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Review of Durham’s Regulations Related to Stormwater Management Durham, New Hampshire

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October 24, 2007

Review of Durham’s Regulations Related to Stormwater Management
Durham, New Hampshire

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Stone Project # 051609-W

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1. PURPOSE

This report provides a review of Durham’s Zoning Ordinance, Subdivision Regulations, Site Plan Review Regulations, Road Construction Regulations, and proposed Stormwater Ordinance regarding 1) compliance with state and federal stormwater regulations, and 2) how well these ordinances and regulations may be expected to perform in managing stormwater. The revisions suggested in these documents are intended to improve stormwater management in Durham for the benefit of the community and the protection of its water resources and wetlands.
2. INTRODUCTION
The Town of Durham has adopted progressive development rules intended to guide development for the benefit of the community and the preservation of Durham’s natural resources base. Durham’s development rules in effect are contained within several documents: the Zoning Ordinance, Subdivision Regulations, Site Plan Review Regulations, and Road Construction Regulations. Also included in Durham’s development rules by citation are state and federal regulations and standards, for example, the New Hampshire Department of Transportation’s Policy Relating to Driveways and Access to the State Highway System. These documents were reviewed to evaluate the strengths and weaknesses of the current regulations/ordinances as they relate to stormwater management.

2.1. Evolution of Stormwater Management
Drainage systems have been constructed through the ages with the goal of collecting and conveying runoff waters away from developed land as efficiently as possible. This approach may protect structures and roads from flood damage on individual developed sites; however, it can exacerbate downstream flooding and create many negative conditions in receiving waterbodies and groundwater resources. Building construction and paving increases the amount and rate of surface runoff and storm sewers increase the efficiency (reduced travel time) with which this runoff is conveyed to receiving waters; hence receiving streams are impacted by larger and more frequent high flows events, which accelerate erosion of stream channels and degrade stream habitat. Because a greater fraction of the water input to developed land typically runs off than in the pre-development condition, groundwater recharge is reduced, which may result in lower water yield in groundwater aquifers and reduced baseflows (dry weather flows caused by exfiltrating groundwater) in streams. In many settings, these impacts of development on watershed hydrology are at least as great a concern as the impacts of contaminated stormwater runoff on receiving water quality, although, in general, water quality impacts of stormwater runoff are pervasive and well documented.

From basic drainage engineering, stormwater management has evolved as a field concerned with both the quantity and quality of rain and snow melt runoff generated in the built environment. The most popular term in the stormwater management lexicon is Best Management Practice, BMP, which has been used to describe almost any type of structure or activity that might conceivably reduce water pollution from diffuse (non-point) sources. The most common type of BMP used to treat stormwater in the U.S. at this time is a stormwater pond. In new commercial and residential subdivision development, stormwater is typically conveyed to a pond, which detains the flow, thereby reducing high flow impacts on downstream channels and providing a measure of treatment, primarily through settling of suspended solids. This approach does not, however, address the underlying hydrologic change that generally occurs when land is developed—groundwater recharge is still
diminished and streams carry too much water during and shortly following storms and not enough in the dry periods between storms. And while suspended solids may be reduced, treatment ponds are less effective in reducing certain nutrients and metals and can increase water temperatures in receiving waters, a potential impact on cold water fish species. Placing a stormwater pond or a treatment wetland at the discharge end of a large stormwater collection system is considered a conventional, “end-of-pipe” approach to managing stormwater. The heavy reliance on structural components means that future generations will inherit another infrastructure in need of maintenance and repair.

Distributed stormwater management is an alternate approach that relies heavily on non-conventional practices to: 1) minimize stormwater runoff, and 2) treat the runoff that is generated as close to the source as possible, often in landscaped areas viewed as site amenities. Generation of runoff is minimized by limiting clearing and grading, amending poor soils to promote infiltration, capturing rainfall in cisterns for beneficial use, using pervious paving materials and alternate types of roofing, reducing the area of impervious surfaces and disconnecting them from stormwater conveyances, strategically placing landscaped areas to intercept and infiltrate runoff, etcetera. Stormwater treatment systems may include vegetated swales, constructed wetlands and ponds, vegetated media filters (i.e., bioretention areas), and other bioengineered treatment systems. Distributed stormwater management minimizes hydrologic impacts of development because precipitation and runoff are infiltrated on site to the extent possible and natural flow paths are preserved wherever possible.

Distributed stormwater management is a central theme in “better site design”, a term popularized by the Center for Watershed Protection (CWP) to describe development that seeks three goals: “to reduce the amount of impervious cover, to increase natural lands set aside for conservation, and to use pervious areas for more effective stormwater treatment.” To advance these goals, CWP has suggested municipal and county government consider a set of approximately 20 model development principles in formulating their regulations.

2.2. Format of Durham Stormwater Review

Given the breadth of the material, a tool was needed to focus our review of Durham’s Zoning Ordinance and Subdivision, Site Plan Review, and Road Construction Regulations. CWP’s model development principles were chosen because they enabled us to take a comprehensive look at Durham’s ordinances/regulations from a stormwater perspective. Section 3 of this report evaluates Durham’s development rules against 20 model development principles and 77 related benchmarks suggested by CWP. Each subsection restates a development principle, followed by a table listing associated benchmarks, and finally a summary where the applicable provision in the Zoning Ordinance or regulations is cited and recommendations are provided. For a rationale statement supporting each model development principle, refer to Appendix A, which is a report from CWP’s round table
process in Blair County, Pennsylvania. For instance, the rationale behind several of the
development principles involving roads, driveways, and parking lots is to minimize
construction of new impervious area to minimize stormwater runoff.

While a formal series of discussions in a round table forum would undoubtedly produce excellent insights into revisions of the Durham’s code to better manage stormwater, the scope of the present review is more limited and we can not possibly know all the important issues in the community. The review covered in Section 3 is intended to reinforce areas where Durham appears to be doing well and to suggest areas where changes should be considered. This report will provide a solid basis for town staff and town boards to consider future changes to the regulations to improve stormwater management. Provided with this information, the town may wish to engage in CWP’s round table or similar facilitated process to discuss and refine potential regulatory changes. Such a process would also serve to expand the Durham’s knowledge base regarding stormwater management, which is consistent with the goal and requirement of providing education and outreach opportunities to community members.

It will obvious to some that the model development principles discussed will not provide complete solutions in many settings. One reason is that our climate in the New England puts us at a disadvantage in some ways as compared to communities to the south. Closed drainage systems will still be necessary to manage stormwater in some constrained settings. However, where better site design and distributed management of stormwater can succeed, these approaches should be encouraged, because they have the potential to provide a better legacy of intact natural systems, sustained groundwater aquifers, and fewer infrastructure liabilities.

Section 4.0 is a detailed review of Durham’s draft Storm Water Ordinance from the standpoint of consistency with state and federal stormwater regulations. Overlapping state and federal regulations result in an unfortunate level of complexity at the local level, especially with regards to construction phase stormwater controls.
3. REVIEW OF DURHAM’S EXISTING DEVELOPMENT RULES AS COMPARED TO CWP MODEL DEVELOPMENT PRINCIPLES

The following documents were reviewed in evaluating Durham’s development rules against model development principles suggested by CWP.

- The Durham Zoning Ordinance as Adopted By the Durham Town Council on February 20, 2006
- New Hampshire Department of Transportation’s Policy Relating to Driveways and Access to the State Highway System, Adopted March 10, 2000
- New Hampshire Department of Transportation’s Standard Specifications for Road and Bridge Construction, 2006 edition
- Recommended Model Development Principles for Blair County, Pennsylvania. May 2006. Alliance for the Chesapeake Bay and the Center for Watershed Protection
- Recommended Model Development Principles for Baltimore County, Maryland. June 2006. Center for Watershed Protection, Alliance for the Chesapeake Bay, Home Builders Association of Maryland, and Baltimore County Department of Environmental Protection and Resource Management
- Recommended Model Development Principles for Frederick County, Maryland. May 2006. Center for Watershed Protection
- Code and Ordinance Worksheet. Center for Watershed Protection

It is evident in review of these documents that the Town of Durham understands many of the environmental protections that may be incorporated in planning new development. There are many areas where Durham’s rules are appropriately strong. The rules regarding “Conservation Subdivisions” are particularly strong, especially as this conservation based development design appears to be the only “by right” development method for residential subdivisions, all non-complying subdivisions needing to meet one of four stringent exceptions. The regulations regarding shoreland buffer zones, which apply to all mapped waterbodies including small streams, are also strong, as are the wetland protection regulations. That said, there are areas within the existing regulations that may be changed to improve stormwater management.

The remainder of this section is a comparison of Durham’s development rules with model development principles suggested by CWP. As the principles are generic, some clearly apply in Durham better than others. Further, the model development principles are somewhat different...
among the four CWP documents reviewed. The development principles cited here were drawn, in most cases verbatim, from the Blair County Roundtable Report (Appendix A) or the Frederick or Baltimore County Reports in a few instances. The associated benchmarks were drawn from CWP’s Code and Ordinance Worksheet. A response is provided to each benchmark question, and the source(s) of the information in Durham’s ordinances/regulations was noted along with our comments.

3.1. **Principle No. 1. Street Width**

Principle: *Design residential streets for the minimum required pavement width needed to support travel lanes, on-street parking, and emergency, maintenance, and service vehicle access. These widths should be based on traffic volume.*

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<thead>
<tr>
<th>Benchmark</th>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>What is the minimum pavement width allowed for streets in low density residential developments that have less than 500 daily trips?</td>
<td>20 foot paved width for 1-200 vehicle per day</td>
</tr>
<tr>
<td>B</td>
<td>At higher densities are parking lanes allowed to also serve as traffic lanes (i.e., queuing streets)?</td>
<td>No</td>
</tr>
</tbody>
</table>

Source/Comments: Road Construction Regulations, Section 4.02. Street width is based on traffic volume as suggested and minimum width is within suggested range of 18-22 feet. Note however that Durham’s Master Plan 2000, p. 9.18, recommends revising the road regulations and subdivision regulations for residential development to “limit the scale and scope or required roadways (including reduction of pavement width and shoulder widths to minimum fire code requirements).” Based on the importance of road width in stormwater generation, we agree that the minimum pavement width standards in the Road Construction Regulations should be carefully considered and reduced if feasible. Consider also adding specification for queuing streets, landscaped bump-outs, and use of alternate paving materials (e.g., porous concrete or porous asphalt and interlocking pavers) for road shoulders on residential streets.

3.2. **Principle No. 2. Street Length**

Principle: *Reduce the total length of residential streets by examining alternative street layouts to determine the best option for increasing the number of homes per unit length.*

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<th>Benchmark</th>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Do street standards promote the most efficient street layouts that reduce overall street length?</td>
<td>Not necessarily</td>
</tr>
</tbody>
</table>

Source/Comments: Zoning Ordinance Articles XII and XIX and Subdivision Regulations Section 9.08. The conservation subdivision provisions may promote reduced street length
due to their flexibility regarding lot layout, lot size, road frontage, and building setback requirements. Consider whether frontage requirements for other types of development may be reduced from the values specified in the Zoning Ordinance Table of Dimensional Requirements.

3.3. Principle No. 3. Rights-of-Way

Principle: Wherever possible, residential street right-of-way widths should reflect the minimum required to accommodate the travel-way, sidewalk, and vegetated open channels. Utilities and storm drains should be allowed to be located within the pavement section of the right-of-way wherever possible.

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<thead>
<tr>
<th>Benchmark</th>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>What is the minimum right of way width for a residential street?</td>
<td>50 feet</td>
</tr>
<tr>
<td>B</td>
<td>Does the code allow utilities to be placed under the paved section of the ROW?</td>
<td>Permitted but discouraged</td>
</tr>
</tbody>
</table>

Source/Comments: Road Construction Regulations, Sections 3.12 and 4.01. The minimum right-of-way width is above the minimum suggested by CWP of 45 feet. The Road Construction Regulations (Section 3.12) discourage placement of underground utilities within the paved area of the right-of-way. Both provisions may lead to excessively wide rights-of-way in some cases. Consider reducing the minimum required right-of-way width and encouraging placement of underground utilities within the paved section of the right of way.

3.4. Principle No. 4. Cul-de-Sacs

Principle: Minimize the number of residential street cul-de-sacs and incorporate landscaped areas to reduce their impervious cover. The radius of cul-de-sacs should be the minimum required to accommodate emergency and maintenance vehicles. Alternative turnarounds should be considered.

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>What is the minimum radius allowed for cul-de-sacs?</td>
<td>50 feet to center line</td>
</tr>
<tr>
<td>B</td>
<td>Can a landscaped island be created within the cul-de-sac?</td>
<td>A landscaped island may be required (with adequate drainage installed) at the discretion of the Planning Board</td>
</tr>
<tr>
<td>Benchmark</td>
<td>Question</td>
<td>Response</td>
</tr>
<tr>
<td>-----------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>C</td>
<td>Are alternative turnarounds such as “hammerheads” allowed on short streets in low density residential developments?</td>
<td>Hammerheads may be permitted at the discretion of the Planning Board</td>
</tr>
</tbody>
</table>

**Source/Comments:** Road Construction Regulations, Section 3.06. The minimum cul-de-sac diameter is 100 feet to center line regardless of average daily traffic volume. Where no landscaped island is provided, consider reducing the required diameter to 70 to 90 feet from outside pavement edge to outside pavement edge. Consider specifying that landscape islands be depressed below road grade, rather than raised, such that they serve to store and treat road runoff as opposed to acting as a source of run-on to the roadway. In addition to hammerheads, consider allowing other alternatives to cul-de-sacs, including loop roads and “eyebrow” corners.

### 3.5. Principle No. 5. Vegetated Open Channels

**Principle:** Where density, topography, soils, and slope permit, vegetated open channels (swales) should be used in the street right-of-way to convey and treat stormwater runoff.

