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Proposed Regulation
Agency Background Document

Agency name	Virginia Soil and Water Conservation Board
Virginia Administrative Code (VAC) citation	4 VAC 50 -60
Regulation title	Virginia Stormwater Management Program (VSMP) Permit Regulations
Action title	Amend Parts I, II, and III of the Virginia Stormwater Management Program Permit Regulations to address water quality and quantity and local stormwater management program criteria.
Date this document prepared	March 26, 2009

This information is required for executive branch review and the Virginia Registrar of Regulations, pursuant to the Virginia Administrative Process Act (APA), Executive Orders 36 (2006) and 58 (1999), and the *Virginia Register Form, Style, and Procedure Manual.*

Brief summary

In a short paragraph, please summarize all substantive changes that are being proposed in this regulatory action.

This proposed regulatory action amends the technical criteria applicable to stormwater discharges from construction activities, establishes minimum criteria for locality-administered stormwater management programs (qualifying local programs) and Department of Conservation and Recreation (Department) administered local stormwater management programs, as well as authorization procedures and review procedures for qualifying local programs, and amends the definitions section applicable to all of the Virginia Stormwater Management Program (VSMP) regulations.

With regard to technical criteria applicable to stormwater discharges from construction activities, revised water quality and water quantity requirements are proposed to be included in Part II of the regulations. These requirements will be further discussed later in this document; in summary, however, water quality requirements include a 0.28 lbs/acre/year phosphorus standard for new development, a requirement that total phosphorus loads be reduced to an amount at least

20% below the pre-development phosphorus load on prior developed lands, and a requirement that control measures be installed on a site to meet any applicable wasteload allocation. Water quantity requirements include both channel protection and flood protection criteria.

This action would also establish the minimum criteria and ordinance requirements (where applicable) for a Virginia Soil and Water Conservation Board (Board) authorized qualifying local program (Part IIIA) or for a Board-authorized Department-administered local stormwater management program (Part IIIB) which include, but are not limited to, administration, plan review, issuance of coverage under the General Virginia Stormwater Management Program (VSMP) Permit for Discharges of Stormwater from Construction Activities, inspection, enforcement, reporting, and recordkeeping. Part IIID establishes the procedures the Board will utilize in authorizing a locality to administer a qualifying local program. Part IIIC establishes the criteria the Department will utilize in reviewing a locality's administration of a qualifying local program.

Finally, this proposed action would make changes to definitions in Part I, which is applicable to the full body of the VSMP regulations. Unnecessary definitions are proposed to be deleted, needed definitions are proposed to be added, and many existing definitions are proposed to be updated.

Legal basis

Please identify the state and/or federal legal authority to promulgate this proposed regulation, including (1) the most relevant law and/or regulation, including Code of Virginia citation and General Assembly chapter number(s), if applicable, and (2) promulgating entity, i.e., the agency, board, or person. Describe the legal authority and the extent to which the authority is mandatory or discretionary.

The Virginia Stormwater Management Program was created by Chapter 372 of the 2004 Virginia Acts of Assembly (HB1177). This action transferred the responsibility for the permitting programs for Municipal Separate Storm Sewers (MS4s) and construction activities from the State Water Control Board and DEQ to the Virginia Soil and Water Conservation Board and DCR. This federally-authorized program is administered in accordance with requirements set forth in the federal Clean Water Act (33 USC § 1251 et seq.) as well as the Virginia Stormwater Management Act (§10.1-603.1 et seq.).

Section 10.1-603.2:1 of the Code of Virginia speaks to the powers and duties of the Virginia Soil and Water Conservation Board. Among those powers and duties, the Board:

> "…***shall permit, regulate, and control stormwater runoff in the Commonwealth***. *In accordance with the VSMP [Virginia Stormwater Management Program], the Board may issue, deny, revoke, terminate, or amend stormwater permits; adopt regulations; approve and periodically review local stormwater management programs and management programs developed in conjunction with a municipal separate storm sewer permit; enforce the provisions of this article; and otherwise act to* ***ensure the general health, safety and welfare of the citizens of the Commonwealth as well as protect the quality and quantity of state waters from the potential harm of unmanaged stormwater***."

Specifically, the Board may:

> *"…(1) issue, deny, amend, revoke, terminate, and enforce permits for the control of stormwater discharges from Municipal Separate Storm Sewer Systems and land disturbing activities;*
> *(2) delegate to the Department or to an approved locality any of the powers and duties vested in it by this article except the adoption and promulgation of regulations. Delegation shall not remove from the Board authority to enforce the provisions of this article."*

Subdivision 2 of §10.1-603.2:1 of the Code of Virginia authorizes the Virginia Soil and Water Conservation Board to delegate to the Department or an approved locality the implementation of the Virginia Stormwater Management Program:

> *§10.1-603.2:1 Powers and duties of the Virginia Soil and Water Conservation Board.*
> *(2) Delegate to the Department or to an approved locality any of the powers and duties vested in it by this article except the adoption and promulgation of regulations. Delegation shall not remove from the Board authority to enforce the provisions of this article.*

Section 10.1-603.3 of the Code of Virginia [as it will read effective July 1, 2009] requires establishment of stormwater management programs by localities. The Board must amend, modify or delete provisions of the Virginia Stormwater Management Program (VSMP) Permit Regulations to allow localities to implement local stormwater management programs:

> *§10.1-603.3. Establishment of stormwater management programs by localities.*
> *A. Any locality located within Tidewater Virginia as defined by the Chesapeake Bay Preservation Act (§ 10.1-2100 et seq.), or any locality that is partially or wholly designated as required to obtain coverage under an MS4 permit under the provisions of the federal Clean Water Act, shall be required to adopt a local stormwater management program for land disturbing activities consistent with the provisions of this article according to a schedule set by the Board. Such schedule shall require adoption no sooner than 15 months and not more than 21 months following the effective date of the regulation that establishes local program criteria and delegation procedures, unless the Board deems that the Department's review of the local program warrants an extension up to an additional 12 months, provided that the locality has made substantive progress. A locality may adopt a local stormwater management program at an earlier date with the consent of the Board.*
> *B. Any locality not specified in subsection A may elect to adopt and administer a local stormwater management program for land disturbing activities pursuant to this article. Such localities shall inform the Board and the Department of their initial intention to seek delegation for the stormwater management program for land disturbing permits within six months following the effective date of the regulation that establishes local program criteria and delegation procedures. Thereafter, the Department shall provide an annual schedule by which localities can submit applications for delegation.*
> *C. In the absence of the delegation of a stormwater management program to a*

locality, the Department will administer the responsibilities of this article within the given jurisdiction in accordance with an adoption and implementation schedule set by the Board.

