concern in industrial areas.
- **Infiltration Trenches** - Infiltration trenches are shallow drains filled with high porosity materials (e.g. gravel). Stormwater discharged to these trenches is stored during the runoff event and infiltrates into the groundwater during dry weather periods. As with infiltration basins, performance requires porous subsoils and adequate depth to the groundwater table. The acceptability and designs of infiltration trenches must take into consideration the potential for infiltrating water to adversely affect soil strength around foundations. Infiltration trenches are generally not recommended for roof runoff near buildings because of building code requirements; but can be effective as part of the overall open channel drainage system.

- **Dry Detention Ponds/Basins** - These are basins designed to temporarily store and treat storm water prior to gradually releasing it downstream. Such basins can provide flood control and storm water treatment benefits. Treatment performance depends on storage volume (12-24 hours of residence time is considered a good rule of thumb), and good circulation (avoidance of short circuiting). A major factor limiting good performance is that, during larger storm runoff events, water entering a dry basin may resuspend previously settled material in which case the ponds may act as a source of sediment and associated chemicals. In general dry basins are not as effective as wet basins (discussed below), however, in certain arid areas, wet basins are not feasible. Performance of dry basins can be improved by incorporating slow release outlet structures. Such basins are generally applicable to residential, commercial, and industrial development in areas where there is insufficient runoff to maintain wet basins.
- **Retention Ponds/Wet Basins** - These are basins that contain a permanent pool of water. Such ponds can provide flood control, ecological, and water quality benefits. The performance of wet basins depends on the size of the basin, watershed characteristics, and influent conditions. The primary treatment process in retention ponds is settling. Maintenance is required for removing debris, vegetation management, and maintaining the inlet and outlet structures. Accumulation rates in such basins typically require that accumulated sediment be removed about once every 10-20 years. Retention ponds are generally applicable to most urban situations, as long as there is adequate space for the facility and acceptable geological conditions.
- **Constructed/Restored Wetlands** - In addition to providing flood control and water supply benefits through artificial recharge of groundwater, constructed wetlands designed for stormwater management provide water quality benefits through a number of processes including sedimentation, filtration, absorption, biological processes, and nutrient uptake. Pollutant removal performance depends on the size of the wetland relative to the watershed, the design of the wetland, and the type and composition of wetland vegetation. Wetlands also provide additional ecological and recreational benefits. If a significant amount of sedimentation is anticipated, a deep settling basin could be constructed (which the water would enter prior to reaching the wetland). The basin would require periodic maintenance to remove accumulated sediment. Constructed wetlands require maintenance, especially in the first 5-10 years during which vegetation is growing and natural seeding is occurring. Providing suitable hydrologic conditions for vegetation growth and water treatment is key to successful performance of constructed wetlands. Constructed wetlands are generally applicable to most urban situations, as long as there is adequate space for the facility, an adequate source of water, and appropriate soils. In California, such wetlands would likely be seasonal in nature. The cost of urban lands often preclude this type of treatment in the more densely developed portions of urban areas.

A variation of this control is the use of existing wetlands for urban runoff treatment. Existing wetlands at or downstream of a new development/redevelopment project can be enhanced to improve hydrology, and runoff from the development project can be directed to the wetlands. Note that the dry detention ponds/basins, retention ponds/wet basins, and the constructed wetlands need to be periodically monitored for

accumulation of toxic materials, and provisions made for cleanout and disposal pretreatment may be added (to remove heavy sediment trash and debris) to reduce maintenance. If a significant amount of sediment is anticipated, a deep settling basin could be constructed. This would also need to be periodically cleaned out to maintain capacity.

