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State Funding for Public Sewer Infrastructure in Maryland

Is it Smart Growth versus the Bay?

Jim Cohen

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Jim Cohen
Urban Studies and Planning Program
University of Maryland

jimcohen@umd.edu

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Introduction

Since the late 1960s, the Maryland Legislature has passed a range of programs and regulations aimed at conserving open space and helping restore the health of the Chesapeake Bay, North America's largest estuary. In the late 1990s, the state went beyond its open space and Bay protection foci by introducing a set of anti-sprawl initiatives that are collectively known as the Maryland Smart Growth Initiatives. (Table 1, on p. 17, provides a summary of key environmental and land use laws in Maryland.).

Maryland's Smart Growth program, encompassing a number of state laws and programs passed by the state legislature since 1997, initially had 3 main objectives[1]: to conserve the state's most valuable natural resources; to save taxpayers from the unnecessary cost of building sprawl-supporting infrastructure; and to support existing communities and neighborhoods by targeting state resources to support development in what are called "Priority Funding Areas", or PFAs (Maryland Office of Planning 2000).[2]

To achieve its objectives the Maryland Smart Growth program relies on state fiscal incentives / disincentives rather than regulation (Cohen 2002, DeGrove 2005; Knaap and Freece 2007). When initially implemented, Smart Growth provided state grants, loans and/or tax breaks for: rural land preservation by local governments and land trusts under a competitive grants program; down-payment assistance to homebuyers purchasing houses near their places of employment (in neighborhoods meeting state criteria); clean up and reuse of brownfields (combined with limitations on retroactive liability for developers intending to clean up and reuse them); job-creation by employers who meet state thresholds and standards for employment generation within PFAs; and infrastructure creation/expansion, and certain types of economic development, housing and other selected programs, only to areas within PFAs. In recent years, state fiscal downturns have led to cutting back or elimination of funding for some of these programs. However, the state has continually had funds for grants and loans for local infrastructure. The general topic to be discussed in this paper is the importance and effectiveness of state spending on sewer infrastructure as a strategy for directing new development to PFAs.

In many ways, the open space, Bay protection and Smart Growth Initiatives seem compatible. By conserving farmland, open space and forests, and encouraging new development in existing communities and more compact, planned ones, the state could reduce impervious surface creation that a more dispersed development pattern would produce. That, along with discouraging dispersed development that relies on septic systems, would restrain the amount of nitrogen, phosphorous, sediment and other non-

[1] A few years after Smart Growth was initiated, the website of the Maryland Office of Planning (now the Maryland Department of Planning) contained a new, 4th objective: "provide Marylanders with a high quality of life, whether they choose to live in a rural community, suburb, small town, or city".

[2] The PFAs include: municipalities; areas designated by the state for revitalization; federal or state enterprise zones; areas of the state located between Interstate 495 and DC or between Interstate 695 and Baltimore City; and areas identified by county governments that meet certain state criteria on actual or zoned density and actual or planned availability of water and sewer infrastructure.

point source pollution that enters the Bay and its tributaries.[3] Focusing state spending on public sewer infrastructure exclusively to PFAs would help local governments support growth in those areas. Also, since septic systems produce more nutrient pollution per capita than public sewer plants, attracting new growth to PFAs rather than to currently rural areas would be better for the Bay's health.

The assumptions stated in the previous paragraph raise a number of questions about the effectiveness of Smart Growth provisions related to state spending on public sewers. This paper looks at data on the state's sewer infrastructure grants and loans to local governments, and at the Smart Growth implications of recent federal and state legislation mandating upgrades to the state's largest sewer plants, to explore the following three questions.

1. How important is state financial assistance to local governments in enabling them to generate the funding needed for public sewers? If state funding constitutes a large portion of that funding, then the Smart Growth provision limiting state money to within PFAs is an important tool for directing growth.

2. To what degree is state sewer funding being used for facilities inside, rather than outside of, PFAs, and what explains any state sewer funding for facilities located outside of PFAs?

3. Federal and state regulations since 2004 have put caps on nutrient emissions (nitrogen and phosphorous) from major sewer plants in Maryland. If there is not sufficient funding to enable plants to meet the standards, will this drive future development to rural areas – counter to Smart Growth aims? If so, what types of policies could address that problem?

To examine these questions, the paper begins with an overview of Maryland Dept. of the Environment (MDE) funding for local water and sewer projects, and the relevant Smart Growth provisions related to where that money can be spent. It then indicates what is known about the proportion of local funds for sanitary sewerage infrastructure that comes from MDE. Following this is a review of: a) the degree to which, and the reasons why, state funding for local public sewer projects was for projects located outside of PFAs from 1997 through 2006; and b) the priorities for MDE spending under the MDE's largest funding source – the State Water Quality Revolving Loan Fund – for the state's FY 2009. The paper then summarizes the Smart Growth implications of the nutrient emission caps that have been placed on the state's largest sewer treatment plants.

