

# The Effect of Local Stormwater Regulations on Future Nitrogen Loads in the Oyster River Watershed

Lamprey River Symposium  
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# Credits

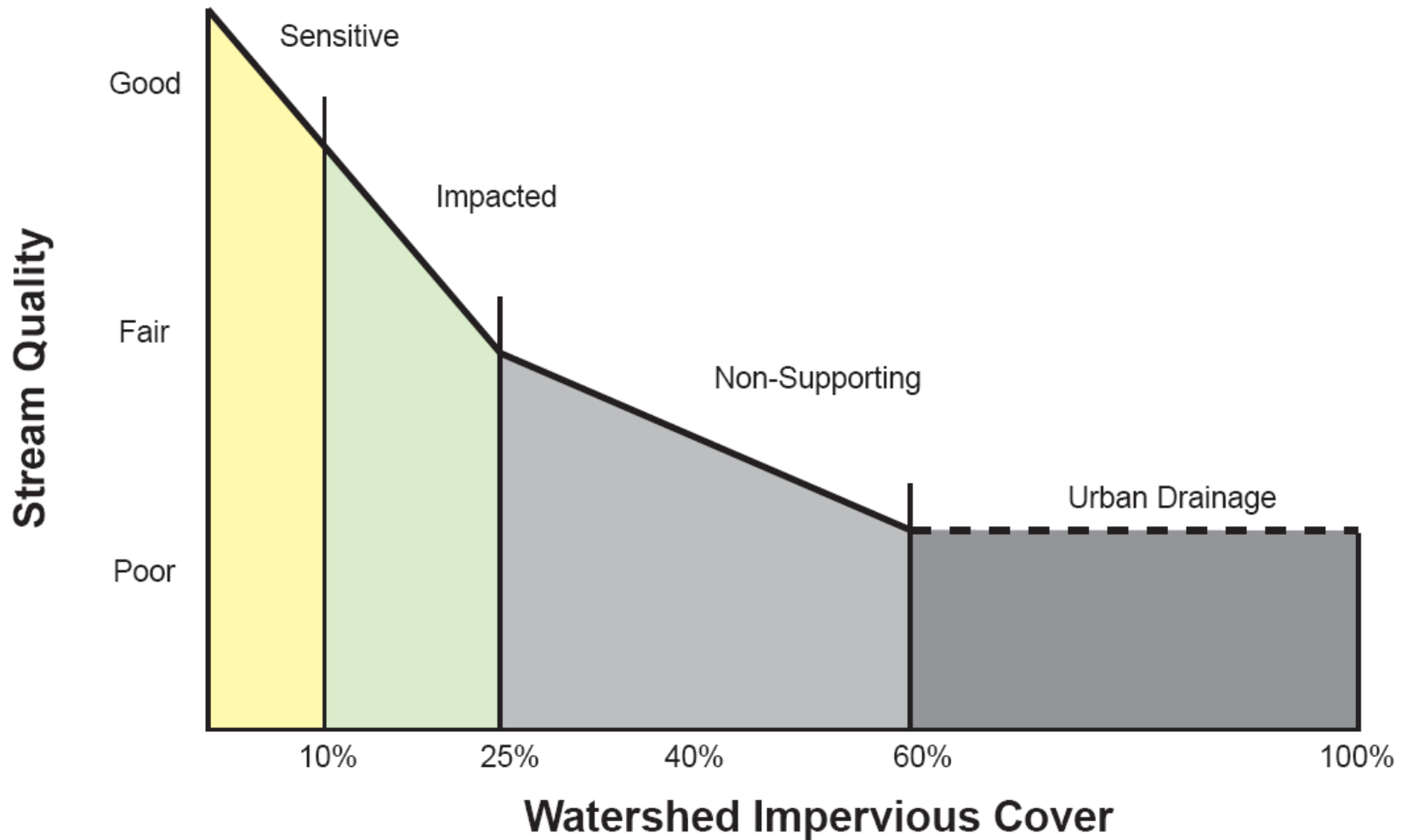
- Pollution Prevention Grant provided by EPA Region 1
- Project team includes
  - UNHSC
  - VHB
  - SRPC

# SWA Model Stormwater Ordinance/ Regulations (Dec. 2012)

- Core Elements:

- Promotes LID Planning and “Green Infrastructure”
- Groundwater Recharge and Volume Control
- Addresses existing IC through redevelopment requirements
- Requires Operations and Maintenance

