Review of Initial Calculations of Falls Stage 1 Jurisdictional Loads

January 24, 2018 - UNRBA

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Background for Falls Stage 1 Jurisdictional Loads

- Falls Rule Stage 1 adaptive implementation requires the determination for all local governments:

  - *"nutrient loading increases from lands developed subsequent to the baseline period and not subject to the requirements of the local government's Falls Lake new development stormwater program."*

  - *Nutrient load from septic systems and sanitary sewer collection systems (not a topic for today)*

Background for Today's Task

- LGs have used a variety of calculation methods and assumptions, are in various states of completeness and results

- Today's Task: group reviews different methods and assumptions used, LG initial results

- Today's Goal: group agrees upon a set of calculation methods and assumptions for LGs to use for revised calculations

Concepts to Discuss

- Spatial extent of development that went in during interim period (what's "in" / "out"?)

- Calculation methods and assumptions:

  - Pre-development annual load (beginning of interim period)

  - Post-development annual load (end of interim period)

Interim Development Period

- Falls Baseline is 2006

- Start point for interim development period = 1/1/2007

- End point for interim development period = when your New D ordinance went into effect

- Include all developments built after 1/1/2007 and vested before New D ordinance went into effect

Spatial Extent – What's "In" / "Out"?

- How to identify qualifying development?

- What types of land covers to include/exclude?

- How to handle annexations?

Spatial Extent – How to ID development?

- Methods used by LGs:
  - Projects requiring stormwater permits
  - All permitted projects
  - New D only
  - New D and expansions of Existing D
  - Developments ID'd using aerial photos
- DWR recommendation:
  - all permitted New D projects regardless of whether stormwater permit required, all commercial/industrial expansion projects

Spatial Extent – What Types of Land Covers to Include/Exclude?

- ## Methods used by LGs:

  - Exclude forest
  - Exclude roads to be dedicated to DOT
  - Include all parts of permitted project area
  - Include all area detected in aerial photography that changed over time

- ## DWR recommendation:

  - include all land cover types in spatial extent of issued permit (include forest and roads to be dedicated to DOT)

Spatial Extent – How to Handle Annexations?

- Methods used by LGs:

  - Add to municipality if annexed in during interim period

- DWR recommendation:

  - (Based on Draft Model Program presented to NSAB in 2013)

  - Involves development post-baseline only (Falls Stage 1)

  - Load increases are added to overall reduction need of annexing municipality regardless of whether development happened before or after annexation

  - Load increases are not included in county's Stage1 estimate

Pre-D Annual Load – Calculation and Assumptions

- Use default loading rate provided in Rule or not?

- How to prep data if you don't use default?

- How to do calculation, if you don't use default?

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Pre-D Annual Load – Use Default Loading Rate?

- Methods used by LGs:

  - Yes, use default loading rate (2.89 lb/ac/yr N, 0.63 lb/ac/yr P)

  - No, use local pre-D land cover data and one of the available calculation tools

  - No, use other model

- DWR recommendation:

  - Use local pre-D land cover data, *or*

  - Use default loading rate if you can't get good pre-D land cover data, with some likely changes to available tools for post-D

Pre-D Annual Load – How to Prep Data?

- ## Methods used by LGs:
    - Land cover areas from development permits
    - Land cover proportions based on lot sizes, development types
    - Land cover areas from stormwater utility data, aerial photos

- ## DWR recommendation:
    - Use land cover areas calculated for development permit if available *(preferred approach), or*
    - Propose assumptions for converting planning-level info (e.g. lot size, development type) to relative proportions of land covers, and informed by stormwater utility data and/or aerial photos

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Pre-D Annual Load – How to do Calculation?

- Methods used by LGs:
  - Default loading rate from Rule
  - Neuse calculation
  - Tar-Pam tool
  - Jordan-Falls v2 tool
  - SNAP v4 tool
  - Other runoff-loading model
- DWR recommendation:
  - Use Jordan-Falls v2 tool, *or*
  - SNAP v4 tool, *or*
  - Default loading rate from Rule

Post-D Annual Load – Calculation and Assumptions

- How to prep data?

- How to do calculation?

- Comparability of Pre-D and Post-D methods

- What to do with buy-down credit?

- What to do with installed SCMs?

Post-D Annual Load – How to Prep Data?

