MODEL LOW IMPACT DEVELOPMENT (LID) ORDINANCE PROVISIONS FOR SHORELAND ZONING ORDINANCES

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Introduction

Lake (and stream) water quality matters!! Many understand the environmental consequences of declining water quality in lakes and streams. Water quality is of course paramount for lakes that are used as a source of drinking water. Whether or not a lake is a source of drinking water excess nutrients from pollution especially phosphorous can lead to uncontrolled algal growth that consumes oxygen in lakes and can create fish kills, odors and other problems.

Many are not aware of an important connection between lake water quality and economic and municipal fiscal vitality. Research shows a very strong link between lake water clarity/quality and recreational use. Lake recreational activities, etc. provide income to many local businesses. Recreation on Maine lakes generates $1.1 billion annually. Drinking water, youth camps, and commercial uses on lakes generate an additional $400 million in Maine. Lake-front property is a high value tax base and generates a large portion of revenue that supports municipal budgets. Research shows a very strong link between lake clarity/quality and lake-front property values. Diminishing the value of these properties reduces municipal revenues and can lead to non-waterfront property tax payers paying more in property taxes.

According to the Environmental Protection Agency, Maine Department of Environmental Protection (DEP) and other water quality experts non point source pollution (dirty runoff) is the number one threat to lake (and stream) water quality in this nation and state. Dirty runoff is the major reason for current lake (and stream) water quality problems. When rain falls on impervious cover like building roofs, driveways, etc. it cannot soak into the ground and becomes dirty runoff. (Lawns though technically not impervious cover act like an impervious surface.) Impervious cover produces sixteen times more dirty runoff than forested land. Impervious cover equals pollution because pollutants such as pesticides and nutrients like phosphorous, which can cause algae blooms, build up on impervious surfaces and wash off into lakes and streams when it rains.

Dirty runoff from development in the Shoreland Zone is a primary concern. Twenty to thirty percent of the pollution of lakes most at risk (DEP list) stem from dirty runoff from single family development in the Shoreland Zone. This amount of pollution can make the difference between having a clear, high quality lake or having a lake plagued by algae blooms.

Current land use ordinances fall short of adequately protecting lake and stream water quality. Most municipalities have Shoreland Zoning, which provides some protection to lake and stream quality. But the 20 – 30% of pollution of lakes most at risk coming from dirty runoff from single family development occurs with a Shoreland Zoning ordinance in place. Many developed lakefront properties lack effective buffering downslope from primary structures that could

restrain dirty runoff. A few communities have phosphorous(P) control ordinances but these typically only apply to commercial and subdivision development or rarely to new single family residences. New residential additions are invariably exempt from P control ordinances. On many lakes most new development are additions to existing structures.

These model ordinance provisions focus only on the Shoreland Zone and apply low impact development (LID) techniques to restrain dirty runoff near its source. LID is a primary remedy to dirty runoff, spreading it out and allowing it to soak into the ground where it's naturally treated. LID accomplishes this by using several low tech measures such as rain gardens, buffers, etc. that fit in with the site's natural topography and drainage.

LID has numerous benefits. Costs for LID are similar to costs for conventional development site work because there's often less grading and clearing when LID is employed. LID is flexible offering many design options. It can increase property values for example a rain garden can be considered a landscape amenity. There's typically less lawn, less mowing and less fertilizer. Most importantly LID can effectively protect the water quality of lakes and streams.

These model LID ordinance provisions can significantly address the 20 – 30 percent lake pollution caused by dirty runoff from single family development in the Shoreland Zone. These model ordinance provisions will fit into a pre-existing Shoreland Zoning ordinance subsection J called "Storm Water Runoff" that's part of Section 15 "Land Use Standards" as 15.J.3-6 plus appendices. These LID provisions would apply to all new development in the Shoreland Zone involving less than one acre of disturbed area, which is not subject to DEP's Stormwater Management law.

There are three tiers of regulation with each tier concerned with one of 3 types of structure: new primary structures, new additions to primary structures, and new and additions to decks and accessory structures. New primary structures require that either buffer design standards or alternative LID standards from "LID Guidance Manual for Maine Communities" be met. The buffer standards were derived from DEP's "Buffer Design Standards for Single Family Residential Lots." Provisions for new additions to primary structures require that there be no net gain of stormwater exported from the property and a 25 feet wide or as wide as possible buffer be reserved downslope of all developed area. Requirements for new or additions to decks and accessory structures are specific to the structure and are listed in Appendix 2.

