CHELTENHAM TOWNSHIP - WISSAHICKON CREEK TOTAL MAXIMUM DAILY LOAD (TMDL) STRATEGY

Cheltenham Township, Montgomery County, Pennsylvania

March 2016

DRAFT

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An Employee Owned Company

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Introduction

Section 303(d) of the Clean Water Act and the U.S. Environmental Protection Agency's (EPA's) Water Quality Planning and Management Regulations (40 CFR Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for waterbodies that are not meeting their designated uses even though pollutant sources have implemented technology-based controls. A TMDL establishes the allowable load of a pollutant or other quantifiable parameter based on the relationship between pollutant sources and in-stream water quality. A TMDL provides the scientific basis for a state to establish water quality-based controls to reduce pollution from both point and nonpoint sources and restore and maintain the quality of the state's water resources (USEPA, 1991).[1]

The EPA established a Total Maximum Daily Load (TMDL) for the Wissahickon Creek watershed in 2003 to address those segments impaired as a result of excess siltation. The TMDL identified overland flow from urban stormwater runoff and streambank erosion as primary contributors. Cheltenham Township as a regulated MS4 is required to implement a TMDL plan through the National Pollutant Discharge Elimination System (NPDES) program. The overall goal of this TMDL plan is to decrease siltation in stormwater runoff. Cheltenham's initial TMDL plan was prepared in January 2013. This plan has been updated in response to comments in a Pennsylvania Department of Environmental Protection's (PA DEP) letter dated February 26, 2015. Periodic updates to this plan will be required due to changes in land uses as well as the installation and modification of stormwater facilities.

Wissahickon Watershed Information

The Wissahickon Creek drains approximately 64 square miles and extends 24.1 miles in a southeasterly direction through lower Montgomery and northwestern Philadelphia Counties. Major tributaries in the basin include Sandy Run and Pine Run, draining a heavily urbanized area east of the mid-section of the watershed. Other tributaries to Wissahickon Creek include Trewellyn Creek, Willow Run - East, Willow Run - West, Rose Valley Tributary, Paper Mill Run, Creshiem Creek, Monoshone Creek, Prophecy Creek, Lorraine Run, Wises Mill Tributary, and Valley Road Tributary. All tributaries mentioned are included with the mainstem of the Wissahickon Creek on Pennsylvania's 303(d) list of impaired waters.[1]

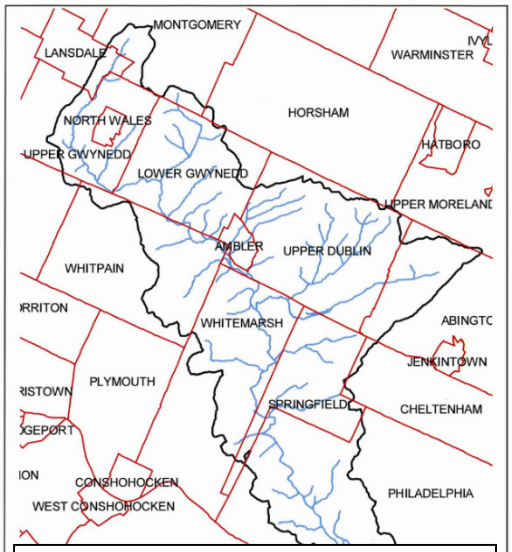


Figure 2-2 Municipal boundaries in the Wissahickon Creek, Pennsylvania from the Nutrient and Siltation TMDL Development for

The northwest section of Cheltenham Township is located within the Wissahickon Creek watershed. A figure showing the contributing areas to the Wissahickon Creek within the Township is included in Appendix I. A total of

167.2 acres of Cheltenham Township is located in the Wissahickon Creek watershed. The majority of this area exists low-intensity residential development although the area also includes a supply yard operated by Glasgow Inc., Carroll Brooke Park and a small area of township open space.