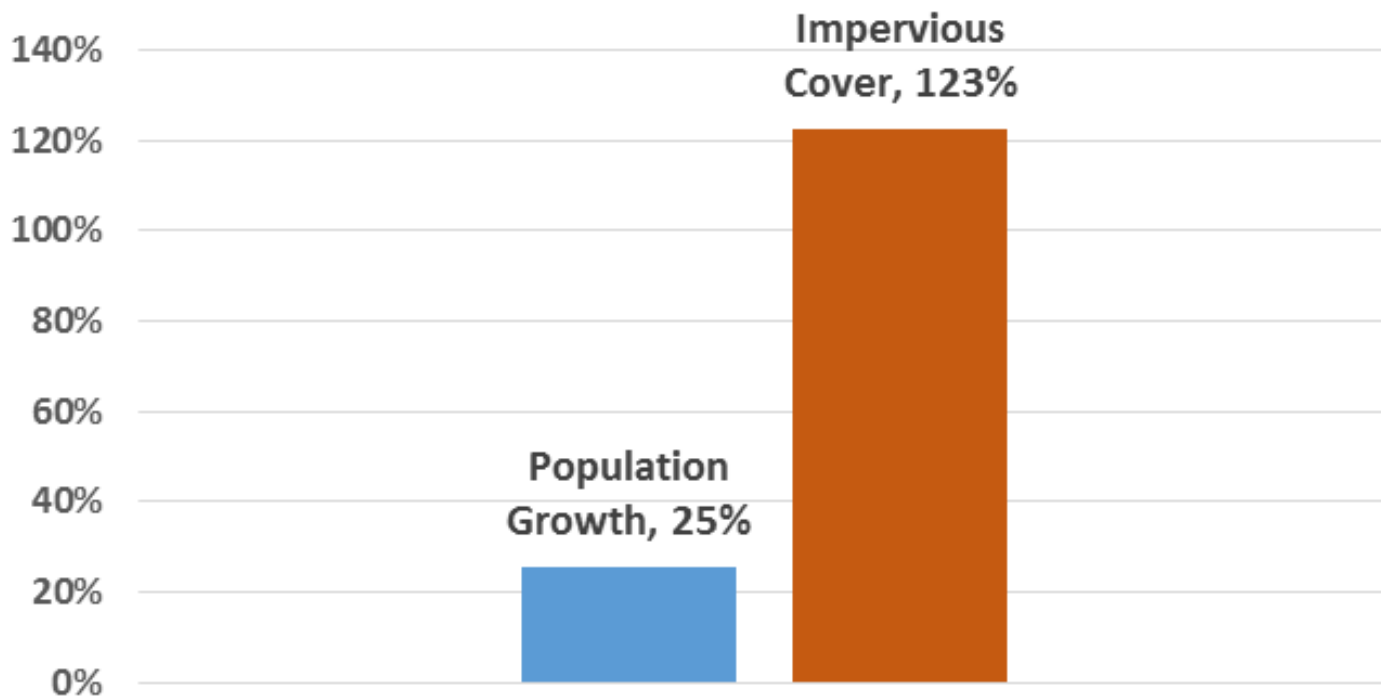
# Impact of Impervious Cover



Adapted from Schueler

# Historical Population and IC Area Trends in the Oyster River Watershed

## Population and IC Growth in the OR Watershed 1990 - 2010



# Study Approach

# Study Approach

- Major Steps;
  - Build-Out Analysis to Estimate Future IC Increases.
  - How Much of Future IC Area would be Subject to New Regulations.
  - How Much of the Applicable IC Area would be Treated due to New Regulations.
  - Assume a Typical Pollutant Removal Efficiency for Stormwater BMP Treatment

# Future Population Growth by Town

Town	Estimated Future Population Growth in the Watershed Over the Next 15 and 30 years			Projected Percent Change
	2010	2025	2040	2010-40
Barrington	1,651	1,836	2,105	27 %
Dover	2,764	2,993	3,358	22 %
Durham	13,802	15,452	17,804	29 %
Lee	2,369	2,397	2,534	7 %
Madbury	1,209	1,372	1,597	24 %
Nottingham	437	546	669	53 %
<b>Total</b>	22,232	24,596	28,067	26%
	Net Increase	<b>2,364</b>	<b>5,835</b>	

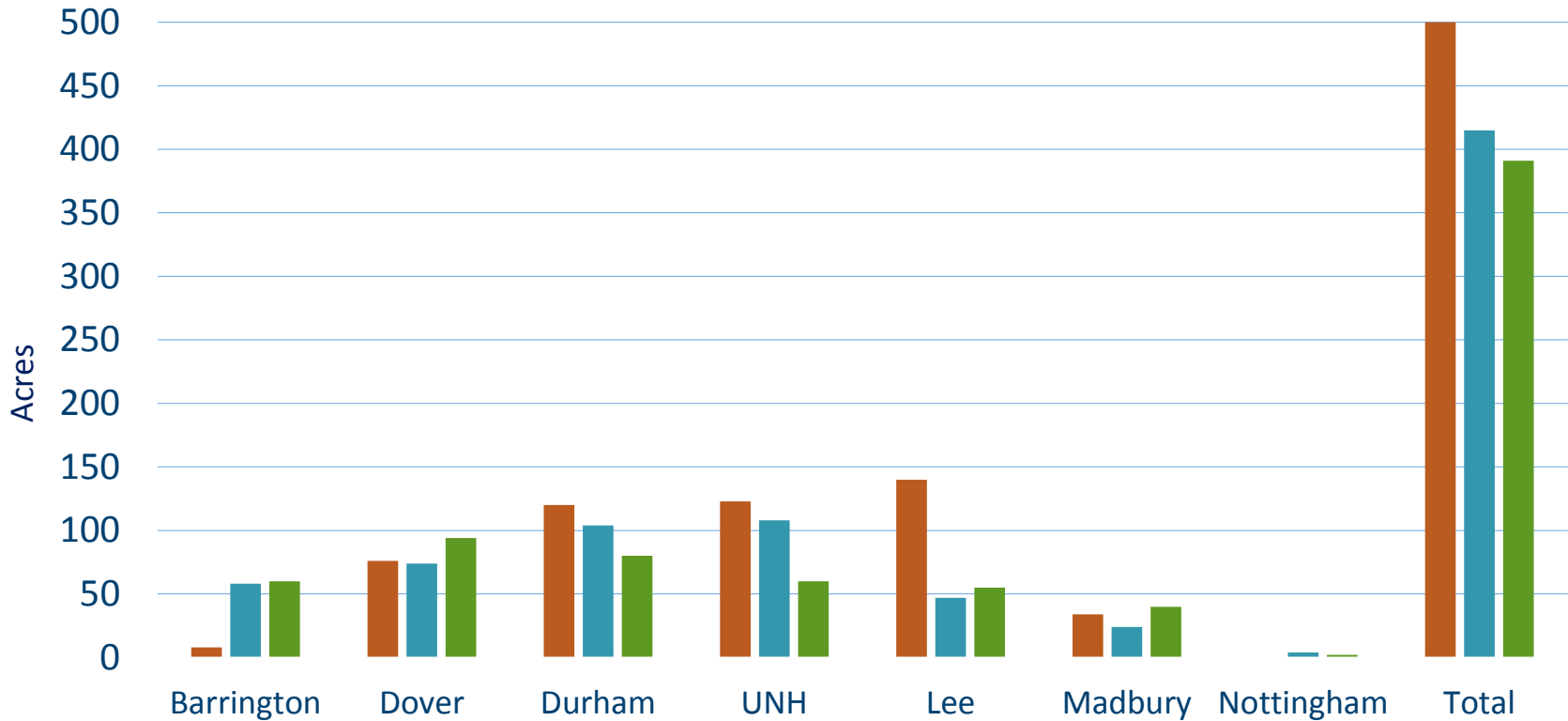


# Future Residential IC Area

- Major Assumptions:

- Based on Population Growth & Current IC per capita ratio in each Town.
- Population Growth Estimates Available for 2025 and 2040 (30 years).
- For Durham & Dover, 80% of the future development would occur as subdivisions or multi-family units and subject to new regulations.
- For other towns, 50:50 split as subdivisions/multi-family and single-lot development.

