September, 2011 Design Handbook for
Low Impact Development Best Management Practices
Errata

POSTED 06/30/2016

Page 2:
About this Handbook
This Handbook supplements the Riverside County Water Quality Management Plan (WQMP) by providing guidance for the planning, design and maintenance of Low Impact Development (LID) BMPs which may be used to mitigate the water quality impacts of developments within Riverside County.

This Handbook is the culmination of over five years of research, wherein manuals, studies, and experts from across the country were consulted to identify the most effective LID BMPs and designs. Although there are many types of BMPs that can be considered LID, this research found that the BMPs that are likely to be the most effective for the life of the project are those that are integrated into the design of the site and passively remove pollutants from runoff (without human intervention) through natural processes such as infiltration, biofiltration, and evapotranspiration. Further, it was found that BMPs are only effective as a function of how well they are maintained. ~~Proprietary BMPs, underground BMPs or BMPs that require complicated maintenance equipment and procedures are all much less likely to be appropriately maintained, therefore, less reliable for the protection of water quality.~~

Page 2:
Selecting appropriate LID BMPs
~~LID BMPs are a highly effective and naturally based form of Treatment Control BMPs.~~ Before selecting any particular BMPs for a site, refer to the WQMP applicable to the project (based on the watershed the project is located in). The WQMP may specify particular types of LID or Treatment Control BMPs that can or must be considered for use on the project. Such considerations may include whether or not the LID BMP will maximize on-site retention of runoff, or be based on the types of pollutants that the site may generate, types of pollutants that are impairing the downstream receiving waters, and which BMPs are effective at addressing those pollutants. Generally infiltration BMPs have advantages over other types of BMPs, including reduction of the volume and rate of runoff, as well as full treatment of all potential pollutants potentially contained in the stormwater runoff. It is recognized however that infiltration may not be feasible on sites, such as those with high groundwater, low infiltration rates, or located on compacted engineered fill. In those situations, harvest and use, bioretention and/or biotreatment based BMPs that provide opportunity for evapotranspiration and incidental infiltration may be a more feasible option. The WQMP may specify criteria that can be used to determine when particular BMPs are considered feasible.

Page 4:

Can I place my BMP underground?

~~Under most circumstances, in areas of new development or significant redevelopment, the use of underground treatment control BMPs in lieu of the LID BMPs in this Handbook is not justifiable.~~ Please check with the Engineering Authority.

Page 6:

Planter Boxes

Bioretention Facilities can also be placed above ground as planter boxes. Planter boxes must have a minimum width of 2 feet, a maximum surcharge depth of 6 inches, and no side slopes are necessary. Planter boxes must be constructed so as to ensure that the top surface of the engineered soil media will remain level. This option may be constructed of concrete, brick, stone or other stable materials that will not warp or bend. Chemically treated wood or galvanized steel, which has the ability to contaminate stormwater, should not be used. ~~Planter boxes must be lined with an impermeable liner on all sides, including the bottom. Due to the impermeable liner, the inside bottom of the planter box shall be designed and constructed with a cross fall, directing treated flows within the subdrain layer toward the point where subdrain exits the planter box, and subdrains shall be oriented with drain holes oriented down. These provisions will help avoid excessive stagnant water within the gravel underdrain layer.~~ Similar to the in-ground Bioretention Facility versions, this BMP benefits from healthy plants and biological activity in the root zone. Planter boxes should be planted with appropriately selected vegetation.

Page 10:

Extended Detention Basin BMP Fact Sheet

EXTENDED DETENTION BASIN BMP FACT SHEET

Estimate the orifice size and outlet plate configuration (number per row, etc.). Based on D_o provided in the Basin Footprint section, the spreadsheet will automatically generate the stage vs. discharge relationship for this outlet:

$$Q = C*A*[2*g*(H-H_o)]^{0.5}$$

Where:

Q = discharge (ft^3/s)
C = orifice coefficient
A = area of the orifice (ft)

g = gravitational constant (32.2 ~~ft2/s~~ ft/s^2)
H = water surface elevation (ft)
H_o = orifice elevation (ft)

Page 3:
Harvest and Use BMPs

HARVEST AND USE BMP FACT SHEET

Figure 1 – Common Design Elements of Underground Cistern (Rainwater Harvesting Solutions Guide- Contech Engineered Solutions[1])

Page 3
Harvest and Use BMPs
Footer

1. http://www.conteches.com/DesktopModules/Bring2mind/DMX/Download.aspx?command=core_download&entryid=8645&language=en-US&PortalId=0&TabId=144

Page 1:
Bioretention Facility

3.5 Bioretention Facility

Description

Bioretention Facilities are shallow, vegetated basins underlain by an engineered soil media. Healthy plant and biological activity in the root zone maintain and renew the macro-pore space in the soil and maximize plant uptake of pollutants and runoff. This keeps the Best Management Practice (BMP) from becoming clogged and allows more of the soil column to function as both a sponge (retaining water) and a highly effective and self-maintaining biofilter. In most cases, the bottom of a Bioretention Facility is unlined, which also provides an opportunity for infiltration to the extent the underlying onsite soil can accommodate. When the infiltration rate of the underlying soil is exceeded, fully biotreated flows are discharged via underdrains. Bioretention Facilities therefore will inherently achieve the maximum feasible level of infiltration and evapotranspiration and achieve the minimum feasible ~~(but highly biotreated)~~ discharge to the storm drain system.