Waste Load Allocation (WLA)

The Wissahickon Creek TMDL plan establishes Waste Load Allocations (WLA) for each municipality within the Wissahickon watershed. The WLA is the summation of Streambank Erosion and Overland Load components for the target siltation amount in pounds per year (lbs/yr). This WLA is the amount of siltation, in pounds per year, the

Municipality	Existing Load from Streambank Erosion (lbs/yr)	Streambank Erosion WLA (lbs/yr)	Percent Reduction for Streambank Erosion	Existing Overland Load (lbs/yr)	Overland Load WLA (lbs/yr)	Percent Reduction for Overland Load (lbs/yr)	TOTAL WLA (lbs/yr)
Ambler	17,974.49	9,346.73	0.48	75,008.50	32,843.24	0.56	42,189.97
Cheltenham	1,758.29	1,512.13	0.14	20,549.46	4,449.00	0.78	5,961.13
Horsham	2,611.24	1,267.20	0.51	5,764.44	2,288.51	0.60	3,555.71

Portion of Figure 14-2 Summary of sediment wasteload allocations from streambank erosion and overland load by municipality (MS4) Nutrient and Siltation TMDL Development for Wissahickon Creek, Final Plan, October 2003, US EPA

municipality is expected to eliminate with the use of stormwater Best Management Practices (BMP's). The following provides the WLA for Cheltenham Township.

Existing Load from Streambank Erosion (lbs/yr) – 1,758.29
Streambank Erosion WLA (lbs/yr) – 1,512.13 (14 percent reduction)

Existing Overland Load (lbs/yr) – 20,549.46
Overland Load WLA (lbs/yr – 4,449.00 (78 percent reduction)

Total WLA (lbs/yr) – 5,961.13

WLA Reduction / Parsing

Parsing is an option to determine the portion of the TMDL load reduction which is not the responsibility of the MS4 permittee. Land areas within the municipality's portion of the impaired watershed which do not drain into the Municipal Separate Storm Sewer (MS4) can be parsed out of the WLA. Any parsing that is undertaken must be consistent with the terms and conditions of the applicable TMDL.[2] The parsing method results in a recalculation of the MS4 TMDL area of responsibility and the municipal's total WLA.

Based on analysis of Cheltenham's Wissahickon Creek watershed, the Township's storm sewer system and LIDAR contour data, areas which do not drain into the MS4 were

determined. Overall it was determined 28.1 acres within the municipality does not drain into the MS4. Of this total 16.1, acres exist as low-intensity residential development and 12.0 acres exist as deciduous forest. A table located in Appendix II provides the adjusted WLA. The following summarizes the adjusted WLA.

Total WLA (lbs/yr) – 5,961.13
Adjusted (parsed) WLA (lbs/yr) – 792.1
Recalculated Total WLA (lbs/yr) – 5,169.0

Reductions in Pollutant Loadings

The built out and residential nature of the areas located within the Wissahickon Creek watershed limits the potential for the stormwater projects which could reduce the overall WLA. One project which was completed and resulted in a reduction in siltation runoff was the installation of a detention basin as shown on the Figure in Appendix I. The basin was installed to limit downgradient flooding concerns. Appendix II provides the calculated reduction in pollutant loadings. The existing pollutant load reduction is 471.1 lbs/yr.

Recalculated Total WLA (lbs/yr) – 5,169.0
Existing Pollutant Load Reduction (lbs/yr) – 471.1
Remaining WLA (lbs/yr) – 4,697.9

Pollutant Loading Reduction Implementation

The majority of the Wissahickon Creek watershed in Cheltenham Township was built out in the early to mid-1900's. Because of this, there are no existing stormwater facilities, such as detention basins, which could be retrofitted to reduce siltation runoff. In addition, no Wissahickon Watershed stream channels exist within Cheltenham Township, although a WLA exists for stream bank erosion.

The following table provides completed, anticipated or potential projects which may qualify in reducing the WLA for the municipality. As projects are implemented they will be included in the Reduction in Pollutant Loadings table in Appendix I and noted in the preceding section. A list of standard Best Management Practices (BMP's) and their sediment removal effectiveness is included in Appendix III.

Completed, Anticipated or Potential Project	Expected Implementation
Street Sweeping	Before the end of 2016 the Township is expected to review their street sweeping program to determine if additional routes or increased frequency would cost effectively reduce the WLA.