# Commercial Development Estimates



- Existing Commercially Developed Land
- Estimated Future Commercial Developed Area based on 20% Assumption
- SRPC Priority Commercial Properties for Future Development

# Future Commercial IC Area

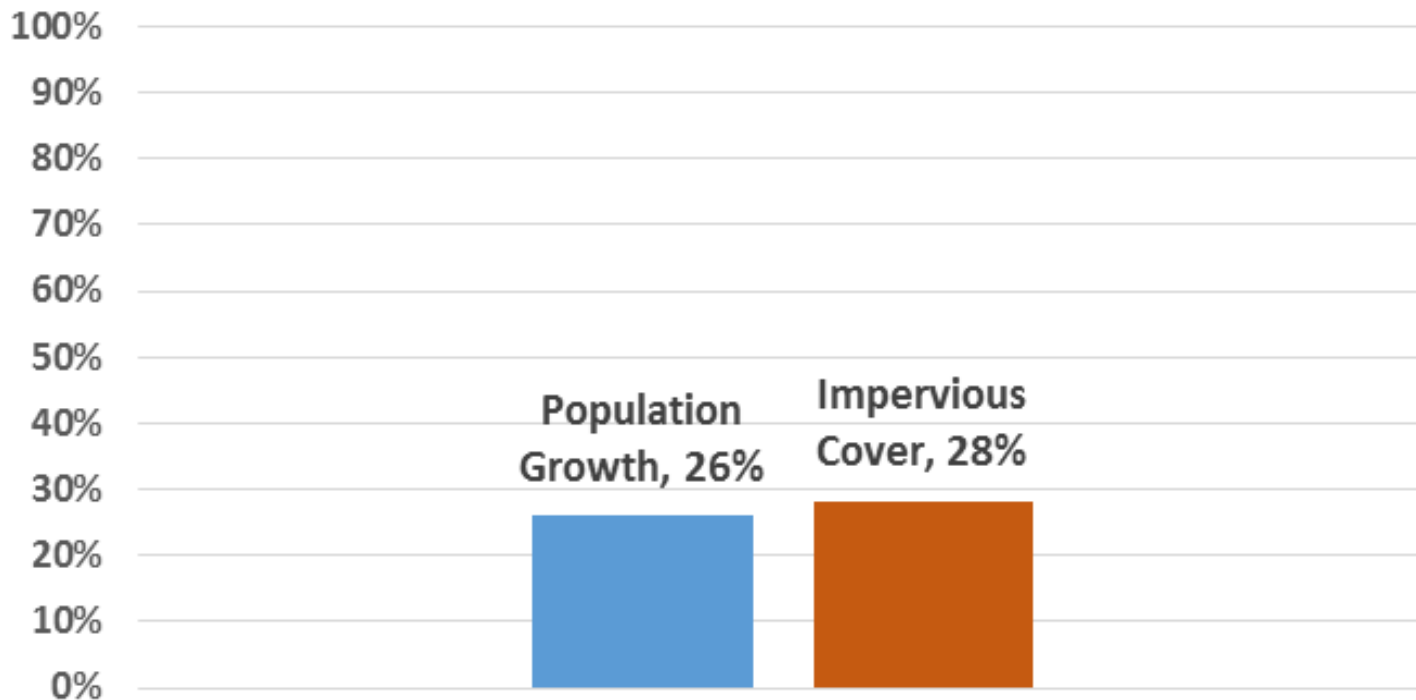
- Major Assumptions:
  - Future IC Area based on Current IC per Parcel Ratio
  - Load reductions based on trigger condition
  - 80 % of the Future Commercial Dev. Subject to Regs

Statistics for existing commercial developments in Durham that would be subject to regulation

