Land Use Loading Rates

Urban Stormwater Workgroup

October 21, 2014

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Outline

- Using the developed lands literature review
- Land uses
- Concentrations vs. rates
- Scale
- Next steps

Loading Rates and Targets

- Loading rates from multiple models and literature are used to inform the targets
- Targets are specified loading rates used to calibrate the Phase 6 Watershed Model
  - Do not include BMPs
  - Show relative differences among land use loading rates
  - Subject to modification through calibration
    - Actual rate adjusted
    - Relative differences maintained
- Loads will vary around the target based on the nutrients applied and management actions

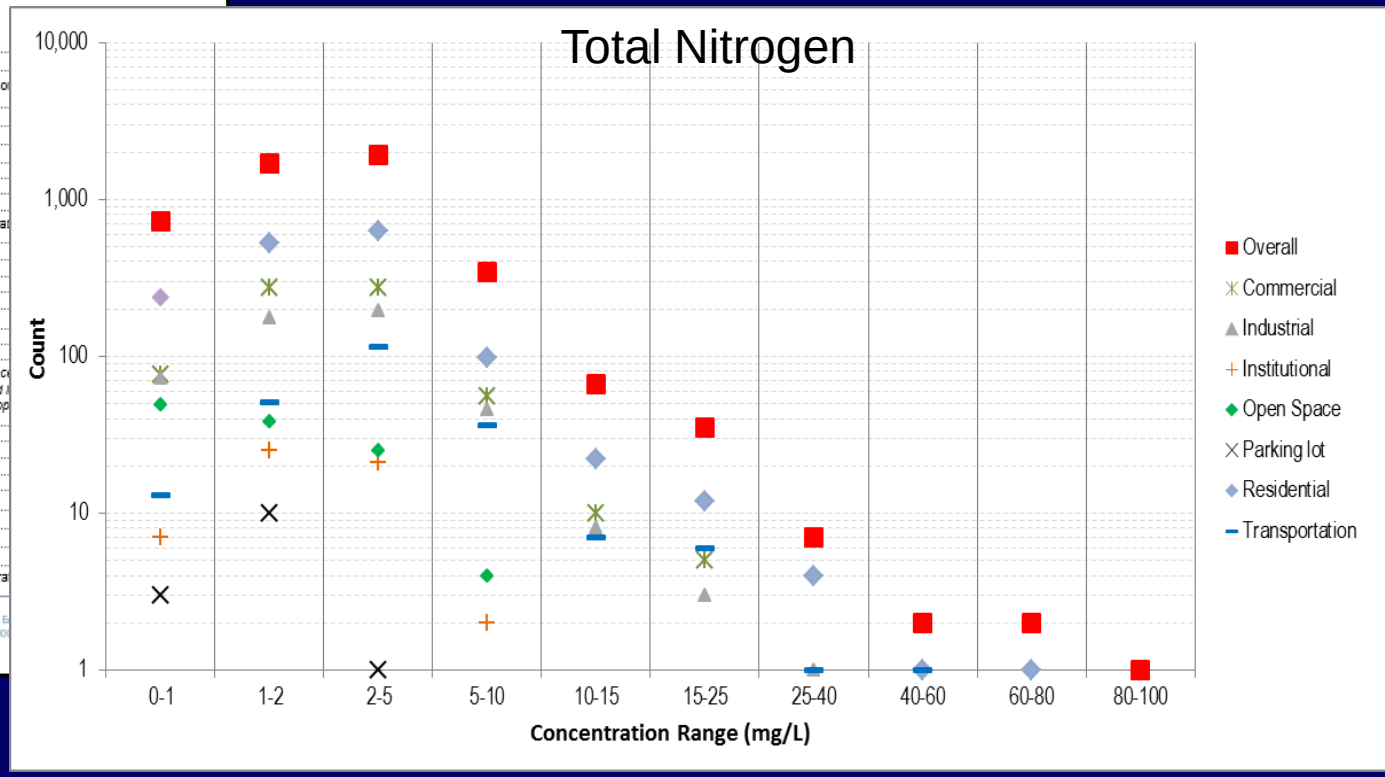
Literature Review—Developed Lands

TETRA TECH

MEMO

To:	Gary Shenk, EPA; Peter Claggett, USGS
Cc:	Tom Schueler, CSN
From:	Mark Sievers, Tetra Tech Inc.
Date:	March 31, 2014
Subject:	Land Use Loading Literature Review Task Summary and Results