- **Filtration Systems** - Filtration systems convey stormwater through filter media (e.g., sand, compost, charcoal) to treat the storm water. The chemicals treated vary depending on the type of media and may include fine sediment, colloidal material, hydrocarbons, organics, nutrients and dissolved metals. Such systems come in many sizes and designs including: (1) inserts placed in individual storm drain inlets, (2) linear units that treat stormwater from small impervious areas such as parking lots, and (3) large 1-2 acre sand filters that treat runoff from urban catchments. Filters are effective as long as the capacity of the filter is not exceeded, and the filter is not allowed to clog. Filter inserts are particularly problematic in this regard, and recent testing and evaluation questions their applicability where material in runoff will clog or block the filter. In stormwater applications filter systems are required to remove blocking materials (leaves, trash, debris, sediments, oil and grease) and storage to better manage flowrates. Experience to date with filter type inserts for drain inlets suggest that the units are easily clogged with sediment and debris, with resultant bypassing of most of the flows. Therefore, inserts are not recommended unless require frequent inspection and cleaning is performed. Filtration systems will have limited application in small well-maintained parking lots.
- **Oil/Grit Separators** - Oil/grit (gravity) separators are usually multi-chambered treatment units that are placed underground and treat stormwater from a drainage catchment. The individual chambers often are designed to trap grit and floatables, and adsorb hydrocarbons. Flows in excess of the design capacity should be diverted around the unit, otherwise there is the possibility that sediment previously trapped in the chambers will be resuspended and flushed downstream. Inspection and maintenance is required to ensure that the units are not filling up with sediment, as accumulation can affect performance. Traditional gravity oil/water separators that utilize skimming devices and coalescing plates (to increase droplet size and capture) are generally not applicable to stormwater conditions where total hydrocarbon concentrations are generally less than 10 mg/l. The performance of oil/grit separators varies depending on the chosen design. Research should be done before selecting any separators to verify that they will perform as desired. In general, oil/grit separators are useful only at sites where there are chances that oil spills could occur and to a limited degree at development sites that have high oil and grease loadings such as petroleum storage yards and vehicle storage facilities.

Post-Construction BMPs for Projects Requiring Ministerial Approvals

- **Incorporate low-maintenance landscaping** - Use low-maintenance drought-tolerant landscaping that does not require frequent fertilizer, pesticide and herbicide application.

- **Label storm drains to discourage dumping** - Label all storm drain inlets and catch basins within the project area with prohibitive language (such as: "NO DUMPING – DRAINS TO OCEAN") and/or graphical icons to discourage illegal dumping. Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area.· Legibility of stencils and signs must be maintained.
- **Where possible, direct gutters to landscaped areas** - Roof drains may be eliminated only in one to two-story buildings. Where these cannot be eliminated, direct the downspout of the gutter to landscaped area or into an infiltration trench. Install several gutters to distribute the flow. Note that roof drains may be eliminated in residential and some commercial areas only, and should not be eliminated in industrial areas.
- **Use alternate paving materials/porous/permeable materials, where appropriate** - Use alternate paving materials (pavers), landscaping, mulch, gravel and cobbles where appropriate to provide ground cover, and reduce the use of asphalt or other impervious pavement. Pavers are recommended for driveways, walkways, and patios in single-family residences where the site does not generate highly polluted runoff (that could contaminate groundwater if it were to infiltrate) and where ADA requirements do not have to be met. In non-residential areas, pavers are recommended for emergency access roads, overflow parking areas, and non-handicapped parking stalls. These are not recommended where heavy loads (e.g. truck movement) are anticipated. For more information on alternate paving materials, see Post-Construction Controls for New Development Fact Sheets available from BASMAA.

Providing Proof of Ongoing BMP Maintenance

As part of project review, if a project applicant is required to include Structural or Treatment Control BMPs in project plans, the City will require that the applicant provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

For all properties, the verification will include the developer's signed statement, as part of the project application, accepting responsibility for all structural and treatment control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public or private entity assuming responsibility for Structural or Treatment Control BMP maintenance. A sample agreement is included in Attachment A at the end of this section.

The transfer of property to a private or public owner shall have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP included in the sales or lease agreement for that property. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located

within a common area which will be maintained by a homeowner's association, language regarding the responsibility for maintenance shall be included in the projects conditions, covenants and restrictions (CC&Rs).

Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what storm water management facilities are present, signs that maintenance is needed, and how the necessary maintenance can be performed. The transfer of this information shall also be required with any subsequent sale of the property.

Sources of Additional Information

For additional information on post-construction controls for new development and redevelopment projects, see the following:

Bay Area Stormwater Management Agencies Association. 1996. Start at the Source. Residential Site Planning and Design Guidance Manual for Stormwater Quality Protection.

City of Olympia. 1994. Impervious Surface Reduction Study. Conducted by the Public Works Department. Water Resources Program. November. (for information on reducing impervious surfaces such as street widths, sidewalks, and parking facilities).

