Nutrient Load Assessment Protocol

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Overview

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- Background and Purpose
  - PCS Recommendations (Inland Bays)
- Protocol
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Definitions/Acronyms

- **TMDL**: Total Maximum Daily Load
- **Land use loading rate**: amount of nutrients, expressed in pounds per day, that a particular land use may contribute to the waterways.
- **PLUS**: Preliminary Land Use Service
- **BMP**s: Best Management Practices

Critical Environmental Area

- The Tributary Action Team recommended designating the Inland Bays a "**Critical Environmental Area**".

- The entire Watershed should be managed for nutrient reductions consistent with TMDL load reductions, or to the maximum extent possible.

What is a Nutrient Load Assessment Protocol?

The Protocol is a tool to assess nutrient load reduction or additions as landuse changes.

Purpose

– Evaluate current and new development proposals in watersheds with adopted nutrient pollution limits (TMDLs) to determine impacts on nutrient loads and water quality.

PCS Recommendation

Implementation mechanism: Nutrient budget must be approved before gaining approval for any permits needed by the Department.

Schedule: This p... will be implemented upon pr... tion of the Strategy. Som... s have been voluntari... g these budgets for several mont... ... a protocol b... ...ished in order to ensure that the budg... produc... able and accurate.

Funding: The budget shall b... ...oper. The protocol tool will be available free of char...

Monitoring: The Departm... ...to ensure consistency in procedures, howev... ...r sh... ...portunity to provide more accurate i...

Responsible par... ...oper, the Department

Estimated Nutrient Reductions: Difference in the land use loading rate for the previous land use and the developed land use with BMPs.

Protocol

- Worksheet
- Results
- Calculations and data

Protocol

- Protocol can be used in most watersheds below the C&D Canal.

- Uses current landuse and asks for the proposed landuse.

- Ask about questions about:
    - wetlands and forest
    - existing buffers
    - open space
    - Percent impervious cover– has default values
    - wastewater disposal
    - whether septic systems will be eliminated
    - stormwater management and BMP used

Protocol calculates

- Nutrient loads based upon current and proposed landuse.

- Loads from open space and impervious cover

- Reductions resulting from buffers

- Wastewater loads

- And stormwater reductions from proposed BMPs

Worksheet

IDENTIFY THE PROJECT

- What is the name of the project?
- What is the tax parcel number?
- Where is the project located? Which watershed?
  - Map links available if unsure.
  - Current applicable watersheds:
    - Inland Bays, Little Assawoman, Nanticoke/Broad Creek
    - Murderkill, Appoquinimink
  - Others to be added as TMDLs promulgated
- What is the PLUS project number?

Worksheet

CURRENT LAND USE

- What is the size of the parcel (in acres)?

- Is there a golf course?

- How many acres are currently used for agriculture? Is manure/litter used as a fertilizer?

- What kind of BMPs exist on the site? I.e. riparian buffers, water control structures, etc.?

  - If there are buffers are they grassed or forested? How many acres of each?

Worksheet

- Does the parcel have any forests and/or wetlands?
  - How many acres of each?
  - Are the wetlands tidal or non-tidal?
- Is there any existing development or structures?
- Is there grass or brush lands?
- Are there any gravel pits?

PROPOSED DEVELOPMENT

- How many acres will be disturbed during construction?

- How many structures will be built?

- How many acres of rooftops, sidewalks, roads, and other impervious surfaces are in the design?

Worksheet

- Will any wetlands be lost as a result of this project?

  - If yes, how many acres of tidal or non-tidal wetlands will be affected.

- Will any forests be lost as a result of this development?

Worksheet

- How many acres will be left undisturbed?
- How many acres will be replanted as trees?
- Will removed wetlands be mitigated?
- Development
  - How many acres will be used for residential or commercial purposes?
  - How many single family dwelling units?
  - How many multi-family dwelling units?
  - Acreage for clubhouse or conference center?
  - Acreage for retail uses?

Worksheet

- Open Space
  - Active Recreational facilities?
    - Bike paths, pool, tennis or basketball courts?
  - Acres of managed open space, excluding golf courses?
    - Parks, lawns, athletic fields, playgrounds, etc?
  - Is a golf course included in the design? If so what is the acreage?

Worksheet

- Buffers
  - Will new buffers be planted, and/or will required setbacks be vegetated?
  - If so, will they be grass, forested, or a combination?
  - What is the average width of the buffer?
  - What is the linear length (in feet) of the buffer?

Worksheet

- Storm Water Treatment
  - Independent practices and/or treatment train?
  - How many and what kinds of practice are being planned for the site?
  - How many acres will be treated by each practice?

Worksheet

- Wastewater Treatment
  - How will wastewater generated by your proposed development be treated?
    - Individual onsite wastewater treatment and disposal systems (Septics)?
    - Large, community system?
    - Central sewer?
    - Spray Irrigation?
  - How many gallons per day will be generated by commercial uses in the development?
  - If central sewer is being used, will installation generate offsite hookups?
  - Will onsite systems be performance based?

