Relative Loading Rates for Developed Land Uses with Tree Canopy

Adjustments to non-tree canopy land uses may be advisable

- Relative loading rates for non-tree canopy land uses were established using data from the National Stormwater Quality Database (NSQD)
- NSQD does not separate land areas covered in tree canopy
- By adding the tree canopy land uses, it may be determined that the non-tree canopy land use loading rates should be increased to remove the effect of tree canopy

From the Expert Panel recommendation at the 9/15/15 USWG

Recommendation for relative loading rate for tree canopy land use

Same relative loading rate of 17% for both Tree Canopy land uses, 'bump up' for TN due to additional reduction from interflow

- TP and TS = 17%
- TN = 18.5%

Chesapeake Bay Program
Science. Restoration. Partnership.

VirginiaTech
Invent the Future

Tree Canopy Land Uses

- There are 9 tree canopy land uses

- Tree canopy over:
  - Open space, not agricultural
  - Impervious urban
  - Pervious urban

- These are further divided into MS4, CSS, and non-regulated land uses

Adjustment rules

- Adjusted existing non-tree canopy land uses by increasing the loading rates to remove the effect of trees that are assumed to be in the original NSQD

- Land uses adjusted include:
  - Roads
  - Buildings and Other
  - Turf Grass

- Maintained the relationship of a 18.5% TN reduction from the land use that is modified by the Tree Canopy land use.
  - Example: Tree Canopy over Roads is 18.5% less than Roads.

- Acres are used to weight the land uses for the adjustment. As acres are updated for the official Phase 6 land use, the rates presented may change slightly.

TN Relative Loading Rate—TC over Imp Taken From ROADS

Shown on MS4 land uses, the same relative differences will be on CSS and non-regulated. Shown here with the draft acres for regulated.

Land Use	original	no adjustment	adjusted
MS4 Tree Canopy over Turfgrass	-	0.39	0.41
MS4 Turf Grass	0.48	0.48	0.50
MS4 Tree Canopy over Impervious	-	0.82	0.83
MS4 Roads	1.00	1.00	1.02
MS4 Buildings and Other	0.79	0.79	0.80
MS4 Construction	1.19	1.19	1.19

TP Relative Loading Rate—TC over Imp Taken From ROADS

Shown on MS4, the same relative differences will be on CSS and non-regulated.
Shown here with the draft acres for regulated.

Land Use	original	no adjustment	adjusted
MS4 Tree Canopy over Turfgrass	-	0.83	0.85
MS4 Turf Grass	1.00	1.00	1.03
MS4 Tree Canopy over Impervious	-	0.83	0.85
MS4 Roads	1.00	1.00	1.03
MS4 Buildings and Other	0.79	0.79	0.82
MS4 Construction	3.89	3.89	3.89

Adjustment rules—Second Method

- Assumed that Tree Canopy is over Roads as well as Buildings and Other.

- Weighted the reduction as 90% from roads and 10% from Buildings and Other.
  - These percentages can change when we receive the land cover information

- Acres are used to weight the land uses for the adjustment. As acres are updated for the official Phase 6 land use, the rates presented may change slightly.

TN Relative Loading Rate—TC over Imp Taken From Roads (90%) & Buildings (10%)

Shown on MS4 land uses, the same relative differences will be on CSS and non-regulated. Shown here with the draft acres for regulated.

Land Use	original	no adjustment	adjusted from Roads and Buildings
MS4 Tree Canopy over Turfgrass	-	0.39	0.41
MS4 Turf Grass	0.48	0.48	0.50
MS4 Tree Canopy over Impervious	-	0.82	0.81
MS4 Roads	1.00	1.00	1.02
MS4 Buildings and Other	0.79	0.79	0.81
MS4 Construction	1.19	1.19	1.19

TP Relative Loading Rate—TC over Imp Taken From Roads (90%) & Buildings (10%)

Shown on MS4, the same relative differences will be on CSS and non-regulated.
Shown here with the draft acres for regulated.

Land Use	original	no adjustment	adjusted
MS4 Tree Canopy over Turfgrass	-	0.83	0.86
MS4 Turf Grass	1.00	1.00	1.03
MS4 Tree Canopy over Impervious	-	0.83	0.84
MS4 Roads	1.00	1.00	1.03
MS4 Buildings and Other	0.79	0.79	0.82
MS4 Construction	3.89	3.89	3.89

Impact of relative loading rates on calibrated model loads

- The total load from developed land uses is determined by the indicators. (http://www.chesapeakebay.net/indicators/indicator/nitrogen_loads_and_river_flow_to_the_bay1)

- The relative loading rates adjust the load among the developed land uses, and do not change the total load.

- Spatial differences come from inputs (fertilizer, atmospheric deposition, etc.…) and stream and river delivery variance.