# TREATMENT BEST MANAGEMENT PRACTICES TECHNOLOGIES MATRIX*

| | BMPs | Pollutants of Concern for Source Water** – Percent Removal | | | | Pollutants of Concern for Urban Runoff – Percent Removal | | | | | | | Community and Environmental Factors | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total Nitrogen | Total Phosphorous | Total Dissolved Solids | Total Organic Carbon | Total Suspended Solids | Total Copper | Total Lead | Total Zinc | Oil and Grease | Bacteria | Trash / Sediment | Aesthetics | Habitat | Relative Cost | Maintenance | Safety | Water Conservation |
| FILTRATION | Perimeter Sand Filter (i.e., Delaware) | 25% [e], 24% [g], 12.9% to 84.2% [y] Nitrate -55% [g], -674.2 to 66.8%% [y] TKN 44% [g], 0.0 to 90.4% [y] Ammonia N –100 to 75.6% [y] Nitrite N –236 to 92.9% [y] | 56.3 to 91.8% [y], -14.3 to 91.8% [y] 50% [e], 44% [g] Ortho-Phosphate 21% [g], -10 to 93.9% [y], 16.7 to 92.9% [y] | NA | 67% [l], -100 to 90% [y] | 80% [e], 81% [g], 41.2 to 96.4% [y], 15.4 to 96.4% [y] | 64% [g], 0 to 50% [r] Dissolved 64% [g] | 85% [g] Dissolved 43% [g] | 89% [g], 57.9 to 88.2% [y] Dissolved 92% [g] | TPH – Oil 55% [g] TPH – Diesel 47% [g] | Fecal Coliform 79% [g] | NA | ○ | ○ | ◑ | E | ● | ● |
| | Surface Sand Filter (i.e., Austin) | 21% [aa], 25% [e], 17% [g], 31% [r], 32% [r], 47% [r] Nitrate -71% [g] TKN 41% [g], 62% [r], 57% [r], 81% [r], 46% [aa] Nitrate + Nitrite -82% [r], -37% [r], -38% [r] Nitrate as Nitrogen 0% [aa] | 61% [r], 50% [r], 65% [r], 33% [aa], 50% [e], 39% [g], 55% [g] Ortho-Phosphate 6% [g] | 30% [r], -19% [r], 3% [r] | 61% [r], 38% [r], 87% [r], 48% [aa] | 80% [e], 90% [g], 87% [r], 70% [r], 86% [r], 70% [aa] | 50% [g], 60% [r], 20% [r], 71% [r] Dissolved 6% [g] | 87% [g], 80% [r], 85% [r], 79% [r], 45% [aa] Dissolved 39% [g] | 80% [g], 80% [r], 78% [r], 84% [r], 45% [aa] Dissolved 80% [g] | TPH – Oil 30% [g] TPH – Diesel 25% [g] | Fecal Coliform 65% [g], 36% [r], 22% [r], 69% [r], 76% [aa] | Sediment 85% [k] | ○ | ○ | ◑ | E | ● | ● |
| | Compost Filter System | Nitrate -34% [h] | 41% [h], 4% [h], 40% [g] | NA | NA | 95% [h], 85% [h] | Metals 61 to 88% [h], 44 to 75% [h] | Metals 61 to 88% [h], 44 to 75% [h] | Metals 61 to 88% [h], 44 to 75% [h] | NA | NA | Sediment 85% [k] | ◑ | ○ | ◑ | L | ◑ | ● |
| | Media Filter | 13% [g] Nitrate -7% [g] TKN 19% [g] | 24% [g] Orthophosphate 9% [g] | NA | NA | 40% [g], 92% [w], 43% [w] | 67% [g], 65% [w], 33% [w] Dissolved 26% [g] | 52% [g], 82% [w], 50% [w] Dissolved 29% [g] | 55% [g], 83% [w], 29% [w] Dissolved 23% [g] | TPH – Oil 52% [g] TPH – Diesel 67% [g], 81% [w], 74 to 69% [w] TPH 84% [w] | Fecal Coliform 47% [g] | NA | ◑ | ○ | ◑ | L | ● | ● |
| INFILTRATION | Porous Pavement | 65% [ee], 88% [kk] | 60% [kk], 49% [ee] Ortho-Phosphate 26% [ee] | NA | NA | 95% [kk], 73% [ee] | Metals 99% [kk] | Metals 99% [kk] 73% [ee] | Metals 99% [kk] 72% [ee] | NA | NA | NA | ● | ○ | ◑ | E | ● | ● |
| | Infiltration Trench | 60% [e], 60% [z] | 60% [e], 60% [z], 55% [k] | NA | NA | 80% [e] | 75 to 80% [l] | 75 to 80% [l] | 75 to 80% [l] | NA | 90% [z] | Sediment 75% [k], 90% [z] | ◑ | ○ | ◑ | E | ● | ● |
| | Infiltration Basin | 45 to 55% [l], 60 to 70% [l], 55 to 60% [l], 16.9 mg/L# [g] Nitrate 0.4 mg/L# [g] TKN 0.4 mg/L# [g] | 50 to 55% [l], 65 to 75% [l], 60 to 70% [l] 1.1 mg/L# [g] | NA | NA | 202 mg/L# [g], 75% [l], 99% [l], 90% [l] | 0.002 mg/L# [g] Dissolved <0.001 mg/L# [g] Metals 75 to 80% [l], 95 to 99% [l], 85 to 90% [l] | <0.001 mg/L# [g] Dissolved <0.001 mg/L# [g] Metals 75 to 80% [l], 95 to 99% [l], 85 to 90% [l] | <0.001 mg/L# [g] Dissolved 0.002 mg/L# [g] Metals 75 to 80% [l], 95 to 99% [l], 85 to 90% [l] | TPH-Oil <0.2 mg/L# [g] TPH-Gasoline <0.05 mg/L # [g] TPH-Diesel 0.188 mg/L# [g] | Fecal Coliform <200 MPN/100 mL# [g] 75% [l], 90% [l] | NA | ◑ | ◑ | ○ | V, L | ◑ | ● |