Completed, Anticipated or Potential Project	Expected Implementation
Private redevelopment	Redevelopment of private properties within the Wissahickon watershed is limited, however, several redevelopment projects are being considered. These projects, and their impact to the WLA, will be included in the TMDL plan once they are completed. These future redevelopment projects are expected to help in reducing the WLA due to the adoption of the Wissahickon Act 167 Ordinance which promotes BMP's which reduce sediment runoff.
Carroll Brooke Park Swale	Before the end of 2106, the Township is expected inspect the swale which receives runoff from Carroll Brooke Park to determine if installation of a BMP, such as a vegetated filter strip, would cost effectively reduce the WLA.
Glasgow, Inc. / Carroll Brooke Park Raingarden	Before the end of 2016, the Township is expected to inspect runoff from Glasgow, Inc. which discharges to Carroll Brooke Park. A determination will be made if installation of a raingarden, or other appropriate BMP, would be a cost effective method to reduce sediment runoff from the Glasgow property.
Carroll Avenue	Before the end of 2016, review of recent improvements along Carroll Avenue, specifically to the stormwater conveyance channels, to determine if they have had an overall decrease in sediment runoff.
Carroll Avenue	Before the end of 2016, the Township is expected to evaluate the installation of a raingarden, or other appropriate BMP, at the northeast end of Carroll Avenue to determine if it would be a cost effective method to reduce sediment runoff.
Church Road and Willow Grove Avenue	Before the end of 2016, review of plans / recent improvements at Church Road and Willow Grove Avenue, specifically to the stormwater conveyance facilities, to determine if they have had an overall decrease in sediment runoff.
Route 309 Offset Road Improvements	Before the end of 2016, review the recent Route 309 offset road improvements to determine if they have had an overall decrease in sediment runoff.
Cresheim Trail	Evaluate the incorporation of raingardens, or other appropriate BMP's, with future Cresheim Trail extension projects.
Area Parsing	Before the end of 2016, conduct additional field inspections to determine if any additional areas within the Wissahickon watershed do not flow into the MS4 and can be parsed out.

Public Participation

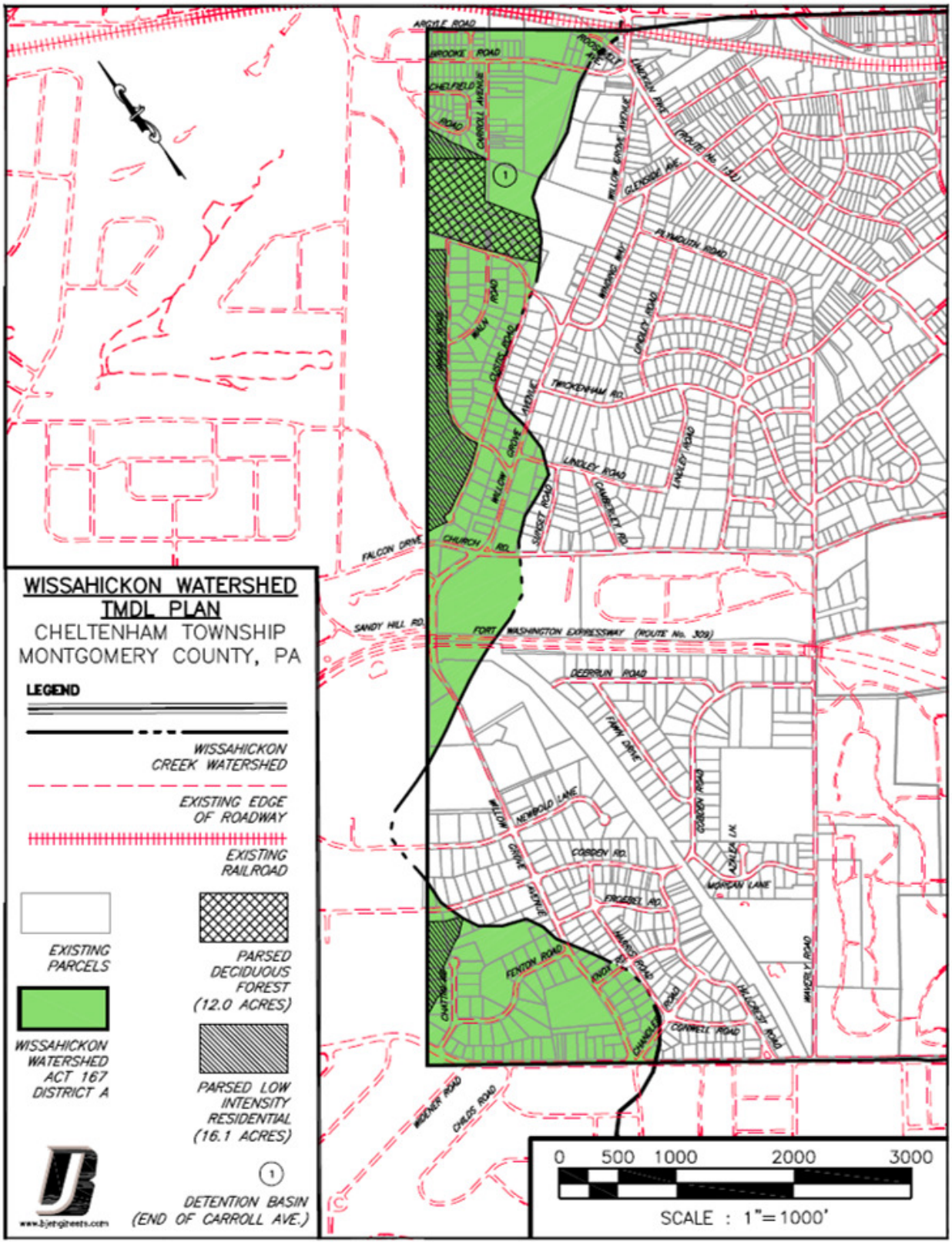
A Public participation component is required by the PA DEP as part of this TMDL plan. Public participation includes making the plan available for review, advertising in a newspaper of general circulation, describing the plans strategy, where it may be reviewed and the length of time provided for the receipt of comments. The plan requires receipt by the municipality of written and verbal comments, documentation and consideration of each timely comment and identification of any changes made to the plan in response to those comments.