The memo is separated into the following sections (click for hyperlink):



Land Uses in Lit Review

- Comm./Ind./High-Int. Dev.
- Commercial
- Golf course
- Impervious
- Industrial
- Inst./Open Space
- Institutional
- MIX-Com/Hwy
- MIX-Com/Ind
- MIX-Com/Inst
- MIX-Com/Mult
- MIX-Com/Open
- MIX-Com/Res
- MIX-Hwy/Mult
- MIX-Ind/Hwy
- MIX-Ind/Mult
- MIX-Ind/Open
- MIX-Ind/Res
- MIX-Inst/Res
- MIX-Open/Hwy
- MIX-Open/Mult
- MIX-Res/Hwy
- MIX-Res/Mult
- MIX-Res/Open
- Open Space
- Parking lot
- Pervious
- Rec./Golf Course
- Recreational
- Residential
- Residential, High Density
- Residential, Low Density
- Residential, Medium Density
- Residential-Driveway
- Residential-Lawn
- Residential-Roof
- Roads/Trans.
- Roads-High Use
- Roads-Low Use
- Roads-Medium Use
- Roof
- Transitional
- Transportation
- Turf

CBP Developed Land Uses

All are also divided by federal, MS4-regulated, and Combined Stormwater Sewer (CSS)

Phase 6 Proposed

- Impervious
  - Roads
  - Buildings, parking lots, etc.
  - Tree canopy over impervious
- Pervious
  - Turf
  - Tree canopy
  - Open space
- Construction
- Extractive

Phase 5

- Impervious developed
- Pervious developed
- Construction
- Extractive

Option A: Secondary Source of Info

- MIX-Com/Hwy
- MIX-Com/Ind
- MIX-Com/Inst
- MIX-Com/Mult
- MIX-Com/Open
- MIX-Com/Res
- MIX-Hwy/Mult
- MIX-Ind/Hwy
- MIX-Ind/Mult
- MIX-Ind/Open
- MIX-Ind/Res
- MIX-Inst/Res
- MIX-Open/Hwy
- MIX-Open/Mult
- MIX-Res/Hwy
- MIX-Res/Mult
- MIX-Res/Open
- Transitional

Sources of data=1,803

Option A: Developed Impervious Buildings, Parking Lots, Etc.

- Comm./Ind./High-Int. Dev.
- Commercial
- Impervious
- Industrial
- Institutional
- Parking lot
- Residential-Roof
- Roof

Sources of data=3,896

Option B: Developed Impervious Buildings, Parking Lots, Etc.

- Comm./Ind./High-Int. Dev.
- Impervious
- Industrial
- MIX-Com/Hwy
- MIX-Com/Ind
- MIX-Hwy/Mult
- MIX-Ind/Hwy
- MIX-Ind/Mult
- Parking lot
- Residential-Roof
- Roof

Sources of data=2,986

Option A: Developed Pervious Open Space

- Inst./Open Space
- Open Space
- Pervious

Sources of data=355

Option B: Developed Pervious Open Space

- Commercial
- Inst./Open Space
- Institutional
- MIX-Com/Inst
- MIX-Com/Mult
- MIX-Com/Open
- MIX-Ind/Open
- MIX-Open/Hwy
- MIX-Open/Mult
- MIX-Res/Hwy
- MIX-Res/Mult
- MIX-Res/Open
- Open Space
- Pervious
- Transitional

Sources of data=2,441

Option A: Developed Pervious Turf

- Golf course
- Residential (2,312)
- Residential, High Density
- Residential, Low Density
- Residential, Medium Density
- Residential-Lawn
- Turf