Trigger Condition (sf)	% Regulated
5,000	80%
10,000	60%
20,000	50%
40,000	30%

# Projected Population and IC Area Trends in the Oyster River Watershed

## Population and IC Growth in the OR Watershed 2010 - 2040



# Pollutant Load Modeling Assumptions

## Pollutant Loading per Impervious Acre (lbs/ac/yr)

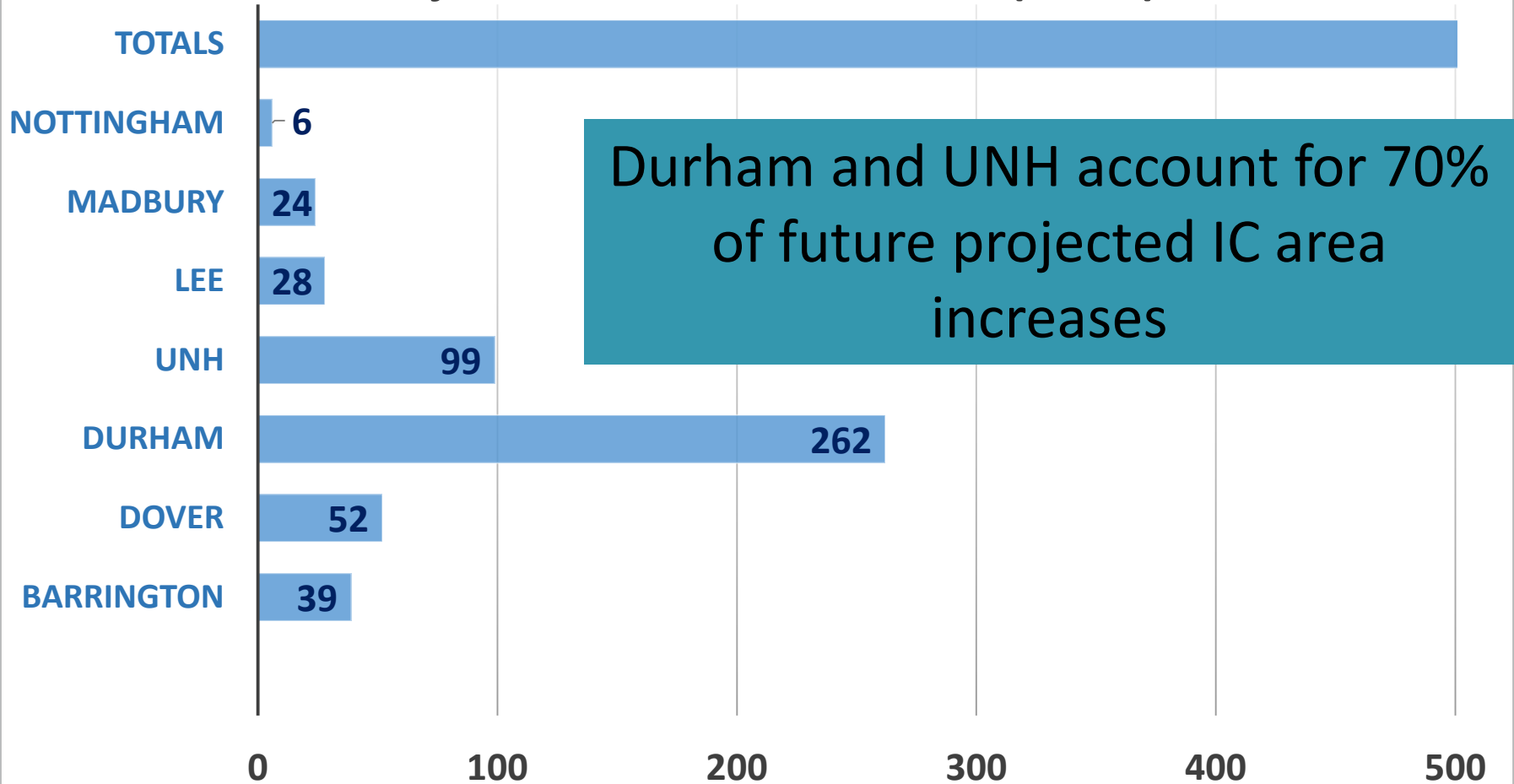
Base Load Rate	TSS	TP	TN
Residential	266	1.6	16.1
Commercial	613	2.6	23.6
<b>Load Rate with Treatment* &amp; Regs adopted</b>			
Residential	34.5	0.73	6.4
Commercial	79.6	1.18	9.5

\*assumes 87%, 55%, 60% removal rates

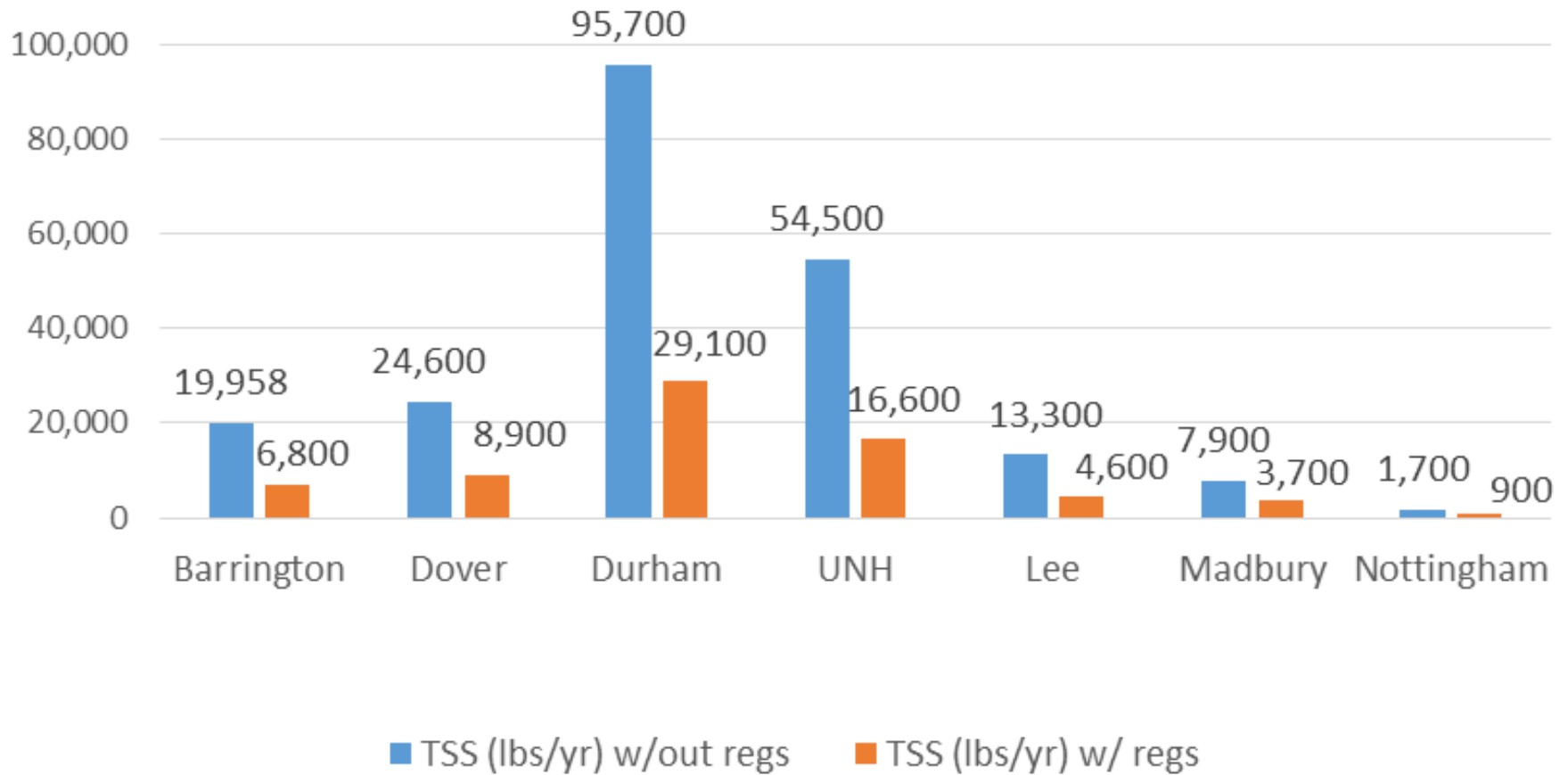
Loading rates based on USEPA Simple Method