Additionally, enactment clause 2 of the Chapter 18 of the 2009 Virginia Acts of Assembly stipulates that *the regulation that establishes local program criteria and delegation procedures and the water quality and water quantity criteria, and that is referenced in subsections A and B of §10.1-603.3 of this act, shall not become effective prior to July 1, 2010.*

Subsection E of §10.1-603.3 further stipulates minimum requirements for a local stormwater program:

§10.1-603.3(E). Establishment of stormwater management programs by localities.
E. Each locality that is required to or that elects to adopt and administer an approved local stormwater management program shall, by ordinance, establish a local stormwater management program that may be administered in conjunction with a local MS4 program and a local erosion and sediment control program, which shall include, but is not limited to, the following:

1. Consistency with regulations adopted in accordance with provisions of this article;

2. Provisions for long-term responsibility for and maintenance of stormwater management control devices and other techniques specified to manage the quality and quantity of runoff; and

3. Provisions for the integration of locally adopted stormwater management programs with local erosion and sediment control, flood insurance, flood plain management, and other programs requiring compliance prior to authorizing construction in order to make the submission and approval of plans, issuance of permits, payment of fees, and coordination of inspection and enforcement activities more convenient and efficient both for the local governments and those responsible for compliance with the programs.

F. The Board shall delegate a local stormwater management program to a locality when it deems a program consistent with this article.
G. Delegated localities may enter into agreements with soil and water conservation districts, adjacent localities, or other entities to carry out the responsibilities of this article.
H. Localities that adopt a local stormwater management program shall have the authority to issue a consolidated stormwater management and erosion and sediment control permit that is consistent with the provisions of the Erosion and Sediment Control Law (§10.1-560 et seq.).
I. Any local stormwater management program adopted pursuant to and consistent with this article shall be considered to meet the stormwater management requirements under the Chesapeake Bay Preservation Act (§10.1-2100 et seq.) and attendant regulations.

Section 10.1-603.4 also provides additional authority and guidance to the Board in the development of regulations, including authority to develop criteria associated with local program

administration and implementation, criteria to control nonpoint source pollution, and to establish statewide standards for stormwater management from land disturbing activities.

§10.1-603.4. Development of regulations.

The Board is authorized to adopt regulations that specify minimum technical criteria and administrative procedures for stormwater management programs in Virginia. The regulations shall:

1. Establish standards and procedures for delegating the authority for administering a stormwater management program to localities;

2. Establish minimum design criteria for measures to control nonpoint source pollution and localized flooding, and incorporate the stormwater management regulations adopted pursuant to the Virginia Erosion and Sediment Control Law (§ 10.1-560 et seq.), as they relate to the prevention of stream channel erosion. These criteria shall be periodically modified as required in order to reflect current engineering methods;

3. Require the provision of long-term responsibility for and maintenance of stormwater management control devices and other techniques specified to manage the quality and quantity of runoff;

4. Require as a minimum the inclusion in local programs of certain administrative procedures which include, but are not limited to, specifying the time period within which a local government that has adopted a stormwater management program must grant permit approval, the conditions under which approval shall be granted, the procedures for communicating disapproval, the conditions under which an approved permit may be changed and requirements for inspection of approved projects;

6. Establish statewide standards for stormwater management from land disturbing activities of one acre or greater, except as specified otherwise within this article, and allow for the consolidation in the permit of a comprehensive approach to addressing stormwater management and erosion and sediment control, consistent with the provisions of the Erosion and Sediment Control Law (§ 10.1-560 et seq.) and this article. However, such standards shall also apply to land disturbing activity exceeding an area of 2500 square feet in all areas of the jurisdictions designated as subject to the Chesapeake Bay Preservation Area Designation and Management Regulations (9 VAC 10-20 et seq.) adopted pursuant to the Chesapeake Bay Preservation Act (§ 10.1-2100 et seq.);

7. Require that stormwater management programs maintain after-development runoff rate of flow and characteristics that replicate, as nearly as practicable, the existing predevelopment runoff characteristics and site hydrology, or improve upon the contributing share of the existing predevelopment runoff characteristics and site hydrology if stream channel erosion or localized flooding is an existing predevelopment condition…;

8. Encourage low impact development designs, regional and watershed approaches, and nonstructural means for controlling stormwater;

9. Promote the reclamation and reuse of stormwater for uses other than potable water in order to protect state waters and the public health and to minimize the direct discharge of pollutants into state waters;

10. Establish, with the concurrence of the Director, a statewide permit fee schedule for stormwater management related to municipal separate storm sewer system permits; and

11. [Effective July 1, 2009] *Provide for the evaluation and potential inclusion of emerging or innovative stormwater control technologies that may prove effective in reducing nonpoint source pollution.*

It should also be noted that localities may adopt more stringent criteria than the minimum criteria developed by the Board through this regulatory process.

§10.1-603.7. Authorization for more stringent ordinances.
A. Localities are authorized to adopt more stringent stormwater management ordinances than those necessary to ensure compliance with the Board's minimum regulations, provided that the more stringent ordinances are based upon factual findings of local or regional comprehensive watershed management studies or findings developed through the implementation of a MS4 permit or a locally adopted watershed management study and are determined by the locality to be necessary to prevent any further degradation to water resources or to address specific existing water pollution including nutrient and sediment loadings, stream channel erosion, depleted groundwater resources, or excessive localized flooding within the watershed and that prior to adopting more stringent ordinances a public hearing is held after giving due notice.
B. Any local stormwater management program in existence before January 1, 2005 that contains more stringent provisions than this article shall be exempt from the requirements of subsection A.

HB2168 of the 2009 Legislative Session (soon to be signed into law with a July 1, 2009 effective date) establishes a new §10.1-603.8:1 containing a process for approving stormwater management offsets in the Chesapeake Bay watershed and grants the Board the necessary authority to develop a future program in the remainder of the state.

§ 10.1-603.8:1. Stormwater nonpoint nutrient offsets.
A. As used in this section:
“Nonpoint nutrient offset” means nutrient reductions certified as nonpoint nutrient offsets under the Chesapeake Bay Watershed Nutrient Exchange Program (§ 62.1-44.19:12 et seq.).
"Permit issuing authority" has the same meaning as in § 10.1-603.2 and includes any locality that has adopted a local stormwater management program.
“Tributary” has the same meaning as in § 62.1-44.19:13.
B. A permit issuing authority may allow compliance with stormwater nonpoint nutrient runoff water quality criteria established pursuant to § 10.1-603.4, in whole or in part, through the use of the permittee's acquisition of nonpoint nutrient offsets in the same tributary.
C. No permit issuing authority shall allow the use of nonpoint nutrient offsets to address water quantity control requirements. No permit issuing authority shall allow the use of nonpoint nutrient offsets in contravention of local water quality-based limitations: (i) consistent with determinations made pursuant to subsection B of § 62.1-44.19:7, (ii) contained in a municipal separate storm sewer system (MS4) program plan approved by the Department, or (iii) as otherwise may be established or approved by the Board.
D. A permit issuing authority may only allow the use of nonpoint nutrient offsets when the permit applicant demonstrates to the satisfaction of the permit issuing authority that (i) alternative site designs have been considered that may accommodate on-site best

management practices, (ii) on-site best management practices have been considered in alternative site designs to the maximum extent practicable, (iii) appropriate on-site best management practices will be implemented, and (iv) full compliance with postdevelopment nonpoint nutrient runoff compliance requirements cannot practicably be met on site.