<table>
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<tr>
<th>Benchmark</th>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Are curb and gutters required for most residential street sections?</td>
<td>Yes, street curbing and gutters are required in areas serviced by the municipal storm water collection system and elsewhere at the discretion of the Department of Public Works</td>
</tr>
<tr>
<td>B</td>
<td>Are there established design criteria for swales that can provide stormwater quality treatment (i.e., dry swales, biofilters, or grass swales)?</td>
<td>Not within existing town regulations nor contained in documents incorporated by reference</td>
</tr>
</tbody>
</table>

**Source/Comments:** Road Construction Regulations, Sections 3.10, 3.11, and 3.19. Section 3.11 (Driveways and Other Accesses) incorporates NHDOT’s Policy Relating to Driveways and Access to the State Highway System by reference. Note that the current NHDOT Policy is dated March 10, 2000, not 1992 as indicated in Section 3.11 of the Road Construction Regulations. NHDOT’s 2000 Policy (Section 12.d) permits construction of swales to accommodate drainage and storage of snow. Section 3.19 of the Road Construction Regulations (Drainage) specifies that all streets be provided with “drainage facilities (closed storm drainage system, where appropriate, or culverts and ditches)”, the construction of which shall be in accordance with the Standard Specifications for Road and Bridge Construction, NHDOT, 1990. Note that this reference is also outdated—the current
Consider revising the Road Construction Regulations to encourage construction of vegetated swales and other open drainage systems along new roadways where feasible (e.g., where hydraulic capacity is sufficient to convey the 10-year storm event without erosive flow velocities) and to discourage extension of closed, curb and gutter drainage systems. These regulations should allow for construction of rock-lined drainage swales where road grades are too steep for vegetated open channels. The requirement for street curbing and gutters in Section 3.10 should be removed. An appropriate manual should be referenced in Section 3.19 for design of vegetated swales, such as New Hampshire’s Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire (Rockingham County Conservation District, NH Department of Environmental Services, Soil Conservation Service, August 1992, as amended). Note, however, that the New Hampshire Department of Environmental Services is reportedly considering removing vegetated swales as an accepted treatment practice from this manual. In this case, a federal manual such as EPA’s National Management Measures to Control Nonpoint Source Pollution from Urban Areas may be incorporated by reference to continue to realize the water quality benefits of these naturalized conveyance systems.

3.6. Principle No. 6. Parking Ratios

Principle: The required parking ratio governing a particular land use or activity should be enforced as both a maximum and a minimum in order to curb excess parking space construction. Existing parking ratios should be reviewed for conformance taking into account local and national experience to see if lower ratios are warranted and feasible.

<table>
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<tr>
<th>Benchmark</th>
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<th>Response</th>
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<tbody>
<tr>
<td>A</td>
<td>What is the minimum parking ratio for a professional office building (per 1000 square feet of gross floor area)?</td>
<td>4 spaces</td>
</tr>
<tr>
<td>B</td>
<td>What is the minimum required parking ratio for shopping centers (per 1,000 square feet of gross floor area)?</td>
<td>4 spaces</td>
</tr>
<tr>
<td>C</td>
<td>What is the minimum required parking ratio for single family homes (per home)?</td>
<td>2 spaces</td>
</tr>
<tr>
<td>D</td>
<td>Are your parking requirements set as maximum or median (rather than minimum) requirements?</td>
<td>No</td>
</tr>
</tbody>
</table>

**Source/Comments:** Zoning Ordinance Article XXI, Section 175.112 AND Site Plan Review Regulations, Section 9.7. Consider reviewing and updating the current parking ratio minimum requirements based on a current assessment of actual local demand. Note that the parking ratio standard for office buildings (and possibly other uses) is inconsistent between the Zoning Ordinance and the Site Plan Review Regulations; these standards...
should be harmonized. The lesser of the two minimum standards for office space (1 space per 325 square feet) is recommended. Consider allowing reduced parking ratios for any use if a developer can substantiate claims for the reduction, possibly with a caveat that the difference in number of spaces be reserved as an unpaved, vegetated area. Also consider discouraging construction of an excessive number of parking spaces by requiring developers to justify construction of more spaces than the required minimum or more spaces than a certain percentage (e.g., 120%) of the required minimum.

3.7. Principle No. 7. Parking Codes

Principle: Parking codes should be revised to lower parking requirements where mass transit is available or when enforceable, shared parking arrangements are made.

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<th>Benchmark</th>
<th>Question</th>
<th>Response</th>
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<tbody>
<tr>
<td>A</td>
<td>Is the use of shared parking arrangements promoted?</td>
<td>No</td>
</tr>
<tr>
<td>B</td>
<td>Are model shared parking agreements provided?</td>
<td>No</td>
</tr>
<tr>
<td>C</td>
<td>Are parking ratios reduced if shared parking arrangements are in place?</td>
<td>Not applicable</td>
</tr>
<tr>
<td>D</td>
<td>If mass transit is provided nearby, is the parking ratio reduced?</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

Source/Comments: Consider incorporating language in the Zoning Ordinance and/or Site Plan Review Regulations encouraging shared parking and providing a model shared parking agreement.


Principle: Reduce the overall imperviousness associated with parking lots by providing compact car spaces, minimizing stall dimensions, incorporating efficient parking lanes, and using pervious materials in spillover parking areas.

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<th>Benchmark</th>
<th>Question</th>
<th>Response</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>What is the minimum stall width for a standard parking space?</td>
<td>9 feet</td>
</tr>
<tr>
<td>B</td>
<td>What is the minimum stall length for a standard parking space?</td>
<td>18 feet</td>
</tr>
<tr>
<td>C</td>
<td>Are at least 30% of the spaces at larger commercial parking lots required to have smaller dimensions for compact cars?</td>
<td>No, no more than 20 percent of the off-street parking requirement may be met by the use of compact spaces</td>
</tr>
<tr>
<td>D</td>
<td>Can pervious materials be used for spillover parking areas?</td>
<td>Yes, interlocking bricks are allowed for all multi-unit dwelling units and all nonresidential uses</td>
</tr>
</tbody>
</table>
Source/Comments: Zoning Ordinance Article XXI. Consider increasing the percentage of the parking requirement that may be met using compact spaces (CWP suggests a minimum of 30 percent). Consider requiring use of pervious materials (for example, porous concrete, porous asphalt, interlocking concrete pavers, and grid systems backfilled with crushed stone) for surfacing overflow parking areas and also encouraging use of these materials throughout entire parking lots.


Principle: Where appropriate and when public benefit is demonstrated, provide meaningful incentives to encourage structured and shared parking to make it more economically viable.

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<th>Benchmark</th>
<th>Question</th>
<th>Response</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Are there any incentives to developers to provide parking within garages rather than surface parking lots?</td>
<td>No</td>
</tr>
</tbody>
</table>

Source/Comments: Zoning Ordinance Article XXI. In the downtown area, consider providing incentives to developers in situations that warrant above or below ground parking. Seriously consider above or below ground parking to satisfy public parking demands.


Principle: Wherever possible, provide stormwater treatment for parking lot runoff using bioretention areas, filter strips, and/or other practices that can be integrated into required landscaping areas and traffic islands.

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<tr>
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<th>Response</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Is a minimum percentage of a parking lot required to be landscaped?</td>
<td>Yes, a minimum of 5% of the total parking and driveway area</td>
</tr>
<tr>
<td>B</td>
<td>Is the use of bioretention islands and other stormwater practices within landscaped areas or setbacks allowed?</td>
<td>Not explicitly prohibited</td>
</tr>
</tbody>
</table>

Source/Comments: Zoning Ordinance Article XXI, Section 175-114. Consider encouraging use of bioretention areas (vegetated media filters) in parking lot islands and perimeter landscape buffer areas. Consider requiring that landscape areas be recessed below the lot surface. Curbing around these areas should be minimized or curb cuts should be provided to permit passage of runoff flow to the landscaped islands and buffer areas. Wheel stops may be used instead of curbing at the end of parking stalls. Reference an appropriate manual for design guidelines for bioretention areas and landscape islands and buffers.
3.11. **Principle No. 11. Open Space Design**

Principle: *Advocate environmentally-sensitive practices in development to minimize total impervious area (e.g., by shrinking development footprint), reduce total construction costs, conserve natural areas and contiguous open space, protect agricultural land, provide community recreational space, and promote watershed protection.*

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<tr>
<th>Benchmark</th>
<th>Question</th>
<th>Response</th>
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<tbody>
<tr>
<td>A</td>
<td>Are open space or cluster development designs allowed in the community?</td>
<td>Yes</td>
</tr>
<tr>
<td>B</td>
<td>Is land conservation or impervious cover reduction a major goal or objective of the open space design ordinance?</td>
<td>Yes</td>
</tr>
<tr>
<td>C</td>
<td>Are the submittal or review requirements for open space design greater than those for conventional development?</td>
<td>No</td>
</tr>
<tr>
<td>D</td>
<td>Is open space or cluster design a by-right form of development?</td>
<td>Yes</td>
</tr>
<tr>
<td>E</td>
<td>Are flexible site design criteria available for developers that utilize open space or cluster design options (e.g., setbacks, road widths, lot sizes)?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Source/Comments:** Zoning Ordinance Article XIX. "Conservation Subdivisions" are the required form of subdivision development, with certain exceptions. Article XIX appears to provide a strong basis for conserving natural areas and minimizing increases in stormwater runoff with development through the site design process. The flexibility with regard to lot layout, frontage requirements, and setbacks in Conservation Subdivisions may be employed in designing subdivisions that have considerably less impact on the environment than conventional subdivisions.


Principle: *Relax side yard setbacks and allow narrower frontages to reduce total road length in the community and overall site imperviousness. Relax front setback requirements to minimize driveway lengths and reduce overall lot imperviousness.*

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<th>Benchmark</th>
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<th>Response</th>
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<tbody>
<tr>
<td>A</td>
<td>Are irregular lot shapes (e.g., pie-shaped, flag lots) allowed in the community?</td>
<td>Yes, for example, porkchop lots</td>
</tr>
<tr>
<td>B</td>
<td>What is the minimum requirement for front setbacks for a one half (½) acre residential lot?</td>
<td>30 feet; in a conservation subdivision the setback may be reduced with Planning Board approval</td>
</tr>
</tbody>
</table>
**Benchmark Question Response**

<table>
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<tr>
<th>Benchmark</th>
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<tbody>
<tr>
<td>C</td>
<td>What is the minimum requirement for rear setbacks for a one half (½) acre residential lot?</td>
<td>20 feet; in a conservation subdivision the setback may be reduced with Planning Board approval</td>
</tr>
<tr>
<td>D</td>
<td>What is the minimum requirement for side setbacks for a one half (½) acre residential lot?</td>
<td>10 feet; in a conservation subdivision the setback may be reduced with Planning Board approval</td>
</tr>
<tr>
<td>E</td>
<td>What is the minimum frontage distance for a one half (½) acre residential lot?</td>
<td>100 feet; in a conservation subdivision the setback may be reduced to a minimum of 50 feet with Planning Board approval</td>
</tr>
</tbody>
</table>

**Source/Comments:** Dimensional requirements for setbacks and road frontage are given in the Zoning Ordinance Article XII, Section 175-54 (Table of dimensional requirements). These dimensions are superseded by Article XIX for lots in a conservation subdivision abutting a public street created after July 1, 2003. In this case, the road frontages and yard setbacks may be less than those established in Table 175-54, subject to Planning Board approval. Frontage and setback requirements for conservation subdivisions appear appropriately flexible or low. Consider reducing frontage and setback requirements for other types of development if feasible.

### 3.13. Principle No. 13. Sidewalks

Principle: *Promote more flexible design standards for residential subdivision sidewalks. Where practical, consider locating sidewalks on only one side of the street and providing common walkways linking pedestrian areas. Also grade to pervious areas.*

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>What is the minimum sidewalk width allowed in the community?</td>
<td>6 feet</td>
</tr>
<tr>
<td>B</td>
<td>Are sidewalks always required on both sides of residential streets?</td>
<td>No</td>
</tr>
<tr>
<td>C</td>
<td>Are sidewalks generally sloped so they drain to the front yard rather than the street?</td>
<td>No</td>
</tr>
<tr>
<td>D</td>
<td>Can alternate pedestrian networks be substituted for sidewalks (e.g., trails through common areas)?</td>
<td>Yes, pedestrian and bicycle paths “may or may not be adjacent to traveled roadways” (Road Construction Reg. Sec. 3.09)</td>
</tr>
</tbody>
</table>
Source/Comments: The Town of Durham’s Road Construction Regulations, Section 4.20, require sidewalks to be a minimum of 6 feet wide. Sidewalks are not mandated by regulation, but may be required at the discretion of the Planning Board (Road Construction Regulations, Section 3.09). If the community is unlikely to benefit from a sidewalk, they are not required, which reduces new impervious surfaces. Consider allowing narrower sidewalks (CWP recommends a minimum width of 4 feet or less). Also consider requiring sidewalks to slope toward front yards or the open drainage system, where possible, to minimize drainage to the street and the closed drainage system.


Principle: Reduce overall lot imperviousness by promoting alternative driveway surfaces and shared driveways that connect two or more homes together.

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<tr>
<th>Benchmark</th>
<th>Question</th>
<th>Response</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>What is the minimum driveway width specified in the community?</td>
<td>12 feet</td>
</tr>
<tr>
<td>B</td>
<td>Can pervious materials be used for single family home driveways (e.g., grass, gravel, porous pavers, etc)?</td>
<td>Yes</td>
</tr>
<tr>
<td>C</td>
<td>Can a “two track” design be used at single family driveways?</td>
<td>Possibly not—no reference to a “two track” design</td>
</tr>
<tr>
<td>D</td>
<td>Are shared driveways permitted in residential developments?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source/Comments: Road Construction Regulations, Section 3.11. Driveway construction is required to meet the State of New Hampshire Department of Transportation’s Policy and Procedures for Driveways and Other Accesses to the State Highway System, 1992. Note that Section 3.11 of the Road Construction Regulations should be updated to reference the current NHDOT Policy adopted March 1, 2000. The NHDOT 2000 Policy states that no more than three driveways may be constructed with access to state roads within 500 feet (Section 8.c). The minimum driveway width in the NHDOT 2000 Policy, appended schematic #1, is given as 12 feet. In rural areas, driveways must slope down from state highways in the approach section (NHDOT 2000, Section 10.f). According to Durham’s Subdivision Regulations, Section 9.03.A, driveways shall not serve more than two lots, except on porkchop lot subdivisions. Zoning Article XXI allows for gravel driveways for single-family and duplex housing and requires adequate drainage to prevent runoff flowing onto adjacent property, sidewalks, and public roads. Zoning Article XII, Section 175-57 allows for shared driveways in porkchop subdivisions.
It would be advantageous to permit narrower driveways (CWP recommends a minimum width of 9 feet or less) for single family homes; however NHDOT requires a 12 foot minimum. Consider revising Durham’s Road Construction Regulations, Section 3.11 to specify that driveways should drain to pervious areas (e.g., lawns) where site conditions allow in order to minimize runoff flow to the street and/or the stormwater drainage system. Also consider encouraging use of pervious materials (for example, porous concrete, porous asphalt, interlocking concrete pavers, and grid systems backfilled with crushed stone) for surfacing driveways if site conditions allow.

