Total Maximum Daily Load (TMDL) and Smart Growth

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The Clean Water Act, Section 303(d), requires States to identify waters not meeting State water quality standards, to set priorities for Total Maximum Daily Load (TMDL) development, and develop a TMDL for each pollutant or group of pollutants for each listed water. A TMDL is the sum of the loads ("wasteload allocations" for point sources and "load allocations" for nonpoint sources) of a pollutant that a waterbody can receive and still meet water quality standards. The calculation must include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality. The calculation also must consider seasonal variation in water quality.

In developing a TMDL, States (or the EPA) take future growth into consideration in several ways. First, TMDLs should describe important assumptions made in developing the TMDL, such as future growth trends. Second, developing a TMDL (setting a pollutant budget for a waterbody) should create a process of getting community stakeholders to think about what will be necessary to protect both current and future business, commerce and development without jeopardizing the water resource that supports these activities. Two opposite approaches illustrate this idea:

- if you set aside little or no allocation for pollutant loadings from future growth, you would limit opportunities for future development/job creation; this approach, however, minimizes the reductions in current loadings needed from existing development to address future inputs
- if you carve out a big allocation for future growth, it presents a broader range of options for future economic development, but at a cost, since it means there must be greater reductions from existing businesses, and residents.

Use of smart growth techniques can help communities maintain pollutant loading limits established by a TMDL, and minimize pollution impacts caused by development within a watershed, although estimating the benefits of reducing future pollutant loadings is usually very difficult. There is nothing in current TMDL regulations or guidance that would prevent the use of estimated reductions in pollutant loadings resulting from current or future use of "smart growth" designs. At present, however, there is only a small number of studies regarding effects of smart growth on runoff and loadings and this presents a challenge to those wishing to "credit" smart growth/green design strategies in TMDLs.

This information sheet describes some smart growth techniques that States can consider when developing TMDLs. It also identifies tools, such as master plans and ordinances, that can help States and municipalities ensure that smart growth is used to help meet pollutant loading limits specified within a TMDL.

Smart growth includes a series of principles for minimizing environmental impacts while allowing growth and making communities more livable. Smart growth focuses on avoiding negative environmental impacts and the enormous costs of new or expanded infrastructure that commonly result from development. Typically sprawl creates low-density residential

communities that depend on longer-distance travel to jobs, schools, and shopping areas. It is easy to see that increased travel distance and dependence on cars can result in increased air pollution. The results of sprawl on water quality are just as real but, perhaps, less obvious. Cleared land, compacted and paved surfaces, and expanded road systems cause greater production of overland runoff, which is commonly polluted by sediments, nutrients, bacteria, heavy metals and other toxic substances, such as (for fresh water) chloride from road salt. In areas without sewers, the increased number of septic systems can degrade the quality of groundwater, which (unless intercepted by wells) eventually discharges into surface water. On the other hand, if an area has sewers, some water available for recharging ground-water supplies is permanently lost, which can lower the flow of streams and, therefore, the ability of streams to assimilate pollutant loads during dry-weather periods.

What are the growth-related issues *that can impact estimates of pollutant loadings in a TMDL?*

- *Increased loading of sediments and soil-bound pollutants (e.g., nutrients, heavy metals, hydrocarbons) during and immediately following construction* - Construction activities within a watershed may result in long-term impacts on nearby waterbodies. For example, a large influx of sediment to a low-gradient stream or wetland area may bury natural vegetation or a rocky substrate and decrease water depth, leading to a reduction in density and richness of aquatic species and an increase in average water temperature.

- *Increased pollutant loadings from increased stormwater runoff* – Sprawling development generally means a significant addition of paved surface area that prevents infiltration and increases the amount of runoff generated from each storm event. In addition to increased flooding potential, this runoff may contain significant amounts of pollutants such as sand and silt, oil, agricultural chemicals, nutrients and toxics from urban and suburban environments that enter surface waters via stormwater pipes and direct runoff from land.

- *Increased nutrient and pesticide loadings from lawn fertilizers and garden chemicals* - A secondary effect of suburban development is an increase in residential

Smart growth minimizes impacts on the environment by encouraging better land use practices, such as these Principles for Better Land Use, adopted by the National Governors' Association, and similar Principles adopted by the Smart Growth Network.

- Mix land uses (i.e., residential and commercial);
- Take advantage of existing community assets;
- Create a range of housing opportunities and choices;
- Foster "walkable", close-knit neighborhoods;
- Promote distinctive, attractive communities with a strong sense of place, including the rehabilitation and use of historic buildings;
- Preserve open space, farmland, natural beauty, and critical environmental areas;
- Strengthen and encourage growth in existing communities
- Provide a variety of transportation choices
- Make development decisions predictable, fair, and cost-effective;
- Encourage citizen and stakeholder participation in development decisions.

and commercial use of fertilizers and pesticides to maintain landscaped areas, such as lawns, parks, and golf courses. These chemicals, especially if applied excessively or at the wrong time of year, can enter surface water via stormwater runoff or groundwater via infiltration.