E. Documentation of the permittee's acquisition of nonpoint nutrient offsets shall be provided to the permit issuing authority in a certification from an offset broker documenting the number of phosphorus nonpoint nutrient offsets acquired and the associated ratio of nitrogen nonpoint nutrient offsets at the offset generating facility. The offset broker shall pay the permit issuing authority a water quality enhancement fee equal to six percent of the amount paid by the permittee for the nonpoint nutrient offsets. If a locality is not the permit issuing authority, such fee shall be deposited into the Virginia Stormwater Management Fund established by § 10.1-603.4:1. If the permit issuing authority is a locality, such fees shall be used solely in the locality where the associated stormwater permit applies for inspection and maintenance of stormwater best management practices, stormwater educational programs, or programs designed to protect or improve local water quality.

F. Nonpoint nutrient offsets used pursuant to subsection B shall be generated in the same or adjacent eight digit hydrologic unit code as defined by the United States Geological Survey as the permitted site. Nonpoint nutrient offsets outside the same or adjacent eight digit hydrologic unit code may only be used if it is determined by the permit issuing authority that no nonpoint nutrient offsets are available within the same or adjacent eight digit hydrologic unit code when the permit issuing authority accepts the final site design. In such cases, and subject to other limitations imposed in this section, nonpoint nutrient offsets generated within the same tributary may be used. In no case shall nonpoint nutrient offsets from another tributary be used.

G. For that portion of a site's compliance with stormwater nonpoint nutrient runoff water quality criteria being obtained through nonpoint nutrient offsets, a permit issuing authority shall (i) use a 1:1 ratio of the nonpoint nutrient offsets to the site's remaining postdevelopment nonpoint nutrient runoff compliance requirement and (ii) assure that the nonpoint nutrient offsets are secured in perpetuity.

H. No permit issuing authority may grant an exception to, or waiver of, postdevelopment nonpoint nutrient runoff compliance requirements unless off-site options have been considered and found not available.

I. In considering off-site options, the permit issuing authority shall give priority to the use of nonpoint nutrient offsets unless a local fee-in-lieu-of, pro-rata share, or similar program has been approved by the Board as being substantially equivalent in nutrient reduction benefits However, prior to approval by the Board, there shall be a rebuttable presumption that any local government fee-in-lieu- of, pro-rata share, or similar program is substantially equivalent in nutrient reduction benefits. The Board shall establish criteria for determining whether any such local program is substantially equivalent, which shall be used during the local stormwater management program approval process in § 10.1-603.3.

J. The Board may establish by regulation a stormwater nutrient program for portions of the Commonwealth that do not drain into the Chesapeake Bay.

2. That no Virginia Soil and Water Conservation Board regulatory action, nor any local government ordinance or regional (watershedwide) stormwater management plan amendment, is necessary prior to implementation of this act; however, the Virginia Soil and Water Conservation Board may conform its regulations to this act through an exempt action and may adopt regulations through a nonexempt action.

Also, requirements set forth in the federal Clean Water Act (33 USC § 1251 et seq.), formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972, Public Law 92-500, as amended by Public Law 95-217, Public Law 95-576, Public Law 96-483, and Public Law 97-117, or any subsequent revisions thereto, and its attendant regulations set forth in 40 CFR Parts 122, 123, 124 and 125 requires states to establish a permitting program for the management of stormwater for municipal separate storm sewer systems (MS4s) and construction activities disturbing greater than or equal to an acre.

Purpose

Please explain the need for the new or amended regulation by (1) detailing the specific reasons why this regulatory action is essential to protect the health, safety, or welfare of citizens, and (2) discussing the goals of the proposal, the environmental benefits, and the problems the proposal is intended to solve.

Controlling stormwater runoff and its impacts is a serious issue facing the Commonwealth and its local governments. Citizens are complaining about flooding caused by increased amounts of stormwater runoff and the runoff is also reported as a contributor to excessive nutrient enrichment in numerous rivers, lakes, and ponds throughout the state, as well as a continued threat to estuarine waters and the Chesapeake Bay. Numerous studies have documented the cumulative effects of urbanization on stream and watershed ecology. Research has established that as impervious cover in a watershed increases, stream stability is reduced, habitat is lost, water quality becomes degraded, and biological diversity decreases largely due to stormwater runoff. We recognize that impervious areas decrease the natural stormwater purification functions of watersheds and increase the potential for water quality impacts in receiving waters. Additionally, runoff from managed turf is recognized as an additional significant source of pollutants.

Uncontrolled stormwater runoff has many cumulative impacts on humans and the environment including:

- Flooding - Damage to public and private property
- Eroded Streambanks - Sediment clogs waterways, fills lakes and reservoirs, and kills fish and aquatic animals
- Widened Stream Channels - Loss of valuable property
- Aesthetics - Dirty water, trash and debris, foul odors
- Fish and Aquatic Life - Impaired and destroyed
- Impaired Recreational Uses - Swimming, fishing, boating
- Threatens Public Health - Contamination of drinking water, fish/shellfish
- Threatens Public Safety - Drownings occur in flood waters

- Economic Impacts – Impairments to fisheries, shellfish, tourism, recreation related businesses

Additionally, development can dramatically alter the hydrologic regime of a site or watershed as a result of increases in impervious surfaces. The impacts of development on hydrology may include:

- Loss of vegetation, resulting in decreased evapotranspiration
- Soil compaction
- Reduced groundwater recharge
- Reduced stream base flow
- Increased runoff volume
- Increased peak discharges
- Decreased runoff travel time
- Increased frequency and duration of high stream flow
- Increased flow velocity during storms
- Increased frequency of bank-full and over-bank floods

It is believed that these proposed regulations will work to minimize the cumulative impacts of stormwater on humans and the environment and moderate the associated hydrologic impacts. If not properly managed, stormwater can have significant economic impacts and the stream restoration costs to fix the problems after the fact are very costly.

A 2007 EPA Office of the Inspector General report entitled "Development Growth Outpacing Progress in Watershed Efforts to Restore the Chesapeake Bay; Report No.2007-P-00031; September 10, 2007, noted that "new development is increasing nutrient and sediment loads at rates faster than loads are being reduced from developed lands". The Chesapeake Bay Program Office estimated that impervious surfaces in the Bay watershed grew significantly – by 41 percent – in the 1990s. Meanwhile, the population increased by only 8 percent. Because progress in reducing loads is being offset by increasing loads from new development, greater reductions will be needed to meet the Bay goals as well as to address stream impairments across the Commonwealth. The Chesapeake Bay Program Office estimated that loads from developed and developing lands increased while loads from agriculture and wastewater facilities decreased. Currently, 32% of the phosphorus loads and 28% of the sediment loads to the Bay watershed are attributed to urban and suburban sources, making it one of the most significant contributors to the Bay's poor health.