The model LID ordinance provisions also include requirements for a pre-permit inspection, LID plan, and operation and maintenance plan, which do not apply to decks and accessory structures. There is provision for an affordable, qualified service provider, the SWCD to do an

inspection and the plans. Estimated cost for inspection and plans by SWCD would total $300 - $600 comparable to cost of a soil test for a septic system.

These model LID ordinance provisions are the product of reviewing numerous ordinances and reports related to LID. The ordinance provisions were prepared by Fred Snow Community Planner at Kennebec Valley Council of Governments(KVCOG), which was under contract with Kennebec County Soil and Water Conservation District(KCSWCD). In addition to developing the model ordinance provisions the purpose of this project also concerned outreach about LID and this model to some towns in the China Lakes and Belgrade Lakes regions. The project has been a collaborative effort with John Blais, PE, former Watershed Project Director at KCSWCD providing review comments on drafts of the model LID provisions and Jim Hart, PE, Director of Water Quality at Kennebec Water District and board member of China Regional Lakes Alliance(CRLA) providing review comments on a related power point presentation and assistance concerning outreach. Additional stakeholders that initially met together to launch this project and offered comments or assistance include Scott Pierz, CEO for Town of China and Peter Kallin Executive Director of Belgrade Regional Conservation Alliance (BRCA). Comments from meetings with BRCA's Belgrade Lakes Trust, China Lake Association and CRLA were also helpful.

Model LID Ordinance Provisions for Shoreland Zoning Ordinances

Note: Section 15.J.1-2 is preexisting in SZ ordinances. The following in **bold,** Section 15.J.3-6 are the model LID ordinance provisions.

Section 15 Land Use Standards

J. Storm Water Runoff

1. All new construction and development shall be designed to minimize storm water runoff from the site in excess of natural pre-development conditions. Where possible, existing natural runoff control features , such as berms, swales, terraces and wooded areas, shall be retained in order to reduce runoff and encourage infiltration of storm waters.

2. Storm water runoff control systems shall be maintained as necessary to ensure proper functioning.

3. **All new construction and development not subject to a Maine Department of Environmental Protection (DEP) Stormwater Management Law permit shall meet either buffer design standards in Appendix 1 or alternative low impact development(LID) standards presented in the LID Guidance Manual for Maine Communities (LID Manual) dated 9/27/07 with two exceptions:**

   a. Existing primary structures with new building expansions shall achieve no net gain of stormwater exported from the property and a 25 feet wide or as wide as possible buffer area downgradient of all developed area on the lot must be reserved either undisturbed to naturally revegetate or to be revegetated. Revegetated buffer areas shall be planted with hardy (native preferred) varieties requiring minimum maintenance and shall not be planted or maintained as lawn area. If existing vegetation in this buffer area is insufficient to effectively buffer stormwater then a minimum 5 feet wide by 40 feet long buffer with two buffer bundles (see Appendix 3) provided by Soil and Water Conservation District(SWCD) must be installed. Plant varieties used for rain gardens must be listed in DEP's Stormwater Management Manual Volume I, Appendix B.

   b. New or expansions of decks patios ,retaining walls , accessory structures or impervious surfaces not part of a development of a new primary structure or a building expansion of an existing primary structure shall meet requirements in Appendix 2.

4. **All new construction and development subject to buffer design standards in Appendix 1 or alternative LID standards in the LID Manual or expansions of existing primary structures shall require a pre-permit site inspection , LID plan, and operation and maintenance plan by SWCD or other qualified professional including Maine Professional Engineer, certified Geologist or licensed Landscape Architect. The LID plan will apply buffer design standards in Appendix 1 or LID techniques designed to meet alternative LID standards from LID Manual or designed to achieve no net gain of stormwater exported from the property whichever is applicable. New construction and development shall be consistent with the LID plan.**