The newspaper advertisement, public comments, consideration of the comments and summary of the resulting changes to the TMDL plan will be included in Appendix IV as they are completed / received.

References

1. "Nutrient and Siltation TMDL Development for Wissahickon Creek, Pennsylvania. Final Report." October 2003. U.S. Environmental Protection Agency.
2. "Draft Model Total Maximum Daily Load and Chesapeake Bay Pollutant Reduction Plan and Guidance." February 2015. PA DEP.
3. "Pennsylvania Stormwater BMP Manual." December 30, 2006. PA DEP

Appendix I


WISSAHICKON WATERSHED
TMDL PLAN
CHELTENHAM TOWNSHIP
MONTGOMERY COUNTY, PA
LEGEND
WISSAHICKON CREEK WATERSHED
EXISTING EDGE OF ROADWAY
EXISTING RAILROAD
EXISTING PARCELS
PARSED DECIDUOUS FOREST (12.0 ACRES)
WISSAHICKON WATERSHED ACT 167 DISTRICT A
PARSED LOW INTENSITY RESIDENTIAL (16.1 ACRES)
DETENTION BASIN (END OF CARROLL AVE.)
www.bjengineers.com
0 500 1000 2000 3000
SCALE : 1"=1000'
ARGYLE ROAD
BROOKE ROAD
CHELFIELD ROAD
CARROLL AVENUE
ROOSEVELT AVE.
LINCOLN DRIVE
(ROUTE No. 151)
WILLOW GROVE AVENUE
GLENSIDE AVE.
PLYMOUTH ROAD
WINDING WAY
LINDLEY ROAD
WALN ROAD
CUSTIS ROAD
TWICKENHAM RD.
LINDLEY ROAD
CAMBERLEY RD.
SUNSET ROAD
FALCON DRIVE
CHURCH RD.
SANDY HILL RD.
FORT WASHINGTON EXPRESSWAY (ROUTE No. 309)
DEERRUN ROAD
FAWN DRIVE
NEWBOLD LANE
COBDEN RD.
COBDEN ROAD
AZALEA LN.
MORGAN LANE
FROEBEL RD.
FENTON ROAD
CHANDLER ROAD
CONWELL ROAD
HILLCREST ROAD
WAVERLY ROAD
WIDENER ROAD
CHILDS ROAD

Appendix II

Adjusted (parsed) WLA
Wissahickon Creek Total Maximum Daily Load (TMDL) Strategy
Cheltenham Township, Montgomery County, PA

Pollutant Source	Calculated Parsed MS4 Area (acres)	TMDL Unit Area Load (lbs/ac/yr)	Calculated Parsed WLA (lbs/yr)
Deciduous Forest	12.0	8.69	104.3
Low-Intensity Residential	16.1	42.72	687.8
Totals	**28.1**	**---**	**792.1**

TMDL Unit Area Load based on Cheltenham Township situated within Subwatershed 4 of the Wissahickon Creek.[1]

Reduction in Pollutant Loadings
Wissahickon Creek Total Maximum Daily Load (TMDL) Strategy
Cheltenham Township, Montgomery County, PA

Project	Contributing Area / Linear Feet and Pollutant Load	Pollutant Load Reduction
Detention Basin (southwest end of Carroll Avenue)	Drainage area to basin consists of 2.2 acres of Transitional landuse at 356.93 lbs/acre/yr. Drainage area consist of gravel / dirt construction equipment storage yard.	A total of 785.2 lbs/yr of sediment is expected from the contributing area. Using a 60% TSS reduction the calculated Pollutant Load Reduction is 471.1 lbs/yr.