The Commonwealth needs to employ all possible strategies in its tool box to address water quality improvements on a statewide basis in both agricultural and urban settings, including making marked improvements in its stormwater regulations. The proposed stormwater regulations are a necessary and critical part of the Commonwealth's overall nutrient reduction strategies and the criteria included in the proposed regulations will slow nutrient and sediment increases, and where possible, contribute to water quality improvements. Improved stormwater management through these regulations will have numerous benefits including reductions in flood risk, avoidance of infrastructure costs through the use of LID practices, improved aquatic life, and enhancement of recreational and commercial fisheries.

Substance

Please briefly identify and explain the new substantive provisions, the substantive changes to existing sections, or both where appropriate. (More detail about these changes is requested in the "Detail of changes" section.)

The key provisions of this regulation include:

1) Establishes that in order to protect the quality of state waters and to control nonpoint source pollution, a local program shall apply the minimum technical criteria and statewide standards established in Part II for stormwater management associated with land disturbing activities.

NOTE: In general, since 2005 when the Board took over the federal stormwater permit program, the current water quality technical criteria for construction activity statewide are as follows:

- Sites between 0 and 15% imperviousness for new development, all stormwater runoff goes virtually untreated.
- New development above the 16% imperviousness threshold requires a post development pollutant load of 0.45 lbs/acre/year Phosphorus.
- A 10% reduction in the pre-development load is required on redevelopment sites.

New statewide water quality technical criteria that are being proposed for construction activity are as follows:

- For new development, a 0.28 lbs/acre/year phosphorus standard is established.
- On prior developed lands, total phosphorus loads shall be reduced to an amount at least 20% below the pre-development phosphorus load.
- If a wasteload allocation for a pollutant has been established in a TMDL and is assigned to stormwater discharges from a construction activity, control measures must be implemented to meet the WLA.
- A qualifying local program may establish more stringent standards.
- Compliance with the water quality criteria shall be determined utilizing the Virginia Runoff Reduction Method.
- BMPs listed in Table 1 of Part II or those available on the Virginia Stormwater BMP Clearinghouse shall be utilized to reduce the phosphorus load.
- A locality may establish use limitations on specific BMPs (such as wet ponds or certain infiltration practices).

We believe that most projects can achieve the required reductions on site. However, if the water quality technical criteria cannot be met on-site, off-site controls in part or in whole will be allowed by a qualifying local program in accordance with a Department-approved comprehensive watershed stormwater management plan. Offsite reductions shall be equal to or greater than those required on the land disturbing site.

If no comprehensive watershed stormwater management plan exists, the criteria may still be allowed to be met off-site if:

- The local program allows for off-site controls;
- The applicant demonstrates to the satisfaction of the local program that offsite reductions equal to or greater than those that would otherwise be required for the site are achieved;
- The development's runoff will not result in flooding or channel erosion impacts downstream of the site or any off-site treatment area;
- Off-site controls are located within the same Hydrologic Unit Code or the adjacent downstream Hydrologic Unit Code to the land disturbing site;
- Verification has been received as to the legal right to use the offsite property; and
- A maintenance agreement for the stormwater facilities is developed.

If allowed by the qualifying local program, reductions required for a site may be achieved by the payment of a pro-rata fee sufficient to fund improvements necessary to adequately achieve those reductions.

A local program may also waive the water quality requirements through the granting of an exception in accordance with Part III provided that:

- The exception is the minimum necessary to afford relief.
- Reasonable and appropriate conditions are imposed to preserve the intent of the Act.
- Granting will not confer on the permittee any special privileges denied to others under similar circumstances.
- The exception requests are not based upon conditions or circumstances that are self-imposed or self-created.
- Economic hardship alone is not sufficient reason to grant an exception.

[NOTE: Additionally, HB2168 of the 2009 Session, effective July 1, 2009, created a new section numbered 10.1-603.8:1 relating to stormwater nonpoint nutrient offsets that stipulates that a permit issuing authority may allow compliance with stormwater nonpoint nutrient runoff water quality criteria through the use of the permittee's acquisition of nonpoint nutrient offsets in the same tributary.]

2) Establishes in Part II water quantity criteria to address channel protection and flood protection. This language clarifies and expands on current requirements found in Minimum Standard 19 in the Erosion and Sediment Control Regulations (4VAC50-30).

Channel protection shall be achieved through one of the following:

- Stormwater released into a man-made conveyance system from the 2-year 24-hour storm shall be done so without causing erosion of the system.
- Stormwater released into a restored stormwater conveyance system, in combination with other existing stormwater runoff, shall not exceed the design of the restored system nor result in instability of the system.
- Stormwater released to a stable natural stormwater conveyance shall not cause the system to become unstable from the one-year 24-hour storm discharge and it shall provide a peak flow rate from the one-year 24-hour storm that is less than or equal to the pre-development peak flow rate as ascertained by the energy balance equation.

- Stormwater released to an unstable natural stormwater conveyance shall provide a peak flow rate from the one-year 24-hour storm that is less than or equal to the forested peak flow rate as ascertained by the energy balance equation.

Flood protection shall be achieved through one of the following:

- The post-development peak flow rate from the 10-year 24-hour storm is confined within a man-made conveyance system.
- The post-development peak flow rate from the 10-year 24-hour storm is confined within a restored stormwater conveyance system.
- The post-development peak flow rate from the 10-year 24-hour storm is confined within a natural stormwater conveyance that currently does not flood.
- The post-development peak flow rate from the 10-year 24-hour storm shall not exceed the predevelopment peak flow rate from the 10-year 24-hour storm based on forested conditions in a natural stormwater conveyance where localized flooding exists.
- A local program may adopt alternative flood design criteria that achieve equivalent results.

If either of the following conditions are met, the channel protection and flood protection criteria do not apply:

- The site's contributing drainage area is less than or equal to one percent of the total watershed area draining to the point of discharge.
- The development of the site results in an increase in the peak flow rate from the one-year 24-hour storm that is less than one percent of the existing peak flow rate from the one-year 24-hour storm generated by the total watershed area draining to the point of discharge.

3) Establishes the minimum criteria and ordinance requirements (where applicable) for a Board-authorized qualifying local program (Part IIIA) or for a Board-authorized department-administered local stormwater management program (Part IIIB), which include but are not limited to administration, plan review, issuance of coverage under the General Virginia Stormwater Management Program (VSMP) Permit for Discharges of Stormwater from Construction Activities, inspection, enforcement, reporting, and record keeping.

A local program shall provide for the following:

- Identification of the authority(ies) issuing permit coverage, reviewing plans, approving plans, conducting inspections, and carrying-out enforcement.
- Any technical criteria differing from those set out in the regulations.
- Plan submission and approval procedures.
- Project inspection and monitoring processes.
- Procedures for long-term inspection and maintenance of stormwater management facilities.
- Enforcement
- An ordinance that incorporates the components outlined above is required.
- A local program shall report specified information to the Department.

- A local program may require performance bonds or other financial surety.