Sources of data=2,342

Option B: Developed Pervious Turf

- Golf course
- MIX-Com/Res
- MIX-Ind/Res
- MIX-Inst/Res
- Residential
- Residential, High Density
- Residential, Low Density
- Residential, Medium Density
- Residential-Lawn
- Turf

Sources of data=2,969

Option A: Developed Impervious Roads

- Residential-Driveway
- Roads-High Use
- Roads-Low Use
- Roads-Medium Use
- Transportation (641)

Sources of data=686

Option B: Developed Impervious Roads

- MIX-Res/Hwy
- Residential-Driveway
- Roads-High Use
- Roads-Low Use
- Roads-Medium Use
- Transportation (641)

Sources of data=694

Option A & B: Developed Pervious Tree Canopy over Turf

- Rec./Golf Course
- Recreational

Sources of data=11

Option A: Ranking

Phase6 Proposed LU-Version A	TN	TP	TSS
Developed Pervious Tree Canopy Over Turf or Herbaceous	55%	78%	-31%
Developed Pervious Open Space	-38%	-24%	146%
Developed Impervious Buildings, Parking Lots, Etc.	-22%	-4%	-30%
Developed Impervious Roads	20%	-10%	-30%
Developed Pervious Turf	-15%	-40%	-55%

Option B: Ranking

Phase6 Proposed LU-Version A	TN	TP	TSS
Developed Pervious Tree Canopy Over Turf or Herbaceous	28%	18%	-41%
Developed Impervious Buildings, Parking Lots, Etc.	-44%	-36%	147%
Developed Pervious Open Space	-8%	66%	-32%
Developed Pervious Turf	37%	-13%	-29%
Developed Impervious Roads	-14%	-35%	-46%

Land Use Summary

Developed is also divided by federal, MS4-regulated, and Combined Stormwater Sewer (CSS)
Agriculture is also divided by manure eligible vs. manure ineligible

- Phase 6 proposed land uses = 47
  - Developed 8
  - Agricultural 27
  - Other 12

- Phase 5 land uses = 23
  - Developed 4
  - Agricultural 16
  - Other 3

It may be that the loading rate data do not support differentiation among some land uses

Ranking Land Use Loads

- Concentrations (mg/L)
- Loading rates (Lb/A)

- Loads will vary by pervious vs. impervious
  - Evapotranspiration
  - Surface runoff
  - Infiltration to groundwater for pervious

