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Minimizing Environmental Impacts Through Stormwater Ordinance and Site Plan Regulation

University of New Hampshire Stormwater Center (UNHSC)

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Environmental and Financial Benefits of Adopting Local Stormwater Regulations to Reduce Pollutant Loads Associated with Future Development

The Seacoast Region and the larger Great Bay watershed represents one of the fastest developing regions in the state. Stormwater runoff from impervious surfaces has been shown to be one of the leading causes for declining water quality and increased flooding in our region's water resources. The Great Bay Estuary, a critical ecological and economic resource in the NH Coastal Region is listed as impaired due to declining water quality conditions resulting from increased pollutant loads largely contributed from non-point sources. As future development continues to unfold, pollutant loads from development activity are only going to increase.

In 2012, the Southeast Watershed Alliance (SWA) commissioned the UNH Stormwater Center and the Rockingham Planning Commission to develop model stormwater standards that communities could adopt in zoning or land development regulations to help minimize the environmental impacts of increased stormwater runoff from new and redevelopment activity.

SWA MODEL STORMWATER STANDARDS

Core Elements:

- Promote LID Planning and "Green Infrastructure"
- Enable groundwater recharge and volume control
- Address existing impervious cover through redevelopment requirements
- Require operations and maintenance

PILOT TEST CASE

Using the Oyster River watershed as a pilot test case, this study evaluated the financial and ecological benefits of adopting the enhanced model stormwater standards to reduce future pollutant loads resulting from expansion of impervious area in the watershed over the next 30 years. The standards would apply to new development and redevelopment projects subject to site plan and/or subdivision review by the Planning Board. This includes most, if not all, commercial or mixed use development projects and residential multi-family or subdivision projects.

FUTURE COMMERCIAL IC AREA

One of the most important aspects of the model regulation is the adoption of the actual trigger threshold which would require a new development or redevelopment to comply with the regulatory standards. Often this decision is made by comparing the state program trigger (100,000 sf of disturbance) to the proposed town standard. The model advocates adoption of a 5,000 sf trigger condition. This aspect of the regulation has a substantial effect on the future water quality and pollutant load reduction potential and should be carefully considered.

For context the statistical analysis of existing impervious cover (IC) for commercial parcels in Durham is shown in **Table 1.**

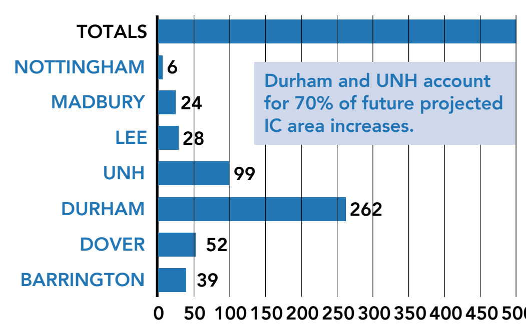
TABLE 1: Statistics for existing commercial developments in Durham that would be subject to regulation.

TRIGGER THRESHOLD	PERCENT REGULATED
5,000 sf	80%
10,000 sf	60%
20,000 sf	50%
40,000 sf	30%

PROJECTED FUTURE IC AREA BY 2040

Another important component of the study was the watershed-based approach as opposed to simply analyzing changes in a particular town or city. Since most towns contribute to multiple watersheds – as is the case with Barrington, Dover and Nottingham – only a portion of the land area of those municipalities contributes to the overall watershed load. In the Oyster River watershed, another 500 acres of IC area is estimated to be added over the next 30 years due to future residential and commercial development activity (**Figure 1**).

FIGURE 1: Projected increase in IC Area (acres).



This represents a 40 percent increase over existing conditions. With no local stormwater regulations in place, by 2040 this new IC area would increase the average annual Total Suspended Sediment (TSS) load by approximately 217,700 pounds (~109 tons),as well as add 1,060 pounds of Total Phosphorus (TP), and 9,950 pounds of Total Nitrogen (TN). With enhanced stormwater treatment in place as a result of local stormwater standards, the predicted average annual pollutant loads would be approximately 40 to 70 percent lower, eliminating 147,150 pounds (~74 tons) of TSS, 450 pounds of TP and 4,900 pounds of TN that would otherwise be discharged to the Oyster River and the Great Bay Estuary. For nitrogen alone, more than half of the predicted future annual load attributed to new IC area could be reduced by providing enhanced stormwater treatment. (Figure 2).

POTENTIAL REDUCTION CREDITS

An important outcome of this study is that the adoption of more stringent redevelopment requirements, which are relatively easy and inexpensive to implement, can be highly effective in reducing future pollutant loads not only from future development but from existing untreated commercial land uses as well. In essence these model standards can leverage the economic investment of developers in redevelopment projects to improve water quality conditions in the Great Bay and meet future state and federal permit requirements. Over the course of a five-year permit term, this study found that a 1.8% decrease in TSS, 1.1% decrease in TP and a 1.3% decrease in TN from baseline pollutant loads could be credited to a municipality that updated their stormwater standards. (Figure 3).

In addition, early adoption of these model standards could result in substantial cost savings through future cost avoidance in not having to construct numerous stormwater BMP retrofits to meet future regulations. The overall cost to retrofit this IC area would be approximately $14 million, using an average retrofit cost of $30,000 per acre. These estimated future costs do not include the cost of inflation nor the added potential cost of lost or diminished ecological services and/or recreational uses as a result of decreased water quality conditions. A breakdown of the estimated cost avoidance for each town within the Oyster River watershed is shown in Figure 4.