A local program shall require stormwater management plans that include the following elements:

- Location of points of discharge, receiving waters, pre- and post-development conditions.
- Contact information.
- Project narrative.
- Location and design of stormwater management facilities.
- Hydrologic characteristics and structural properties of the soils utilized during facility installation.
- Hydrologic and hydraulic computations of the pre and post-development runoff conditions for the required design storms.
- Calculations verifying compliance with the water quality and quantity requirements.
- A site map that includes the specified elements.
- Plans shall be appropriately signed and sealed by a professional.

The regulation establishes timelines for establishing plan and application completeness, for plan review and approval, and for plan modifications. It also establishes applicant notification requirements.

Establishes that coverage under the construction general permit shall be authorized in accordance with the following:

- The applicant must have an approved stormwater management plan.
- The applicant must have submitted proposed right-of-entry agreements or easements granted from the owner to the local program for the purposes of inspection and maintenance of stormwater management facilities as well as maintenance agreements, including inspection schedules, for such facilities.
- An approved general permit registration statement.
- The required fee form and total fee.

Inspections shall be conducted as follows:

- The local program or its designee shall inspect the land disturbing activity during construction.
- At the termination of the project and prior to bond or surety release of the performance bond or surety, construction record drawings for the permanent stormwater facilities shall be submitted to the local program.
- The owner of the stormwater management facilities shall conduct inspections in accordance with the inspection schedule in the recorded maintenance agreement and shall submit the inspection report to the local program.
- The local program shall develop a Board-approved inspection schedule.

Information shall be reported on a fiscal year basis by the local program to the Department by October 1st annually as follows:

- Information regarding permanent stormwater facilities completed during the fiscal year.

- Number of permitted projects inspected by acreage categories.
- Number and type of enforcement actions taken.
- Number of exceptions granted or denied.

4) Establishes a Schedule of Civil Penalties as guidance for a court as required by law.

5) Establishes in Part IIID the procedures the Board will utilize in authorizing a locality to administer a qualifying local program. The application package shall include the following:

- The local program ordinance(s);
- A funding and staffing plan based on the projected permitting fees;
- The policies and procedures, including but not limited to, agreements with Soil and Water Conservation Districts, adjacent localities, or other entities, for the administration, plan review, permit issuance, inspection and enforcement components of the program.

The Department shall operate a program in any locality in which a qualifying local program has not been adopted in accordance with a Board-approved schedule.

6) Establishes in Part IIIC the criteria the Department will utilize in reviewing a locality's administration of a qualifying local program. The review shall consist of the following:

- An interview between Department staff and the qualifying local program administrator or his designee;
- A review of the local ordinance(s) and other applicable documents;
- A review of a subset of the plans approved by the qualifying local program and consistency of application including exceptions granted;
- An accounting of the receipt and of the expenditure of fees received;
- An inspection of regulated activities; and
- A review of enforcement actions and an accounting of amounts recovered through enforcement actions.

7) Makes changes to definitions in Part I as follows:

- Deletes unnecessary definitions;
- Establishes abbreviations for commonly used terms;
- Updates definitions such as "channel", "development", "drainage area", "flood fringe", "floodplain", "floodway", "impervious cover", "local stormwater management program", "permit-issuing authority", "pre-development", "site", and "watershed"; and
- Adds needed definitions such as "comprehensive stormwater management plan", "karst features", "man-made stormwater conveyance system", "natural channel design concepts", "natural stormwater conveyance system", "natural stream", "point of discharge", "pollutant discharge", "prior developed lands", "qualifying local program", "restored stormwater conveyance system", "runoff characteristics", "runoff volume", "site hydrology", "stable", "stormwater conveyance system", "stormwater management standards", "unstable", "Virginia Stormwater Management Handbook", and "Stormwater management standards".

Issues

Please identify the issues associated with the proposed regulatory action, including:
1) the primary advantages and disadvantages to the public, such as individual private citizens or businesses, of implementing the new or amended provisions;
2) the primary advantages and disadvantages to the agency or the Commonwealth; and
3) other pertinent matters of interest to the regulated community, government officials, and the public.

If the regulatory action poses no disadvantages to the public or the Commonwealth, please so indicate.

The primary advantage of this proposed regulatory action is enhanced water quality and management of stormwater runoff in the Commonwealth. Citizens are complaining about flooding caused by increased amounts of stormwater runoff and the runoff is also a contributor to excessive nutrient enrichment in numerous rivers, lakes, and ponds throughout the state, as well as a continued threat to estuarine waters and the Chesapeake Bay. The water quality and quantity criteria proposed by this regulatory action will improve upon today's stormwater management program and assist the Commonwealth in reducing nutrient pollution and meeting Chesapeake Bay restoration goals. The regulations will have numerous benefits including reductions in flood risk, avoidance of infrastructure costs through the use of LID practices, improved aquatic life, and enhancement of recreational and commercial fisheries.

The implementation of local stormwater management programs will also have benefits for the regulated community. Today, construction activity operators must go to two sources in order to receive needed Erosion and Sediment Control (locality) and Stormwater (Department) approvals. The development of locality-run qualifying local programs will allow for both approvals to be received from a singular source, thus improving efficiency as well as saving time for the developer. Even in localities where the Department administers the local stormwater management program, the program envisioned by these proposed regulations will allow for greater customer service and oversight over today's more limited program.

As the Board is also proposing a regulatory action related to permit fees (Part XIII) as a compliment to this regulatory action, and as the permit fees proposed by that regulatory action are based on projected costs associated with program administration based on actual data for performing specified management activities, this regulatory action is not projected to have an adverse financial impact upon localities administering qualifying local programs or upon the Department in administering local stormwater management programs or in its oversight of qualifying local programs.

The primary disadvantage of this regulatory action will be increased compliance costs in some instances for construction site operators. Those costs are further discussed in the Economic Impact portion of this document.

Requirements more restrictive than federal

Please identify and describe any requirement of the proposal which are more restrictive than applicable federal requirements. Include a rationale for the need for the more restrictive requirements. If there are

no applicable federal requirements or no requirements that exceed applicable federal requirements, include a statement to that effect.

The administration of a stormwater management program within the Commonwealth is mandated by the federal Clean Water Act. The portions of the VSMP regulations proposed to be amended by this action, however, fall outside of any federal mandate. Rather, the authorization of locality administration of local stormwater management programs is mandated by the Virginia Stormwater Management Act (§10.1-603.1 et seq.).

Likewise, the water quality and quantity criteria proposed by this action fall not under the mandate of the Clean Water Act, but arise under the Board's responsibilities under the Virginia Stormwater Management Act, including the responsibility to "…protect the quality and quantity of state waters from the potential harm of unmanaged stormwater…" (§10.1-603.2:1).