Note: See Legend on page 3 of Matrix.

| | BMPs | Pollutants of Concern for Source Water** – Percent Removal | | | | Pollutants of Concern for Urban Runoff – Percent Removal | | | | | | | Community and Environmental Factors | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total Nitrogen | Total Phosphorous | Total Dissolved Solids | Total Organic Carbon | Total Suspended Solids | Total Copper | Total Lead | Total Zinc | Oil and Grease | Bacteria | Trash / Sediment | Aesthetics | Habitat | Relative Cost | Maintenance | Safety | Water Conservation |
| **DETENTION / SETTLING** | Wet Vault / Tank | NA | 30% k | NA | NA | NA | NA | NA | NA | NA | NA | Sediment 60% g | ○ | ○ | ◐ | V, L | ◐ | ◐ |
| | Underground Detention | NA | 20 to 40% l | NA | NA | 60 to 80% l | NA | 40 to 70% l | NA | NA | NA | NA | ○ | ○ | ○ | V, L | ● | ● |
| | Dry Detention | NA | 75% k | NA | NA | NA | NA | NA | NA | NA | NA | Sediment 90% k | ○ | ○ | ● | V, L | ● | ● |
| | Dry Extended Basin / Dry Extended Detention Pond | 25% c, Nitrate+Nitrite 4% c | 47% c, 25% k, Soluble -6% c | NA | NA | 47% c | 26% †c | NA | 26% c | NA | NA | Sediment 45% g | ◐ | ◐ | ○ | V, L | ◐ | ● |
| | Wet Extended Basin / Pond / Retention Pond | 33% c, 31% q, 30% e, 39% q, Nitrate Nitrogen 153% d, TKN –28% d, 27% g, Nitrate 61% g, Nitrate+Nitrite 43% c, 24% q | 51% c, 48% q, 50% e, 5% q, 45% k, 65% k, 30-90% s, Dissolved Organic -47% q, Soluble 66% c, 52% q | 6% d | NA | 80% c, 74% d, 80% e, 93% g, 67% q, 50 to 90% s, 80 to 90% s | -40% d, 98% g, Dissolved 57% g | 51% d, 99% g, Dissolved 76% g | -12% d, -93% g, Dissolved 41% g | 27% d, TPH – Oil 38% g, TPH – Diesel 91% g | Fecal Coliform 64% d, 99% g | Sediment 80% g | ● | ● | ○ | V, L | ○ | ● |
| | Unlined Extended Detention Basin | 16% g, Nitrate 15% g, TKN 17% g | 38% g, Dissolved Ortho-Phosphate -8% g, Particulate 41% g | NA | NA | 69% gs | 58% g, 57% q, Dissolved 5% g, Particulate 73% g | 72% g, Dissolved 33% g, Particulate 73% g | 72% g, 66% c, 51% q, Dissolved 24% g, Particulate 84% g | NA | NA | NA | ○ | ○ | ○ | V, L | ○ | ● |
| | Lined Extended Detention Basin | 13% g, Nitrate 8% g, TKN 16% g | 15% g, Dissolved Ortho-Phosphate 10% g, Particulate 58% g | NA | NA | 40% g | 27% g, Dissolved 8% g, Particulate 50% g | 48% g, 70 to 80% s, Dissolved 42% g, Particulate 55% g | 54% g, 40 to 50% q, Dissolved 39% g, Particulate 65% g | TPH – Oil 11% g, TPH – Diesel 0% g | Fecal Coliform 12% g | NA | ○ | ○ | ○ | V, L | ○ | ◐ |
| **BIOFILTRATION** | Detention w/ Swales | 9% b, Nitrate + Nitrite, Total -9% b | -87% b | -29% b | 14% b | NA | NA | 22% b | 12% b | NA | Fecal Coliform 47% b, Fecal Streptococci –520% b | NA | ○ | ○ | ● | V, L | ◐ | ● |