# Projected Future IC Area by 2040

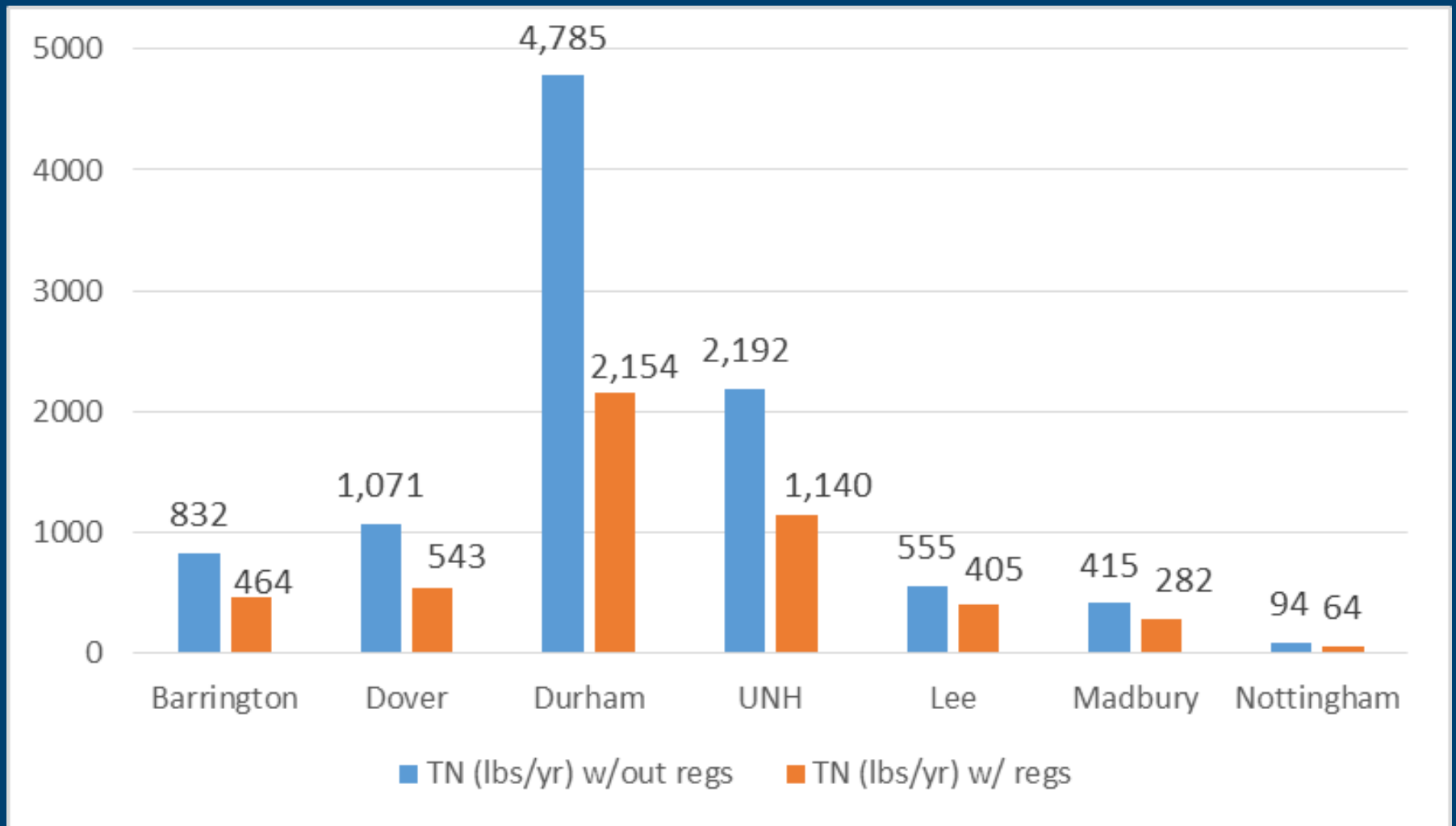
Projected Increase in IC Area (acres)