3.15. Principle No. 15. Open Space Management

Principle: Clearly specify how community open space will be managed and designate a sustainable legal entity responsible for managing both natural and recreational open space.

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<tr>
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<th>Question</th>
<th>Response</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Does the community have enforceable requirements to establish associations that can effectively manage open space?</td>
<td>Yes</td>
</tr>
<tr>
<td>B</td>
<td>Are open space areas required to be consolidated into larger units?</td>
<td>One purpose of the conservation subdivision regulations is creation of continuous open spaces. Also, in calculating useable area, fragmented areas of suitable land are considered not developable, resulting in consolidation of open space</td>
</tr>
<tr>
<td>C</td>
<td>Does a minimum percentage of open space have to be managed in a natural condition?</td>
<td>No</td>
</tr>
<tr>
<td>D</td>
<td>Are allowable and unallowable uses for open space in residential developments defined?</td>
<td>Yes</td>
</tr>
<tr>
<td>E</td>
<td>Can open space be managed by a third party using land trusts or conservation easements?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source/Comments: For subdivisions, open space protection provisions are given in Zoning Article XIX Section I. and Durham’s Subdivision Regulations Sections 9.08 and 9.09. The Subdivision Regulations describe provisions for the designation, use, ownership, and
permanent maintenance of common open space. Durham’s regulations concerning
designation and protection of open space in residential subdivision development appear
strong. However, consider differentiating among uses permitted in primary conservation
areas versus secondary conservation areas. Consider specifying that clearing and
excavation/grading may not be performed in primary conservation areas, which would
preclude construction of wastewater drainfields and stormwater ponds in these areas.
Zoning Article XIX currently allows for both these uses in common open space without
regard to conservation value. Also, consider opportunities to extend any of these open space
conservation provisions to other (non-residential) types of development.

3.16. Principle No. 16. Rooftop Runoff

Principle: Direct rooftop runoff to pervious areas such as yards, open channels, or vegetated areas
and avoid routing rooftop runoff to the roadway and the stormwater conveyance system.

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</thead>
<tbody>
<tr>
<td>A</td>
<td>Can rooftop runoff be discharged to yard areas?</td>
<td>Yes, there is no indication that this practice is not acceptable</td>
</tr>
<tr>
<td>B</td>
<td>Do current grading or drainage requirements allow for temporary ponding of stormwater on front yards or rooftops?</td>
<td>Yes, there is no indication that this practice is not acceptable</td>
</tr>
</tbody>
</table>

Source/Comments: Zoning Ordinance Article XVI, 175-86.C and Subdivision Regulations
Section 9.06. Within the aquifer protection overlay district, all site drainage except roof and
exterior foundation drains must be directed to a detention/holding pond outside the aquifer
recharge area. While directing roof runoff to pervious areas is not explicitly encouraged, this
statement indicates that infiltration of roof runoff is not prohibited in the aquifer protection
overlay district or elsewhere. Consider revising this provision in Article XVI to specifically
encourage rooftop disconnection (drainage to pervious areas like lawns). Also, Section 9.10
(Fire Protection) of the Subdivision Regulations requires all single family residential
subdivisions that do not have access to fire hydrants on a public water main to have cisterns
within 3,000 feet of every building with a capacity of 15,000 gallons. Consider the potential
of these systems to store roof runoff, possibly serving as sources of irrigation water between
storms (while maintaining the required storage volume at all times).

3.17. Principle No. 17. Buffer Systems

Principle: Create a variable width, naturally vegetated buffer system along all perennial and
intermittent streams that also encompasses critical environmental features such as the 100-year
floodplain, steep slopes, and freshwater wetlands.
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Is there a stream buffer ordinance in the community?</td>
<td>Yes, Zoning Ordinance Article XIV, Shoreland Protection Overlay District</td>
</tr>
<tr>
<td>B</td>
<td>If so, what is the minimum buffer width?</td>
<td>The Shoreland Protection Overlay District contains all land within 250 feet of major waterbodies and within 75 feet of most perennial brooks. Within this district, setback distances vary by use. Depending on the waterbody, the shoreland setback distance of building and structures is 125, 75, or 25 feet</td>
</tr>
<tr>
<td>C</td>
<td>Is expansion of the buffer to include freshwater wetlands, steep slopes, or the 100-year floodplain required?</td>
<td>Yes, the wetlands conservation overlay district preserves wetland areas and associated upland buffer zones and the flood hazard overlay district provides protection of riparian zones.</td>
</tr>
<tr>
<td>D</td>
<td>Does the stream buffer ordinance specify that at least part of the stream buffer be maintained with native vegetation?</td>
<td>Yes</td>
</tr>
<tr>
<td>E</td>
<td>Does the stream buffer ordinance outline allowable uses?</td>
<td>Yes</td>
</tr>
<tr>
<td>F</td>
<td>Does the ordinance specify enforcement and education mechanisms?</td>
<td>No</td>
</tr>
</tbody>
</table>

**Source/Comments:** Zoning Ordinance Articles XIII, XIV, and XV. Durham’s regulations concerning buffer zones adjacent to waterbodies and wetlands appear appropriately strong. Consider instituting a legal mechanism for requiring a seller to notify prospective buyers about the presence of steam buffer zones (and other protected areas) on a property.

### 3.18. **Principle No. 18. Clearing and Grading**

Principle: **Clearing and grading for land development should be limited to the minimum amount needed to build lots, allow access, and provide fire protection. A fixed portion of any community open space should be managed as protected green space in a consolidated manner.**
Benchmark | Question                                                                                                                                                                                                 | Response |
--- | ---                                                                                                                                                                                                     | ---
A | Is there any ordinance that requires or encourages the preservation of natural vegetation at residential development sites?                                                                                                      | Yes       |
B | Do reserve septic field areas need to be cleared of trees at the time of development?                                                                                                                   | No        |

**Source/Comments:** Site Plan Review Regulations Sections 9.5 and 9.9; Zoning Ordinance Article XIV. Section 9.9 of the Site Plan Review Regulations states “Grading and clearing should be minimized so as to avoid creating undue erosion or interruption of natural drainage ways.” This is a positive statement that is consistent with the Zoning Ordinance, Article XIX, and will be reinforced by adoption of a stormwater ordinance. Also, neither Durham’s nor any State of New Hampshire regulations require reserve septic fields to be cleared at the time of development. No changes recommended.


Principle: Incentives and flexibility in the form of density compensation, buffer averaging, property tax reduction, stormwater credits, and by-right open space development should be encouraged to promote conservation of stream buffers, forests, meadows, and other areas of environmental value. In addition, off-site mitigation consistent with locally adopted watershed plans should be encouraged.

Benchmark | Question                                                                                                                                                                                                 | Response |
--- | ---                                                                                                                                                                                                     | ---
A | Are there any incentives to developers or landowners to conserve non-regulated land (open space design, density bonuses, stormwater credits, or lower property tax rates)?                                                   | Yes       |
B | Is flexibility to meet regulatory or conservation restrictions (density compensation, buffer averaging, transferable development rights, off-site mitigation) offered to developers?                                                   | Yes       |

**Source/Comments:** For subdivisions, open space protection provisions are given in the Zoning Ordinance, Article XIX, Section I and Durham’s Subdivision Regulations Sections 9.08 and 9.09. The Subdivision Regulations describe provisions for the designation, use, ownership, and permanent maintenance of common open space. Common open space is composed of primary and secondary conservation areas, the designation of which considers the significance of the natural resources present. Conservation Subdivisions are a by-right form of development and open space conservation is required in Conservation Subdivisions; therefore providing incentives for developers to conserve open space is less relevant. Transfer of development rights on designated common open space is presently an option.
Presumably if open space is protected through an easement with a land trust or other conservation organization there would be a tax benefit to the landowners, which is an incentive. There do not appear to be stormwater credits available for land conservation. None of the other types of arrangements appear to be offered; however the designation of useable area and the delineation of common open space are inherently flexible processes.

3.20. Principle No. 20. Stormwater Management

Principle: New stormwater outfalls should not discharge untreated or unmanaged stormwater into jurisdictional wetlands, sole-source aquifers, or other water bodies.

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<th>Benchmark</th>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Is stormwater required to be treated for quality before it is discharged?</td>
<td>Yes, where site disturbance equals or exceeds certain area thresholds</td>
</tr>
<tr>
<td>B</td>
<td>Are there effective design criteria for stormwater best management practices (BMPs)?</td>
<td>Yes, but these are not appropriately referenced in Durham’s existing regulations</td>
</tr>
<tr>
<td>C</td>
<td>Can stormwater be directly discharged into a jurisdictional wetland without pretreatment?</td>
<td>No</td>
</tr>
<tr>
<td>D</td>
<td>Does a floodplain management ordinance that restricts or prohibits development within the 100-year floodplain exist?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source/Comments: Road Construction Regulations, Sections 3.18 (Erosion Control) and 3.19 (Drainage); Subdivision Regulations, Section 9.06; and Site Plan Review Regulations, Section 9.3. Note that Section 9.06 of the Subdivision Regulations is nearly identical to Section 9.3 of the Site Plan Review Regulations.

Durham’s Road Construction Regulations, Section 3.18 require that erosion prevention and sediment control be practiced in all road construction projects. Erosion prevention and sediment control practices “shall meet at a minimum the Best Management Practices set forth in the Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire by the Rockingham County Conservation District” (August 1992), which is an appropriate design manual. Section 3.19 of the Road Construction Regulations requires a drainage analysis comparing pre-development and post-development stormwater flows. However, the Road Construction Regulations do not require post-construction stormwater treatment.
Section 9.06 of Durham’s Subdivision Regulations and Section 9.3 of the Site Plan Review Regulations address only stormwater conveyance on development sites, not erosion prevention and sediment control during construction or hydrologic control and water quality treatment after construction. These major gaps in Durham’s existing regulations will be addressed by the draft stormwater ordinance reviewed in Section 4. Section 9.06 of Durham’s Subdivision Regulations and Section 9.3 of the Site Plan Review Regulations specify that stormwater runoff be conveyed via a system designed in accordance with NHDOT’s Standard Specifications for Roadway and Bridge Construction. This is not an appropriate design manual for projects other than municipal streets. At the present time, erosion prevention and sediment control are required for New Hampshire development projects when the area of disturbance will equal or exceed the criteria of the New Hampshire Department of Environmental Service’s Site Specific Permit or EPA’s Construction General Permit, or both. Smaller projects are not covered. EPA’s Construction General Permit only applies to the construction phase of development projects, whereas the NHDES’ Site Specific Permit requires construction phase and post-construction, permanent stormwater controls. Durham requires an ordinance or regulation as part of the implementation of these state and federal permits. EPA’s Phase II Stormwater Rule for municipal separate storm sewer systems (MS4) requires Durham to adopt “an ordinance or other regulatory measure” establishing the Town’s authority to regulate construction phase and post-construction (permanent) stormwater controls at development sites. Adoption of a Stormwater Ordinance is therefore essential to improve stormwater management in Durham and to comply with Durham’s regulatory mandates. Durham’s draft Storm Water Ordinance is reviewed in Section 4 of this report, and will require operators of construction sites of all sizes to reduce the discharge of sediment and other materials to surface waters and the municipal storm drainage system. The ordinance will specify an appropriate manual for design of post-construction stormwater systems. The ordinance will also need to address other aspects of stormwater management in order to comply with EPA’s MS4 permit for Durham.

Additional comments on Section 9.06 of the Subdivision Regulations and Section 9.3 of the Site Plan Regulations are as follows:

- **Subdivision Regs. Sec. 9.06.A./Site Plan Regs. Sec. 9.3.A.**
  - Suggested edits: Substitute “stormwater management” for “stormwater disposal”. Ideally, stormwater becomes a resource, not a waste product.
  - Add reference to Durham’s Stormwater Ordinance when this is adopted.

- **Subdivision Regs. Sec. 9.06.B.2./Site Plan Regs. Sec. 9.3.B.2**
  - In the statement “Wherever possible, it is desirable that the drainage be maintained by an open channel with landscaped banks and adequate width for maximum potential volume of flow”, the intent to maintain open stream channels is good. We suggest strengthening this statement (e.g., “Alteration of pre-development flow paths shall be minimized in planning...”)
and construction of development sites. Drainage ways and streams shall be maintained as naturally vegetated, open channel drainage systems wherever possible given site conditions”) to minimize stream alteration, particularly straightening or channelization and removal of riparian vegetation. Stream channels are a product of a unique flow and sediment delivery regimes—very often alteration of small stream channels leads to unraveling of the systems (incision, aggradation, sedimentation, bank failure, habitat degradation, et cetera), resulting in the need to armor the stream.

- Subdivision Regs. Sec. 9.06.B.3./Site Plan Regs. Sec. 9.3.B.3
  - The statement “The board shall require on-site retention or detention facilities to prevent overloading of existing downstream facilities” appears overly prescriptive. In appropriate settings, generation of stormwater may be minimized through reduction in impervious surface area (through design strategies, rainfall capture/reuse, rooftop disconnection, and/or substitution of pervious paving materials or alternate types of roofing) and stormwater that is generated may be effectively treated and controlled through lot or development scale infiltration practices. In certain settings, these source control strategies eliminate the need for retention/detention facilities.

Additional comments on the Zoning Ordinance are as follows:

- The Zoning Ordinance Article XVI prohibits many uses within the Aquifer Protection Overlay District that are potential source of groundwater contamination. Article CVI also requires that “all runoff from impervious surfaces, except roof and exterior foundation drains, shall be directed into an underground storm sewer system and directed to a detention/holding pond outside of the aquifer and aquifer recharge area.” This provision is cautious but probably appropriate. Consider adding a statement that encourages infiltration of roof runoff in pervious areas and use of pervious materials in paths and sidewalks. The intent is to encourage infiltration of as much clean water as possible to recharge groundwater and avoid receiving water impacts.