The paper reaches three conclusions: 1) that there is conflicting data on the degree to which county governments rely on state grants and loans for sewer infrastructure – confounding efforts to ascertain the effectiveness of the Smart Growth provisions targeting such state spending; 2) that a large amount of the state's water quality

[3] Nitrogen and phosphorous pollution fuels algae growth in the Bay. Algae blooms block light needed for sub-aquatic vegetation that provides habitat for a number of species. Also, decomposition of dead algae requires oxygen that is needed by fish and leads to "dead zones" in the Bay caused by low oxygen levels.

protection funds have been devoted to projects located outside of PFAs, but all are consistent with the Smart Growth legislation; and 3) that unless increased funding for sewer systems is generated or a nutrient trading program is introduced, the federal and state mandates for sewer upgrades will, in certain locations, force new growth into rural areas served by septic systems – contrary to the objectives both of Smart Growth and Chesapeake Bay restoration.

Maryland Financing of Local Water and Sewer Projects, and Relation to Smart Growth Implementation

Brief Review of Literature on the Connection between Sewer Infrastructure Fuding and Growth

Several studies have pointed out the connection between the availability of water and sewer infrastructure and the location and timing of new development (Binkley et al., 1975; Carson et al., 1973; Kelly, 1993; Knaap and Nelson, 1992; Llewelyn-Davis Carson Ltd., 1978; Porter, 1997; Tabors et al., 1976). In particular, Tabors et al. assert that the location, capacity and staging of water and sewer infrastructure is the most important determinant of new development – even more influential than highway spending.

Only one study, by Howland and Sohn (2007), has examined the impact of state water and sewer spending under Maryland's Smart Growth program. The authors used data on the location of water and sewer infrastructure investments between 1997 and 2002 to examine two questions: a) to what extent Smart Growth policy has restricted water and sewer investments to areas inside PFAs; and b) what are the county-specific characteristics that affect county compliance with the policy. Howland and Sohn found that, for projects for which the specific service area could be identified, 29 percent of state water and sewer funds for local governments went to projects located outside of PFAs (for reasons to be discussed later in this paper), while for locally-funded projects, the rate was 25 percent. The authors' statistical analysis found that the likelihood of county water and sewer investment going outside its PFAs was positively and significantly related to the county's population growth rate and size of the its tax base.

Sources of State Funding for Water and Sewer Projects

The Maryland Department of Environment (MDE) administers a total of eight grant and loan programs that provide funding to local governments and, in some cases, to private drinking water treatment plant owners, for four general types of projects: 1) upgrading wastewater facilities; 2) retrofitting stormwater management controls; 3) restoring streams; and 4) acquiring, constructing, rehabilitating, and improving water supply facilities. The eight programs are listed in Table 2 on p. 18.

Each of the 8 funding programs is briefly profiled, below. The total amount of funds spent in each of the eight programs, from its inception through July 2007, is taken from the Maryland Dept. of Environment website (MDE Website 2007a). Except for the Bay Restoration Fund, the funding amounts from 1997 through 2006 are taken from a State Dept. of Budget and Management (2006). The Bay Restoration funding amount is taken from Maryland Bay Restoration Fund Advisory Committee (2007). The 1997 to 2006

figures are included below because they closely approximate the onset of the state's Smart Growth initiatives.

1. The Water Quality State Revolving Fund (WQSRF) provides below-market-rate-interest loans to local governments to finance wastewater treatment plants and other water quality and public health improvement projects. This fund is, by far, the largest source of funding for water-related programs in the state, with over $1.2 billion in loan money extended since its origin through July 2007. Of that amount, $781.5 million was extended during the period from 1997 through 2006. The fund is administered by the MDE's Maryland Water Quality Financing Administration (WQFA). Created by the Maryland General Assembly in 1988, the WQFA provides financial assistance for a wide variety of projects to protect or improve the water quality of the state's rivers, streams, and other water sources, and the Chesapeake Bay. The fund is used to fund wastewater treatment plans and other "point source" water quality projects, as well as such "non-point source" pollution control projects such as landfill capping. Funded projects must be consistent with the Federal Clean Water Act of 1987, and most of the funding (80 percent) comes from the federal EPA.

2. The Drinking Water Revolving Loan Fund (DWRLF) provides below-market-interest-rate loans for drinking water projects. Created by the General Assembly in 1993, it utilizes federal EPA funds available under the Federal Safe Drinking Water Act and Amendments of 1996. The fund extended $144.6 million in from 1997 through 2006.