# Estimated Effect on Future TSS Loads (lbs/yr) due to Stormwater Regulations

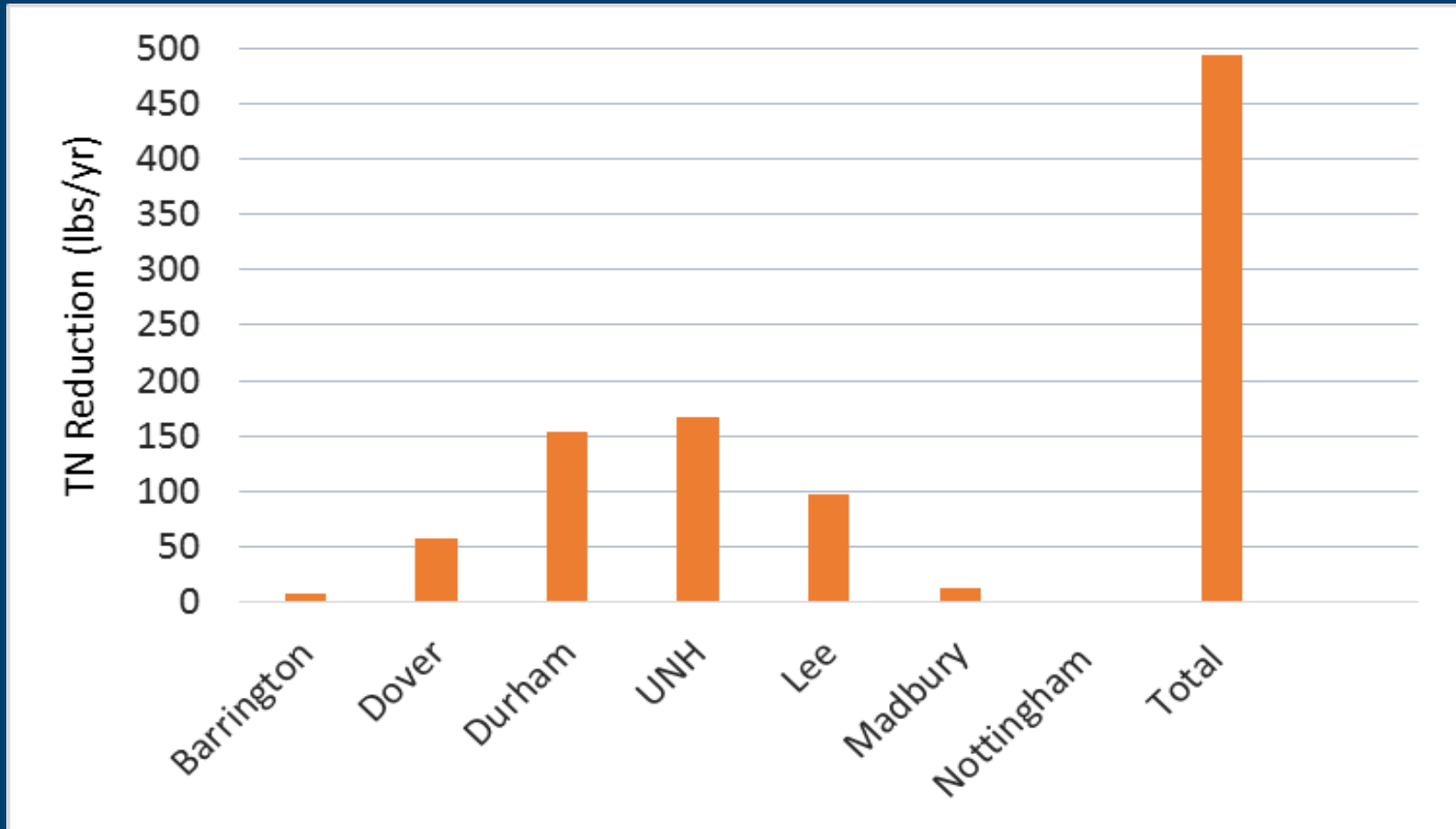


# Estimated Effect on Future TN Load (lbs/yr) In Each Town Due to Stormwater Regulations



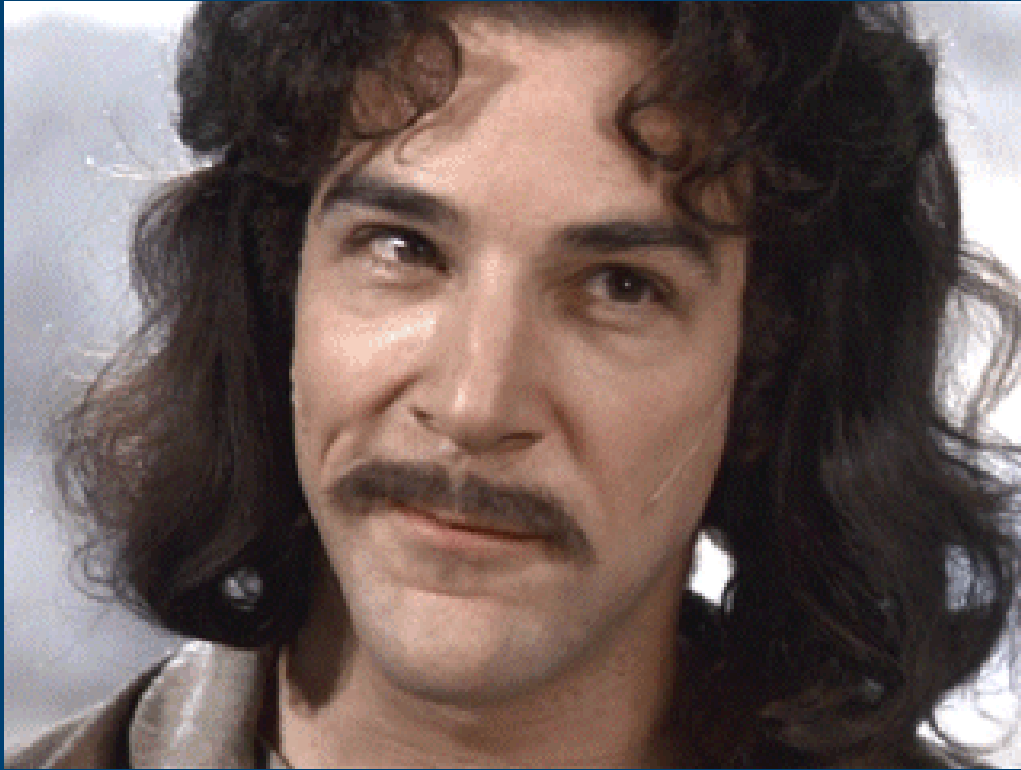


# Estimated TN Load Reductions Due to Future Redevelopment



Based on assumption that 25% of the Commercial IC area is redeveloped