Results

- Parcel Information
- Required Nutrient Reductions (TMDL) for affected watershed
- Nutrient load resulting from wastewater treatment
- Density
- Urban nutrient load resulting from impervious cover, managed turf and unmanaged open space.

Results

- Nutrient reductions given for Storm water treatment

- Nutrient reductions for buffers
  - Includes information on the effectiveness of buffers as proposed.

Results

- Nutrient Load Assessment
  - Predevelopment nutrient load coming from parcel
  - TMDL Load (the Goal!)
  - Nutrient load resulting from the conversion of land uses. Does not include wastewater inputs or BMP credits.
  - Project load with wastewater but not BMPs
  - Project load with BMPs

Results

- Additional Information and Features
  - Percent of nutrient load from wastewater inputs
  - Nutrient losses expected during construction

Calculations and Data

- Calculations
  - Locked to protect the logic and programming
  - All calculations are referenced in Guidance and Reference Document
- Data
  - References:
    - Ritter, Sims, CWP, ASCE, etc.
  - Can be found in Guidance document with calculations

Plans for the future

- User friendly format
- Web based?
- Incorporate additional conservation design practices
- Urban Nutrient Management planning
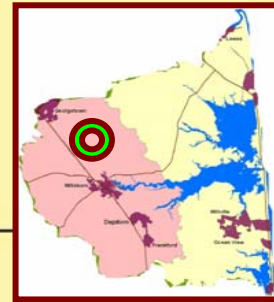- Addition of new watersheds

Example

- Parcel size: 100 acres
- Located: High reduction area of Inland Bays Watershed
- Current use: ag w/manure application and forests
- No agricultural BMPs or any proposed urban buffers
- Proposed Use: 88 single family homes with open space, and performance based individual septic system, and storm water BMPs in treatment train
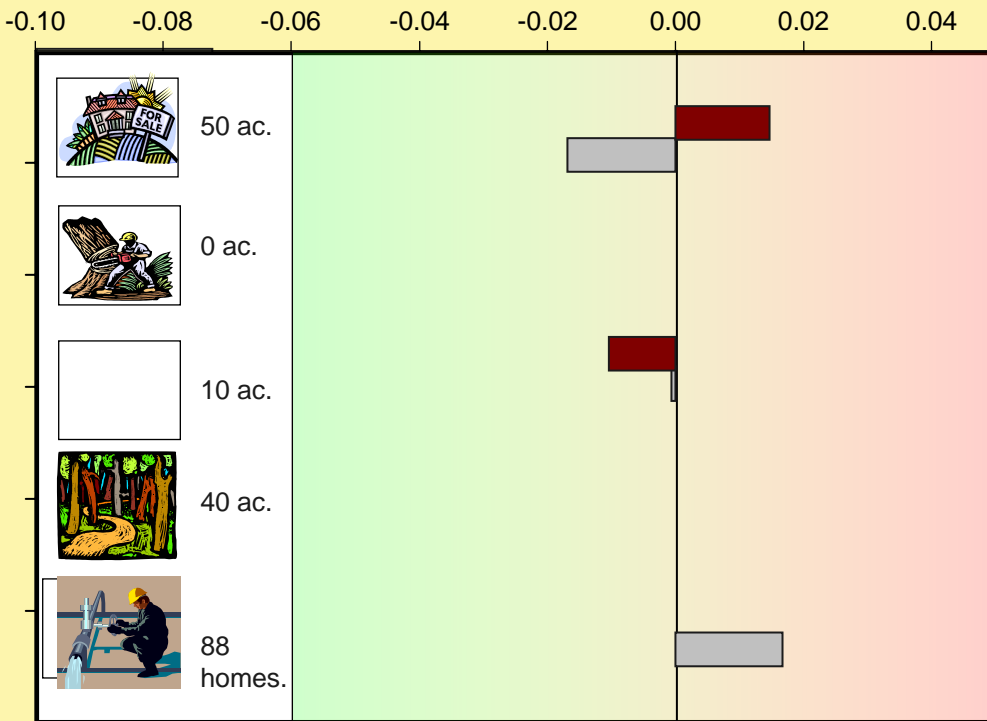
Example

100 Acre Land Area

50 Ac Agriculture
10 Ac Brushland
40 Ac Forest

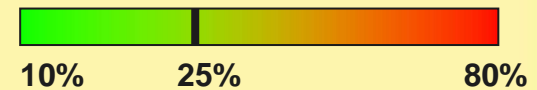# Changes in Nutrient Loads to the Inland Bays with Proposed Landuse Conversions at 100 Acre Development

High Reduction Area

Change in Phosphorus (Pounds per Day)

-0.10   -0.08   -0.06   -0.04   -0.02   0.00   0.02   0.04

Farmland Development — 50 ac.

Deforestation — 0 ac.

Other Development — 10 ac.

Reforestation & Preservation — 40 ac.

Wastewater — 88 homes.

