Urban Tree Canopy Expansion and Urban Forestry Planting BMPs

PRACTICE AT A GLANCE

Tree planting is a critical activity for communities in the Chesapeake Bay watershed to undertake in the long-term to offset the loss of trees from development. While natural regeneration and conservation of existing forests will also contribute to increasing the tree canopy within developed areas of the watershed, there are two new tree planting BMPs for nutrient and sediment reductions available with the release of the Phase 6 Chesapeake Bay Watershed Model. The BMPs represent different types of tree planting projects that increase tree canopy found in developed areas – from single trees planted to contiguous planting areas. The two new BMPs provide opportunity for communities in the Bay watershed to count every tree planted. Only one type of credit may be applied for each tree planting project. Tree planting projects that are part of a riparian buffer, agricultural tree planting, or structural BMP do not apply to these BMPs, because they are tracked through other BMP credits.

PRACTICE DESCRIPTION

Two new BMPs are available for credit to Bay communities in the Phase 6 Chesapeake Bay Watershed Model for upland (non-riparian) tree plantings on developed land.

The **Urban Tree Canopy Expansion BMP** applies to tree plantings on developed land (impervious or turfgrass) that result in an increase in tree canopy but are not intended to result in forest-like conditions. This BMP does not require trees to be planted in a contiguous area. The credit is based on number of trees planted and an efficiency, or percent reduction relative to the underlying land use.

The **Urban Forest Planting BMP** applies to tree planting projects in urban or suburban areas with the intent of establishing forest ecosystem processes and function. Trees are planted in a contiguous area according to a planting and maintenance plan that meets State or District of Columbia definitions for planting density and associated standards for establishing forest conditions, including no fertilization and minimal mowing as needed to aid tree and understory establishment. The credit for this BMP is based on a land use conversion from developed turfgrass to forest.

WHERE TO FIND THE BEST OPPORTUNITIES IN YOUR COMMUNITY

Trees in developed areas may be found in a variety of locations. Transportation corridors, sidewalks, parking lots, private yards or landscaped areas, or public places are common locations where individual to small groups of trees may be planted. Tree planting activities in these areas would be examples where the Urban Tree Canopy Expansion BMP would be applicable as the trees are not intended to result in forest-like conditions, yet provide some water quality and other environmental benefits.

Trees planted with the intent to convert managed pervious areas, such as turfgrass to forests may be eligible for the Urban Forest Planting BMP. Local jurisdictions should consult with their State or District forestry agency to determine eligibility of tree planting projects for this credit. In general, large open space areas in a community that are currently turfgrass are good examples for planting locations to include for example, schools, parks, athletic areas, faith-based organizations among others. Areas next to existing forests may also be prime locations for this type of tree planting project and credit. Consideration of how the area is currently used should be taken into consideration. For example, an open space area may be used for outdoor school or church activities throughout the year.

GENERAL COST INFORMATION

The costs for tree planting projects should take into consideration the planting materials and equipment, labor (if not volunteer), post-planting and long term maintenance. The costs will vary depending on, for example, the size of the tree planted, where or whom the tree is purchased from (wholesale vs retail), and use of volunteers.

TIPS FOR GETTING STARTED IN YOUR COMMUNITY

A variety of local, state, federal and nongovernmental partners are working together to support tree planting efforts in local communities throughout the watershed. A local government may have an Urban Forestry Management Plan that includes a tree canopy cover goal, as well as potential areas for planting or reforestation. The Chesapeake Bay Agreement also defines tree canopy goals. Resources including technical information/best practices, state and local contacts, funding opportunities, and community success stories are currently being added to the new Chesapeake Tree Canopy Network website, which is set for public launch in January 2017. The Watershed Forestry Resource Guide, a partnership between the Center for Watershed Protection and the U.S. Forest Service Northeastern State and industry, provides information on planning, assessment, forest-friendly development practices, tree planting and maintenance practices. Links to these resources are provided below.

WHAT DEGREE OF TECHNICAL SUPPORT IS NEEDED?