FIGURE 2: Estimated Effect on Future TSS, TP and TN Loads (lbs/yr) Due to Stormwater Regulations

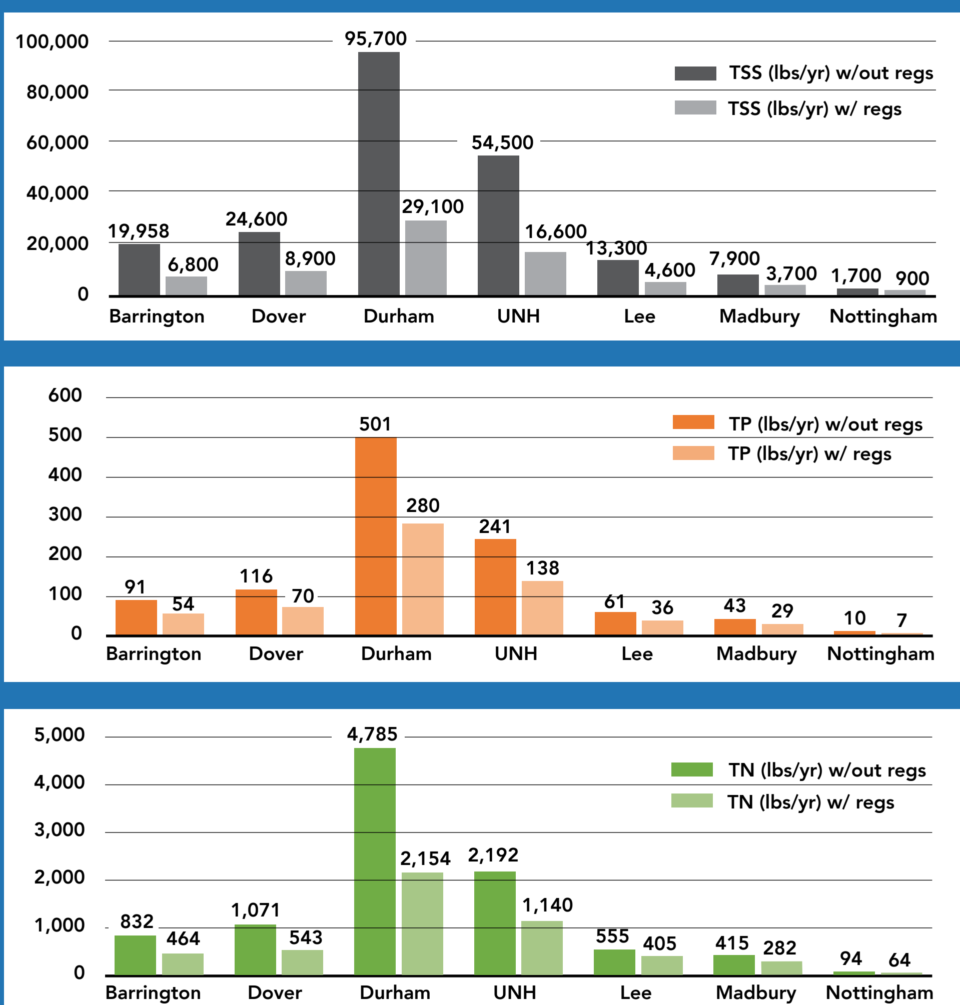


FIGURE 3: Pollutant load reduction credit per permit term (5 years)

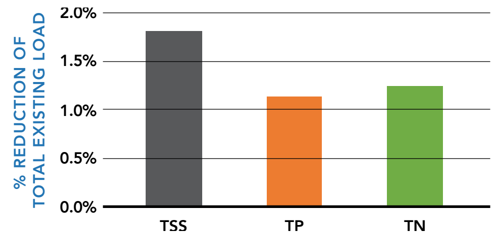
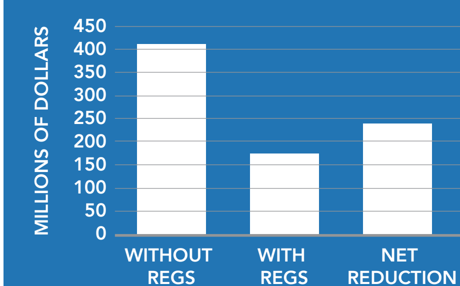


FIGURE 4: Cost Avoidance

TOWN	FUTURE IC TREATED	FUTURE COSTS $30K PER ACRE
Barrington	29	$861,000
Dover	43	$1,300,000
Durham	231	$6,944,000
UNH	102	$3,048,000
Lee	32	$967,000
Madbury	15	$446,000
Nottingham	3	$89,000
TOTAL	455	$13,655,000

COST AVOIDANCE FOR GREAT BAY WATERSHED



ECONOMIC IMPACT – COST AVOIDANCE

If the potential savings in deferred costs or cost avoidance gained through early adoption of stormwater regulations and enhanced treatment were extended beyond the Oyster River watershed to include the entire Great Bay watershed, the potential future cost savings could be in the hundreds of millions of dollars.

EPA United States Environmental Protection Agency

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