Wilson, A. 1994. "Stormwater Management, Environmentally Sound Approaches", published in the Environmental Building News, Vol. 3, No. 5, September/October. (for a general discussion of new development controls).

City of San Rafael. 1991. Hillside Residential Design Guidelines Manual. Prepared by Gast Hilmer Associates. (for more information on designing and building residential developments in hilly areas).

Bay Area Stormwater Management Agencies Association (BASMAA). 1997. Compilation of New Development Stormwater Treatment Controls in the San Francisco Bay Area. June. (For treatment controls)

California State Stormwater Quality Task Force. 1993. California Stormwater Best Management Practice Handbook - Municipal. March. (For treatment controls)

US Environmental Protection Agency. 1993. Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Issued Under Authority of Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990. EPA 840-B-92-002. January.

Center for Watershed Protection, Watershed Protection Techniques, A Quarterly Bulletin on Urban Watershed Restoration and Protection Tools.

Center for Watershed Protection. 1996. Design of Stormwater Filtering Systems, prepared for Chesapeake Research Consortium, December.

Center for Watershed Protection. 1995. Site Planning for Urban Stream Protection, prepared by T. Schueler for Metropolitan Washington Council of Governments. (For information on cluster development, stream protection buffers, street reduction controls)

MANDATORY DESIGN STANDARDS

All discretionary development and redevelopment projects that fall into one of the following categories are subject to the Design Standards set forth below. These categories are:

1. Single-Family Hillside Residences
2. 100,000 Square Foot Commercial Developments
3. Automotive Repair Shops
4. Retail Gasoline Outlets
5. Restaurants
6. Home Subdivisions with 10 or more housing units
7. Parking lots 5,000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff

1. Design Standards Applicable to All Categories:

a. Peak Storm Water Runoff Discharge Rates. Post-development peak storm water runoff discharge rates shall not exceed the estimated pre-development rate for developments where the increased peak storm water discharge rate will result in increased potential for downstream erosion.

b. Conserve Natural Areas. If determined appropriate by the City, the following items must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

1) Concentrate or cluster Development on portions of a site while leaving the remaining land in a natural undisturbed condition.
2) Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
3) Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
4) Promote natural vegetation by using parking lot islands and other landscaped areas.
5) Preserve riparian areas and wetlands.

c. Minimize Storm Water Pollutants of Concern. The development must be designed so as to minimize, to the maximum extent practicable, the introduction of pollutants of concern that may result in significant impacts, generated from site runoff of directly connected impervious areas (DCIA), to the storm water conveyance system as approved by the building official. Pollutants of concern consist of any pollutants that exhibit one or more of the following characteristics: current loadings or historic deposits of the pollutant are impacting the beneficial uses of a receiving water, elevated levels of the pollutant are found in sediments of a receiving water and/or have the potential to bioaccumulate in organisms

therein, or the detectable inputs of the pollutant are at concentrations or loads considered potentially toxic to humans and/or flora and fauna. In meeting this specific requirement, "minimization of the pollutants of concern" will require the incorporation of a BMP or combination of BMPs best suited to maximize the reduction of pollutant loadings in that runoff to the Maximum Extent Practicable.

d. Protect Slopes and Channels. Project plans must include BMPs consistent with local codes, ordinances, or other regulatory mechanism and these Design Standards to decrease the potential of slopes and/or channels from eroding and impacting storm water runoff:

1) Convey runoff safely from the tops of slopes and stabilize disturbed slopes.
2) Utilize natural drainage systems to the maximum extent practicable.
3) Stabilize permanent channel crossings.
4) Vegetate slopes with native or drought tolerant vegetation, as appropriate.
5) Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion, with the approval of all agencies with jurisdiction, e.g., the U.S. Army Corps of Engineers and the California Department of Fish and Game.

e. Provide Storm Drain System Stenciling and Signage. All storm drain inlets and catch basins within the project area must be stenciled with prohibitive language (such as: "NO DUMPING – DRAINS TO OCEAN") and/or graphical icons to discourage illegal dumping. Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area.· Legibility of stencils and signs must be maintained.

f. Properly Design Outdoor Material Storage Areas. Outdoor material storage areas refer to storage areas or storage facilities solely for the storage of materials. Where proposed project plans include outdoor areas for storage of materials that may contribute pollutants to the storm water conveyance system, the following Structural or Treatment BMPs are required:

1) Materials with the potential to contaminate storm water must be: (a) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the storm water conveyance system; or (b) protected by secondary containment structures such as berms, dikes, or curbs.
2) The storage area must be paved and sufficiently impervious to contain leaks and spills.
3) The storage area must have a roof or awning to minimize collection of storm water within the secondary containment area.

g. Properly Design Trash Storage Areas. A trash storage area refers to an area

where a trash receptacle or receptacles (dumpsters) are located for use as a repository for solid wastes. All trash storage areas must meet the following Structural or Treatment Control BMP requirements (individual single family residences are exempt from these requirements):

1) Trash container areas must have drainage from adjoining roofs and pavement diverted around the area(s).
2) Trash container areas must be screened or walled to prevent off-site transport of trash.

h. Provide Proof of Ongoing BMP Maintenance. If a project applicant has included or is required to include, Structural or Treatment Control BMPs in project plans, the applicant shall provide verification of maintenance provisions through such means as may be considered appropriate by the City, including but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits. For all properties, the verification will include the developer's signed statement, as part of the project application, accepting responsibility for all structural and treatment control BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance. The transfer of property to a private or public owner must have conditions requiring the recipient to assume responsibility for maintenance of any Structural or Treatment Control BMP to be included in the sales or lease agreement for that property, and will be the owner's responsibility. The condition of transfer shall include a provision that the property owners conduct maintenance inspection of all Structural or Treatment Control BMPs at least once a year and retain proof of inspection. For residential properties where the Structural or Treatment Control BMPs are located within a common area which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the project's conditions, covenants and restrictions (CC&Rs). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what storm water management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the City may be able to provide. The transfer of this information shall also be required with any subsequent sale of the property. If Structural or Treatment Control facilities are located within a public area proposed for transfer, they will be the responsibility of the developer until they are accepted for transfer by the public agency. Structural or Treatment Control facilities proposed for transfer must meet design standards adopted by the public entity for the facilities installed and shall be approved by the public agency prior to its installation.

i. Properly Design Structural and Treatment Control Facilities. Structural and treatment control facilities shall be designed based on either a volumetric or flow based treatment control design standard, or both, as described below to mitigate (infiltrate, filter or treat) storm water runoff:

1) Volumetric Treatment Control Design Standard:

a) The 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87, (1998); or

b) The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbook – Industrial/ Commercial, (2003); or

c) The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event.

2) Flow Based Treatment Control Design Standard:

a) The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the area; or

b) The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.

Limited Exclusion: Restaurants and Retail Gasoline Outlets, where the land area for development or redevelopment is less than 5,000 square feet, are excluded from the numerical Structural or Treatment Control BMP design standard requirement only.

2. Provisions Applicable to Individual Priority Project Categories:

a. <u>100,000 Square Foot Commercial Developments</u>:

1) Properly Design Loading/Unloading Dock Areas:

a) Cover loading dock areas or design drainage to minimize run-on and runoff of storm water.

b) Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

2) Properly Design Repair/Maintenance Bays:

a) Repair/maintenance bays must be indoors or designed in such a way that doesn't allow storm water runon or contact with storm water runoff.

b) Design a repair/maintenance bay drainage system to capture all washwater, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local wastewater authority, obtain an Industrial Waste Discharge Permit.

3) Properly Design Vehicle/Equipment Wash Areas:

a) Self-contained and/ or covered areas must be equipped with a clarifier, or other pretreatment facility, and
b) Properly connected to a sanitary sewer or other appropriately permitted disposal facility.

b. Restaurants:

1) Properly Design Equipment/Accessory Wash/Steam Clean Areas:

a) These areas must be self-contained, equipped with a grease trap, and properly connected to a sanitary sewer.
b) If the wash area is to be located outdoors, it must be covered, paved, have secondary containment, and be connected to the sanitary sewer or other appropriately permitted disposal facility.

c. Retail Gasoline Outlets:

1) Properly Design Fueling Area:

a) The fuel dispensing area must be covered with an overhanging roof structure or canopy. The canopy's minimum dimensions must be equal to or greater than the area within the grade break. The canopy must not drain onto the fuel dispensing area, and the canopy downspouts must be routed to prevent drainage across the fueling area.
b) The fuel dispensing area must be paved with Portland cement concrete (or equivalent smooth impervious surface), and the use of asphalt concrete shall be prohibited.
c) The fuel dispensing area must have a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents runon of storm water to the extent practicable.
d) At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.