- ## Methods used by LGs: (same as pre-D)

  - Land cover areas from development permits
  - Land cover proportions based on lot sizes, development types
  - Land cover areas from stormwater utility data, aerial photos

- ## DWR recommendation: (same as pre-D)

  - Use land cover areas calculated for development permit if available *(preferred approach), or*
  - Propose assumptions for converting planning-level info (e.g. lot size, development type) to relative proportions of land covers, and informed by stormwater utility data and/or aerial photos

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Post-D Annual Load – How to do Calculation?

- Methods used by LGs:
    - Neuse calculation
    - Tar-Pam tool
    - Jordan-Falls v2
    - SNAPv4
    - Other calculation method
- DWR recommendation:
    - Jordan-Falls v2, *or*
    - SNAP v4
    - (Modifications if you use Pre-D Default Loading Rate)

Post-D Annual Load – Pre-D vs. Post-D Methods

- Methods used by LGs:
  - Same calculation tool pre-D and post-D
  - Similar calculation tool (Neuse/Tar-Pam and SNAPv4)
  - Pre-D default loading rate and post-D Neuse, Tar-Pam, JFv2, or SNAPv4
  - Other model or method
- Potential issues with bias and different results depending on whether you use Pre-D default rate

Post-D Annual Load – Pre-D vs. Post-D Methods

The Problem:

- Rule asks us to calculate the difference in load due to development

- Pre-D default loading rate is a Total Loading Rate

- Tools calculate only Runoff Loading Rates

- Lower BUA → large discrepancy between total load and runoff load

- Potentially large bias in pre-to-post load difference depending on how you calculate Pre-D load

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Post-D Annual Load – Comparing EMCs/Loading Rates – Rule Default vs JFv2 vs SNAPv4

	Land Cover	N Loading Rate (lb/ac/yr)	P Loading Rate (lb/ac/yr)		Land Cover	N Loading Rate (lb/ac/yr)	P Loading Rate (lb/ac/yr)
Total Load	Default Forest (75%)	1.6	0.33	**Runoff Load**	JF2 Forest	0.78	0.13
	Default Pasture (22%)	5.7	1.1		JF2 Pasture	1.92	0.83
	Default Crops (3%)	13.4	5.3		JF2 Managed Pervious	1.63	0.31
	Default Mixed (100%)	2.89	0.63		JF2 Lawn / Landscape	1.19	0.23
					SNAP4 Forest	0.47	0.01
					SNAP4 Other Pervious	1.21	0.52

Post-D Annual Load – Pre-D vs. Post-D Methods

DWR Recommendation:

- OK to use tools that calculate runoff rather than total load:

  - Use *same tool* for pre-D and post-D runoff-based calculation

- If you want to use Default Pre-D Loading Rate:

  - Provide Post-D total load estimate using a model, *or*

  - *Possibly,* modify calculation tool for post-D to adjust pervious cover EMCs to account for discrepancy, or other modifications

Post-D Annual Load – Handling Buy-Down Credit?

- Methods used by LGs:

  - Buy-down credits assumed to apply in Falls regardless of whether project location was lower in Neuse

  - Buy-down credits applied when project roads removed from calculation

- DWR recommendation:

  - Apply buy-down credits regardless of where in Neuse credit-generating project was located

  - Buy-down credits can only be used if all parts of the project are included in export calculation

Post-D Annual Load – Handling SCMs?

- ## Methods used by LGs:
  - Development without SCMs lumped together, Development with SCMs calculated individually
  - All developments calculated individually
  - SCM efficiencies from Tar-Pam or Neuse method (use calcs submitted by developer)
  - SCMs modeled in JFv2
  - SCMs modeled in SNAPv4

- ## DWR recommendation:
  - Lump developments without SCMs together
  - Individually model developments with SCMs in JFv2 or SNAPv4

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Preliminary Stage 1 LG Jurisdictional Loads

Falls Local Government	Nitrogen (Pounds/Year)	Phosphorus (Pounds/Year)
Butner	781	82
Creedmoor	**(397)**	**(148)**
Durham	3,500	450
Hillsborough	774	165
Raleigh	92	16
Roxboro	--	--
Stem	409	129
Wake Forest	--	--
Durham County	--	--
Franklin County	--	--
Granville County	967	**(1,435)**
Orange County	--	--
Person County	1,759	**(228)**
Wake County	**(663)**	**(251)**

Red = reductions needed, Bold = credits, Estimates current as of 1/23/2018

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Next Steps

- Resolve differences in approach if any exist

- LGs recalculate and submit

- Discuss results at another UNRBA meeting

- Finalize and incorporate into Draft Model Program

- Present to Water Quality Committee September 2018

QUESTIONS?

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