3. The Biological Nutrient Removal (BNR) Cost Share Grant Program is a State and local cost-share grant program to assist local governments in implementing BNR technology at Maryland's 66 largest publicly-owned sewage treatment plants. From 1984 through mid 2007, this program has provided over $239 million for BNR upgrades (MDE Website 2007a), of which $147.7 million was extended from 1997 through 2006.

4. The Supplemental Assistance Program provides grant assistance to local governments to plan, design and construct wastewater projects that address a public health or water quality problem of high priority to MDE. Funded projects include upgrading wastewater treatment to bring in compliance with state regulations; connecting of older communities with failing septic systems to public sewer systems; and correcting such system deficiencies such as combined sewer overflows, excessive inflow and infiltration, and antiquated pump stations. By intent, the majority of the grantees under this program are the more rural, less affluent counties and municipalities that have limited resources. Through July 2007 this program has provided over $67.8 million in funding, often in conjunction with the WQSRF (MDE Website 2007a). Of that amount, $36.55 million was extended from 1997 through 2006. In July 2007 program was funding 32 wastewater projects throughout the state.

5. The Small Creeks and Estuaries Restoration Program (SCERP) funds water quality restoration projects in seriously degraded water bodies in Maryland. SCERP was first funded in the State's 1990 capital budget to help local governments with voluntary efforts to restore and enhance streams and creeks in older, developed areas of the state -- often in

conjunction with other revitalization efforts. From 1990 to July 2007, the program provided over $16.3 million in grants and is currently funding nine projects throughout the state. Of that funding amount, about $7.84 million was extended from 1997 through 2006.

6. The Maryland Stormwater Pollution Control Cost-Share Program, established in mid-1984, funds the implementation of stormwater management retrofit and conversion projects, in order to help control the amount of nutrients and pollutants entering the state's waterways from older developed areas. Since its origin the program has provided over $22.5 million for various best-management-practices implementations, and is currently funding 11 projects (MDE Website 2007a). From 1997 through 2006 the program spent $9.02 million.

7. The Bay Restoration Fund, created during the 2004 Legislative Session, provides funds for activities that reduce nutrient pollution into the Chesapeake Bay. The Enhanced Nutrient Removal (ENR) Program under this fund was established to provide up to 100 percent grant funding to upgrade the state's largest wastewater treatment plants to reduce nitrogen and phosphorous concentrations in wastewater effluent to state-of-the-art treatment levels. Revenues for the fund come from wastewater treatment plant users, as well as owners of private septic systems. Sixty percent of the funds collected from septic system owners are used to upgrade septic systems with best available technology, and 40 percent is used to pay farmers to plant cover crops to absorb nitrogen. From the program's inception until the end of 2006, the Fund had extended $73.9 million in grants for local ENR and other public sewerage projects, and $9.0 million for septic system upgrades.

8. The Water Supply Financial Assistance Program provides State grants to assist small communities in the acquisition, construction, rehabilitation, and improvement of publicly owned water supply facilities. Up to July 2007 the program has provided over $59.6 million for such projects (MDE Website 2007a) -- $22.0 million of this from 1997 through 2006. The program is currently funding 14 projects throughout the state.

Of the above 8 MDE funding programs, 4 are focused on sewerage facilities; 2 with drinking water facilities, one with stormwater management upgrades, and one with stream and creek enhancement. During the 1997 to 2006 time period, MDE gave out a total of over $1.23 billion in grants and loans for local water and sewer projects under these programs. Of that amount, $1.04 billion (or 84.4 percent) of the funding, was for public sewer related projects, and another 9.0 million was for septic system upgrades.

<u>Dependence of Local Governments on State Funding of Sewer Infrastructure</u>
It is difficult to determine what proportion of local government funding for sewer infrastructure in Maryland comes from the state government. County governments are not required to put projected expenditures and sources of funding in their comprehensive water and sewer plans that are given to MDE and MDP for review. Accordingly, there is no statewide data source providing a breakdown of local sewerage spending, by funding source.

This paper relied on two published studies for estimates on the degree to which local governments depend on state funds for sewer infrastructure. First, Howland and Sohn (2007) reviewed county capital improvement programs and other data from county sanitary districts and water and sewer departments to identify the sources and amounts of funding for local sewer *and water* infrastructure. The CIPs and reports utilized covered the period from 1997 through 2003. They found that county governments use their own funds to finance 88 percent of statewide investments in water and sewer funding. (Their article does not separate water funding from sewer funding). State government was the second largest funding source, contributing 8 percent of total water and sewer costs. The remainder of the financing came from private sources (3 percent) and the federal government (1 percent). Howland and Sohn concluded that state water and sewer funds were a "relatively minor" factor in financing local water and sewer investment, so were not acting as a constraint on water and sewer infrastructure development outside of PFAs.