d. Automotive Repair Shops:

1) Properly Design Fueling Area:

a) The fuel dispensing area must be covered with an overhanging roof structure or canopy. The canopy's minimum dimensions must be equal to or greater than the area within the grade break. The canopy must not drain onto the fuel dispensing area, and the canopy downspouts must be routed to prevent drainage across the fueling area.
b) The fuel dispensing area must be paved with Portland cement concrete (or equivalent smooth impervious surface), and the use of asphalt concrete shall be prohibited.
c) The fuel dispensing area must have a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents runon of storm water to the extent practicable.

d) At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.

2) Properly Design Repair/Maintenance Bays:

a) Repair/maintenance bays must be indoors or designed in such a way that doesn't allow storm water run-on or contact with storm water runoff.

b) Design a repair/maintenance bay drainage system to capture all wash-water, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local wastewater authority, obtain an Industrial Waste Discharge Permit.

3) Properly Design Vehicle/Equipment Wash Areas:

a) These areas must be self-contained and/or covered, equipped with a clarifier, or other pretreatment facility, and properly connected to a sanitary sewer or other appropriately permitted disposal facility.

4) Properly Design Loading/Unloading Dock Areas:

a) Cover loading dock areas or design drainage to minimize run-on and runoff of storm water.

b) Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

e. Parking Lots:

1) Properly Design Parking Areas:

a) Reduce impervious land coverage of parking areas.

b) Infiltrate or treat runoff.

2) Properly Design To Limit Oil Contamination and Perform Maintenance:

a) Treat to remove oil and petroleum hydrocarbons at parking lots that are heavily used (e.g. fast food outlets, lots with 25 or more parking spaces , sports event parking lots, shopping malls, grocery stores, discount warehouse stores).

b) Ensure adequate operation and maintenance of treatment systems particularly sludge and oil removal, and system fouling and plugging prevention control.

3. Waiver.

At its discretion and for good cause, the City may waive one or more of the requirements set forth in this Section if impracticability for a specific property can be established. A waiver of impracticability shall be granted only when all other Structural or Treatment Control BMPs have been considered and rejected as infeasible. Recognized situations of impracticability include, (i) extreme limitations of space for treatment on a redevelopment project, (ii) unfavorable or unstable soil conditions at a site to attempt

infiltration, and (iii) risk of ground water contamination because a known unconfined aquifer lies beneath the land surface or an existing or potential underground source of drinking water is less than 10 feet from the soil surface. A waiver may be revoked for cause and with proper notice.

4. Limitation on Use of Infiltration BMPs.

Three factors significantly influence the potential for storm water to contaminate ground water. They are (i) pollutant mobility, (ii) pollutant abundance in storm water, (iii) and soluble fraction of pollutant. The risk of contamination of groundwater may be reduced by pretreatment of storm water. In addition, the distance of the groundwater table from the infiltration BMP may also be a factor determining the risk of contamination. A water table distance separation of ten feet depth in California presumptively poses negligible risk for storm water not associated with industrial activity or high vehicular traffic.

Site specific conditions must be evaluated when determining the most appropriate BMP. Additionally, monitoring and maintenance must be provided to ensure groundwater is protected and the infiltration BMP is not rendered ineffective by overload. This is especially important for infiltration BMPs for areas of industrial activity or areas subject to high vehicular traffic [25,000 or greater average daily traffic (ADT) on main roadway or 15,000 or more ADT on any intersecting roadway]. In some cases pretreatment may be necessary.

5. Alternative Certification for Storm Water Treatment Mitigation.

In lieu of conducting a detailed BMP plan review to verify Structural or Treatment Control BMP adequacy, the City may, at its discretion, elect to accept a signed certification from a Civil Engineer or a Licensed Architect registered in the State of California, that the plan meets the criteria established herein. Certifying person(s) will have to demonstrate to the City's satisfaction that they have been trained on BMP design for water quality not more than two years prior to the signature date. Training conducted by an organization with storm water BMP design expertise (e.g., a University, American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, or the California Water Environment Association) may be considered qualifying."