| | Extended Detention Wetland | NA | 53% m, 69% n | NA | NA | 95% m, 96% n | NA | 90% m, 94% n | 92% m, 90% n | NA | NA | NA | ● | ● | ◐ | V, L | ● | ● |
| | Constructed Wetlands / Stormwater Wetlands | Nitrate Nitrogen (55 lb/yr†, 34.1%)jf, Nitrate, Nitrite Nitrogen (25 lb/yr†, 15.4%)jf, Nitrate+Nitrite 67% c, 67% q, 28% qq, 30% c, 21% q, TKN (690 lb/yr†,63.6%)jf | 49% qq, 50% o, (33 lb/yr†, 39.6%)jf, Soluble 35% c, 39% q, 49% c, 51% q | NA | 65% o, 34% gg | 41.3% o, 67% gg, 75% c, 54% q, (8,629 lb/yr†, 41.3%)ff | 51% o, 40% c, 39% q, 41% gg | 62% gg | 45% gg, 22.8% o, 44% c, 54% q, (13 lb/yr†, 22.8%)jf | Petroleum Hydrocarbons 87% gg | 77% gg | NA | ● | ● | ◐ | V, L | ◐ | ● |
| | Gravel-Based Wetlands | 30% e | 40% e | NA | NA | 80% e | NA | NA | NA | NA | NA | NA | ◐ | ◐ | ◐ | V, L | ● | ● |
| | Bioretention / Bioinfiltration | TKN 68.6 to 80% cc | 60% e, 70 to 83% h, cc, 30% k | NA | NA | 80% e, 90% h, cc | Metals 93 to 98% h, cc | Metals 93 to 98% h, cc | Metals 93 to 98% h, cc | NA | 90% h,cc | Sediment 75% k | ● | ◐ | ○ | L | ● | ● |
| | Wet Swale | 40% e | 25% e | NA | NA | 80% e | NA | NA | NA | NA | NA | NA | ◐ | ● | ● | L | ◐ | ● |
| | Grass Channel | Nitrate 31.4% i, Nitrate -25% j | 4.5% i, 45% j, 29% j | NA | NA | 67.8% i, 60% j | 42 to 62% i, 2 to 16% i, 46 to 73% j | 42 to 62% i, 2 to 16% i, 46 to 73% j | 42 to 62% i, 2 to 16% i, 46 to 73% j | NA | -100% i, -25% j | NA | ◐ | ◐ | ● | L | ● | ● |
| | Grass Swale / Biofiltration Swale / Dry Swale | 26% g, 50% e, 67% h, 841% q, Nitrate 11% g, 66% h, 38% s, TKN 31% h, Nitrate and Nitrite Nitrogen 31% q | 8% h, 57% f, 34% q, 50% e, 15% k, 9% s, Dissolved 28% f, Soluble 38% q | NA | NA | 80% e, 50% g, 77% h, 81% s, 81% q | Dissolved 58% f, 61% g, 51% s, 51% q, Dissolved 50% g | Dissolved 9% f, 69% g, 67% s, Dissolved 61% g | Dissolved 15% f, 77% g, 71% s, 71% q, Dissolved 74% g | TPH – Oil 51% g Hydrocarbons 62% s | Fecal Coliform 33% g | Sediment 65% k | ◐ | ◐ | ● | L | ● | ● |
| | Biofiltration Strip/ Filter Strip | 12% g, (2.68 mg/L¶, 15%)h, Nitrate -1% g, (0.58 mg/L¶, 13%)h, TKN (2.10 mg/L¶, 16%)h, 16% g | (0.62 mg/L¶, -52%)j, 50% k, Dissolved (0.46 mg/L¶, –206%)h | NA | NA | 74% g,h | 84% g, (0.009 mg/L¶, 84%)h, Dissolved 77% g, (0.007 mg/L¶,77%)h | 88% g, (0.006 mg/L¶, 88%)h, Dissolved 66% g, (0.002 mg/L¶, 66%)h | 72% g, (0.055 mg/L¶, 78%)h, Dissolved 57% g, (0.035 mg/L¶, 65%)h | TPH – Oil 59% g, TPH – Diesel 66% g | Fecal Coliform 92% g | Sediment 50% k | ● | ◐ | ● | L | ● | ● |