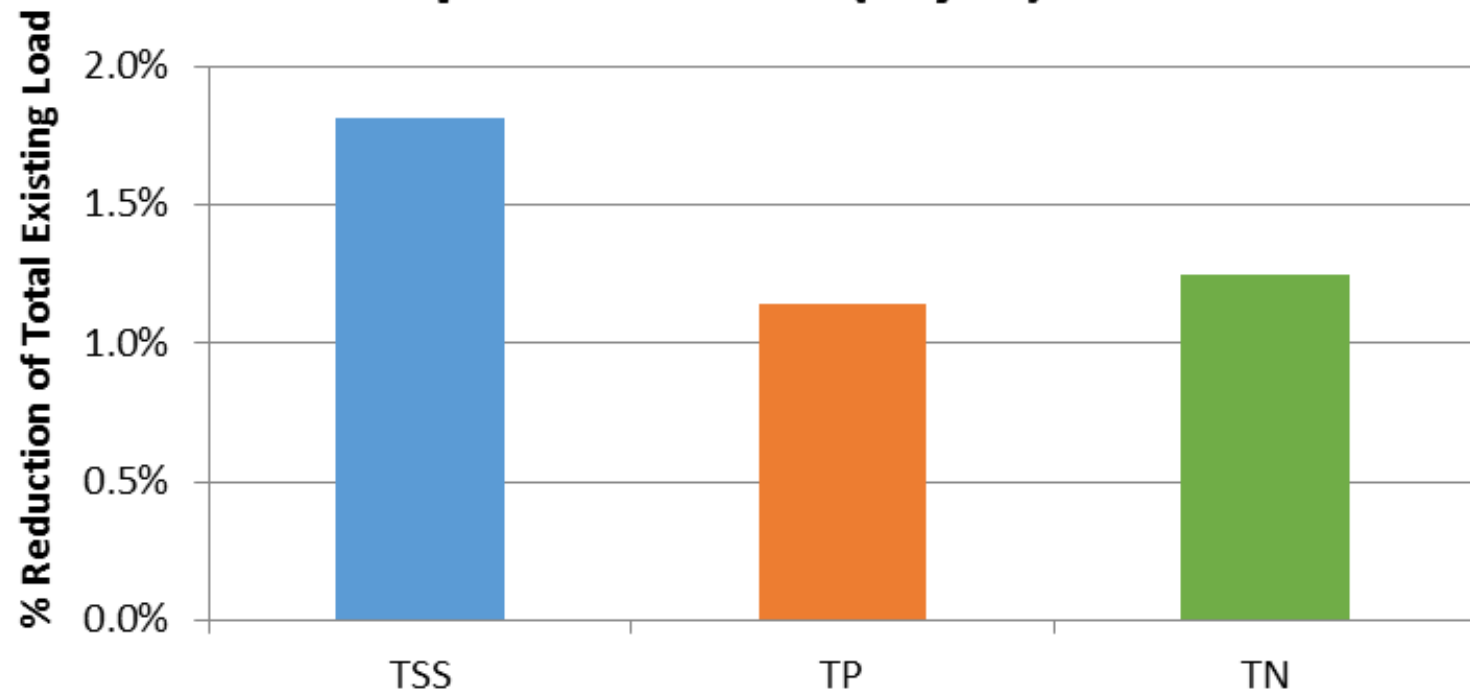
# What does it mean?



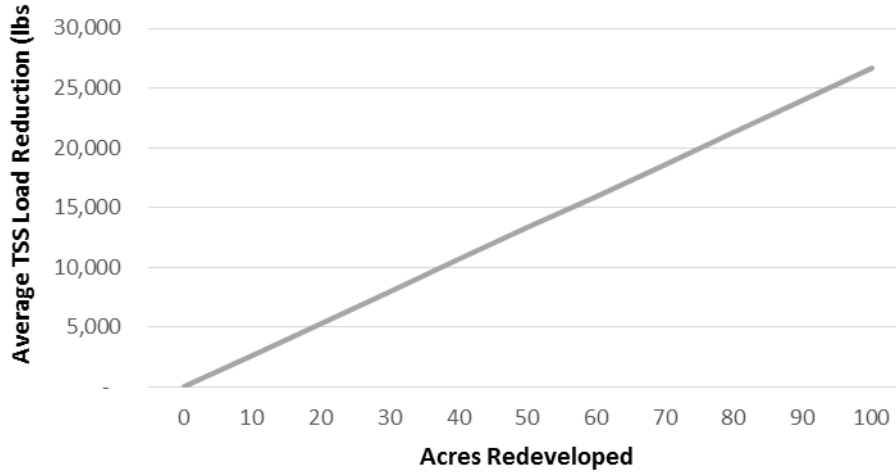
You keep using the words “pollutant load reduction”, I am not sure it means what you think it means...

# Potential Reduction Credits

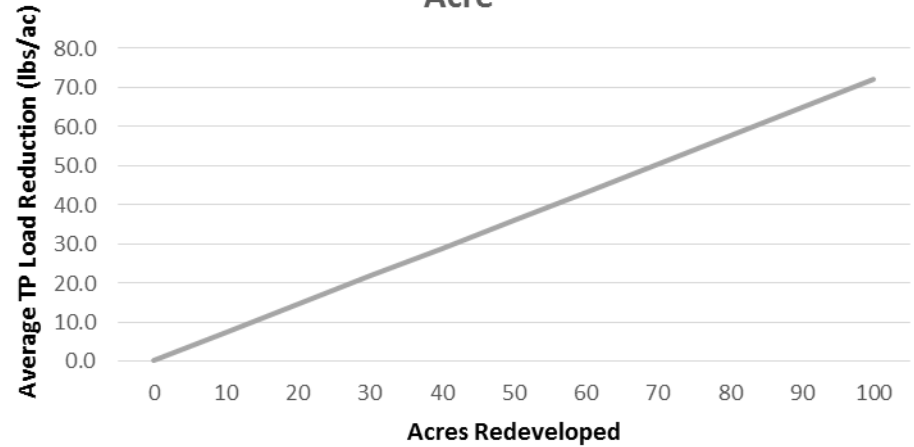
## Pollutant Load Reduction Credit per permit term (5 yrs)