- Floodplain development is related to stormwater management because if the magnitude of high flow events increases in a watershed due to development, investments made in the floodplain are at increased risk. The Zoning Ordinance Article XV restricts floodplain development especially in a regulatory floodway. Note that the definition in the Zoning Ordinance of “Area of Special Flood Hazard” refers only to zones AO, AH, and VO. We did not perform a detailed review of Durham’s Flood Insurance Rate Maps, but quickly noted the presence of unnumbered A zones and also AE zones, which are FEMA regulated zones.
Consider revising this definition and performing a detailed review of Article XV for compliance with National Flood Insurance Program regulations.
4. STORMWATER ORDNANCE

Durham’s draft Storm Water Ordinance, dated December 22, 2003, was reviewed for consistency with state and federal regulations and current thinking in stormwater management. After revision and adoption, this ordinance will meet certain conditions of the National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewers (MS4), which was effective May 1, 2003.

EPA defines an MS4 as “a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains)…that discharges to waters of the State and waters of the United States” (40 CFR 122.26(b)(8)). As the “operator” of a regulated, small MS4, Durham has obtained coverage under NPDES to discharge pollutants to waters of New Hampshire and of the United States in accordance with the conditions and requirements set forth in the MS4 General Permit.

The MS4 General Permit requires Durham and other MS4 operators to “develop, implement, and enforce a program to reduce the discharge of pollutants from the MS4 to the maximum extent practicable, to protect water quality, and to satisfy the applicable water quality requirements of the Clean Water Act.” This program must include six “minimum control measures” (pollution control measures) specified by EPA as follows:

1. Public education and outreach on stormwater impacts.
2. Public involvement and participation.
3. Illicit discharge detection and elimination.
4. Construction site stormwater runoff control.
5. Post-construction stormwater management in new development and redevelopment.
6. Pollution prevention and good housekeeping for municipal operations.

The MS4 General Permit requires Durham to adopt “an ordinance or other regulatory measure” as a component of three of the six minimum control measures: illicit discharge detection and elimination (IDDE), construction site stormwater runoff control, and post-construction (permanent) stormwater management. Durham must establish its authority to implement these three measures. The primary function of Durham’s stormwater ordinance will be to meet its regulatory requirements related to the IDDE, construction site stormwater runoff control, and post-construction stormwater management. The ordinance will fill these major gaps in Durham’s existing stormwater-related regulations. The ordinance will also be consistent with three related state and federal stormwater permits: New Hampshire Department of Environmental Service’s Alteration of Terrain or “Site Specific” permit, EPA’s Construction General Permit, and EPA’s Multi-Sector General Permit (MSGP) or “Industrial General Permit”. Given the fact that development in Durham is affected by four overlapping stormwater permits, one goal of the review was to limit additional, local requirements in the stormwater ordinance.
4.1. General Comments on Draft Stormwater Ordinance

A detailed review of Sections I through IX was performed, with specific changes recommended in each section. However, the last several sections of the ordinance (Section IX. Administrative Enforcement Remedies; Section X. Right to Reconsideration, Hearing, and Appeal; Section XI. Judicial Enforcement Remedies; Section XII. Supplemental Enforcement Action; and Section XIII Miscellaneous Provisions) were not reviewed in detail. The enforcement provisions contained among these sections do appear to meet (and exceed) EPA's requirements specified in the NPDES General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewers; however, these sections should be reviewed by Durham’s legal council prior to adoption of the ordinance.

This ordinance requires word editing prior to adoption. Consider changing all instances of “storm water” to “stormwater” to reflect common usage and Durham’s Zoning Ordinance.

SECTION I. GENERAL PROVISIONS

Section I.A Purposes. To reflect the need for post-construction (permanent) runoff controls, consider adding another purpose:

“To minimize increases in stormwater runoff from new development and redevelopment in order to reduce flooding, siltation, increases in stream temperature, streambank erosion, and stream channel adjustment.”

Section I.B First sentence is incomplete.

Section I.D Definitions

- Definition #17 Fire Protection Water. Consider eliminating term consistent with comments on Section II.
- Definition #26 Motor vehicle fuel. Change to “motor vehicle fluid”
- Definition #32. NPDES permit. Because New Hampshire is not a delegated state with NPDES permitting authority, suggest striking the parenthetical phrase
- Definition #64 Water in the State (or water). Delete reference to the Gulf of Mexico

Include these additional definitions:

- Illicit discharge. Defined in 40 CFR 122.26(b)(2) as “Any discharge to an MS4 that is not composed entirely of stormwater…” with some exceptions. These exceptions are listed in Section II.B. of the draft ordinance.
- Non-stormwater discharge. Any discharge to the MS4 that is not composed entirely of stormwater
SECTION II. GENERAL PROHIBITION

Section II.B  Revise statement to read: “It is an affirmative defense to any enforcement action for violation of Subsection A of this section that the discharge was composed entirely of one or more of the following categories of non-stormwater discharges.” As currently written, street runoff would not be a permissible discharge to the MS4. The intent of the relevant section of EPA’s Phase II Stormwater Rule is to regulate the types of *non-stormwater* discharges routed through the MS4.

Section II.B.2 and B.3: Suggest eliminating B.3 and simplifying B.2 to exempt all discharges from fire fighting activities, as allowed in EPA’s Phase II Stormwater Rule. With this change, definition #17 in Section 1.D. could also be eliminated.

Section II.B.4  Eliminate.

Section II.B.5  A chlorine level of 4 mg/L is exceedingly high. For reference, super chlorination of swimming pools typically results in chlorine levels of 4-5 mg/L. New Hampshire’s Surface Water Quality Regulations give the freshwater acute toxicity standard as 0.019 mg/L chlorine. Suggest either removing the concentration value or substituting a more appropriate value.

Section II.B.16  Eliminate

Section II.B.17  See comment on Section II.B.5. Also eliminate requirement (added in parentheses) to dechlorinate swimming pool water, because alternate disinfectants (or no disinfectants) may be used in some instances and because allowing chlorinated water to sit after chlorination is terminated will cause chlorine to dissipate gradually without further chemical treatment. Consider referring to “dechlorinated or chlorine free water”.

SECTION III. SPECIFIC PROHIBITIONS AND REQUIREMENTS

Section III.C.15 and 16. See comments on Sections II.B.5 and II.B.17

Section III.C.17  Consider eliminating this prohibition against discharge of fire prevention water. As noted previously, EPA allows broad exception of discharges from fire fighting activities. Because fires are typically unplanned emergencies, establishing systems to recover fire prevention water may not be feasible or enforceable. This is not to discount the potential impact of fire prevention water (which in our experience can be dramatic). If capture and treatment of fire prevention water is in fact feasible, consider incorporating these measures in an ordinance or regulation specifically addressing fire fighting.

Section III.C.19  For consistency, consider moving this provision to the section on discharges from industrial facilities, as Section III.C otherwise addresses only non-stormwater discharges to the MS4.
Section III.C.21 It is unclear whether criteria (a) and (b) are sufficient due to the “and” inserted at the end of criterion (b). Consider revising (b) as: “The discharge does not contain a harmful quantity of any pollutant.” Note that criteria (a) and (b) are not particularly informative to the user of the ordinance.

Section III.E Suggest rewording as: “No person shall connect a line conveying sanitary sewage, domestic or industrial, to the MS4, or allow such a connection to continue; this includes, but is not limited to, discharge of gray water from appurtenances such as washing machines, sink drains, and floor drains.”

Section III.I.1 The prohibition stating “stagnant water shall not be allowed to stand on property” could be interpreted as an impediment to stormwater management practices reliant on infiltration of rainfall and surface runoff in pervious areas such as lawns. This provision could be construed as disallowing disconnection of impervious surfaces (for example, routing roof gutter downspouts to lawns and grading access drives to pervious areas instead of the MS4). Consider striking this provision. The remainder of the subsection requires rewriting for clarity.

SECTION IV. RELEASE REPORTING AND CLEAN UP

Section IV.A Confirm that the Town Engineer is the appropriate emergency contact for hazardous materials releases, and not, for instance, the Town Health Officer or Fire Chief.

Section IV.C Confirm that the Town Engineer is the appropriate contact.

SECTION V. STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES

The general requirements under Section V.A. cover construction projects of all sizes. Operators of projects that are smaller than the disturbance size thresholds of EPA’s construction general permit and NHDES’ Site Specific permit do not need to create a written plan. We endorse these provisions because they appear to strike an appropriate balance between local regulation of small construction sites and the goal of limiting additional requirements on the regulated community.

Due to substantial additions and restructuring, we suggest replacing Section V.A. in its entirety with the following (taken in part from the City of Dover’s proposed amendments to their subdivision regulations):

V.A General Requirements
V.A.1 During project planning and throughout construction or other land disturbance activities, priority should be given to preserving natural drainage systems including perennial and intermittent streams, wetlands, swales, and drainage ditches for conveyance of runoff leaving the project area.
V.A.2 All operators of construction sites shall use best management practices to control and reduce the discharge, to the MS4 and to waters of the United States, of eroded soil and other material associated with the clearing, grading, excavation, and other construction activities to the maximum extent practicable. The best management practices used shall be appropriate for the conditions of the construction site and shall meet the design standards and specifications set forth in the document, Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire, Rockingham County Conservation District, NH Department of Environmental Services (DES), Soil Conservation Service (now the Natural Resources Conservation Service), August 1992, as amended. In implementing this provision, the following measures are required:

V.A.2.(a) Surface water and runoff from off-site and undisturbed areas shall be diverted away from areas of planned disturbance where feasible or carried non-erosively through the project area.

V.A.2.(b) The area of disturbance shall be kept to a minimum. Whenever practical, natural vegetation shall be retained, protected, or supplemented.

V.A.2.(c) Practices to prevent soil erosion and control sediment transport during construction or land disturbance activities shall be properly installed prior to removal of vegetation and soil disturbance in the contributing drainage area. Clearing necessary to install sediment control measures is allowed.

V.A.2.(d) Construction activities, including stripping and clearing, rough grading, road construction, construction of utilities, infrastructure, and buildings, and final grading, shall be sequenced to minimize the extent of unstabilized land at any one time and the duration of exposure of this land. Stripping of vegetation, regrading, or other development shall be done in such a way that will minimize soil erosion. Disturbed portions of the site not in active development shall be adequately stabilized as soon as practicable. Stabilization measures may include: temporary or permanent seeding, mulching, use of geotextiles, sod stabilization, and other appropriate measures.

V.A.2.(e) Tracking of sediments off-site by vehicles, the generation of dust, and the escape of windblown waste from the site shall be minimized.

V.A.2.(f) Discharge of building materials, including cement, lime, concrete, and mortar, to the MS4 or waters of the United States shall be prevented.

V.A.2.(g) The construction site operator shall maintain all erosion and sediment control measures and other best management practices in effective operating condition. Operators of construction sites are not responsible for maintenance of stormwater management measures after final stabilization of the site.

V.A.2.(h) The construction operator shall provide general good housekeeping measures to prevent and contain spills of paints, solvents, fuels, septic waste, and other hazardous chemicals and pollutants associated with construction, and ensure
The construction site operator shall implement proper waste management and disposal practices, including but not limited to covering discarded building materials and properly disposing of litter and septic wastes.

All temporary erosion and sediment control measures shall be removed after final site stabilization. Trapped sediment and other disturbed soil areas resulting from the removal of temporary measures shall be permanently stabilized within 30 days.

Structural measures installed during the construction process to control pollutants in stormwater discharges that will occur after construction operations have been completed should be placed on upland soils to the degree attainable.

Qualified personnel (provided by the operator of the construction site) shall inspect disturbed areas of any construction site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, structural control measures, and locations where vehicles enter or exit the site, at least once every seven calendar days and within 24 hours of the end of a storm that is 0.5 inches or greater. All erosion and sediment control measures and other identified best management practices shall be observed in order to ensure that they are operating correctly and are effective in preventing significant impacts to receiving waters and the MS4. Based on the results of the inspection, best management practices shall be revised as appropriate, and as soon as is practicable.

The Town Engineer may require any plans and specifications that are prepared for the construction of site improvements to illustrate and describe the best management practices required by paragraph V.A.2 above that will be implemented at the construction site. The Town may deny approval of any building permit, grading permit, subdivision plat, site development plan, or any other Town approval necessary to commence or continue construction, or to assume occupancy, on the grounds that the management practices described in the plans or observed upon a site inspection by the Town Engineer are determined not to control and reduce the discharge of sediment, silt, earth, soil, and other materials associated with clearing, grading, excavation, and other construction activities to the maximum extent practicable under the circumstances.

Any owner of a site of construction activity, whether or not he/she is an operator, is jointly and severally responsible for compliance with the requirements in this Subsection V.A.

Any contractor or subcontractor on a site of construction activity, who is not an owner or operator, but who is responsible under his/her contract or subcontract for implementing a best management practices control measure, is jointly and severally responsible for any willful or negligent failure on his/her part to adequately implement that control measure.
In addition to local approval, the applicant shall be responsible for obtaining any required State and Federal permits. Permits may include an Environmental Protection Agency (EPA) storm water permit, NH Department of Environmental Services Site Specific permit, or a State wetlands permit.

### V.B One-Acre Disturbances.

Suggest revising as follows: All operators of sites of construction activity, including clearing, grading, and excavation activities, that results in the disturbance of one or more acres of total land area, or that area is part of a common plan of development or sale within which one or more acres of total land area is disturbed, are required by EPA to obtain coverage under a National Pollutant Discharge Elimination System (NPDES) permit for stormwater discharges associated with construction activity, with few exceptions. Construction site operators required to obtain coverage under EPA's Construction General Permit or any individual or group NPDES permit shall comply fully with the applicable permit, including the excavation dewatering and groundwater recharge provisions for construction projects in New Hampshire given in Part 9.A.2 of the Construction General Permit, and with the following requirements, in addition to the provisions in Subsection V.A.:

*Note: There's a slight difference in applicability here. The suggested version only requires operators to adhere to Section V.B if they require a NPDES construction permit. If they waive out of the NPDES permit requirement—we believe this is rare, then they aren’t required to comply with V.B. Given the substance of the Section V.B subsections we think it makes sense to align Durham’s requirement exactly with EPA’s.*

#### V.B.3.

To avoid confusion created by restating permit requirements and the erroneous statement concerning off-site drainage, consider revising opening sentence as:
The SWPPP shall be prepared, signed, and sealed by a Registered Professional Engineer.