Note:  See Legend on page 3 of Matrix.

## TREATMENT BEST MANAGEMENT PRACTICES TECHNOLOGIES MATRIX*

| BMPs | Pollutants of Concern for Source Water** – Percent Removal | | | | Pollutants of Concern for Urban Runoff – Percent Removal | | | | | | | Community and Environmental Factors | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total Nitrogen | Total Phosphorous | Total Dissolved Solids | Total Organic Carbon | Total Suspended Solids | Total Copper | Total Lead | Total Zinc | Oil and Grease | Bacteria | Trash / Sediment | Aesthetics | Habitat | Relative Cost | Maintenance | Safety | Water Conservation |
| **MISCELLANEOUS** — Vortex Type Separators | Nitrate + Nitrite 5% bb TKN 41% hh | 29% v, 27% v, 30% v, 17% bb Dissolved 17% bb | -21% bb | 19/15% hh | 50% v, 70% v, 21% bb, 51.5% bb 24% hh, 63/50% hh, 80% hh, 26% hh, 93% hh, 53% hh, 80% hh, 84% hh | 21.5% bb 12% hh, 33/25% hh, 21% hh | 24% bb, 51.2% bb 13% hh, 47/33% hh, 21% hh | 17% bb, 39.1% bb 29% hh, 26/18% hh, 21% hh, 39% hh | PAH 32% bb, 36% hh 38% hh, 43% hh Diesel 16% hh Motor Oil 33% hh TPH 82% hh | NA | NA | ◐ | ○ | ◐ | V, E | ● | ● |
| Multi-Chambered Treatment Trains | Nitrate 24% g, 14% h, 75% dd, 63% dd, TKN 62% dd Nitrate -9% dd | 80% h, 84% h, 82% dd Ortho-phosphorus 14% dd | 8% dd | 38% dd | 83% g, 85% h, 83% h, 98% h, 81% dd | 22% g, 21% dd Dissolved 17% g Metals 65 to 90% h, 91 to 100% h, 83 to 89% h | 93% g, 73% dd Dissolved 42% g Metals 65 to 90% h, 91to100% h, 83 to 89% h | 91% g, 55% dd Dissolved 46% g Metals 65 to 90% h, 91 to100% h, 83 to 89% h | TPH – Oil 70% g TPH – Diesel 80% g | Fecal Coliform 14% g 78% dd | NA | ○ | ○ | ○ | V, E | ○ | ○ |
| Oil-Water Separator – Water Quality Inlet | NA | 5% k | NA | NA | 49% g | NA | NA | NA | 83% g TPH – Diesel 52% g | NA | Sediment 15% g | ○ | ○ | ◐ | E | ● | ○ |
| Gross Solids Removal Devices (GSRDs)/ Screens and Trash Racks/ Nets/Booms | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | §Gross Solids (Linear Radial: 98.4% ii, 97% ii, 93.7% ii), (Inclined Screen: 100% ii, 82.7% ii, 86.2% ii), (Baffle Box: 93.1% ii, 99.6% ii) Litter (Linear Radial: 98% ii, 93.9% ii, 90.3% ii), (Inclined Screen: 100% ii, 66.9% ii, 81.2% ii), (Baffle Box: 87.2% ii, 98% ii) | ◐ | ○ | ◐ | L, E | ◐ | ◐ |