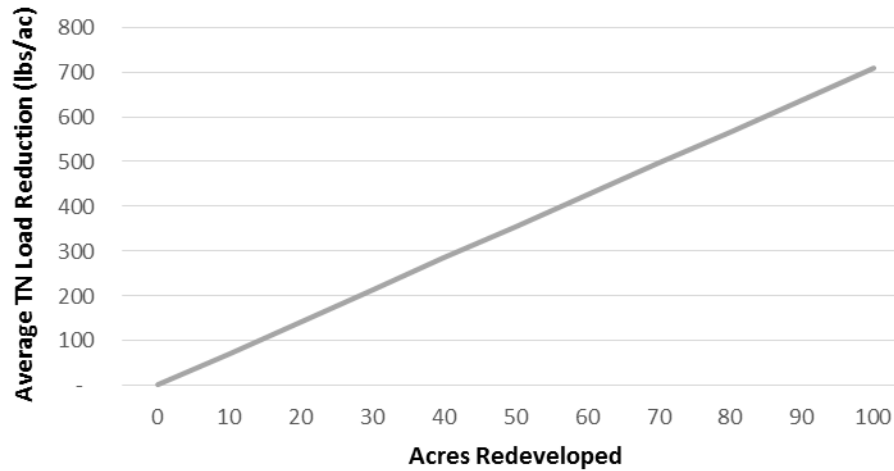
### Sediment Load Reduction Per Redeveloped Acre



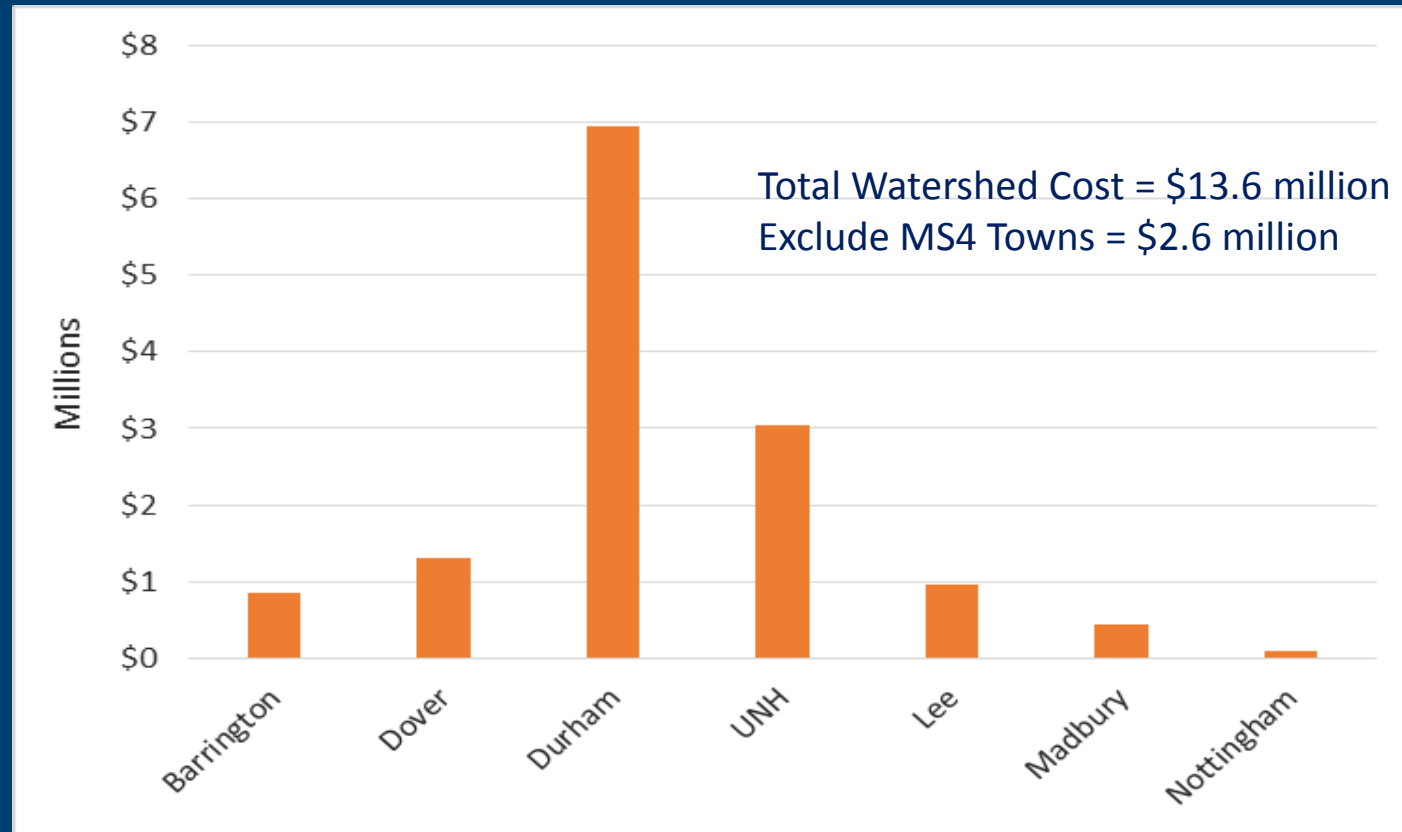
### Phosphorus Load Reduction Per Redeveloped Acre



### Nitrogen Load Reduction Per Redeveloped Acre



# Estimated Future Costs to Retrofit Same IC Area if Regs are Not Adopted



Assumes an average treatment cost of \$30,000 per acre.  
Costs are in 2015 dollars

# Questions and Answers