The other source of information on sources of funding for public sewer facilities spending is the *Infrastructure Needs Survey Report* compiled by the Maryland Department of Planning (MDP) in 2001. The 1997 Smart Growth legislation mandated MDP to survey local governments and State agencies regarding their self-identified infrastructure needs and their fiscal capacity to pay for those needs. The local governments reported on the number of projects of various infrastructure types that were either a) short-term capital projects that were included in their 6-year capital improvement program, or were were short-term, unbudgeted needs not included in the CIP; or b) needed long-range projects that were intended for construction in the 15 years following the short-term projects.

Of the $40.1 billion in infrastructure needs identified by the local governments participating in the 2001 survey, nearly $5.3 billion was for needed sanitary sewerage projects, or about 13.2 percent of the projected costs. It should be noted that it is unlikely that local governments were anticipating the sewer upgrades required under state legislation in 2004. The county governments reported that, for the short-term public sewerage projects, 28 percent of the funding would come from the state (over 3.5 times that rate the Howland and Sohn found from their reviews of CIPs a short time later).

One reason for the difference in the State funding reliance rates found in the two studies is that Howland and Sohn used *actual* funding data in published CIPs and other reports. In contrast, the data provided MDP for the 2001 study was self-reported, and MDP did not review local government CIPs or other documents. It is possible that county personnel in the MDP survey might have had an incentive to overestimate the need for state assistance for sanitary sewer infrastructure funding. After all, the counties were asked to indicate their *needs* for infrastructure funding, not what they were actually spending. Also, no separate data was available on county *water supply* infrastructure funding sources in the 2001 MDP survey, so the two studies are not comparing the same infrastructure category.

The 2001 the *Infrastructure Needs Survey Report* also shows that municipal governments report a lower dependence on state funding for sewerage infrastructure than the counties. Municipal governments reported that state funding would only supply 11 percent of needed public sewerage infrastructure funds, with 70 percent being generated by the municipalities.

In summary, the Howland and Sohn interviews and the MDP infrastructure survey offer differing perspectives on the extent to which local governments have been depending on state funding for meeting their public sewer infrastructure needs. In the former study, the State funding for water *and* sewer constituted only an average of 8 percent of a county's needed funding. This led to the authors' conclusion that the Smart Growth provision of confining water- and sewer-related state loans and grants to PFAs, was a weak incentive for Smart Growth compliance. The 2001 MDP infrastructure survey, on the other hand, suggests that, across all counties, funding from state loans and grants programs constitute 28 percent of the *public sewerage* infrastructure funding that will be needed. The difference in findings may have to do with different reporting mechanisms and the inclusion of water infrastructure in the Howland and Sohn study. This discrepancy points to the need for consistent and detailed reporting of local infrastructure needs, so that the state is able to better ascertain local governments need for state investments to support Smart Growth.

More importantly, local governments' dependence on state funding for sewer infrastructure increased in 2004 with Maryland's approval of the tributary strategies and passage of the Bay Restoration Fund, both addressing the need for EPA- and state-mandated reductions in the total annual amount of nitrogen and phosphorous that is released from treatment plants into surface waters. The legislation and its impact on local government sources of sewer funding, will be discussed later in this paper.

Limitation of MDE Funding under the Priority Funding Areas Legislation

The Code of Maryland stipulates that, beginning October 1, 1998, the State may not provide funding for a growth-related project if that project is not located within a PFA (State Finance and Procurement §5-7B-04).[4] Exceptions to this rule are outlined in the Code. Included among them are two that are quite relevant to MDE's water and sewer funding programs: 1) a project that is required to protect health or safety [§5-7B-06(a)(1)]; and 2) a project that, "due to its operational or physical characteristics, must be located away from other development" [§5-7B-05(a)(3)]. The first exception would allow MDE funding to assist a public sewer extension outside a PFA in an area when septic systems have failed. The second exception would allow MDE funding for a sewage treatment plant that serves a PFA, to be located outside the PFA.

The PFA legislation specifies, for each state department, which funding programs or projects are considered to be "growth related". For MDE, only 3 of the 8 funding

[4] The law stipulates that a growth related project not inside a PFA can receive state funding only if it receives approval from the Board of Public Works, comprised of the Governor, the State Treasurer, and the State Comptroller. Section 5-07B-06 of the State Finance and Procurement Article provides exceptions to this process, as noted herein.

programs listed above are considered growth related under Maryland Code §5-75-01. They are a) the Water Quality Revolving Loan Fund; b) the Water Supply Assistance Program; and c) the Supplemental Assistance Program. However, these three programs accounted for over 78.1 percent of the funding (or $962.7 million) extended by MDE for water and sewer projects between the years 1997 and 2006. Specifically, two public sewer funding projects considered "growth-related" accounted for $818.1 million (or 66.4 percent) of the total MDE water and sewer financial assistance during that period. In other words, over 78 percent of MDE's water and sewer funding for local projects, and two-thirds of its sewer funding specifically, must be spent inside PFAs unless they qualify for exemptions.