#### V.B.8.

Consider eliminating this subsection. The requirement that an engineer sign any significant modification to a SWPPP is included in V.B.4 (in brackets); therefore V.B.8 is redundant. Also, V.B.8 creates confusion by incompletely restating permit requirements and including an erroneous statement concerning off-site drainage.

#### V.B.9.

Consider providing a certification form in an appendix to this ordinance, if Durham wishes to require this certification. Section V.B.9 should make reference to this certification form. Also, in the certification statement given in V.B.9, delete the words “associated with industrial activity”.

#### V.B.18.

Correct reference to Part VIII of the Construction General Permit. The correct reference is to “Part 5”.

STONE ENVIRONMENTAL, INC. • October 24, 2007 29
V.C. **Significant Alteration of Terrain.** Suggest adding Section V.C. with the following provisions:

New Hampshire Code of Administrative Rules, Part Env-Ws 415.03 specifies that a Site Specific permit shall be obtained from the New Hampshire Department of Environmental Services (NHDES) prior to commencing any of the following activities:

- Any project involving dredging, excavation, filling, mining, transporting of forest products, construction, earth moving, or other significant alteration of the characteristics of the terrain as defined in Env-Ws 415.02 that will occur in or on the border of the surface waters of the state; or

- Construction, earth moving, or other significant alteration of the characteristics of the terrain as defined in Env-Ws 415.02 when a contiguous area of 50,000 square feet or more if within the protected shoreline as defined by RSA 483-B or 100,000 square feet or more in all other areas will be disturbed.

Depending on the location and size of the disturbed area, whether the disturbed area is contiguous, and differences in applicability related to common plans of development, an applicant may be required to obtain a Site Specific permit from NHDES or a NPDES construction permit from EPA or both. If both permits apply, the construction site operator is required to comply with Sections V.A., V.B., and V.C. of this Ordinance.

V.C.1. No person undertaking any activity for which a Site Specific permit is required shall cause or allow the activity to cause any water quality degradation, including siltation or turbidity in surface water.

V.C.2. If required, submission of a Site Specific permit application shall be made to the New Hampshire Department of Environmental Services at least 30 days prior to the proposed starting date of the proposed activities and no activities shall commence without prior approval of the application by the New Hampshire Department of Environmental Services.

V.C.3. Applications shall include a site plan (for excavation activities only) or a detailed development plan (for all other projects requiring a Site Specific permit) and all associated information and calculations, as specified in New Hampshire Code of Administrative Rules, Parts Env-Ws 415.06, Env-Ws 415.10, and Env-Ws 415.11, unless the information has been specifically waived under Env-Ws 415.13.

V.C.4. Within 10 days of a change of ownership of a project site, the new owner shall notify the New Hampshire Department of Environmental Services of the change of ownership, by submitting the information described in New Hampshire Code of Administrative Rules, Part Env-Ws 415.19.

**SECTION ZZ. (ADDED) PERMANENT (POST-CONSTRUCTION) STORMWATER CONTROLS**
The sixth minimum control measure in the NPDES MS4 permit is post-construction stormwater control. This measure requires Durham and other small MS4 operators to manage stormwater discharged to the MS4 from new development and redevelopment sites with more than one acre of disturbance. The main element of permanent stormwater management is controlling peak runoff rates from standard design storm events to pre-development rates. This emphasis on hydrologic controls distinguishes many permanent controls from construction-phase controls. Permanent stormwater management continues for the life of the facility.

One provision of the NPDES MS4 permit requires Durham to ensure “adequate long term operation and maintenance of best management practices.” However, there is no indication within the permit concerning how to interpret this use of the word “adequate”. The MS4 permit provides no information about performance standards, design criteria, or the acceptability of different permanent stormwater control options. EPA’s Multi-Sector General Permit addresses discharges from some industrial sites, but aside from the very general language in the MS4 permit, there is a gap in federal stormwater permit coverage concerning operational-phase controls on stormwater runoff from commercial, residential, institutional, transportation, and other facilities. Despite the lack of clear federal regulations, EPA has suggested demanding language in a lengthy model ordinance for operational phase stormwater runoff control. This model may be accessed at: http://www.epa.gov/owow/nps/ordinance/mol6.htm.

Regulatory requirements for operational phase stormwater controls are poorly defined in New Hampshire. NHDES’ Site Specific permit addresses the design of permanent stormwater controls in a general way for projects requiring this permit. At a minimum, Durham is required to fill the gap between EPA’s 1 acre (43,560 square feet) disturbance criteria and the 50,000/100,000 square foot disturbance criteria of the Site Specific permit. This must be accomplished through local review of appropriate stormwater management plans.

Drafting a new ordinance section related to permanent stormwater controls is out of the scope of the present review. There are however many sources to draw from, including model ordinances and ordinances from other communities in the Seacoast region. Likely preferable to EPA’s model is a new (draft) permanent stormwater management model ordinance from NHDES, accessible at: http://www.nh.gov/oep/programs/MRPA/conferences/documents/IIA-Fall06-ILU-Stormwater.pdf. We recommend the Town of Durham consider this model and adopt its most appropriate components.

Consider the following basic provisions to get this section of the Ordinance started:

ZZ.A Stormwater Management Plan
All new developments and redevelopment projects disturbing greater than 1 acre shall submit a Permanent (Post-Construction) Stormwater Management Plan
(SMP) with an application for subdivision or site plan review. The SMP, which shall be prepared by a Professional Engineer licensed in New Hampshire, shall address and comply with the requirements set forth herein and as specified by the Planning Board.

ZZ.A.1. Best management practice (BMP) techniques shall be used to control peak flows and total volume of runoff, provide water quality protection, and maintain on-site groundwater recharge. Measures shall be taken to control the post-development peak rate of runoff so that it does not exceed pre-development runoff for the 2-year, 24-hour storm event and for additional storm event frequencies as specified in the design criteria of the “Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire.”


ZZ.B. Operation & Maintenance Plan
ZZ.B.1. All stormwater management systems shall have an operation and maintenance (O&M) plan to ensure that systems function as designed. This plan shall be reviewed and approved as part of the review of the proposed permanent (post-construction) stormwater management system and incorporated in the permanent Stormwater Management Plan, if applicable. Execution of the O&M plan shall be considered a condition of approval of a subdivision or site plan. If the stormwater management system is not dedicated to the city/town pursuant to a perpetual offer of dedication, the Planning Board may require an applicant to establish a homeowners association or similar entity to maintain the stormwater management system.

ZZ.B.2. The stormwater management system owner is generally considered to be the landowner of the property, unless other legally binding agreements are established.

ZZ.B.3. The O&M plan shall, at a minimum, identify the following:
ZZ.B.3.(a) Stormwater management system owner(s);
ZZ.B.3.(b) The party or parties responsible for operation and maintenance and, if applicable, implementation of the SMP;
ZZ.B.3.(c) A schedule for inspection and maintenance;
ZZ.B.3.(d) A checklist to be used during each inspection;
ZZ.B.3.(e) The description of routine and non-routine maintenance tasks to be undertaken;
ZZ.B.3.(f) A plan showing the location of all stormwater management facilities covered by the O&M plan; and,
ZZ.B.3.(g) A certification signed by the owner(s) attesting to their commitment to comply with the O&M plan.

SECTION VI. STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY

NOTE: Industrial facilities in Durham are currently covered under an extension of EPA’s MSGP-2000 permit which expired in 2005. The MSGP-2006 permit has not been finalized (EPA expected to finish this in 2006). When MSGP-2006 is finalized, Durham will need to revisit this section of the Ordinance. Suggest changing “Industrial General Permit” to “Multi-Sector General Permit” or MSGP throughout to reflect current usage.

VI.A. Revise applicability to include all facilities with discharges regulated under the MSGP (which includes landfills and hazardous waste treatment, disposal and recovery facilities). Suggest: “All operators of facilities with industrial activities eligible for coverage under the NPDES Multi-Sector General Permit (MSGP), as identified in Appendix D of the MSGP, and all other facilities that the Town Engineer determines are contributing a substantial pollutant loading to the MS4, shall comply with the following requirements:”

VI.A.8 Consider eliminating this subsection. The requirement that an engineer sign any significant modification to a SWPPP is included in VI.A.4 (in brackets); therefore VI.A.8 is redundant.

VI.A.14 The “Part IV.D.4” citation appears to be incorrect. It does not seem to match a relevant provision in the expired MSGP-2000 permit or the proposed MSGP-2006 permit. The citation may be to the old MSGP-1995. These citations need to be updated.

VI.A.16 The MSGP citation appears incorrect, as above.
VI.A.17 The MSGP citation appears incorrect, as above.
VI.A.20 The MSGP citation appears incorrect, as above. Change one year to three years, because the MSGP-2000 requires the SWPPP and associated records be kept for 3 years from the date that the facility’s coverage under this permit expires or is terminated.

VI.A.21 The MSGP citation appears incorrect, as above.
VI.A.23 The MSGP citation appears incorrect, as above.

VI.B The origin of and reason for the inclusion of the phrase “coal pile runoff and hazardous metals” is unclear. Consider deleting this phrase.

SECTION VII through SECTION XI
The provisions are clear and appear to comply with federal requirements regarding site access, discharge monitoring, and enforcement. These sections should be further reviewed by Durham’s legal council. Several editorial problems were noted, as follows:

Correct multiple instances of the following omission throughout: “the (blank) and the [Town Code Enforcement Officer]…”

Section X.A.1. Correct references to subsections.

Section X.A.4. Correct references to subsections.

SECTION XII. SUPPLEMENTAL ENFORCEMENT ACTION

XII.A. Performance Bond
In the first sentence, suggest removing the clause “associated with construction or industrial activity”. This clause would prevent the Town Engineer from requiring a performance bond of the operator of a commercial facility or other new development or redevelopment site that is required to implement post-construction (permanent) stormwater controls.

XII.B. Liability Insurance
Suggest removing clause “associated with construction or industrial activity” for the reason cited above.

SECTION XIII. MISCELLANEOUS PROVISIONS

Consider adding the following subsection:

XIII.zzz Compatibility with Other Permit and Ordinance Requirements
This ordinance is not intended to interfere with, abrogate, or annul any other ordinance, rule or regulation, statute, or other provision of law. The requirements of this ordinance should be considered minimum requirements, and where any provision of this ordinance imposes restrictions different from those imposed by any other ordinance, rule or regulation, or other provision of law, whichever provisions are more restrictive or impose higher protective standards for human health or the environment shall be considered to take precedence.
APPENDIX 1.
RECOMMENDED MODEL DEVELOPMENT PRINCIPLES FOR BLAIR COUNTY, PENNSYLVANIA
Recommended Model
Development Principles
for Blair County, Pennsylvania

Consensus of the Local Site Planning Roundtable

Funded in part by:
Chesapeake Bay Small Watershed Grants Program through the National Fish & Wildlife Foundation
Chesapeake Bay Program
Western Pennsylvania Watershed Program

An Initiative of the Builders for the Bay:
Center for Watershed Protection
Alliance for the Chesapeake Bay
Blair County Builders Association

May 2006
Acknowledgments

The Blair County Site Planning Roundtable would not have been possible without the time and effort extended by the roundtable members and the generous support of the Chesapeake Bay Program, Chesapeake Bay Small Watershed Grants Program through the National Fish & Wildlife Foundation and the Western Pennsylvania Watershed Program.

We would also like to thank the Blair County Builders Association; Blair County Planning Commission; Blair County Conservation District; Juniata Clean Water Partnership; Juniata Valley Audubon Society; Blair, Logan, Frankstown, Allegheny and Snyder townships; and the boroughs of Hollidaysburg and Duncansville for their partnership in this Builders for the Bay roundtable.

Team members included Pat Devlin and Donna Morelli from the Alliance for the Chesapeake Bay, and Pam Rowe and Julie Tasillo from the Center for Watershed Protection. Assistance was also provided by Anna Breinich of the Pennsylvania Environmental Council.

Copies of this document are available from the Alliance for the Chesapeake Bay, 3310 Market Street, Suite A, Camp Hill, PA 17011/ phone 717-737-8622. Copies are also available from each of the partner organizations and agencies. The final consensus document can be downloaded from the website: www.buildersforthebay.net.

This document was prepared by the Alliance for the Chesapeake Bay and Center for Watershed Protection

Cover Photo Credit: Pat Devlin

May 2006
Executive Summary

This document is a product of the Blair County Site Planning Roundtable, a year-long consensus process initiated by the Builders for the Bay to review existing development ordinances and identify regulatory barriers to environmentally-sensitive residential and commercial development at the site level. A diverse cross-section of local government, non-profit, environmental, homebuilding, business, development and other community professionals made up the membership of the Blair County Roundtable. Through a consensus process, members of the Roundtable adapted the National Model Development Principles to specific conditions. Roundtable recommendations include specific ordinance revisions that would increase flexibility in site design standards and promote the use of open space and flexible design development in Blair County.

The National Model Development Principles adapted by the Blair County Site Planning Roundtable are designed to collectively meet the objectives of Better Site Design (BSD), which are to 1) reduce overall site impervious cover, 2) preserve and enhance existing natural areas, 3) integrate stormwater management, and 4) retain a marketable product. Code modifications and other Roundtable recommendations were crafted to remove regulatory hurdles and provide incentives, flexibility, and guidance for developers implementing BSD.
Recommended Model Development Principles for Blair County, Pennsylvania

Highlights of the Blair County Site Planning Roundtable

Design of Residential Streets and Parking Lots
• Promotes minimum road widths consistent with low traffic volumes in residential areas.
• Reduces minimum right-of-way width requirements to 33 feet (in accordance with PennDOT liquid fuels tax standard).
• Where used, cul-de-sac center islands should incorporate vegetative and stormwater treatment design features.
• Encourages municipalities to assume responsibility for long term maintenance of roadside vegetative swales.
• Encourages use of pervious materials for road shoulders and overflow parking.
• Encourages parking lot designs that reduce impervious cover and maximize use of irregular spaces.
• Promotes adoption of maximum parking ratios for non-residential uses.
• Eliminates parking lot requirements, such as curbing requirements, that conflict with the state’s stormwater policy.