Total Pollutant Load Reduction (lbs/yr) 471.1

Appendix III

BMP Listing and Sediment Removal Rates		
BMP	**BMP Description**	**Sediment Removal Rates**
Street Sweeping	Street sweeping is the physical removal of debris from streets with mechanical or vacuum sweepers or a combination of both.	Removal rate for silt is 55 percent (by volume).
Pervious Pavement with Infiltration Bed	Pervious pavement consists of a permeable surface course underlain by a uniformly-graded stone bed which provides temporary storage for peak rate control and promotes infiltration. The surface course may consist of porous asphalt, porous concrete, or various porous structural pavers laid on uncompacted soil.	Overall reduction in silt is 85 percent.
Infiltration Basin	An Infiltration Basin is a shallow impoundment that stores and infiltrates runoff over a level, uncompacted, (preferably undisturbed area) with relatively permeable soils.	Overall reduction in silt is 85 percent.
Subsurface Infiltration Bed	Subsurface Infiltration Beds provide temporary storage and infiltration of stormwater runoff by placing storage media of varying types beneath the proposed surface grade. Vegetation will help to increase the amount of evapotranspiration taking place.	Overall reduction in silt is 85 percent.
Infiltration Trench	An Infiltration Trench is a “leaky” pipe in a stone filled trench with a level bottom. An Infiltration Trench may be used as part of a larger storm sewer system, such as a relatively flat section of storm sewer, or it may serve as a portion of a stormwater system for a small area, such as a portion of a roof or a single catch basin. In all cases, an Infiltration Trench should be designed with a positive overflow.	Overall reduction in silt is 85 percent.
Rain Garden / Bioretention	A Rain Garden (also called Bioretention) is an excavated shallow surface depression planted with specially selected native vegetation to treat and capture runoff.	Overall reduction in silt is 85 percent.
Dry Well / Seepage Pit	A Dry Well, or Seepage Pit, is a variation on an Infiltration system that is designed to temporarily store and infiltrate rooftop runoff.	Overall reduction in silt is 85 percent.
Constructed Filter	Filters are structures or excavated areas containing a layer of sand, compost, organic material, peat, or other filter media that reduce pollutant levels in stormwater runoff by filtering sediments, metals, hydrocarbons, and other pollutants.	Overall reduction in silt is 85 percent.
Vegetated Swale	A Vegetated Swale is a broad, shallow, trapezoidal or parabolic channel, densely planted with a variety of trees, shrubs, and/or grasses. It is designed to attenuate and in some cases infiltrate runoff volume from adjacent impervious surfaces, allowing some pollutants to settle out in the process. In steeper slope situations, check dams may be used to further enhance attenuation and infiltration opportunities.	Overall reduction in silt is 50 percent.
Vegetated Filter Strip	The EPA defines a Vegetated Filter Strip as a “permanent, maintained strip of planted or indigenous vegetation located between nonpoint sources of pollution and receiving water bodies for the purpose of removing or mitigating the effects of nonpoint source pollutants such as nutrients, pesticides, sediments, and suspended solids.”	Overall reduction in silt is 30 percent.
Infiltration Berm & Retentive Grading	An Infiltration Berm is a mound of compacted earth with sloping sides that is usually located along a contour on relatively gently sloping sites. Berms can also be created through excavation/removal of upslope material, effectively creating a Berm with the original grade. Berms may serve various stormwater drainage functions including: creating a barrier to flow, retaining flow and allowing infiltration for volume control, and directing flows. Grading may be designed in some cases to prevent rather than promote stormwater flows, through creation of "saucers" or "lips" in site yard areas where temporary retention of stormwater does not interfere with use.	Overall reduction in silt is 60 percent.
Constructed Wetland	Constructed Wetlands are shallow marsh systems planted with emergent vegetation that are designed to treat stormwater runoff.	Overall reduction in silt is 85 percent.
Wet Pond / Retention Basin	Wet Ponds/Retention Basins are stormwater basins that include a substantial permanent pool for water quality treatment and additional capacity above the permanent pool for temporary runoff storage.	Overall reduction in silt is 70 percent.
Dry Extended Detention Basin	A dry extended detention basin is an earthen structure constructed either by impoundment of a natural depression or excavation of existing soil, that provides temporary storage of runoff and functions hydraulically to attenuate stormwater runoff peaks. The dry detention basin, as constructed in countless locations since the mid-1970’s and representing the primary BMP measure until now, has served to control the peak rate of runoff, although some water quality benefit accrued by settlement of the larger particulate fraction of suspended solids. This extended version is intended to enhance this mechanism in order to maximize water quality benefits. The basin outlet structure must be designed to detain runoff from the stormwater quality design storm for extended periods. Some volume reduction is	Overall reduction in silt is 60 percent.