5. **The LID plan shall consist of the following elements:**

   a. **A description and drawings of all components of the proposed runoff management system including:**

      i. **All measures for the detention, retention or infiltration of water;**

      ii. **LID techniques used;**

      iii. **All measures for the protection of water quality;**

      iv. **The structural details for all components of the proposed drainage systems and LID practices;**

      v. **Notes on drawings specifying materials to be used, construction specifications, and expected hydrology with supporting pre- and post-calculations;**

      vi. **Proposed site plan showing location of buildings or other structures, impervious surfaces, and LID practices;**

      vii. **Any other information requested by the Planning Board;**

      viii. **All required Best Management Practices in conformance with Maine's Sediment and Erosion Control law.**

   b. **Soils information of the lot from a medium intensity soils map. Some non-buffer LID techniques may require soils information from test pits performed at the location of proposed stormwater retention, detention, or infiltration systems, including but not limited to soil descriptions, depth to estimated seasonal high groundwater, and depth to bedrock.**

c. **Landscaping plan describing the native (preferred) woody and herbaceous vegetative stabilization and management techniques to be used within and adjacent to the stormwater practice.**

d. **Signature of qualified professional who prepared the plan.**

6. **An operation and maintenance plan is required at the time of application and shall include:**

a. **The name of the owner for all components of the system.**

b. **A map showing the location of the systems and facilities including all stormwater and LID best management practices;**

c. **Maintenance agreement that specifies:**

i. **The names and addresses of the person(s) responsible for operation and maintenance;**

ii. **The person(s) responsible for financing maintenance and emergency repairs;**

iii. **An inspection and maintenance schedule for all stormwater best management practices including routine and non-routine maintenance tasks to be performed consistent with the LID Manual;**

iv. **A list of any easements with the purpose and location of each; and**

v. **The signature of the owner and parties responsible for maintenance.**

Appendix 1: Buffer Design Standards

A. Developed Area Flow Path

The flow path over the portion of the developed area for which treatment is being credited must not exceed 150 feet.

B. Soil Restrictions

A buffer is allowed on Hydrologic Soil Group D soils only if it is forested and non-wetland.

C. Buffers General Design and Construction Criteria

1. **Maximum Slope: The buffer's slope must be less than 15% to be included in the calculation of buffer flow path length. Areas with slopes greater than 15% are too steep to be effective as a treatment buffer but should be left undisturbed. The buffer must have a relatively uniform slope so that stormwater does not concentrate in channels.**

2. **Location: The buffer must be located immediately downhill of the developed area.**

3. **Distribution of runoff over the buffer: To be treated, runoff must enter the buffer as sheet flow without a level spreader and cannot be allowed to channelize.**

4. **Separation from streams: Buffers must not be interrupted by intermittent or perennial stream channels or other drainage ways.**

5. **Restabilization of buffers used for sediment control during construction: If a buffer has been used to trap sediment during construction, the sediment must be removed and the original topography, ground cover and vegetation reestablished. Otherwise, sediment accumulations may cause runoff to concentrate in certain locations. It is advisable to protect buffer strips with wood waste berm sedimentation barriers during the construction process.**

6. **Pretreatment for buffers with "bare soil" contributing areas: To prevent a heavy sed-iment loading from damaging the buffer, sites that will have areas of bare soil for a long time cannot utilize this BMP without first pre-treating the runoff with a sediment control BMP.**

7. **Topography: The topography of a buffer area must be such that stormwater runoff will not concentrate as it flows across a buffer, but will remain well distributed. Flow paths of runoff through a buffer must not converge, but must be essentially parallel or diverging. This should be confirmed in the field for each area designated as a buffer.**

8. **Vegetative cover: The vegetative cover type of a buffer must be either forest or meadow. In most instances the sizing of a buffer varies depending on vegetative cover type.**

   Forest buffer: **A forest buffer must have a well distributed stand of trees with essentially complete canopy cover, and must be maintained as such. A forested buffer must also have an undisturbed layer of duff covering the mineral soil. Activities that may result in disturbance of the duff layer are prohibited in a buffer.**

   Meadow buffer: **A meadow buffer must have a dense cover of grasses, or a combination of grasses and shrubs or trees. A buffer must be maintained as a meadow with a generally tall stand of grass, not as a lawn. It must not be mown more than twice per calendar year. If a buffer is not located on natural soils, but is constructed on fill or reshaped slopes, a buffer surface must either be isolated from stormwater discharge until a dense sod is established, or must be protected by a three inch layer of erosion control mix or other approved wood waste material before stormwater is directed to it. Vegetation must be established using an appropriate seed mix.**