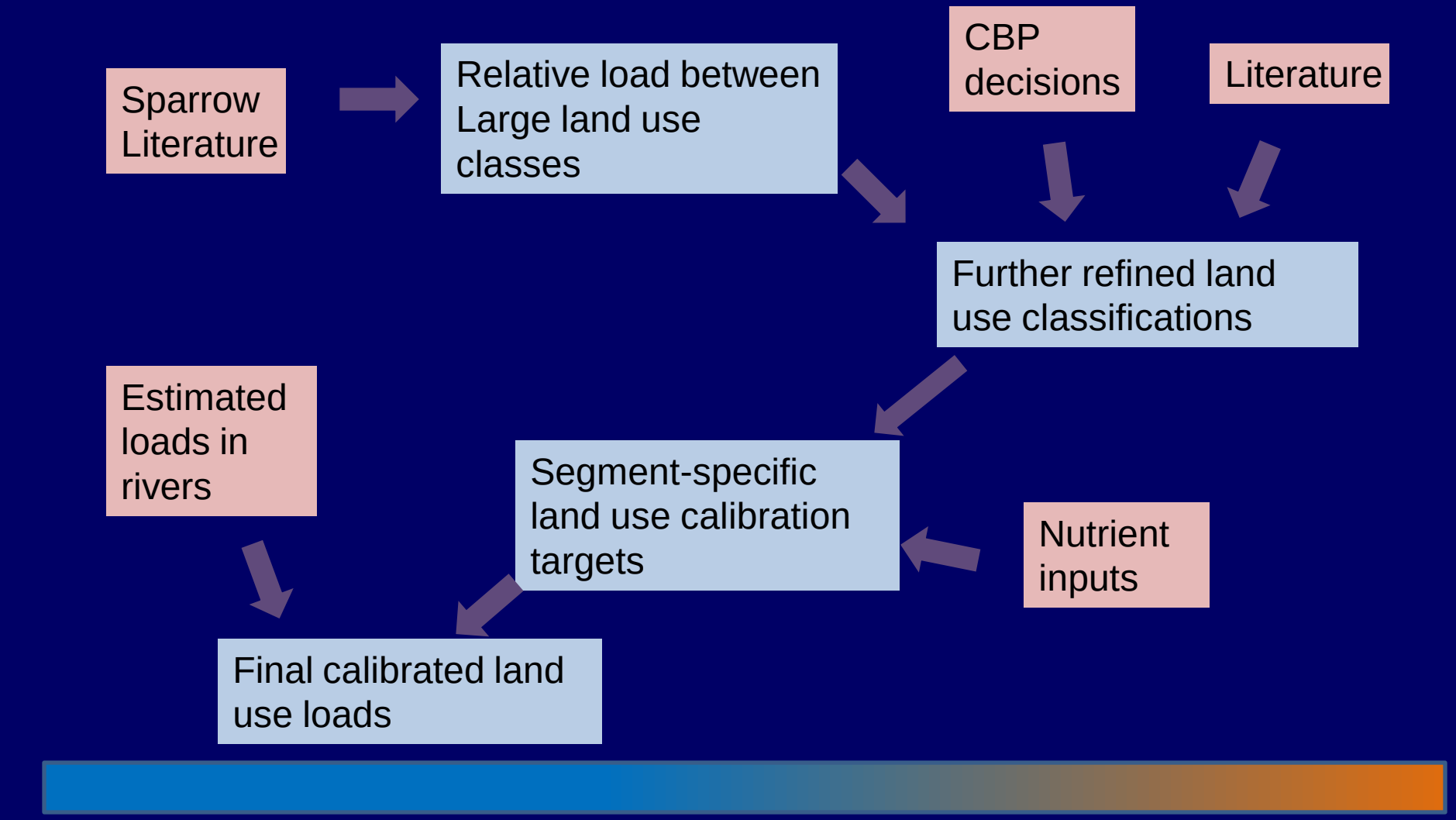
- Incorporate flow: Use the same 10-year average hydrology used by the Watershed Model to convert from mg/L to Lb/A for pervious and impervious land uses

Scale

- Goal is to have targets at the smallest scale that also is best informed by data
  - Field (EOF)
  - Hillslope
  - EOS
  - Small Watersheds or Small
  - Large Rivers

- In this literature review, data sources predominantly are edge-of-pavement

Land Use Load Decisions – Phase 6



Other Sources of Information

- SPARROW—large land use groups
- Construction Expert Panel report
- MDE MS4 monitoring (should be in the literature review, just a double check)
- CBP Sensitivity Work using the multiple model framework
- CWP small-scale sediment work
- Land data team riparian analyses
- Land data team impervious connectedness analysis
- STAC recommendations
- CBP Partnership Watershed Model Phase 5 documentation (where relevant)
- ICPRB calibration work

Role of Workgroups

- Provide critical pieces of information in addition to the full literature review for all source sectors.
- Panel, workgroup documents and recommendations, and available literature are critical sources of data for developing the loading rate targets.
- Modeling workgroup approves the final Phase 6 model

Timeline

- December 31, 2014 - Sparrow and literature review results for draft land uses
- February 28, 2015 - draft targets for draft land uses
- April 30, 2015 - final targets approved by Modeling Workgroup for draft land uses
- Oct 1, 2015 - Once the final land uses are approved, we will finalize targets using a Sparrow update, final sensitivities, and other information.

Keeping Up To Date – Webpages

- Land Use Loading Rates https://www.chesapeakebay.net/about/wmp_for_mpa_effort/land_use_loading_rates

- Additional information on Mid-Point Assessment http://www.chesapeakebay.net/groups/group/water_quality_goal_implementation_team/wmp_for_the_mpa