Lot Design
• Advocates residential development designs that conserve natural or agricultural areas and minimize total impervious cover.
• Reduces minimum front yard setbacks to reduce driveway lengths.
• Promotes adoption of sidewalk standards that are relative to housing density and allow for permeable sidewalk construction materials.
• Provides for shared driveways managed through easement and maintenance agreements.
• Promotes clear guidance on the natural resource management needs of large, open space areas and recognizes the need for long term funding strategies for open space management.

Natural Areas
• Promotes adoption of streamside (riparian) buffer ordinances that utilize a tiered buffer system and include minimum criteria relating to the control of invasive species and the protection of adjacent wetlands and steep slopes.
• Promotes wider stream buffers for naturally producing trout streams.
• Promotes the adoption of local clearing and grading ordinances that limit areas of disturbance necessary for construction.
• Maximizes the retention of existing forest and stands of trees on a development site by establishing minimum percentages for tree retention based on land use.
• Stimulates conservation subdivision design by promoting the adoption of housing densities that could be equally applied to conventional and conservation subdivision design as by-right forms of development.
• Promotes stormwater management requirements for all new development and redevelopment projects.
• Promotes the development or adoption of stormwater management design criteria that address cold water stream conditions.
• Promotes homeowner education and maintenance guidance for the long term viability of on-lot stormwater practices.
• Promotes ordinances that would establish a minimum no-disturbance area surrounding isolated wetlands.
• Promotes adoption of ordinances to protect sensitive steep slopes from development impacts.

Plan Review Process
• Encourages municipalities to provide more opportunities for public participation in the land development process with particular consideration given to the creation of Environmental Advisory Councils.
Every year, over two million acres of land are altered as a part of the development process. Development has historically led to degradation in water quality and biological integrity (NRCS, 2001). The impacts of watershed urbanization on the water quality, biology, and physical conditions of aquatic systems have been well documented (CWP, 2003). The development radius around many of our cities and smaller municipalities continues to widen at a rapid rate, far outpacing the rise in population (Leinberger, 1995). In the Chesapeake Bay Region, it is estimated that more than 90,000 acres of open land are converted annually by development, at a rate four to five times greater per person than seen 40 years ago (Chesapeake Bay Foundation, 2002). As a result, local codes and ordinances that promote reduced impact of development on local water resources are critical to future sustainability.

The protection of water resources and the character of the landscape under a continued growth scenario requires local governments, developers, and site designers to fundamentally change the way that land is developed. Deciding where to allow or encourage development, promote redevelopment, and protect natural resources are difficult issues that jurisdictions have to balance. While effective zoning and comprehensive planning are critical, communities should also explore measures to minimize the impact of impervious cover, maintain natural hydrology, and preserve contiguous open space on sites where development is to occur.

Toward this end, the Center for Watershed Protection in concert with the Alliance for the Chesapeake Bay, and the Blair County Builders Association convened a local Site Planning Roundtable for Blair County. The local Roundtable process in Blair County was modeled after the National Site Planning Roundtable, the 22 Model Development Principles and four basic objectives:

1. Reduce overall site impervious cover
2. Preserve and enhance existing natural areas
3. Integrate stormwater management
4. Retain a marketable product

The 22 Model Development Principles act as benchmarks upon which more specific code and ordinance recommendations were adapted for Blair County. The benefits of applying these 22 Model Development Principles are summarized in the table below.

<table>
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<th>Benefits of Applying the Model Development Principles</th>
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<td><strong>Local Government:</strong></td>
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<td>• Increase local property tax revenues</td>
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<td>• Facilitate compliance with wetlands and other</td>
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<td>• Assist with stormwater regulation compliance</td>
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<td><strong>Developers:</strong></td>
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<td>• Flexibility in design options</td>
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<td>• Reduce development costs</td>
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<td>• Allow for more sensible locations for stormwater</td>
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<td>• Facilitate compliance with wetlands and other</td>
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<td><strong>Homeowners:</strong></td>
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<td>• Increase property values</td>
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<td>• Create more pedestrian friendly neighborhoods</td>
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<td>• Provide open space for recreation</td>
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<td>• Result in a more attractive landscape</td>
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<td>• Reduce car speed on residential streets</td>
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<td>• Promote neighborhood designs that provide a sense of</td>
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<td><strong>Environment:</strong></td>
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<td>• Protect sensitive forests, wetlands, and habitats from</td>
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<td>• Preserve urban wildlife habitat</td>
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<td>• Protect the quality of local streams, lakes, and</td>
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<td>• Generate smaller loads of stormwater pollutants</td>
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<td>• Help to reduce soil erosion during construction</td>
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Why Blair County?

The purpose of a local site planning roundtable is to adapt the national model development principles for local application by identifying how local codes and ordinances can be modified to allow for better site design.

Blair County was selected as a location for a roundtable for multiple reasons:

- Blair County is within the Chesapeake Bay watershed, located in the headwaters of the Juniata River which feeds the Susquehanna River and ultimately the Chesapeake Bay.
- A series of stormwater workshops in 2003 sparked interest in a detailed review of local development ordinances.
- The Juniata River Watershed Management Plan (September 2000) identified stormwater runoff as the number one problem in Blair County. Flooding and streambank damage from non-agricultural sources were also identified as key concerns.
- The Juniata River Watershed Management Plan's implementation strategy recommends:
  - discouraging development in environmentally sensitive areas, such as steep slopes, floodplains and wetlands;
  - providing education for better site design standards, including open space/conservation subdivision design planning; and
  - incorporating riparian buffer requirements in local subdivision and zoning ordinances.
- There are large undeveloped lands still remaining in Blair County, with significant areas of contiguous forests, four significant Important Bird Areas, and the presence of High Quality Cold Water Fishery streams. Better site design principles promote the protection of such natural areas.
- Reliance on small reservoirs for public water supplies makes the groundwater recharge to these supplies an important consideration in land use planning and development.
- Improvements to Interstate 99 in the northern region of Blair County will bring additional growth and development along this corridor in the near future.
- The Beaverdam Stormwater Management Plan (Act 167 Plan, 2000) estimates 10% growth in developed areas in the watershed. Challenges identified in the plan include soils with slow infiltration, mountainous topography, and flooding from increased stormwater volume and velocity. A similar Little Juniata River Stormwater Management Plan is now under development.
- Recently adopted stormwater ordinances in Municipal Separate Storm Sewer System (MS4) communities must now address water quality, infiltration, and stream channel conditions in addition to flood control; however, existing subdivision & land development or zoning ordinances can hinder or prohibit the use of best management practices that meet these objectives. The roundtable helps communities consider ways to coordinate stormwater and other land development ordinances.
- Municipalities, county agencies, local builders/developers, area conservation organizations, and engineering firms expressed interest and were willing to commit staff time to the roundtable process. The Blair County Planning Commission was highly supportive of being included in this review process in order to consider improvements to its model ordinances.
- Completion of the Codes and Ordinance Work sheets (COW) indicated that local development rules are insufficient to protect this area’s water resources and aquatic communities.

Blair County is made up of fifteen townships, nine boroughs and one city. Five townships and two boroughs participated in the roundtable process. Of these municipalities, only four have zoning ordinances and all have subdivision and land development ordinances (SALDO’s). This presents a unique challenge for making specific recommendations for language that is traditionally incorporated into zoning ordinances. As part of this process, the Pennsylvania Environmental Council will be working to develop ordinance language that can be part of both zoning and subdivision and land development ordinances to accommodate this document’s recommendations.
Blair County Roundtable Process

Blair County Roundtable members convened many times over a twelve-month period to become familiar with the Model Development Principles, review existing ordinances and regulations, work in subcommittees, and reach consensus on a final set of recommendations. The Roundtable consisted of 25 dedicated members representing a wide range of professional backgrounds and experience related to local development issues. The process included the following steps:

Kickoff Meeting: June 15, 2005
Approximately 35 stakeholders from this region of Blair County participated in the meeting. Almost every major stakeholder group was represented including those from the development community, local government, environmental groups, and government agencies. The kickoff meeting introduced stakeholders to the national Model Development Principles, reviewed the local Codes and Ordinance Worksheets (COWs), and had participants apply Better Site Design concepts through a hands-on subdivision site plan redesign exercise.

Detailed Codes Analysis: September 7, 2005
The codes analysis was based on results from the COW, feedback from the June kickoff meeting, and discussions with local officials. Completed by the Roundtable facilitators, this analysis provided a concise summary of the regulatory barriers to implementing environmentally-sensitive site design in Blair County and served as the foundation for subcommittee discussions.

The primary documents used for this analysis and for reference during the Roundtable include local ordinances covering zoning, subdivision and land development, stormwater management, erosion and sediment control and state and federal regulations related to site design.

Subcommittee Meetings and Consensus Building: September 2005 — January 2006
The full Roundtable split into two subcommittees with the diversity of interests and expertise represented in each. Each subcommittee was responsible for coming to consensus on a subset of the Model Development Principles.

- Residential Streets, Parking Lots, Yard Setbacks, Sidewalks & Driveways
- Natural Areas & Conservation/Open Space Subdivisions

Both subcommittees met three to four times from September 2005 through January 2006.

Consensus on Final Recommendations: February 22, 2006
In February, the full Roundtable met again to begin the full membership consensus building process. The Roundtable reached consensus on the full suite of recommendations at its February 22, 2006 meeting. During this meeting, the Roundtable was also introduced to the concept of Environmental Advisory Councils as a vehicle for promoting the final Consensus Agreement in the individual municipalities.

Educational Strategy: June 2006
On June 7, 2006, Roundtable members met one more time to discuss the best strategy for promoting the recommendations contained in the Consensus Agreement. Implementation of this educational or “aftercare” strategy will be critical to the adoption of ordinance language that supports better site design. Workshops, tours, shared success stories, and individualized presentations by a variety of Roundtable partners will be used to educate locally elected officials about the merits of better site design and the benefits it can bring to each community.
Membership Statement of Support

This document of recommended development principles was crafted in conjunction with the diverse cross-section of development, local government, non-profit, environmental, and other community professionals who participated in the Builders for the Bay Blair County Site Planning Roundtable.

Members of the Roundtable provided the technical experience needed to craft and refine the model development principles for Allegheny, Blair, Frankstown, Logan, and Snyder townships and Duncansville and Hollidaysburg boroughs. These recommendations reflect our professional and personal experience with land development and do not necessarily carry the endorsement of the organizations and agencies represented by their members. Endorsement implies support of the principles and recommendations as a package and does not necessarily imply an equal level of support among individual recommendations by all Roundtable members.

The members of the Blair County Site Planning Roundtable endorse the model development principles presented in this document, known as Recommended Model Development Principles for Blair County.

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<tr>
<th>Terry Gephardt</th>
<th>Teddie Kreitz</th>
<th>James Eckenrode</th>
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Model Development Principles
Recommended by the Blair County Site Planning Roundtable

Residential Streets and Parking Lots

Principle #1: Street Width
Design residential streets for the minimum required pavement width needed to support travel lanes; on-street parking; and emergency management, maintenance and service vehicle access. These widths should be based on traffic volume.

Recommendations
The Roundtable supports this principle and endorses the following recommendations:

1. For low volume residential roads, municipalities should adopt minimum road widths consistent with the following traffic volumes:

<table>
<thead>
<tr>
<th>Street Type</th>
<th>Required Parking Lanes</th>
<th>Recommended Cartway* Width</th>
<th>Curbing Required</th>
<th>Shoulder</th>
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<tr>
<td>&lt;200 ADT ** per access point</td>
<td>None</td>
<td>17 feet</td>
<td>No</td>
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<tr>
<td>200 - 400 ADT** per access point</td>
<td>None</td>
<td>18 feet</td>
<td>No</td>
<td></td>
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<tr>
<td>&lt; 400 ADT**</td>
<td>One sided or alternate sides</td>
<td>22- 26 feet</td>
<td>Yes</td>
<td></td>
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<tr>
<td></td>
<td>Parking both sides</td>
<td>18 feet paved (plus shoulders)</td>
<td>No</td>
<td>Plus 7 feet each side for shoulder parking</td>
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* Cartway is defined as the portion of a street right-of-way, paved or unpaved, intended for vehicular traffic.
** ADT is defined as average daily trips.

2. Shoulders along streets should be composed of porous materials.
Rationale

Residential streets are often unnecessarily wide and these excessive widths contribute to the largest single component of impervious cover in a subdivision (CWP, 1998). Narrower street widths not only reduce impervious cover, but also promote lower vehicular speeds and increased safety and can reduce construction and maintenance costs.

While minimum road widths are not excessive in Blair County, many ordinances do not clearly connect widths to traffic volumes and parking requirements. In Pennsylvania, many ordinances are based on mobility and land access, not traffic volume. Recommendations aim to add consistency between municipalities based on Average Daily Traffic (ADT) for low volume roads, as well as clarify the connection between minimum road widths and parking or curbing requirements.

Principle #2: Street Length

*Reduce the total length of residential streets by encouraging alternative street layouts for the purpose of reducing impervious cover.*

Recommendations

The Roundtable endorses this principle with no additional recommendations.

Rationale

Total street length is often a function of the frontage, number of entrances, pedestrian safety, and physical site conditions. Guidance encouraging thoughtful, flexible and practical subdivision design criteria that reduces the overall street length can be useful to reduce impervious cover while maintaining the number of desired dwelling units.

No additional recommendations were made for this principle because no current ordinances work against the reduction of street length.

Principle #3: Rights-of-Way

*Wherever possible, residential street right-of-way widths should reflect the minimum required to accommodate the travel-way, sidewalk, and vegetated open channels. Utilities and storm drains should be allowed to be located within the pavement section of the right-of-way wherever possible.*

Recommendations

The Roundtable supports this principle and endorses the following recommendations:

1. Minimum Right-of-Way widths should fall within the range of 33 – 50 feet for local residential access roads (use wider range to provide for vegetated open channels).
2. Municipalities should encourage common ditches and other design techniques that minimize the amount of ROW needed to install utilities.
Rationale
This recommendation allows developers the flexibility to reduce right-of-way widths to as narrow as 33 feet, which is the minimum standard that will qualify a municipal road for PennDOT’s liquid fuel funds. Minimum right-of-way widths should be tied to the street classifications recommended under Principle #1. A wider right-of-way width allows for the use of vegetated open channels or the placement of utilities if they cannot be located under the paved section of the right-of-way.

