Tree Canopy Export Rate Targets Phase 6 Watershed Model Calibration

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Tree Canopy Land Uses

6 tree canopy land uses

- Tree canopy over:
  - Impervious developed
    - Buildings and other
    - Roads
  - Turfgrass

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

Recommendation from 3/2/16 LUWG

Land Use	Nitrogen Reduction	Phosphorus Reduction
Tree Canopy over Turfgrass	23.8%	23.8%
Tree Canopy over Impervious (applied to both Roads and Buildings and Other)	8.5%	11%

Adjustments to non-tree canopy land uses

- 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
- In adding the tree canopy land uses, the effect of tree canopy is removed from non-tree canopy land use, resulting in an increased loading rate

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
  - Turfgrass
- Maintained the relationship of the reduction rate from the land use that is modified by the Tree Canopy land use.
- Weighted the TC over Impervious reduction as 90% from Roads and 10% from Buildings and Other, as recommended by Peter Claggett.
- As acres are updated for the official Phase 6 land use, the rates presented may change slightly.

Developed Land Use Relative Rates before New TC Adjustments

Load Source	TN	TP	acres
Abandoned Mines	0.14	0.39	-
CSS Tree Canopy over Turfgrass	0.48	1.00	14,051
CSS Tree Canopy over Impervious	1.00	1.00	733
CSS Construction	1.19	3.89	2,108
CSS Roads	1.00	1.00	18,062
CSS Buildings and Other	0.79	0.79	48,700
CSS Turf Grass	0.48	1.00	62,260
Active Mines	0.14	0.39	-
Farmstead	0.79	0.79	-
MS4 Tree Canopy over Turfgrass	0.48	1.00	383,829
MS4 Tree Canopy over Impervious	1.00	1.00	50,589
MS4 Construction	1.19	3.89	110,775
MS4 Roads	1.00	1.00	199,233
MS4 Buildings and Other	0.79	0.79	465,504
MS4 Turf Grass	0.48	1.00	1,231,980
Non-Regulated Tree Canopy over Turfgrass	0.48	1.00	344,748
Non-Regulated Tree Canopy over Impervious	1.00	1.00	102,680
Non-Regulated Roads	1.00	1.00	292,695
Non-Regulated Buildings and Other	0.79	0.79	256,381
Non-Regulated Turf Grass	0.48	1.00	1,851,191

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

Land Use	Original	Adjusted
Tree Canopy over Turfgrass	-	0.38
Turf Grass	0.48	0.50
Tree Canopy over Impervious	-	0.91
Roads	1.00	1.02
Buildings and Other	0.79	0.81
Construction	1.19	1.19

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

Land Use	Original	Adjusted
Tree Canopy over Turfgrass	-	0.79
Turf Grass	1.00	1.04
Tree Canopy over Impervious	-	0.91
Roads	1.00	1.04
Buildings and Other	0.79	0.83
Construction	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.

After we have the targets

- *For each land segment, average land load modified by segment-specific input differences from average and sensitivities*
- *BMPs applied*
- *Land to water variance factors applied*
- *Small stream attenuation credited*
- *Delivery factors applied*

Avg. Land Load + ∑(Sensitivity(input - average)) — EOSS

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BMPs — EOSS

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Watershed Delivery Variance — EOSS

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Stream Delivery — EOS

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River Delivery — DEL