Even so, the proposed water quality criterion (0.28 lbs/acre/year new development phosphorus standard) was established based on meeting Virginia's nutrient reduction requirements under the multi-jurisdictional/EPA Chesapeake Bay Agreement and is expected to be an instrumental element in addressing the EPA's forthcoming Chesapeake Bay TMDL. The 0.28 phosphorus standard is derived from the Chesapeake Bay model. Modeling conducted by the Chesapeake Bay Program analyzed the relationship between total nitrogen and phosphorus loads delivered to the Bay and the probability and frequency of attainment with water quality standards (criteria for dissolved oxygen and water clarity). The final annual Bay-wide load target agreed upon was 175 million pounds of nitrogen and 12.8 million pounds of phosphorus. Virginia's portion of this overall load target was set at 51.4 million pounds of nitrogen and 6 million pounds of phosphorus (delivered load to the Chesapeake Bay from all tributaries).

To meet these federally recognized implementation targets, Virginia developed and adopted plans, called Tributary Strategies, which identify implementation actions necessary to remove water quality impairments in the Chesapeake Bay, including its tidal tributaries, caused by nitrogen, phosphorus and sediment pollution. Additionally, Virginia developed water quality standards (dissolved oxygen, chlorophyll-a, and clarity) for the Chesapeake Bay and its tributaries that incorporated the Chesapeake Bay commitments into the Commonwealth's regulatory framework. The plans were devised to achieve nutrient load targets and allocated nutrient reduction load targets to specific types of discharge sources such as agriculture, forest, mixed open, point sources, and urban. From the Bay model load targets established for these discharge sources, computations were made utilizing the target loads for non-urban lands to arrive at an average non-urban load that needs to be met and maintained to meet the tributary goals and more importantly to maintain the health of the Commonwealth's rivers and the Bay. Should such lands be changed in use through development, the 0.28 lbs/acre/year remains a target for the developed lands so that the Commonwealth's waters are not degraded. Additional discussion regarding the development of this standard may be found in Appendix B.

Localities particularly affected

Please identify any locality particularly affected by the proposed regulation. Locality particularly affected means any locality which bears any identified disproportionate material impact which would not be experienced by other localities.

The regulations are not intended to have a disproportionate impact upon any locality. The Code of Virginia, however, dictates that options under the regulations may differ across classes of localities. Section 10.1-603.3 of the Stormwater Management Act specifies that any locality located within Tidewater Virginia as defined by the Chesapeake Bay Preservation Act (§10.1-2100 et seq.), or any locality that is partially or wholly designated as required to obtain coverage under an MS4 permit under the provisions of the federal Clean Water Act, shall be required to adopt a local stormwater management program (qualifying local program) consistent with the criteria established by the Board. Other localities may elect to adopt a qualifying local program; however, in the absence of adoption by such a locality, the Department will administer a local stormwater management program within a jurisdiction. According to the criteria proposed to be established in Parts IIIA and IIIB, a locality-administered qualifying local program and a Department-administered stormwater management program will be substantially the same; therefore, the primary difference will lie in which entity is operating the stormwater management program within the concerned locality.

At this time, the proposed water quality and quantity standards as well as the fees have been established as statewide standards in order to eliminate any disproportionate impact upon any locality. It is possible that public comments received may suggest that Chesapeake Bay and non-Bay standards be established at different levels and/or standards for redevelopment, infill, and within urban development areas could differ from the proposed standards. In these situations, disproportionate impacts could arise due to the variability in land use conditions between localities.

Public participation

Please include a statement that in addition to any other comments on the proposal, the agency is seeking comments on the costs and benefits of the proposal and the impacts of the regulated community.

Public Participation to date:

Public participation in the development of these regulations has already been substantial and is very important to the Board. The proposed regulations reflect work conducted pursuant to two Notices of Intended Regulatory Action (NOIRAs) on this issue and the combined advice of two technical advisory committees (TAC). The Board originally passed a motion authorizing the development of NOIRA on July 21, 2005. The NOIRA was filed on November 15, 2005 and published in the Virginia Register on December 26, 2005. The 60-day public comment period and two public hearings were held between December 26, 2005 and February 24, 2006.

The first TAC was assembled during March and April of 2006 and was composed of 23 members including local governments (9); environmental groups (3); state agencies (5 members; 4 agencies); federal agencies (1); consultants - Home Builders (3); a soil and water conservation district (1); and a planning district commission (1). Between May 4, 2006 and August 21, 2007,

DCR held 12 TAC, 4 TAC subcommittee, and 1 technical discussion group meetings as well as over 50 internal discussions and team drafting meetings to consider the recommendations being received from the TAC.

At the September 20, 2007 Board meeting, the Board directed the withdrawal of the NOIRA stage for Parts I, II, and III in order to address a question regarding the intent of the original NOIRA related to the Part II water quality and quantity technical criteria and authorized the Department to file a new NOIRA. As part of this motion, the Board directed the Department and the new TAC it would form, to build on the work of the previous TAC. The Board also directed the Department to:

- Assemble a workgroup to develop water quantity language for the TAC's consideration.
- Continue work on BMP Clearinghouse.
- Continue work on Handbook Revisions.
- Hold a series of regulation discussion and plan review meetings to address water quality calculations and spreadsheet approach.
- Work on fiscal analysis of proposed regulation.

The 60-day public comment period associated with the new NOIRA for Parts I, II, and III opened on the TownHall on February 18, 2008. The new NOIRA was published in the Virginia Register of Regulations on March 17, 2008 and the previous NOIRA stage was withdrawn. The 60-day public comment period closed April 16, 2008.

The second TAC, comprised of 29-members, included most of the original TAC but incorporated a number of additional stormwater engineers to bring additional technical expertise to the TAC.

Between June 10, 2008 and September 9, 2008, the Department held an additional 5 TAC and 4 water quantity workgroup meetings. The water quantity group was a separate advisory committee that was established and made up of technical experts.

Additionally, the Department contracted with the Center for Watershed Protection (CWP) to provide recommendations to the Department and the Board regarding the water quality and quantity criteria portions of the regulations. This project has been led by David Hirschman. The Center, utilizing the best stormwater data sets and scientific methodologies available in the nation, put forth technical recommendations to the Department and developed the Virginia Runoff Reduction Method and worksheet. These recommendations and processes have been incorporated into the current proposed regulations.

In order to provide the public with an opportunity to understand and test the Virginia Runoff Reduction Method and worksheet and the achievability of the water quality standards, a series of charrettes were held as follows:

- A first round of charrettes was held by DCR [in association with American Society of Civil Engineers (ASCE)] to test the Virginia Runoff Reduction Method and the achievability of the regulations and to familiarize the public with the method:
    - #1 Dorey Park, Richmond (Jan. 31, 2008)
    - #2 Lakes and Watersheds Conference (March 11, 2008)

  - #3 Environment VA (April 1, 2008)
  - #4 Hampton Roads (April 29, 2008)
  - #5 Northern VA (May 12, 2008)
- A second round of charrettes was held after the product was refined during the summer of 2008 based on comments received:
  - #1 Pocahontas State Park, Chesterfield (September 3, 2008)
  - #2 Wetland Studies and Solutions, Gainesville (September 16, 2008)
- Between the first two series of charrettes, we would estimate that we had about 300 different people attend, with 55-60% of those from consulting firms or construction companies, and about 25-30% from local governments.
- It should be noted that a third round of charrettes has begun and further updates and improvements have been made to the Runoff Reduction Method spreadsheet and a complete instruction document produced:
  - #1 Winchester, coordinated with Opequon Targeted Watershed Project (Feb 5, 2009)
  - #2 Lynchburg, sponsored by the Virginia section of ASCE (March 18, 2009)
  - #3 James City County, sponsored by the HRPDC (March 23, 2009)
  - #4 Radford, coordinated with the New River Valley PDC (Date to be determined)

DCR also distributed the methodology to interested entities to conduct testing. As part of these tests, the James River Association contracted with Williamsburg Environmental Group to methodically test the regulations and methodology on a broad spectrum of land disturbing projects.