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\* This list is intended to provide general guidance for selecting BMPs that are suitable for drinking water protection. The contents provided are not exhaustive. Project applicants are encouraged to conduct independent research if necessary. Data presented is from non-vendor sources—see footnotes below. Refer to Appendix A for additional sources of information regarding BMP technologies and water quality management approaches.

\*\* Selecting BMPs should focus on controlling the pollutants of concern for source-water protection.
† Loading removal.
‡ Data based on fewer than 5 data points.
¶ Effluent Concentration.
\# Average concentration while BMP is in operation.

§ Percent removal information for GSRDs only.
● – Best     ◐ – Moderate     ○ – Worst
E = Special equipment requirements     V = Potential vector control     L = High labor requirements
NA: Not Available

[a] Megginis Ck. Marsh Tallahassee, FL. EPA, Florida Department of Environmental Regulation. http://www.bmpdatabase.org/
[b] Alta Vista Planned Development w/ swales, Austin, TX. USGS. http://www.bmpdatabase.org/
[c] National Pollutant Removal Performance Database for Stormwater Treatment Practices: 2nd Edition, http://www.cwp.org
[d] DUST Marsh Debris Basin (Retention Pond (wet) - Surface Pond with a Permanent Pool, Fremont, CA. http://www.bmpdatabase.org/
[e] Georgia Stormwater Management Manual. http://georgiastormwater.com
[f] EPCOT Biofilter - Grass Swale, Orlando, FL. http://www.bmpdatabase.org/
[g] CalTrans BMP Retrofit Pilot Program, Los Angeles/San Diego, CA.
[h] California Stormwater Quality Association (CASQA) New Development and Redevelopment Handbook (TC-30, TC-31, TC-32, TC-40) http://cabmphandbooks.com
[i] Dayton Avenue Swale Biofiltration Study, Seattle Engineering Study, Seattle, WA. http://www.bmpdatabase.org/
[j] Biofiltration Swale Performance. Seattle Metro and Washington Department of Ecology. Seattle, WA. http://www.bmpdatabase.org/
[k] Catalog of Stormwater BMPs for Idaho Cities and Counties. http://www.deq.state.id.us/water/stormwater_catalog/index.asp
[l] US DOT FHA Fact Sheet. – Detention Tanks and Vaults. Northern Virginia District Planning Commission. http://www.fhwa.dot.gov/environment/ultraurb/3fs6/htm
[m] US DOT FHA Fact Sheet. – Wetlands and Shallow Marsh Systems. Martin & Smoot, 1996. http://www.fhwa.dot.gov/environment/ultraurb/3fs5/htm
[n] US DOT FHA Fact Sheet. – Wetlands and Shallow Marsh Systems. Occoquan Watershed Monitoring Laboratories, 1990. http://www.fhwa.dot.gov/environment/ultraurb/3fs5/htm
[o] University of Virginia, 2000, Stormwater Management Research Team.
[p] North Griffin Regional Detention Pond-Wetland Filtration, City of Griffin, Georgia, 2001.
[q] National Pollutant Removal Performance Database for Stormwater Treatment Practices: 1st Edition, http://www.cwp.org
[r] Federal Highway Administration, www.highwayBMP.dfwinfo.com/FHWA_PDF/sand%20filter.pdf. Excerpted from Young, et. Al. Evaluation and Management of Highway Runoff Water Quality

