3.0 BMP Selection

Effective operation and proper maintenance of any storm water treatment systems begins with selection of the most appropriate, site-specific BMPs. Factors to evaluate include:

- **Watershed**

Evaluate the project on a sub-watershed scale by looking at the total runoff area serviced by the project. It is important to account for natural drainage sources as well as impervious surface runoff. Pretreatment and infiltration practices are appropriate for smaller areas, where larger drainage areas may require sizeable basins or wetland treatment. Also, consider BMP location with respect to existing or planned storm water controls and evaluate potential effects on downstream BMPs and the upstream watershed.

- **Storm water Pollutants**

It is important to pinpoint the pollutants likely to reach each BMP and their potential sources. Before selecting BMPs for constituent removal, evaluate source control opportunities. Controlling pollutants at the source is more efficient and cost effective than removing them from storm water runoff. Possible source control methods include paving, sweeping of street abrasives, secondary containment of waste drums, revegetation of eroding slopes, and early capture of hydrocarbons by pretreatment vaults.

Pollutant removal processes vary considerably among BMPs. Mechanisms for eliminating unwanted contaminants include sedimentation, floatation, filtration, infiltration, and biological uptake and conversion. Due to differences in these removal processes, identifying target constituents is crucial for optimum BMP selection. Most BMPs are effective at removing large particles while well vegetated basins and other infiltration methods are more suited for removal of fine sediments (<60μm) and dissolved constituents. Petroleum hydrocarbons and other chemical contaminants are best treated with vendor-supplied filtration media. Dissolved contaminants require long residence times, high soil-water contact, and the opportunity for vegetative uptake.

- **Bypass Opportunities**

To limit treatment volumes and improve pollutant removal capacity, evaluate sources of clean runoff and consider measures to prevent mixing with polluted flows.

- **Area Required**

Often the amount of available land will dictate BMP selection. Large BMPs such as treatment basins and wet ponds are land intensive. Other practices such as treatment vaults and infiltration trenches may require less land area or can be installed underground, although this often increases maintenance costs.

- **High Sediment Loads**

Since most BMPs are susceptible to sediment clogging, areas with unusually high sediment loads should be identified and appropriate pretreatment BMPs or source control methods should be employed. Pretreatment increases the effectiveness of downstream BMPs, reduces maintenance costs, and extends BMP life. Over sizing sediment basins and/or pretreatment structures can help treat areas known to have high sediment loads and provide enhanced

treatment during larger storm events and spring runoff.

- **Debris**

Most areas in the Tahoe Basin are subject to large amounts of woody debris from pine and fir trees. Pine needles, cones, and twigs often find their way into storm water treatment systems and can clog inlets and outlets as well as disrupt desired flow paths. Consider the amount of debris expected, how it might affect project BMPs, and include debris traps where appropriate.

- **Soil Conditions**

Soil permeability has an enormous impact on BMP effectiveness, particularly for infiltration practices. Soil information can be found in the Tahoe Basin Soil Survey published by the US Department of Agriculture, including soil types and estimates of permeability. Site specific infiltration measurements should be made to determine percolation rates. Beware of soils with high clay contents; although they may offer effective treatment, they can impair infiltration efficiencies. Conversely, sandy soils with rapid infiltration rates may not provide adequate treatment of dissolved nutrients. Soil amendments may be necessary to improve treatment capacity of infiltration methods.

- **Slope**

Steep slopes can restrict the use of several BMPs, especially when high flow velocities threaten instability or erosion.

- **Depth to Groundwater**

A critical factor in the design of all BMPs is the water table elevation. Incorrectly estimating the seasonal high water table can cause BMP failure, decrease effectiveness, and increase maintenance costs. Proper performance of infiltration practices requires at least 1.2 meters (4 feet) of separation between the BMP bottom and seasonal high water table. In contrast, wetland treatment systems require high groundwater or irrigation to maintain permanent pools and aquatic vegetation.

- **Bedrock**

Restrictive rock layers can impede downward infiltration of runoff or make pond excavation expensive or impossible. Caltrans suggests at least 1.2 meters (4 feet) of separation between bedrock or other impervious layer and the bottom of treatment facilities.

- **Proximity to Wells**

With the present emphasis on storm water infiltration, the threat of contaminating drinking water wells with urban runoff must be evaluated, especially for infiltration projects. All source water wells and intakes in the Lake Tahoe Basin are bounded by a 182.9 meter (600-foot) buffer zone per Chapter 83 of the TRPA Code of Ordinances. Although this buffer does not restrict BMP installation, well proximity must be considered during the design phase. Monitoring wells may be required to evaluate possible contamination. The location of other research and monitoring wells that may be affected should also be carefully evaluated.

- **Receiving Water**

Evaluate the current condition of the ultimate receiving water, including physical, chemical, and biological indicators. Most waterways in the Tahoe Basin have numerical standards set by the Lahontan Regional Water Quality Control

Board, the Nevada Department of Environmental Protection, or TRPA. Assess storm water impacts before project implementation and set reasonable goals for impact reduction.

- **Public Awareness and Safety**

Informing the public of the location and purpose of project BMPs raises awareness of storm water management and encourages local participation. It is also important to notify local residents of any potential health hazards (such as large wet ponds) associated with storm water controls. It may be necessary to install safety devices, such as fences around certain BMPs. Take into account the proximity to local schools and playgrounds to ensure the safety of local children.

- **Maintenance**

Storm water BMPs must be properly maintained to ensure optimal performance. Maintenance may include planning for access for ease of sediment and debris removal from BMPs.

- **Additional References**

California Tahoe Conservancy. **Soil Erosion Control Grants Program Announcement and Guidelines** (July 2001)