MDE-funded Projects Located Outside of PFAs

MDE uses an "Integrated Project Priority System" (IPPS) to rank applications from local governments that seek assistance under the two state revolving loan funds for clean water (sewer-related) and drinking water. Such a ranking is needed for the two loan funds because, in 2007, MDE received 187 pre-applications requesting a total of over $956.2 million in loan assistance for FY 2009 (MDE Website 2007b). For the Water Quality Revolving Loan Fund alone, MDE received 138 applications requesting a total of $321.4 million in loan funds. The final priority list / intended use plan for these funds contains the 35 top-rated projects, of which only 21 will be funded with the $136.6 million available (MDE Website 2007c).

The IPPS is used to determine a proposed project's eligibility for funding and then score the proposal on the basis of four categories of criteria. Eligibility is limited to construction of publicly owned wastewater treatment facilities that reduce and prevent water pollution problems; and non-point source projects that are intended to improve water quality and habitat restoration, repair or retrofit stormwater management facilities, and correct failing septic systems, cap or close sanitary landfills, assist in agricultural best management practices implementation, or facilitate other water quality improvement projects (MDE Website 2007b). MDE uses the pre-application information on each proposal to score and rank the projects. The scoring system encompasses the nature of existing conditions (i.e. the nature and severity of the problem to be addressed; the proposed benefits to be gained, relative to the State's current priorities for water quality improvement; and the water body and watershed to be improved, relative to the State's priorities). The priority list is then subject to a public review and hearing process, and is then sent to the U.S. EPA to secure funding of the State's Revolving Loan Programs

There were 138 local projects listed in the "Maryland Final Project Priority List for Federal FY 2007 and State FY 2009 Clean Water Funds (State Revolving Loan/State Grant)" (Maryland Department of the Environment 2007a). Of those projects, 102 (or 74 percent) are wastewater treatment projects, while the others are nearly all stormwater management projects. Of the 138 waste water projects, 77 (or about 56 percent) are indicated as being located within PFAs. For the 61 projects located outside of PFAs, 13 have "categorical exclusions" -- mostly for being related to biological nutrient removal – and are not subject to PFA requirements. Another 12 projects have "categorical exceptions", on the basis that a condition of the state financial assistance is that the

project not allow for expansion to accommodate new growth (i.e. will not be allowed to provide capacity for new parcels). Two of the projects located outside of PFAs are for facilities that, due to their nature, cannot be located within a PFA. The projects include a septage receiving facility, and a replacement facility for a treatment plant which, while located within a PFA, is also in a floodplain).

Of the other proposed FY 2009 MDE Clean Water projects located outside PFAs, 32 are allowed based on the PFA law's exceptions for protect health or safety, and/or the project's operational or physical characteristics that require that it be located away from other development. An example is a project in Frederick County to regrade stream slopes, stabilize them with riprap, and replace a culvert in an existing wellfield compound to protect drinking water. Another is capping and lining of a solid waste landfill site in rural Washington County that is leaking harmful emissions to groundwater and surface streams.

MDE utilization of the IPPS ranking produced a priority list showing the 35 top-ranked programs, of which 21 will receive revolving loans totaling $136.6 million.[5] Seven of these 21 projects for which loan amounts have been specified, are located outside of PFAs but meet Smart Growth exception criteria. These projects will receive approximately $85.4 million, or over 62 percent of the loan funds.

State records indicate that, between the years 2000 and 2007, MDE and the State Department of Business and Economic Development have approved and, in some cases funded, 10 local water or wastewater projects located outside of PFAs.[6] Each of these projects were justified on either the "public health or safety" or the "due to their nature . . ." rationales.

Summary of Consistence between MDE Sewer Funding and MD Smart Growth Provisions

In summary, a review of Smart Growth legislation and MDE's records indicate that MDE's provision of grants and loans for sewer-related funding has been consistent with Smart Growth provisions. When MDE funding for sewer infrastructure has gone for facilities outside of PFAs, it has been done either because a) the funding sources were not designated under the Smart Growth law as facilitating "growth-related projects", or b) the funding sources were designated as "growth related" but the expenditures outside PFAs were in compliance with the exemptions criteria. It is not known, however, the degree to which MDE funding for PFA located projects has been servicing areas outside of PFA boundaries.