   Mixed meadow and forest buffer: **If a buffer is part meadow and part forest, the required sizing of a buffer must be determined as a weighted average, based on the percent of a buffer in meadow and the percent in forest, of the required sizing for meadow and forest buffers.**

9. **Deed restrictions and covenants: Areas designated as buffers must be clearly identified on site plans and protected from disturbance by deed restrictions and covenants.**

D. **Buffers General Maintenance Criteria**

1. **Mowing: Meadow buffers shall not be mown more than twice a year. They shall not be maintained as lawn.**

2. **Access and Use: Buffers shall not be traversed by all-terrain vehicles or other vehicles. Activities within buffers shall be conducted so as not to damage vegetation, disturb any organic duff layer, and expose soil.**

E. **Buffer Sizing**

The table on the following page indicates the required buffer flow path length based on soil types and vegetative cover types. Buffers must be located downhill of the entire developed area for which they are providing stormwater treatment; and with no converging contour, such that all runoff from the developed area passes in sheet flow through the buffer for a distance at least as long as the required length of flow path.

Required minimum length of flow path through the buffer Based on a slope no greater than 15%		
Hydrologic soil	**For a forested buffer (feet)**	**For a meadow buffer (feet)**
A	35	50
B	45	60
C Loamy Sand or Sandy Loam	50	70
C Silt Loam, Clay Loam or Silty Clay Loam	70	100
D Non wetland	100	Not Applicable

Appendix 2: Stormwater Management Requirements for Decks, Patios, Retaining Walls, Accessory Buildings, and Impervious Surfaces

A. Deck: Construction of a raised deck shall be designed as follows:

1. **The ground area beneath the proposed deck shall not be paved or otherwise made impervious if it is presently bare ground or landscaped, including lawn.**
2. **If the ground area is presently paved or impervious, impervious surface shall be replaced with crushed rock.**
3. **Should a roof be constructed over the deck Section 5.E.III would apply.**
4. **The proposed deck shall be constructed in such a manner to allow rainfall to pass through to the ground below. An example of this is the typical wooden deck with expansion spaces between the boards that form the deck surface.**

B. Patio: Construction of a patio shall be designed as follows:

1. **The patio shall be constructed of porous brick, crushed rock or other materials that permit infiltration of rainfall to the soil below.**
2. **The patio surface shall not create a concentrated runoff discharge point for stormwater that is not infiltrated through the surface.**

C. Retaining Wall: Construction of retaining walls less than 24 inches in face height shall be designed as follows:

1. **The retaining wall shall not alter the flow direction of stormwater runoff leaving the site, nor shall it alter the stormwater flow to any wetland resource areas on the project site or adjoining properties**
2. **Construction of the retaining wall will not increase the amount of stormwater runoff flowing to any water body**
3. **The area behind the wall is revegetated with grass, shrubs, trees, or a combination thereof, and no further structural development will occur within the setback area including decks and patios.**

D. Accessory Building: An accessory building shall be constructed on a raised footing foundation. Area under the structure shall remain a soil surface. A drip edge 12 inches

wide by 12 inches deep with ¾ inch crushed stone underlined by geotextile fabric must be installed along area of the roof to be treated.

E. Impervious Surfaces: Construction of impervious surfaces (e,g. driveway, paved/concrete walkway) shall be designed so that:

1. **There is no net increase of impervious area on the property, or the volume of stormwater runoff produced by the new impervious area ("recharge volume" or "recharge area") is infiltrated onsite. This can be achieved through Low Impact Development techniques as described in the LID Manual.**
   Expansion of the driveway surface shall not result in additional stormwater runoff flowing to a water body.

Appendix 3: Buffer Bundles

Buffer bundles from County Soil and Water Conservation District can be used to create a buffer covering approximately 25-30 square feet. As you make the strip of buffer plants wider it will not be as long. When initially planted as small plants space them and they will fill in over the years.

Buffer Bundle #1 Medium height (2-5 feet) in full sun
4 Low Bush Blueberry
4 Bayberry
3 Rosa Rugosa
2 Anthony Waterer
2 Beautybush

Buffer Bundle #2 taller shrubs (2-10 feet) in sun to part shade
3 White Snowberry
3 Black Chokeberry
3 Bleeding Heart
6 Hosta
1 Dogwood
12 Columbine
6 Daylily