-10   -8   -6   -4   -2   0   2   4

Change in Nitrogen (Pounds per Day)

Total Change in Loads		Meets TMDL
Nitrogen	-127%	YES
Phosphorus	+29.6%	NO

Load Reductions from Best Management Practices		
	Nitrogen	Phosphorus
Stormwater Wet Ponds	-5	-5
Buffers	0	0
Native Plants	0	0
Misc.	0	0

Impervious Surface = 11 ac.

10%   25%   80%

Change in Pollutant Loads to the Bays from "100 ACRE PARCEL" by Landuse Conversion

Change in P Loading (lbs/yr)

-60   -40   -20   0   20

25 ac.

50 ac.

5 ac.

100 ac.

-150   -100   -50   0   50

Change in N Loading (lbs/yr)

Reforestation

Deforestation

Preservation

Farmland to Development

Wastewater
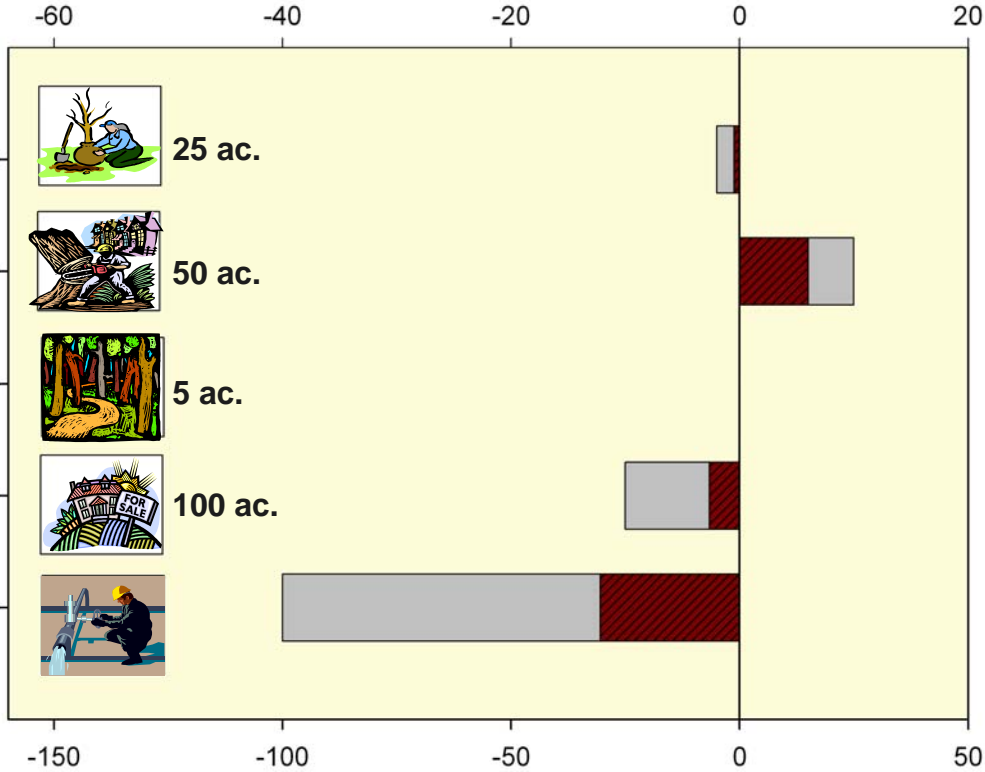
Total Change in Loads	
Nitrogen	-75 lbs/yr
Phosphorus	-10 lbs/yr

Best Management Practices		
	Nitrogen	Phosphorus
Stormwater	-5	-5
Buffers	-10	-10
Lawn Reduction	-1	-1
Narrow Streets	-2	-2
Misc.	0	0
Total	**-18**	**-18**

Impervious Surface

10%   25%   80%
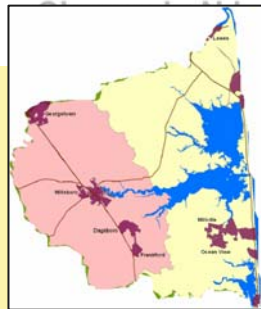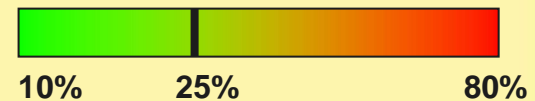
Nutrient Load Change Indicator Layout

- Could be used for individual and aggregate developments for subwatersheds (or TMDL areas)

- Can add numbers to bars or change scale for improved reading

- Need to set reference bounds for "lowest" and "highest" impervious surface areas and define how best calculated

- Need feedback in general and on Best management table

Calculations

- Wastewater = Load from new wastewater system(s) - Load from # of existing septics removed.

- Farm Development = load from acres of Development – load from acres of Ag

- Deforestation = load from acres of development – load from acres of forest

- Grassland/Shrubland in other

Discussion

Indicator	Nutrient loads resulting from landuse changes			
Type	2,4,6			
Spatial Scale	1			
Temporal Scale (min) (rpt)	Multi-year			
Validity	High			
Defensibility	High			
Communicability	High			
Potential for Public Involvement	Yes			
Existing Data	Yes			
Funding Reliability	High			
Reference (now) (future)	Yes			
Merit	High			