**Principle #4: Cul-de-Sac**
Minimize the number of residential street cul-de-sacs and incorporate landscaped areas to reduce their impervious cover. The radius of cul-de-sacs should be the minimum required to accommodate emergency and maintenance vehicles. Alternative turnarounds should be considered.

**Recommendations**
The Roundtable supports this principle and endorses the following recommendations:

1. Where no landscaped island is provided, a cul-de-sac radius may have a minimum width of 40 feet.
2. Altoona should reduce its minimum cul-de-sac radius of 70 feet.
3. When a cul-de-sac is designed, municipalities’ ordinances should explicitly encourage landscaped islands or center areas composed of pervious materials and make reference to design criteria in their stormwater management ordinances.
4. Municipalities should allow for loop or t-shaped turnarounds as alternatives to cul-de-sac end roads.

**Rationale**
When used, cul-de-sac streets must meet PennDOT liquid fuels criteria for municipalities to receive funding – use of a circular turnaround with a 40-foot minimum radius is required. Recommendations focus on encouraging alternative designs that reduce impervious areas associated with closed-end roads and make the center areas of cul-de-sacs a functional element of a street’s stormwater management system.
**Principle #5: Vegetated Open Channels**

Where density, topography, soils and slope permit, vegetated open channels should be used in the street right-of-way to convey and treat stormwater runoff.

**Recommendations**

The Roundtable supports this principle and endorses the following recommendations:

1. Municipalities should assume responsibility for long term maintenance of vegetated swales, including obtaining easements for access and maintenance of swales or other stormwater practices located on private property.
2. Municipalities should educate homeowners about the important function of vegetated swales and the maintenance necessary for long term management of stormwater runoff.
3. Where housing density, soils and slope do not provide suitable conditions for vegetated open channels, ordinances should allow for other infiltration practices, such as rock-lined channels, within the right-of-way.

**Rationale**

Streets contribute higher loads of pollutants to urban stormwater than any other source area in residential developments (Bannerman, et al., 1993 and Steuer, et al., 1997). The use of vegetated open channels to convey stormwater runoff can remove some of these pollutants and decrease the volume of stormwater generated from a site.
Principle #6: Parking Ratios

The required parking ratio governing a particular land use or activity should be enforced as both a maximum and a minimum in order to curb excess parking space construction. Existing parking ratios should be reviewed for conformance taking into account local and national experience to see if lower ratios are warranted and feasible.

Recommendations

The Roundtable supports this principle and endorses the following recommendations:

1. Adopt maximum parking ratios for non-residential uses. Any parking spaces needed beyond the maximum number should be in pervious material.
2. If a proposed land use is shown to need fewer parking spaces than the required minimum, municipal ordinances should allow for the difference to be reserved as an unpaved, vegetated area; however, stormwater management practices must be provided upfront to handle runoff from this area should it become impervious.
3. Municipal ordinances should reference an accepted parking reference guide in adopting updated parking ratios, such as the Institute of Traffic Engineers’ Parking Generation, 3rd ed. (2004), which provides parking demand data for 91 land uses by hour of day.

Rationale

Parking ratios usually represent the minimum number of spaces needed to accommodate the highest hourly parking at the site. In many cases, these ratios are cut and paste recommendations and can result in far more spaces than are actually needed.

Revising parking ratios to reflect actual parking demand should reduce impervious cover from parking lots. Municipalities may elect to conduct a local parking study or to utilize existing national studies such as ITE (2004) and ULI (1999) for data on parking demand for various land uses. Requiring all overflow parking to be constructed in pervious materials would further reduce parking lot imperviousness.

Principle #7: Parking Codes and Shared Parking

Parking codes should be revised to lower parking requirements where mass transit is available or when enforceable, shared parking arrangements are made.

Recommendations

The Roundtable supports this principle and endorses the following recommendation:

1. Municipalities should adopt a shared parking ordinance and include a model agreement in its ordinance to alleviate future parking disputes.

Rationale

Parking demand represents the actual number of parking spaces required to accommodate the parking needs of a particular land use. Depending on site conditions, it may be possible to reduce the number of parking spaces needed. For example, when mass transit is available nearby, or when shared parking is utilized, the number of parking spaces constructed may be reduced.
Principle #8: Parking Lots

Reduce the overall imperviousness associated with parking lots by providing compact car spaces, minimizing stall dimensions, incorporating efficient parking lanes and using pervious materials in spillover parking areas.

Recommendations

The Roundtable supports this principle and endorses the following recommendations:

1. Municipalities should encourage parking lot designs with one-way interior drives and angled parking spaces to reduce the impervious cover associated with the width of travel lanes.
2. Any parking spaces needed beyond the maximum number allowed for a particular use should be required to be built with pervious material.
3. Municipalities should encourage the use of small, odd spaces at ends of parking aisles for motorcycles by posting signage designating motorcycle parking spaces.

Rationale

Parking lots are the largest component of impervious cover in most commercial and industrial zones, but conventional design practices do little to reduce the paved area in parking lots (CWP, 1998). The size of a parking lot is driven by stall geometry, lot layout and parking ratios.

Revisions to parking ratios recommended under Principle #6 will ensure that excessive parking spaces are not created. Requiring parking in excess of these ratios to be constructed of pervious material will further limit impervious cover produced by parking lots.
Principle 9: Structured Parking

*Provide meaningful incentives to encourage structured and shared parking to make it more economically viable.*

Recommendations

The Roundtable supports this principle and endorses the following recommendation:

1. Adopt specific language in ordinance to offer incentives for structured parking, such as tax breaks, additional parking space allowances, or additional height allowance for buildings.

Rationale

The construction costs of vertical parking structures are significantly higher than that of surface lots. Because economics largely drive the feasibility of structured parking, the Roundtable encourages the inclusion of incentives in parking ordinances for situations that might warrant above or below-ground parking structures.

Principle #10: Parking Lot Runoff

*Wherever possible, provide stormwater treatment for parking lot runoff using bioretention areas, filter strips, and/or other practices that can be integrated into required landscaping areas and traffic islands.*

Recommendations

The Roundtable supports this principle and endorses the following recommendations:

1. Eliminate parking lot requirements for curbed landscaped areas that are in direct conflict with the state’s stormwater policy. Ordinances should allow for optional curbing in parking lots based on stormwater management needs.
2. For bioretention purposes, ordinances should offer flexibility in plant selection for landscaped areas in parking lots. Native and/or beneficial plant species should be encouraged for bioretention areas.
3. Adopt language within parking codes that connects parking ordinance with stormwater ordinance requirements and approaches; language should support Best Management Practices (BMPs) to be consistent with PA’s DEP stormwater management manual.
4. Municipal ordinances should allow for the use of pervious surface parking materials for entire parking lots.

Rationale

Parking lots are a significant source of stormwater pollutants in the suburban landscape, particularly lots in commercial areas (CWP, 1998). Typically, landscaping requirements are used to enhance the appearance of a parking lot or to visually separate land uses or developments and can account for 10-15% of the total parking lot area (CWP, 1998). These same areas can be used for stormwater management if properly designed.

These recommendations are aimed at eliminating conflicts between existing stormwater ordinances and the state’s comprehensive stormwater management policy (2002), which promotes a best management practice approach to improve water quality, sustain water quantity and integrate federal stormwater management obligations.
Lot Development

Principle #11: Open Space (Conservation Subdivision) Design

Advocate a type of development that conserves natural areas by incorporating smaller lot sizes [more compact development footprint] to minimize total impervious area and reduce total construction costs, consolidate contiguous open space areas, provide community recreational space, protect agricultural lands, and promote watershed protection.

Recommendations

The Roundtable supports this principle and endorses the following recommendations:

1. Develop model ordinance language for conservation design that can be applied to:
   - Both subdivision & land development and zoning ordinances
   - Areas with and without sewer
2. Development in or adjacent to agricultural security areas must be clustered to promote the consolidation of agricultural areas.
3. Locate open space areas to provide maximum buffering between new development and agricultural lands.
4. Develop a multi-municipal plan for Blair County and adjacent areas to address the issue of agricultural preservation and appropriate development patterns and buffering adjacent to agricultural areas.

Rationale

Open space development is a compact form of development that concentrates development on one portion of the site in exchange for more open space elsewhere. Open space development can improve water quality through impervious cover reduction, more efficient stormwater management, increased riparian buffers, increased open space, and avoidance of environmentally sensitive areas.

Municipalities in Blair County may be most interested in using this technique to protect productive agricultural areas and natural areas that protect cold water fisheries from the impacts of development. Townships without zoning ordinances and, therefore, no current density controls, may want to consider creative land conservation incentives or adopt zoning ordinances that would protect agricultural or high priority natural areas.
Principle #12: Yard Setbacks for Conservation Subdivision Design

To encourage conservation subdivision design, relax side yard setbacks and allow narrower frontages to reduce total road length in the community and overall site imperviousness. Relax front setback requirements to minimize driveway lengths and reduce overall lot imperviousness.

Recommendations

The Roundtable supports this principle and endorses the following recommendations:

1. Adopt minimum front yard setback requirement of 25 feet in all municipalities. Where built-out neighborhoods exist, front yard setbacks should be consistent with existing setbacks and, therefore, may be less than 25 feet.
2. Where side setback requirements require a sum of both sides, allow for a minimum requirement of 7 feet on one side.

Rationale

Often zoning ordinances have very strict requirements that govern the geometry of the lot. Relaxing setbacks and utilizing non-traditional designs can minimize imperviousness while reducing driveway lengths. Relaxing minimum setbacks also allows for smaller lot sizes which is an important design element of open space design.

While frontage requirements in single-family developments are not excessive in any of the Roundtable municipalities, some reductions in front yard setback requirements are recommended to reduce impervious cover contributed by driveways and roads and promote the “walkability” of streets.

Principle #13: Sidewalks

Promote more flexible design standards for residential subdivision sidewalks. Where practical, consider locating sidewalks on only one side of the street and providing common walkways linking pedestrian areas.

Recommendations

The Roundtable supports this principle and endorses the following recommendations:

1. Sidewalks on both sides of a residential street should only be required where average lot size equates to four dwelling units per acre.
2. Sidewalks should not be required where lot densities are less than two lots per acre.
3. Sidewalks should not be required along cul-de-sacs due to low traffic volume.
4. Ordinances should encourage alternative, permeable sidewalk surfaces.
5. Ordinances should require that sidewalks be sloped to direct runoff into pervious areas for infiltration.

At Bancroft (MD), narrower street width with no curbs or gutters reduced impervious cover and minimized clearing and grading. Moving the bike lane into the wooded areas fronting properties reduced the need to place 12 feet of non-porous pavement.
Rationale
Sidewalk requirements are an important element of many subdivision and land development ordinances and are intended to protect pedestrians and address liability concerns. However, requirements should be flexible enough to meet pedestrian demands, while minimizing the amount of impervious cover.

While existing ordinances in this area are not excessively restrictive, Roundtable members encourage greater clarity in the ordinances relating to the necessity of sidewalks and allowance for alternative construction materials.

Principle #14: Driveways and Alternative Surfaces
Reduce overall lot imperviousness by promoting alternative driveway surfaces and shared driveways that connect two or more homes together.

Recommendations
The Roundtable supports this principle and endorses the following recommendations:

1. Ordinance language should encourage designs that direct runoff from driveways away from street conveyance systems and into pervious areas.
2. Shared driveways should be designed to reduce the amount of impervious surface serving multiple homes.
3. Ordinances should provide for options in driveway surfaces and encourage the use of pervious materials.
4. Municipalities should adopt a model shared driveway agreement to avoid conflicts over use and management responsibilities. Such agreements should specify that parking is not allowed on the travel section of the driveway.

Rationale
Studies show that 20% of the impervious cover in residential subdivisions can consist of driveways (Schueler, 1995). Flexible local subdivision codes can allow developers the ability to address this concern.

Roundtable municipalities currently have few standards for driveway design and shared driveways are not addressed by all but one municipality.
Principle #15: Open Space Management
Clearly specify how community open space will be managed and designate a sustainable legal entity responsible for managing both natural and recreational open space.

Recommendations
The Roundtable supports this principle and endorses the following recommendations:

1. Develop long-term funding sources for townships and boroughs to accept management responsibility for open space areas.
2. Develop resource management guidance for the management of these areas including invasive species control, allowable uses (such as types of stormwater management facilities, paths, etc.), and reforestation/native planting goals.
3. Explore the use of recreation councils established by inter-municipal agreement that could provide long-term management of natural open space areas.

Rationale
Open space management is often poorly defined in most communities, leaving the design and maintenance of the space up to the homeowner, homeowners’ associations (HOAs), or other entities that may be ill equipped to properly maintain high quality open space (Heraty, 1992).

Only those municipalities that are largely built out (boroughs and cities) currently have any type of open space provisions in their zoning ordinances, and associated management plans include few management criteria. Whether a public or private entity is responsible for open space management, Roundtable members recognize the importance of clearly identifying resource management responsibilities and financing mechanisms for the long term management of any open space or common areas.

Studies have shown that managing open space in a natural condition compared to lawns and passive recreation is the least expensive maintenance strategy for community associations.
Conservation of Natural Areas

Principle #16: Riparian Buffer Systems
Create a variable width, naturally vegetated buffer system along all perennial and intermittent streams that also encompasses critical environmental features including the 100-yr floodplain, springs and seeps, adjacent steep slopes, and freshwater wetlands. The riparian stream buffer should be maintained in a natural forested condition, or restored with native vegetation. The buffer system should be clearly delineated on plans and through the use of appropriate signage and establishment of limits of disturbance during the plan review, construction, and post-development stages. Municipalities should discourage development within the 100-year floodplain.