The Challenge of Meeting Clean Water Requirements and Supporting Smart Growth

[5] One of the 21 projects to receive funding, in Elkon, MD, was not ranked in 2007 but is getting funds under a previous round of grant determination.

[6] The list of exceptions was obtained from George Keller, MDE, in June 2007.

As a result of federal, regional and state mandates, each major waste water treatment plant in Maryland is bound by a specific future limit on the daily volume of its nitrogen and phosphorous emissions to water bodies. One source of the regulations is the 1972 federal Clean Water Act. Section 303(d) of the act requires states to do the following:

- develop water quality standards for surface waters, which can be more stringent that federal standards, if necessary;
- monitor these water bodies;
- list water bodies that do not meet water quality standards with technology-based controls alone;
- set priority rankings for the listed water bodies;
- draft "Total Maximum Daily Loads" (TMDLs) that meet water quality standards for each listed water body, and solicit public comment on them (A TMDL is the maximum amount of a polluting substance that a waterbody can assimilate from various sources and still meet the established water quality standards.);
- submit the priority list and the TMDLs to EPA for approval; and
- incorporate TMDLs into the State's water quality planning process.

Maryland and the EPA are also signatories to the Chesapeake Bay 2000 agreement, which identified goals and actions for each of the signatory state governments (Maryland, Virginia, Pennsylvania, and DC) to help restore the health of the Chesapeake Bay. To assist in its efforts to meet the goals of the 2000 Bay Agreement, Maryland established a the Maryland Tributary Strategy, a planning process that involved local teams with a range of stakeholders, to develop pollution reduction plans within each of 10 sub-watersheds. Each team developed daily loading caps of nitrogen and phosphorous discharges for its tributary. The final strategy was adopted by the State in 2004.

Shortly after the Tributary Strategy was approved by Maryland, the EPA issued regulations requiring states to assign each of its major wastewater treatment plants an annual limit on its nitrogen and phosphorous discharges. Maryland has until the year 2010 for its treatment plants to comply with the established TMDP limits. By that year the limits will be written into a National Pollution Discharge Elimination System (NPDES) permit. Once this happens, either the State or EPA may initiate enforcement action if a treatment plant does not stay under its permitted TMDLs.

The impact of the EPA and Maryland regulations is that the annual load of nitrogen pollution must be reduced by 20 million pounds per year by the year 2010, over one-third of which (7.5 million pounds per year) must come from the state's sewage treatment plants (Summers, 2007). The state's sewage plants also need to provide about 24 percent of the needed phosphorous reduction needed (or 0.26 million lbs/year out of the 1.1 million lbs/year reduction). Agriculture and other "non-point source pollution" sources are responsible for most of the other reductions needed.

In May 2004 the Maryland legislature passed Senate 320, the Bay Restoration Fund, to create a dedicated fund for wastewater treatment plants -- financed by the plants' customers by a monthly charge of $2.50 per "equivalent dwelling unit (EDU). The fund

is being used to upgrade the state's wastewater treatment plants with enhanced nutrient removal technology, so they attain a wastewater effluent quality of 3 mg/l total nitrogen and 0.3 mg/l total phosphorus. MDE estimates that public sewer users fee – a.ka. "flush tax" -- will generate $60 million per year, which the department will use to back bond issuance (MDE website, 2007d).

According to MDE there are approximately 420,000 onsite septic systems in Maryland. Users of these septic systems also pay into the Bay Restoration Fund via a $30 annual fee collected from each household. MDE expects the fees will generate an annual total of $12 million. Sixty percent of these funds will be used for septic system upgrades in critical areas using the best available technology, while the other 40 percent will help farmers pay for cover crops.

The mandated sewage plant upgrades may be producing, in some parts of Maryland, what one writer has described as "a looming clash between Smart Growth and environmental protection". Wheeler (2006) profiles the conundrum facing Cecil County, the state's second fastest growing county and one of the jurisdictions destined to receive additional population and industry due to expansion of the nearby Aberdeen Proving Ground in adjacent Harford County. To serve its approved-but-not-yet-built development, along with its projected growth over the next 20 years, the county will need to more than double the capacity of the sewage treatment plant serving its designated growth corridor along U.S. 40 and Interstate 95. The plant discharges its treated sewage into the North East River.

Upgrade of the Cecil County sewage treatment plant is scheduled to be completed by 2010. The upgrades to be funded through the BRF will enable the treatment plant to treat about 2.7 million gallons per day, the limit of the state's nutrient cap on the facility. However, reports Wheeler, this will not be sufficient capacity to serve the projected growth. As a result, new growth will likely spread into its rural area. This will not only be a result contrary to Smart Growth but to Bay restoration goals as well, since the spillover growth will be on septic systems that are less efficient (per housing unit) at controlling nutrient pollution than public sewers.