DCR also contracted out with Dr. Kurt Stephenson, an economist at Virginia Tech, in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters in the absence of these regulatory revisions. As part of developing this report, which was released on December 31, 2008, interviews were held with a number of the affected entities and surveys of local governments utilized.

To ensure that standard designs are available for the required best management practices, the Department contracted with the Virginia Water Resources Research Center at Virginia Tech to develop the Stormwater BMP Clearinghouse website and to assist DCR in the administration of an advisory committee. The Department established a Stormwater BMP Clearinghouse Advisory Committee that has met on 8 occasions (May 30, 2007, June 21, 2007, September 11, 2007, December 12, 2007, March 13, 2008, June 12, 2008, September 11, 2008, and January 13, 2009). The Department also has worked with both CWP and Dr. Tom Schueler of the Chesapeake Stormwater Network to develop the BMP specifications and checklists. The most important web pages on the website have been completed and the site is accessible to the public at http://www.vwrrc.vt.edu/swc/. Progress is also being made in completing a Virginia Technology Assessment Protocol document, which will include the testing and verification criteria manufacturers will be able to use to evaluate the pollution removal performance of their technologies.

A revision of the Virginia Stormwater Handbook is also underway. To assist in the review of Stormwater Handbook chapters, an advisory committee was formed. The committee has had one organizational meeting in the fall of 2007 with additional meetings expected as handbook chapters are completed and circulated for comment. As of the date of this writing, four chapters have been circulated to the committee for comments with additional chapters nearing draft completion.

The proposed regulations have also been the subject of public presentations before a variety of organizations, at conferences, and before a legislative study committee.

Additionally, in an effort to keep the public involved in the development of the proposed regulations, the Department posted to its website all of the materials associated with each TAC or subcommittee meeting in order for the public to remain informed of the discussions of the TAC and the development of the proposed regulatory language (http://www.dcr.virginia.gov/lr2.shtml).

Overall, DCR and the Board have made monumental strides in making sure that the public has been aware of this regulatory action and have been provided the opportunity to participate in and to follow the process. In summary, the Department has established two TACs, a Water Quantity Workgroup, a BMP Clearinghouse Advisory Committee, and a Handbook Advisory Committee, and has held almost 50 public meetings associated with the regulations (including a series of charrettes that have reached over 350 professionals), held over 75 internal working sessions to draft and revise the regulations, presented the regulations at a number of meetings, and established three supporting contracts (CWP-scientific and technical, VT-BMP Clearinghouse, and VT-economic). We truly believe that this may have been one of the most vetted environmental regulatory actions ever.

Continuing public participation opportunities:

As this regulatory action moves forward, in addition to any other comments concerning the proposed regulations that individuals wish to offer during the public comment period, the Board is also seeking comments on the costs, benefits, and potential impacts of this regulatory proposal. Also, the Board is seeking information on impacts on small businesses as defined in § 2.2-4007.1 of the Code of Virginia. Information may include 1) projected reporting, recordkeeping and other administrative costs, 2) probable effect of the regulation on affected small businesses, and 3) description of less intrusive or costly alternative methods of achieving the purpose of the regulation.

As the final draft regulations may also contain additional elements related to project grandfathering and refinements to ensure that redevelopment, infill, and development within urban development areas are not discouraged resulting in sprawl, individuals are also encouraged to provide comments relative to these concepts.

Persons desiring to submit written comments pertaining to this proposed regulation and the additional concepts outlined above may do so during the public comment period by the Internet, mail, or facsimile. It is preferred for comments to be posted to the "Public Comment Forums" page of the Virginia Regulatory Town Hall website in the "Secretariat of Natural Resources"

portion of the page under the Virginia Soil and Water Conservation Board's stormwater management regulations action entitled, "Amend Parts I, II, and III of the Virginia Stormwater Management Program Permit Regulations to address water quality and quantity and local stormwater management program criteria." Comments pertaining to this proposed regulation may also be mailed to the Regulatory Coordinator at: Virginia Department of Conservation and Recreation, 203 Governor Street, Suite 302, Richmond, Virginia 23219. Comments may also be faxed to the Regulatory Coordinator at: 804-786-6141. All written comments must include the name and address or email address of the commenter. In order to be considered, comments must be received by 5:00 p.m. on the date established as the close of the comment period.

The Department, as authorized by the Board, will hold at least one public hearing to provide opportunity for public comment. Notice of the hearing(s) will be posted on the Virginia Regulatory Town Hall website (www.townhall.virginia.gov) and on the Department's website. Both oral and written comments may be submitted at that time.

The Department will also continue to the best of our ability to meet with interested entities to discuss areas of concern to better enable the Department in seeking solutions that may be considered in the final regulations, and will continue to attend meetings to better inform affected entities of the details of the proposed regulations and to foster discussions on areas that might be improved.

As has been the history of regulatory actions taken by DCR, all comments will be fully reviewed and thoroughly discussed by DCR in coordination with the Board and the final regulations will be carefully constructed giving full consideration to the public comments received.

Economic impact

Please identify the anticipated economic impact of the proposed regulation.

Introduction

This economic analysis has been prepared to offer a balanced insight into the direct and indirect benefits of these regulations as well as to present a discussion of the potential impacts the proposed stormwater regulatory revisions may have on the private sector, local governments, and state agencies, including the Department of Conservation and Recreation (DCR or Department), and on the citizens of the Commonwealth.

Understanding the significant potential implications of these proposed regulations and the importance of a sound economic discussion of the benefits and costs of the regulations, DCR, on behalf of the Virginia Soil and Water Conservation Board (Board), contracted in June of 2008 with Dr. Kurt Stephenson, a professor at the Department of Agricultural and Applied Economics at Virginia Tech (Blacksburg, VA) to provide an economic analysis of the proposed regulations. Dr. Bobby Beamer, an economist with BBeamer LLC (Keswick, VA) assisted with the study. The report, entitled *Economic Impact Analysis of Revisions to the Virginia Stormwater Regulation* (December 31, 2008), is appended to this discussion document as Appendix C and is available in its entirety for download at http://www.dcr.virginia.gov/lr2c.shtml. While DCR

offered input and comments on the "Virginia Tech Report" as it will be referred to throughout this discussion document, the authors note that all statements, conclusions, omissions, or errors are the sole responsibility of the authors.