Recommendations
The Roundtable supports this principle and endorses the following recommendations:

1. Utilize a tiered buffer system that is less restrictive in the outer zones where the floodplain is extended beyond the minimum buffer zone; identify the types of uses, such as restricted development, recreational facilities, stormwater management, etc., that are appropriate in the different buffer zones.
2. Develop model stream buffer language that can be applied either through the subdivision & land development ordinance, separate ordinance, or zoning ordinance.
3. Develop property owner education program on good buffer maintenance practices.
4. Provide model documents for the protection of buffer areas within dedicated conservation easements that restrict general public access, and explain allowable uses (e.g., paths, certain types of stormwater management practices).
5. Buffers should include the following elements:
   a. Include perennial and intermittent streams and springs/seeps
   b. Bumped out to include adjacent wetlands and certain steep slopes
   c. Measured from the top of bank
   d. No clearing and grading
   e. Eradication and long-term control of invasive species
   f. Replanting of cleared buffers with native trees/shrubs/grasses during the construction phase
6. Utilize the buffers established by the DEP Timber Harvesting Guidelines as a starting point for minimum buffer width:
   a. 0 – 10% slope: 45’ minimum buffer
   b. 11 – 20% slope: 65’ minimum buffer
   c. 21 – 30% slope: 85’ minimum buffer
   d. 31 – 40% slope: 105’ minimum buffer
   e. over 40% slope: 125’ minimum buffer
7. An alternative stream buffer guideline is provided in PA DEP State Forest Resource Management Plan guidance:
   a. Roads and rights-of-way should be located away from stream courses. The filter strip between a stream and road or right-of-way should be 50 feet plus 4 feet for each one percent of slope. This formula for determining buffer width could be used as an alternative.
8. Establish wider buffers for naturally reproducing trout streams identified by the PA Fish Commission.
A tiered buffer system offers flexibility in allowed uses and functions.

**Rationale**

The creation of a riparian buffer system is key to protecting the water quality of streams and offers many additional benefits: 1) provides flood control, 2) protects streambanks from erosion, 3) enhances pollution removal, 4) provides food and habitat for wildlife, 5) prevents disturbance to steep slopes, 6) provides a foundation for future greenways, 7) reduces small drainage problems and complaints, 8) increases property values, and 9) provides space for stormwater facilities.

Stream buffer protection in Roundtable municipalities is generally limited to the floodway, limiting construction of permanent structures but not regulating clearing and grading in any way. Recommendations focus on both the protection and management of buffer systems, especially those next to steep slopes and productive cold water and naturally producing trout streams.
Principle #17: Clearing and Grading
Clearing and grading for land development should be limited to the minimum amount needed to provide building footprints, access for ingress/egress and the provision of utilities. Clearing and grading for any purpose should be managed by establishing review and permit trigger mechanisms that encompass all potential land disturbance, and establishing best management practices (BMPs) appropriate to the type of disturbance.

Recommendations
The Roundtable supports this principle and endorses the following recommendations:

1. All municipalities should develop specific language in their subdivision & land development ordinances, or develop a separate ordinance, that addresses clearing and grading, including the following provisions:
   a. Subdivision plans and subsequent development phase plan submissions must establish a limit of disturbance that is limited to the minimum amount necessary to provide building footprints, access for ingress/egress for a site and the provision of utilities.
   b. Limits of disturbance must be flagged in the field and inspected prior to any clearing and grading activities.
   c. An approved, stamped erosion and sediment control plan must be on-site at all times during active construction activities.
   d. Limits of disturbance must be enforced during all earth moving activities, including preliminary grading and stockpiling activities.
   e. Limits should be set on the duration of time that a site may remain unstabilized following a temporary halt to work. Sites should be stabilized within 7 days. Ordinances should provide specifications for the type of temporary stabilization that is required, as well as permanent stabilization.

*Photo Credit: Deb Rudy*
f. Provide provisions for temporary stockpile operations, such as seeding/covering of stockpiles, locations of stockpiles (outside of stream buffers, etc.).

2. The Blair County Conservation District will work with the local jurisdictions to develop training modules for plan preparers, plan reviewers, and inspectors on how to prepare, review and enforce clearing and grading plans and erosion and sediment controls.

3. The local jurisdictions will update their ordinances to include provisions that cover ALL clearing and grading activities, not just those associated with development; the Allegheny Township Earthmoving Ordinance is recommended as a good model ordinance.

Rationale
Most communities allow clearing and grading of an entire site except for a few specially regulated areas such as jurisdictional wetlands, steep slopes and floodplains. In Blair County, most municipalities reference the Blair County Conservation District’s erosion and sediment control requirements; two Roundtable municipalities have ordinances that generally aim to protect natural areas. Recommendations urge municipalities to adopt clearing and grading ordinances that would reinforce state erosion control regulations and address clearing and grading that occurs outside the permitting process.
Principle #18: Conservation of Trees and Native Vegetation

*Maximize the retention of existing forest and stands of trees and other native vegetation on a development site. Wherever possible, plant native trees and vegetation in community public space, street rights-of-way, parking lot islands, and other landscaped areas to promote natural vegetation. Target the conservation of existing forest/trees and replanting of areas to give priority to environmentally sensitive areas. Forest and tree preservation percentages may be higher in biological diversity areas, landscape conservation areas, and greenways.*

**Recommendations**

The Roundtable supports this principle and endorses the following recommendations:

1. Retain a percentage of existing forest and tree stands on a development site.
2. Manage forest and tree stands on a development site to remove and control invasive species.
3. Encourage replanting of a certain percentage of trees on a development site.
4. Target the conservation of existing forest and trees and replanting efforts on development sites to give priority to certain environmentally sensitive areas including:
   a. Wetland areas
   b. Riparian buffer areas
   c. Steep slopes
   d. Natural Heritage Areas: Biological Diversity Areas (BDAs) and Landscape Conservation Areas (LCAs)
5. Establish minimum percentages for the retention of trees and forests based on land use.

**Rationale**

Native trees, shrubs, and grasses are important contributors to the overall quality and viability of the environment. In addition, they can provide noticeable economic benefits to developers and homeowners. Most of the Roundtable municipalities have no tree preservation ordinances, and there are presently no minimum thresholds for on-site tree or forest canopy. The location of environmentally sensitive areas and heritage inventory sites is an important step in targeting the conservation of existing trees and forest.
Principle #19: Land Conservation Incentives

Incentives and flexibility in the form of density compensation, buffer averaging, property tax reduction, stormwater credits, and conservation subdivision development should be encouraged to promote conservation of stream buffers, forests, meadows, and other areas of environmental value. In addition, off-site mitigation consistent with locally adopted watershed plans should be encouraged.

Recommendations

The Roundtable supports this principle and endorses the following recommendations:

1. Municipalities should define a density that allows for clustering of housing units in conservation subdivision design.
   a. Develop a by-right form of development approval mechanism that provides flexibility for unit type while establishing strong standards for buffering of sensitive environmental features and buffering or landscaping to protect viewsheds and adjacent uses.

2. In encouraging conservation subdivision development, municipalities can demonstrate that this type of development improves adjacent property values and offers a viable option in the residential market.
   a. Local real estate transaction time and sales values in areas in Centre County that have development restrictions and open space preservation requirements sell houses faster than in conventional developments and at 100% or more of their listed value. Providing more sensitive site plans and progressive site design may attract a certain type of buyer.

Rationale

Few communities provide incentives for developers to consider better site design techniques that promote preservation of natural areas. In fact, lengthy plan reviews, additional up-front costs for the developer and uncertainty in plan review and approvals dissuade many developers from proposing conservation measures. Open space designs that ultimately protect large natural features, such as farming, are often confused in the public mind with “cluster development” that has been known to simply cluster houses to save costs, leaving leftover snippets of green space here and there (Arendt, 1994). In reality, a variety of open space or conservation subdivision design options are available for communities to promote in both urban and rural areas.
Principles #20: Stormwater Management

Stormwater management should be required for all new development and redevelopment projects utilizing measures that promote groundwater recharge, protect natural channel conditions, and address the quality of water leaving a site, including temperature impacts to streams.

Recommendations

The Roundtable supports this principle and endorses the following recommendations:

1. Incorporate a map of cold-water streams to be referenced in the subdivision & land development ordinance’s stormwater section, to be used to target appropriate stormwater management practices to protect in-stream water temperatures.
2. Develop local stormwater management design criteria that address cold-water stream conditions, or reference state Chapter 93 water quality requirements for specific stream segments and select appropriate best management practices.
3. Develop stormwater best management practice design criteria that address the attractiveness of design and landscaping plantings and the long-term maintenance of landscaping.
4. Develop homeowner education and maintenance guidance for the long-term viability of on-lot practices.
5. Municipalities should assume responsibility for the long-term maintenance of vegetated swales, including obtaining easements for access and maintenance of swales or other stormwater practices located on private property. (See Principle #5)

Rationale

Many municipalities in Blair County have recently updated their stormwater management ordinances as a result of new federal and state stormwater management requirements. This principle emphasizes the need to examine how ordinances can better address redevelopment projects that provide an opportunity for correcting past stormwater problems. Special attention is also directed at adopting stormwater criteria that best protect Blair County’s cold water stream conditions.
Principle #21: Wetlands Protection

All wetlands - including those not encompassed within a riparian buffer system – should be protected by establishing a minimum no disturbance area surrounding the wetland area.

Recommendations

The Roundtable supports this principle and endorses the following recommendations:

1. A minimum buffer width of 25 feet will be established around wetlands, springs and seeps. The buffer will be expanded up to 100 feet around wetlands with adjacent areas containing steep slopes, and around wetlands of special concern identified by local plans or Natural Heritage inventories.
2. Discourage site designers from locating isolated wetlands within individual private lots to avoid negative impacts on these wetlands from future property owners.

Rationale

State and federal laws currently regulate activities that fill or encroach upon wetlands in Pennsylvania. Wetlands along streams are also afforded protection through floodplain or stream buffer ordinances in some communities. Concern over smaller, isolated wetlands, led to the adoption of this principle that is intended to protect wetlands outside of stream systems by requiring a no-disturbance zone around isolated wetlands.

Principle #22: Steep Slope Protection

Control the disturbance of sensitive steep slopes during the land development process in order to limit erosion and sedimentation, protect watersheds and streams from increases in sediment and pollutants, limit increases in stormwater runoff, prevent an increase in the possibility of slope failures, and maintain adequate vegetative cover on hillsides.

Recommendations

The Roundtable supports this principle and endorses the following recommendations:

1. Localities should explore restricting development on 25% and greater slopes under certain conditions – these conditions could include the extent of the slope, geotechnical conditions, and local experience with steep slope failures.
2. Develop model slope protection language for use in subdivision and zoning ordinances.
3. Review and modify side slope and grading requirements associated with road cuts and house pads to reduce the amount of grading required. Currently there is a large amount of grading into steep slope areas that is caused by the need to provide 4:1 or 3:1 side slopes on roadways. Road and ditch designs need to be revised to reduce the amount of side-slope grading necessary. A similar issue exists for clearing required for house pads and lawn areas.

Rationale

Steep slopes are prevalent in Blair County, and past experiences with slope failures led to the adoption of this principle to add protection for steeply sloped areas.
Principle #23: Plan Process Review

Municipalities should provide more opportunities for public participation in the land development process. Efforts should be made to institute a development review process that involves the community early in the process so that public concerns can be addressed.

Recommendations

The Roundtable supports this principle and endorses the following recommendations:

1. Townships/Boroughs should establish Environmental Advisory Councils (EACs) to provide input to the local officials and provide early public input to the plan review process.
   a. Local officials should determine a framework for establishing these councils, and how they can be best organized in Blair County.
   b. To be effective, EACs should be established at a scale aligned as closely as possible to the municipal level. The preferred order of scale is 1) Municipal level; 2) School District level; and 3) Multi-school district/County level.
   c. The funding implications and advantages of establishing EACs should be explored.

Rationale

An Environmental Advisory Council is a group of three to seven community residents, appointed by local elected officials, that advises the local planning commission, park and recreation board and elected officials on the protection, conservation, management, promotion and use of natural resources within its territorial limits. Municipalities are authorized to establish EACs through Act 177 of 1996, originally Act 148 of 1973.

EAC members devote time and energy to assist elected and appointed officials in protecting the environment. While municipal officials have a high demand for their time and attention, an EAC can devote its full attention to helping officials make environmentally sound decisions. They can act on a municipal or multi-municipal level.

EACs are authorized to:

• Identify environmental problems and recommend plans and programs to protect and improve the quality of the environment;
• Make recommendations about the use of open land;
• Promote a community environmental program;
• Keep an index of all open space areas to determine the proper use of such areas;
• Review plans, conduct site visits, and prepare reports for municipal officials; and
• Advise local government agencies about the acquisition of property.

West Hanover Township EAC plants a raingarden at a township park.
In December 2001, the Alliance for the Chesapeake Bay, the Center for Watershed Protection, and the National Association of Homebuilders launched a partnership known as Builders for the Bay. The primary mission of the Builders for the Bay coalition is to coalesce local builders, developers, environmental groups, governments, and other important stakeholders in a process to review their existing codes and ordinances and begin a locality specific roundtable process. More information and resources related to the Builders for the Bay program can be accessed at www.buildersforthebay.net.

Center for Watershed Protection

Founded in 1992, the Center for Watershed Protection (CWP) is a non-profit organization that works with local, state, and federal governmental agencies, environmental consulting firms, watershed organizations, and the general public to provide objective and scientifically sound information on effective techniques to protect and restore urban watersheds. The Center for Watershed Protection also acts as a technical resource for local and state governments around the country to develop more effective urban stormwater and watershed protection programs. For more information on the Center for Watershed Protection visit www.cwp.org.

Alliance for the Chesapeake Bay

The Alliance for the Chesapeake Bay (ACB) is a regional non-profit organization that fosters partnerships for the restoration of the Bay and its rivers. The Alliance for the Chesapeake Bay is known as the “Voice of the Bay” for its objective, unbiased information on Bay-related issues. Since 1971, the Alliance for the Chesapeake Bay has been helping to build consensus on Bay policies; engaging volunteers in important hands-on restoration projects; educating citizens about the Chesapeake Bay watershed; and strengthening the capacity of grassroots watershed organizations. For more information on the Alliance for the Chesapeake Bay visit www.alliancechesbay.org.

Blair County Builders Association

The Blair County Builders Association (BCBA) is the comprehensive and authoritative source for information on building, construction and UCC implementation in Blair and Bedford counties. The Blair County Builders Association represents more than 230 members in the two-county area, including more than 100 professional builders, remodelers, plumbing, mechanical and electrical contractors. The Blair County Builders Association also offers educational programs and seminars for its members and the general public, sponsors an annual scholarship program for students in Blair and Bedford counties, financially supports local charities, and supports the House Building Project of the Greater Altoona Career and Technology Center and the Blitz Build Projects of Habitat for Humanity of Blair County.
### References

Alliance for the Chesapeake Bay, 2005. “Forest Friendly Development: Chesapeake Bay Watershed Case Studies.” Baltimore, MD.


Blair County, Pennsylvania
Builders for the Bay

www.buildersforthebay.net