The Cecil County situation could be repeated in other counties. This means that either the state will need to generate more funding for sewer upgrades, or introduce a nutrient trading system. Additional funds would necessitate a higher flush tax or some other taxing mechanism. The Bay Restoration fund supported bond sales of $750 million. However, in its June 2007 annual status report, the Bay Restoration Fund Advisory Committee stated that the submitted wastewater treatment plan construction bids are between 20 and 30 percent higher than the original planning estimates (due to increasing costs for energy, steel and concrete) (Bay Restoration Fund Advisory Committee 2007). This raises questions as to whether the BRF can generate sufficient funds needed for the mandated nutrient reductions at of the 66 largest treatment plants. Kim Coble, Maryland Executive Director of the Chesapeake Bay Program, suggests that were the bonds financed over 30 years instead of 20, there would be more money available for plant upgrades (Coble 2007).

Coble also notes that Maryland has been exploring the idea of a nutrient trading program, by which a treatment plant that had reached its nutrient cap could buy unused capacity from another plant in the state, or pay for nutrient reduction provided through other means – such as paying for planting of cover crops or creation of riparian buffers or wetlands. Such a system would only be credible only if a clear scientific foundation for the nutrient reduction achieved by the agricultural Best Management Practices that are to be subsidized by the sewage treatment plant.

Issues concerning the scientific basis of nutrient reduction efficiencies in agriculture have been explored by Simpson and Weammert (2007). They state that the expected results of a BMP will vary with geography, topography, farm management practices and a variety of other factors.

> The research-based estimates of best management practices need to be adjusted to provide more realistic estimates of efficiencies for widespread adoption of the practice. Virtually all research data is generated under excellent management conditions; meaning that studies are done on better than average soils (poorly drained soils avoided, plots easily worked in a day), agronomic management is optimal (timely planting, excellent farm management, high germination seed, etc.) and other hazards (goose grazing, deer grazing, etc.) are eliminated. Hence, the research estimates represent a best-case scenario. This optimistic scenario needs to be adjusted to lower effectiveness when the efficiencies are being applied to widespread field implementation under "average condition" across the Chesapeake Bay watershed (Simpson and Weammert 2007).

Simpson and Weammert have proposed five criteria or guidelines to develop efficiency estimations. For example, they recommend that more weight be given to the BMP findings of peer reviewed literature that has undergone stringent evaluation over studies that have not been subject to the same review process, and that efficiency recommendations reflect operational conditions existing in the average watershed-wide condition. In this way, any trading system that is constructed will be based on a more realistic assessment of the nutrient pollution reductions to be achieved by a BMP, so that Bay water quality will not be compromised.

Conclusions and Recommendations

This paper's review of MDE's sewer infrastructure grants and loans programs during Maryland's Smart Growth era, reaches three conclusions with regard to: a) the strength of this funding as an incentive / disincentive for new growth being directed to PFAs; b) the degree to which the funds have been spent in accordance with Smart Growth provisions; and c) the compatibility of Chesapeake Bay related mandates and legislation in Maryland, with the State's Smart Growth program.

With regard to the relative strength of MDE's spending as an incentive, up until 2004 there was conflicting information on the degree of dependence of county governments on state funding for public sewer facilities. A study by Howland and Sohn (2007), using information contained in county CIPs and related sources dated no later than 2002, found that only about 8 percent of county water and sewer infrastructure funds came from the state. In the 2001 MDP Infrastructure Survey conducted at about the same time, counties self-reported their public sewer funding needs, from state sources, to be 28 percent, while cities reported the need at 11 percent. The discrepancy between the reports' findings was probably due to study methodology, as explained herein.

However, the actual, current need for state funding for sewer facilities was certainly understated in the early 2000s because it did not take into account the state and EPA TMDL caps on sewer plants nitrogen and phosphorous that were imposed in 2004. The Bay Restoration Fund, which will generate at least $750 million for sewer upgrades from a "flush tax", will certainly increase the proportion of local government sewer facility funding that comes from the state.

While a large amount of the state's water quality protection funds have been devoted to projects located outside of PFAs, this spending has been consistent with Smart Growth legislation which specifies the exceptions under which such "growth-related" out-of-PFA funding is allowed. The two MDE programs specified in the Smart Growth law -- the Water Quality Revolving Fund and the Supplemental Assistance Program – together comprised nearly 79 percent of all MDE sewer-related funding from 1997 through 2006 (or $818.1 million). But on those occasions in which the Revolving Loan Funds were spent either on facilities outside of PFAs or on facilities that serve growth outside of PFAs, this spending was allowed because it was intended either to correct a public health problem or to reduce biological nutrient pollution, or because the facilities could not practically be located within a PFA. In addition, for the public sewer service that was extended outside of PFAs for public health reasons, MDE allowed access only to the problematic properties.