- *Increased nutrient loading from numerous septic systems or larger wastewater treatment plants* - Several studies have shown that increases in groundwater nutrient levels, especially nitrogen, are related to increases in housing density. Suburban development often means an increase of nutrient loading in groundwater, surface water, or both from septic systems and wastewater treatment plants unless the wastewater treatment system is designed to remove nutrients. Too many nutrients can cause eutrophication of surface water (excessive growth of algae and/or rooted aquatic plants) and can contaminate groundwater. The nutrient of concern for inland surface waters generally is phosphorus; the primary nutrient concern for coastal waters is nitrogen. Moreover, increased available nitrogen adds to the greenhouse effect, and contributes to photochemical smog.

- *Increased water use may decrease the amount of water available for waterbodies and for diluting pollutant loads* - Increased demand for water to meet commercial and residential needs is met by withdrawing water from wells or surface reservoirs. Significant amounts of this water may be redistributed within a watershed or removed through sewers and inter-basin transfers. This may result in reduced flow in rivers, ponds, or other waterbodies seasonally or throughout the year. Allowable pollutant loads (i.e., TMDLs) that are estimated assuming dilution by current amounts of water may be overestimated if flow is reduced by future water demands.

Helping communities manage growth to control or reduce pollutant loads and to restore impaired waterbodies

Communities that adopt growth management strategies that encourage smart growth and discourage sprawl are in a better position to control pollutant loadings from stormwater discharges, soil erosion, wastewater treatment systems, and many other sources of pollutants.

States and Federal agencies can encourage smart growth by helping communities direct growth towards suitable areas such as brownfields and other infill sites, by encouraging growth that is compact, and by discouraging growth that impacts environmentally sensitive places. Adoption of growth-management plans and best land-use practices in a community can be considerations in the development of TMDLs - particularly when considering future loading rates.

Some states have expressed concern that implementation of TMDLs could thwart smart-growth strategies because TMDLs will cap allowed pollutant loads to already-impaired waters flowing through urban cores, which, in turn, would make it harder for new development to occur in these "target areas" for growth. The fear is that, because of this perception, developers will be inclined to focus their proposals on "greenfields" on the urban fringe, where TMDLs (caps) are not imposed because waterbodies are meeting water quality standards. However, this fails to consider that (1) many "vacant" properties in urban cores already are largely impervious as a result of paving and soil compaction, so putting new buildings on these sites is unlikely to make

runoff volumes worse, (2) "green" building and site designs present the potential for actually reducing runoff volume and pollutant loadings from brownfield redevelopment sites, and (3) sanitary sewage from homes or offices built on brownfields sites may not be discharged to the closest waterbody, but, instead, may flow through the city sewer system to a regional treatment plant some distance away.

Brownfield development and urban infill can be done in such a way that there is no increase in pollutant loadings from the site being developed, and, perhaps, even a reduction from pre-redevelopment conditions. On a “greenfield” site, developers may be required to demonstrate “no effective net increase" in impervious surface area, a requirement that may be difficult to meet. In addition, even though water quality standards may be met in greenfields areas, developers may encounter restrictions because of anti-degradation policies that are a part of all state water quality standards.

Establishing growth-management plans and adopting good land-use management practices can help communities meet TMDL target loads, and potentially reduce the number of waters that are listed on a state’s list of impaired waters (a state’s 303d list). For example, approaches such as conservation subdivisions, where housing is clustered on part of a parcel with the rest of parcel remaining as open space, can help reduce nutrient and other pollutant loadings by reducing the amount of impervious surface area. Use of “compact development” or focusing development on sites that are already developed can minimize the amount of disturbed land and paved surfaces. This, in turn, can minimize release of sediment, nutrient and other pollutants from the site during construction and afterwards. Use of natural landscaping in favor of expansive lawns reduces the need to use lawn chemicals and fertilizers while contributing to protection of habitat areas. Communities that encourage public transit, bicycles, and walkers can reduce the number of vehicles on the road and the amount of pollutants associated with motorized travel.

***Tools Available for Smart Growth**:*

There are many tools and resources available for communities interested in smart growth. The following websites are likely to be particularly useful to communities in New England:

EPA Washington: http://www.epa.gov/dced/index.htm

EPA New England: http://www.epa.gov/ne/ra/sprawl/index.html

Vermont Forum on Sprawl: http://www.vtsprawl.org

Maine State Planning Office: http://www.state.me.us/spo/landuse/

New England Environmental Finance Center: http://efc.muskie.usm.maine.edu/

GrowSmart Maine: http://www.growsmartmaine.org/

New Hampshire Office of State Planning: http://www.nh.gov/osp/SmartGrowth/index.htm

Minimum Impact Development Partnership of the Jordan Institute: www.nhmid.org

Massachusetts Executive Office of Environmental Affairs: http://commpres.env.state.ma.us/

Metropolitan Area Planning Council: http://www.mapc.org/

GrowSmart Rhode Island: http://www.growsmartri.com/

Nonpoint Education for Municipal Officials: http://nemo.uconn.edu/

Smart Growth Network: http://www.smartgrowth.org/sgn

Smart Growth America: http://www.smartgrowthamerica.com/

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