[s] EPA fact sheet 832-F-99-006, http://www.epa.gov
[t] EPA fact sheet 832-F-99-048, http://www.epa.gov
[u] Wetland Vegetation, Dept. of Civil Engineering, University of Virginia.
[v] Rivertech, Inc., Breverd County, Florida, CDS Technologies.
[w] Larry Walker & Associates for Sacramento Stormwater Management Program.
[x] Rivertech, Inc., 13 Monitoring Studies Using Sand Filters.
[y] Delaware Sand Filter BMPs at Airpark, Alexandria, Virginia. www.fwha.dot.gov/environment/ultraurb/5mcs3.htm
[z] EPA fact sheet 832-F-99-019, www.epa.gov
[aa] EPA fact sheet 832-F-99-007, www.epa.gov
[bb] Clayton, R. Performance of a Proprietary Stormwater Treatment Device – The Storm Ceptor.
[cc] EPA fact sheet 832-F-99-012, www.epa.gov
[dd] Urban Stormwater Retrofitting Project Fact Sheet – Packed Bed Wetland Filter System, "Stormwater Treatment Train", City of Orlando. www.stormwater-resources.com/Library/ 103BFloridaRetrofits.pdf
[ee] Urban Stormwater Retrofitting Project Fact Sheet – Bath Club Concourse Stormwater Rehabilitation Project, Florida. www.stormwater-resources.com/Library/ 103BFloridaRetrofits.pdf
[ff] North Griffin Regional Detention Pond – Wetlands Filtration. www.forester.net/sw_0106_north.html
[gg] EPA fact sheet 832-F-99-025, www.epa.gov
[hh] Guidance Manual for On-Site Stormwater Quality Control Measures, City of Sacramento. http://www.sactostormwater.org/documents.htm#guide
[ii] Design and Performance of Non-Proprietary Devices for Highway Runoff Litter Removal. http://stormwater.water-programs.com/Papers/PP031.pdf
[jj] Performance of Urban Stormwater Best Management Practices. University of North Carolina. http://www.unc.edu/depts/geog/them/projects/BMP.html
[kk] US DOT FHA Fact Sheet. – Porous Pavements. MWCOG 1983 and Hogland Et. Al. 1987. http://www.fhwa.dot.gov/environment/ultraurb/3fs15/htm
[ll] US DOT FHA Fact Sheet. – Infiltration Basin. Schueler 1987. http://www.fhwa.dot.gov/environment/ultraurb/3fs2/htm

### Definitions of Community and Environmental Factors

Aesthetics: The visual appearance of a BMP. A rating of "best" indicates that the BMP may actually increase the appearance of the area (e.g., by incorporating attractive vegetation or water elements). A "moderate" rating indicates that the BMP does not measurably impact the appearance of the area, while a rating of "worst" indicates that the BMP is physically unattractive.

Habitat: The ability of a BMP to provide habitat for plants and/or animals. A rating of "best" indicates that the BMP may provide new habitat (for example, vegetated swales and constructed wetlands may provide opportunities for plants, birds, and other small animals). A rating of "moderate" indicates that the BMP is neutral: it neither creates nor reduces habitat. A rating of "worst" indicates the BMP replaces natural areas with manmade surfaces unsuitable as habitat.

Relative Cost: A generalized (non-numerical) gage of BMP cost (relative to other BMPs). A rating of "best" suggests the BMP is relatively more cost-effective. "Moderate" indicates the cost of the BMP is average, while "worst" indicates the BMP is more expensive/less cost effective.

Maintenance: The amount of labor and expense required to maintain proper function of the BMP (relative to other BMPs). A rating of "best" indicates that the BMP does not require much maintenance. "Moderate" implies an average amount of maintenance, while "worst indicates the BMP is labor-intensive or otherwise costly to maintain.

Safety: How safe the BMP is, with respect to public health and environmental protection. A rating of "best" means that the BMP poses little, if any, public health or environmental risk. "Moderate" indicates that there may be some risk (e.g., mosquito breeding), while "worst" indicates there are real potential safety risks that must be taken into consideration (e.g., risk of a person falling into a vault or pond).

Water Conservation: The extent to which a BMP helps or hinders water conservation efforts. A rating of "best" indicates that the BMP results in increased water conservation, either by not requiring additional water to function properly or by storing or re-using water (e.g., through enhanced infiltration). A rating of "moderate" is neutral, meaning that the BMP has little effect on water conservation, while a rating of "worst" indicates that the BMP actually requires additional water use.