This paper endorses the view that the Chesapeake Bay restoration program (specifically the TMDL caps) will be at odds with the Maryland Smart Growth program under current funding and program conditions. Unless there is more funding made available for sewer plant upgrades under the Bay Restoration than at present, in some jurisdictions the nutrient caps will force new growth outside of PFAs. This will not only mean that new development will likely go to rural locations, but that the growth will be served by septic systems – which emit more nutrient pollution per household than those on public systems.

If additional funds are not available for sewer plant TMDL upgrades, other measures must be introduced to allow jurisdictions to accept new growth in PFAs served by plants that have hit their TMDL caps. One alternative discuss in this paper is a nutrient trading program. Another potential alternative is a "bubble permit" process under which planning areas would be established by MDE, within which the TMDP limits would apply to a planning area as a whole rather than an individual plant (Maryland Department

of Planning 2007). Another option would be for MDE to allow wastewater reuse, such as for spray irrigation, to be credited to TMDL reduction. All these alternatives need extensive study, however, to ensure that Bay water quality is not compromised by offset programs. Unless more funding is made available, or carefully crafted nutrient trading, bubble permit and/or wastewater reuse programs are introduced, the TMDL limits could produce results contrary to the purposes of both Smart Growth and Bay restoration.

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Table 1. Selected Land Use / Environmental Legislation in Maryland Since 1969

Year	Legislation / Program	Purpose
1969	Program Open Space	Earmarks funds from State's real estate transfer tax to purchase open space for parks and natural resources areas.
1970	Tidal Wetlands Act	Requires permit from State for alteration of tidal wetlands; requires mitigation of any wetland loss.
1975	MD Agricultural Land Preservation Foundation	Allows rural landowners to create districts within which a State foundation may buy conservation easements to preserve productive agricultural land and woodlands.
1982	Stormwater Management Act	Requires on-site treatment of stormwater on new development sites to prevent non-point source pollution.
1984	Critical Area Act	Places restrictions on land use activities within a zone measured 1000 ft. from the Chesapeake Bay and its major tributaries.
1989	Non-tidal Wetlands Act	Requires permit from State for alteration of non-tidal wetland; requires minimum 25 ft. buffer from outer edge of wetland; requires mitigation for any non-tidal wetland loss.
1991	Forest Conservation Act	Requires developers to replace some of forest cleared for building; requires tree planting on development sites that have few or no trees; applies to parcels > 40,000 sq. ft.
1992	Economic Growth, Resource Protection and Planning Act	Requires incorporation of state visions, and sensitive areas elements, in comprehensive plans
1997	Smart Growth Initiatives	Described herein.
2001	GreenPrint Program	Uses State appropriations to preserve a network of the State's most valuable ecological lands through targeted acquisitions and easements.
2004	Bay Restoration Fund	Described herein
2006	House Bill 1141	Requires water resources plan element in local comprehensive plans.

Table 2. Water Quality Grant and Loan Programs of the Maryland Department of the Environment; Local Assistance Provided from 1997 through 2006

Name of Program	Type	Intended Use of Assistance	Local Assistance from 1997 - 2006 (in $ millions)
Water Quality State Revolving Fund	Loan	Wastewater treatment plants and other water quality and public health improvement projects	781.5
Drinking Water Revolving Loan Fund	Loan	Drinking water projects	144.6
Biological Nutrient Removal (BNR) Program	Grant	Implementing BNR technology at Maryland's 66 largest publicly-owned sewage treatment plants	147.7
Supplemental Assistance Program	Grant	Wastewater projects that address a public health or water quality problem	36.6
Small Creeks and Estuaries Restoration Program	Grant	Water quality restoration projects in seriously degraded water bodies	7.8
MD Stormwater Pollution Control Cost-Share Program	Grant	Stormwater management retrofit and conversion projects, to help control the amount of nutrients and pollutants entering the state's waterways from older developed areas	9.0
The Bay Restoration Fund	Grant	Upgrade the state's 66 largest wastewater treatment plants to reduce nitrogen and phosphorous concentrations in wastewater effluent to state-of-the-art treatment levels.	73.9 for ENR and other public sewer projects; 9.0 for septic upgrades
Water Supply Financial Assistance Program	Grant	Assist small communities in the acquisition, construction, rehabilitation, and improvement of publicly owned water supply facilities.	22.0
		Total	**$1,232.1**

Sources: Maryland Department of Budget and Management (2006); Maryland Bay Restoration Fund Advisory Committee (2007)