Individuals or organizations that plant trees should follow recommendations or guidance for proper tree planting methods and post-planting care to provide the best possible conditions for long-term healthy growth. In your community, you may consult local government agencies, specifically the Urban Forester, that may have guidance as part of their Stormwater Management manual, or Forestry Management Plan. State forestry agencies and the District of Columbia Urban Forestry Administration have programs and technical assistance available to assist with tree plantings and related urban and community forestry activities. Other organizations such as Cooperative Extension Service, Soil and Water Conservation Districts, and National Arbor Day Foundation may be a good resource. Check the Chesapeake Tree Canopy network website starting January 2017 for technical guidance and partner information.

COMPUTING THE POLLUTANT REMOVAL CREDIT

The total nitrogen (TN), total phosphorus (TP) and total suspended sediment (TSS) reductions for both the Urban Tree Expansion BMP and Urban Forest Planting BMP are calculated as a land use change in the forthcoming Phase 6 CBP modeling tools. Tools such as CAST, MAST or VAST can be used for planning purposes to estimate the reduction in your respective area. The credit for each BMP is cumulative, which means that the acres reported in a previous year carry over into the next year for the duration of the BMP.

The credit for the Urban Tree Canopy Expansion BMP is a relative load reduction based on a change in land uses for the Phase 6 model. Each tree is given a creditable area of 144 ft^2, equivalent to 300 trees per acre, that is multiplied by a relative load reduction (see Table 1). The credit is applied to all trees planted. Trees may be planted over impervious cover (e.g. sidewalk planter, roadway boulevard) or over turfgrass. For example, a tree planted on turfgrass will receive a TN load reduction of 23.8%, whereas the reduction would be 8.5% TN if the tree was planted over impervious surface.

Table 1. Tree canopy relative land use loading rates based on the underlying land use land cover (Source: Hynicka and Divers 2016)

Land Use	Total Nitrogen Reduction (%)	Total Phosphorus Reduction (%)	Total Sediment Reduction (%)
Canopy over Turfgrass	23.8	23.8	5.8
Canopy over Impervious	8.5	11.0	7.0

The total reduction will be automatically calculated through the modeling tools, but can basically be understood by the following equations.

Tree Canopy Land Use Pollutant Load (lbs/yr) (edge of field)

= Tree canopy acreage for trees planted x % loading rate reduction of Tree Canopy Land Use x underlying Land Use loading rate.

The Tree canopy acreage for trees planted is the “number of trees planted x 300 trees/acre”. An example calculation to illustrate how the credit would apply follows.

EXAMPLES

Caveat: The examples below use Phase 5.3.2 land uses and loading rates to demonstrate how the reduction can be estimated for each BMP, but the BMPs themselves will only be applied in the Chesapeake Bay Watershed Model Phase 6. As such the land use loading rates used in this example are for ***illustration purposes only as the Phase 6 Chesapeake Bay Watershed Model is still under review and subject to change prior to the release of the final model in 2017****.*

A jurisdiction reports 1,000 trees planted in 2017, 800 trees are planted on pervious land uses, and 200 trees are planted on sidewalks or impervious right-of-ways. The effectiveness value applied to the BMP is based on the land use change to tree canopy over pervious or tree canopy over impervious as presented in the table above. Given that 1 tree planted receives a credit of 144 ft^2, a conversion factor of 300 trees is equivalent to 1 acre is used. Therefore, 800 trees will receive a creditable area of 2.67 acres (or 800/300) and 200 trees will receive a creditable area of 0.67 acres.

Table 2. Urban Tree Canopy Expansion BMP Example

Numbers of trees Planted	Dominant underlying Land Use Land Cover	Equivalent tree canopy acres (300 trees = acre converted land use)	TN	TP	TSS
800	Turfgrass[1]	2.67	7.87	0.35	27.84
200	Impervious[1]	0.67	0.88	0.14	60.67
[1] In the Phase 5.3.2. model, pervious land use loading rates for TN, TP and TSS are: 12.4 lb/ac/yr, 0.55 lb/ac/yr and 180 lbs/ac (or 0.09 ton/ac); Impervious land use loading rates for TN, TP and TSS are: 15.5 lb/ac/yr, 1.93 lb/ac/yr and 0.65 ton/ac					

The credit for the Urban Forest Planting BMP is a land use change from turfgrass to forest land use. The credit is the difference in loading rates for the acres reported.