	also achieved in a dry basin through initial saturation of the soil mantle (even when compacted) and some evaporation takes place during detention. The net volume reduction for design storms is minimal, especially if the precedent soil moisture is assumed as in other volume reduction BMPs.	
Water Quality Filters & Hydrodynamic Devices	A broad spectrum of BMPs have been designed to remove non point source pollutants from runoff as a part of the runoff conveyance system. These structural BMPs vary in size and function, but all utilize some form of settling and filtration to remove particulate pollutants from stormwater runoff, a difficult task given the concentrations and flow rates experienced. Regular maintenance is critical for this BMP. Many water quality filters, catch basin inserts and hydrodynamic devices are commercially available. They are generally configured to remove particulate contaminants, including coarse sediment, oil and grease, litter, and debris.	Overall reduction in silt is 60 percent.
Riparian Buffer Restoration	A riparian buffer is a permanent area of trees and shrubs located adjacent to streams, lakes, ponds, and wetlands. Riparian forests are the most beneficial type of buffer for they provide ecological and water quality benefits. Restoration of this ecologically sensitive habitat is a responsive action to past activities that may have eliminated any vegetation.	Overall reduction in silt is 65 percent.
Landscape Restoration	Landscape Restoration is the general term used for actively sustainable landscaping practices that are implemented outside of riparian (or other specially protected) buffer areas. Landscape Restoration includes the restoration of forest (i.e. reforestation) and/or meadow and the conversion of turf to meadow. In a truly sustainable site design process, this BMP should be considered only after the areas of development that require landscaping and/or revegetation are minimized. The remaining areas that do require landscaping and/or revegetation should be driven by the selection and use of vegetation (i.e., native species) that does not require significant chemical maintenance by fertilizers, herbicides, and pesticides.	Overall reduction in silt is 85 percent.
Soil Amendment & Restoration	Soil amendment and restoration is the process of improving disturbed soils and low organic soils by restoring soil porosity and/or adding a soil amendment, such as compost, for the purpose of reestablishing the soil's long-term capacity for infiltration and pollution removal.	Overall reduction in silt is 85 percent.
Floodplain Restoration	Floodplain restoration tries to mimic the interaction of groundwater, stream base flow, and root systems – key components of a stream corridor under pre-settlement (pre-1600s) conditions. Under presettlement conditions, typically the roots of the riparian vegetation on the floodplain were directly linked to the base flow elevation of the stream. Groundwater frequently interacted with the root zones and the stream's base flow. Where the groundwater was lower than the stream's base flow, the gravel-lined streams and permeable floodplains frequently reduced surface flows through infiltration. The interaction among the stream's base flow, groundwater, permeable floodplain soils, and riparian root zones provides multiple benefits, including the filtering of sediments and nutrients through retention of frequent high flows onto the floodplain, removal of nitrates from groundwater, reduction of peak flow rates, groundwater recharge/infiltration, and increase of storage and reduction of flood elevations during higher flows. As a result of historical and recent human impacts, many stream networks have little interaction among the groundwater, stream base flow, and the root systems of floodplain vegetation. Frequently, recently deposited floodplain soils are cohesive, separating the root zones from base flow and allowing only minimal infiltration from the surface flow through the porous pre-settlement soils and gravels. Floodplain restoration as a BMP should be considered where there is minimal interaction among the key components. Other benefits of this BMP include thermal cooling of the stream base-flow, improved benthic community species diversity and habitat, re-establishment and significant increases of wetland areas and native plant species on the floodplain, reduction of invasive plant species, and increased aquatic habitat and riparian areas.	Overall reduction in silt is 85 percent.
Level Spreaders	Level Spreaders are measures that reduce the erosive energy of concentrated flows by distributing runoff as sheet flow to stabilized vegetative surfaces. Level Spreaders, of which there are many types, may also promote infiltration and improved water quality.	Overall reduction in silt is 20 percent.

Appendix IV

(The newspaper advertisement, public comments, consideration of comments and summary of the resulting changes to the TMDL plan will be included as they are completed / received.)