A jurisdiction reports 1,000 trees planted in 2017 on turfgrass and were planted to meet the State recommended planting density for reforestation. The State planting density is 200 trees per acre for 1" caliper trees with a minimum ¼ acre planting area. The Urban Forest Planting BMP provides a 1:1 acre land use conversion credit. Therefore, a creditable land use acreage credit is 5 acres (1000/200). This area is multiplied by the respective land use loading rates (turfgrass and forest) to determine the load reduction.

Table 3. Urban Forest Planting BMP Example

(Assume planting density of 200 trees/acre and 1:1 acre land use conversion credit)

# trees	Land Use	TN (lb/ac)	TP (lb/ac)	TSS (lbs/ac)
1000	Turgrass[1]	12.4	0.55	180
	Forest[1]	3.92	0.11	78
		TN (lbs)	**TP (lbs)**	**TSS (lbs)**
	Turfgrass	62	2.75	900
	Forest	19.6	0.55	390
	Lbs Reduction	**42.4**	**2.2**	**510**

[1]In the Phase 5.3.2 model, pervious land use loading rates for TN, TP and TSS are: 12.4 lb/ac/yr, 0.55 lb/ac/yr and 0.09 ton/ac; forest land use loading rates for TN, TP and TSS are: 3.92 lb/ac/yr, 0.11 lb/ac/yr and 78 lb/ac

HOW TO REPORT THE PRACTICE TO THE STATE

The State and District forestry agencies have oversight of the two tree planting BMPs and are currently developing reporting guidelines for local tree planting efforts to be reported within each jurisdiction for crediting towards the Chesapeake TMDL. These guidelines will be completed by June 2017 and will be posted on the Chesapeake Tree Canopy Network website.

For urban tree plantings, jurisdictions should report the following information to NEIEN:

- *BMP Name:* Urban Tree Canopy Expansion
- *Measurement Name:* Number of Trees Planted
- *Geographic Unit:* Qualifying NEIEN geographies including: Latitude/Longitude; *or* County; *or* Hydrologic Unit Code (HUC12, HUC10, HUC8, HUC6, HUC4); *or* State
- *Date of Implementation:* Year the trees were planted
- *Land Uses:* Turfgrass, Roads, Buildings and Other

For urban forest plantings, jurisdictions should report the following information to NEIEN:

- *BMP Name:* Urban Forest Planting
- *Measurement Name:* Acres Planted
- *Geographic Unit:* Qualifying NEIEN geographies including: Latitude/Longitude; *or* County; *or* Hydrologic Unit Code (HUC12, HUC10, HUC8, HUC6, HUC4); *or* State
- *Date of Implementation:* Year the trees were planted
- *Land Uses:* Turfgrass

WHAT IS REQUIRED TO VERIFY THE PRACTICE OVER TIME

Verification efforts by local governments would ideally focus on ensuring that management of trees planted provides for optimal survival. A 2.5% to 5% annual mortality is currently built-into the recommendations for the Urban Tree Canopy Expansion BMP. Specific verification procedures and

protocols will be determined by the State and District of Columbia in accordance with the overall BMP Verification Principles and BMP Verification Framework adopted by the Chesapeake Bay partnership. The Forestry Workgroup's BMP verification guidance for these two tree planting BMPs will be updated by June 2017 and posted on the Chesapeake Tree Canopy Network website.

RESOURCES

To download a copy of the Expert Panel report recommendations, go to,

http://www.chesapeakebay.net/groups/group/bmp_expert_panels

To learn more about the Chesapeake Tree Canopy Strategy effort and BMP credits, please contact Julie Mawhorter, USDA Forest Service Mid-Atlantic Urban and Community Forestry Coordinator (jmawhorter@fs.fed.us)

Chesapeake Tree Canopy Strategy and 2 Year Workplan – http://www.chesapeakebay.net/managementstrategies/strategy/tree_canopy

Chesapeake Tree Canopy Network website – launch in January 2017

https://chesapeaketrees.net

To download resources from the Watershed Forestry Resource Guide, go to, http://forestsforwatersheds.org/

Urban Watershed Forestry Manual Part 3 – Urban Tree Planting Guide - http://www.na.fs.fed.us/pubs/uf/watershed3/urban_watershed_forestry_manual_part3.pdf