The discussion included herein is a compilation of the findings presented in the Virginia Tech Report as well as substantial additional discussion developed by the Department of Conservation and Recreation meant to build on and complement the report. This document does liberally draw from the Virginia Tech Report throughout this discussion. Where possible, the direct attribution for the materials is specifically noted and pages for the excerpt are referenced.

This discussion document and the report also draw on:

- An online survey of localities in the summer of 2007 regarding personnel and budgetary needs performed by DCR;
- Independent discussions by Dr. Stephenson and Dr. Beamer with localities and other affected entities;
- Permit data from DCR's existing stormwater permitting database (since January 29, 2005 when DCR took over program administration);
- Data provided to the Department's regional Soil and Water Conservation offices from localities pursuant to §10.1-566.1 that states that each local erosion and sediment control plan-approving authority shall report to the Department a listing of each land-disturbing activity in the locality for which a plan has been approved;
- Charrettes held by DCR [in association with American Society of Civil Engineers (ASCE)] to test the Virginia Runoff Reduction Method and the achievability of the regulations and to familiarize the public with the method;
- Information from the James River Association's contract with Williamsburg Environmental Group to prepare case studies of a broad spectrum of land disturbing activities to evaluate potential cost implications of the proposed regulations; and
- A literature search performed by the Chesapeake Bay Foundation for DCR of relevant fiscal articles.

Purpose for this regulatory action

The purpose of this regulatory action is to amend the Virginia Soil and Water Conservation Board's Virginia Stormwater Management Program (VSMP) Permit Regulations to establish criteria to further protect the quality and manage the quantity of stormwater runoff to state waters, criteria for the administration of a local stormwater management program, processes and procedures for Board approval of a qualifying local program, and local program oversight and implementation criteria for the Board and the Department in order to ensure the general health, safety and welfare of the citizens of the Commonwealth as well as protect the quality and quantity of state waters from the potential harm of unmanaged stormwater pursuant to §10.1-603.2:1 of the Code of Virginia. Although a simple concept in theory and a generally well supported goal by the general populace, the economic ramifications of implementing regulations to accomplish this purpose may be significant, although shown to be highly necessary to maintain or improve the health of the state's waters.

A September 2007 EPA Office of Inspector General evaluation report entitled *Development Growth Outpacing Progress in Watershed Efforts to Restore the Chesapeake Bay* (Report No.

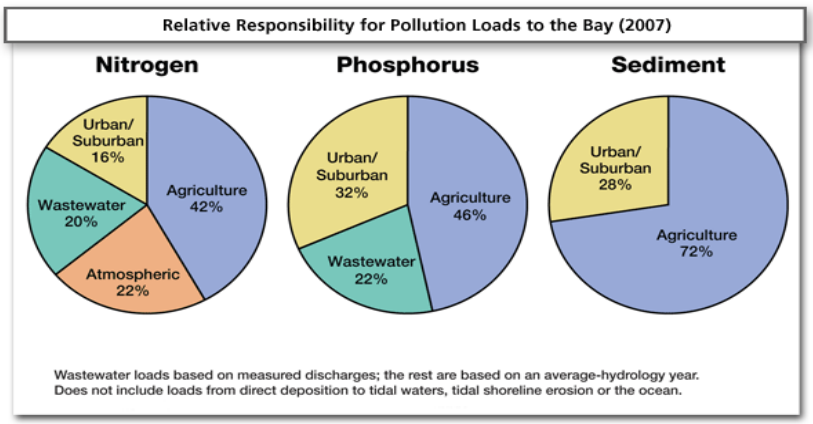
2007-P-00031) stipulated that "[i]f communities do not sufficiently address runoff from new development, loads from developed lands will continue to increase rather than diminish. As a result, restoration costs will increase, and the Bay will not be restored to the health envisioned in the *Chesapeake 2000* Agreement because water quality degradation and loss of aquatic life will continue." The report also notes that "[t]he Chesapeake Bay provides economic and recreational opportunities estimated to exceed $33 billion annually, according to a 1989 economic study by the State of Maryland".

The 2003-2004 Annual Report of the Maryland Department of Natural Resources entitled *Inspired by nature….guided by nature* stated that "[a]s an economic engine, the combined value of the Bay to the States of Maryland and Virginia is a staggering $1.2 trillion dollars. Its annual economic benefits are estimated to be $60 billion dollars."

The Virginia Tributary Strategies as finalized in January 2005, developed as Virginia's Chesapeake Bay cleanup plan in response to the multistate and EPA *Chesapeake 2000* Agreement, stated that addressing stormwater was a key focus. The approach identified in the Tributary Strategies relating to improved nonpoint source reductions called for DCR to focus on seven programmatic areas:

1. Agricultural Best Management Practices (BMP) Acceleration
2. Expansion of Nutrient Management Planning and Implementation Efforts
3. **The Consolidation and <u>Strengthening</u> of the Virginia Stormwater Management Program**
4. Enhancing Implementation of the Virginia Erosion and Sediment Control Program
5. Strengthen Implementation of the Chesapeake Bay Preservation Act
6. Enhancement of the NPS Implementation Database Tracking Systems
7. Enhancing outreach, media and education efforts to reduce pollution producing behaviors

DCR has been and will continue to pursue improvements in each of the seven areas as it is clear that the focus of improving the Chesapeake Bay and Virginia's water quality requires substantial improvement in all significant sources of pollution. We need to implement actions across agriculture, point sources, air deposition, and urban and suburban runoff. The report entitled State of the Chesapeake Bay Program: Summary Report to the Chesapeake Executive Council released on November 20, 2008 clearly notes the loadings from each of these sources and substantiates the significant contribution of nitrogen and phosphorus from urban/suburban sources in the Bay Watershed. This is illustrated in the graphic below.



In this regard, several initiatives to address these avenues of pollutant reductions are underway, including those focused on agriculture. The Commonwealth continues to work to achieve high levels of conservation practices on farmland. Recent commitments by the Governor and legislature to fund cost share programs is enabling DCR to focus on implementing five priority practices on many more acres of farm fields. There are also regulatory requirements for proper nutrient management to govern the application of manures, fertilizers and biosolids on several types of farmland.

Very high levels of treatment are also being required by law for municipal sewage treatment plants. Numerous localities are now required to make major upgrades to their wastewater plants to improve water quality.

However, even with the reductions that can be achieved from these sources, the best modeling information available has made it clear that nutrient and sediment reduction goals cannot be met unless pollution loadings from urban and developing sources are also substantially reduced.

These proposed regulations are thus a necessary part of the overall reduction strategies. We believe that a substantial amount of work done to date shows that proper site planning and designing for stormwater controls early in the development process will ease many difficulties involved with requiring appropriate stormwater controls. These improved stormwater regulations are necessary to protect the public interest. For example, stormwater itself is increasingly being recognized as a resource that should be retained on site and used for irrigation, groundwater recharge, and other beneficial uses. On the other hand, damages to aquatic resources, stream channels, and downstream properties from poorly managed stormwater are significant and are difficult to correct if development has taken place without the necessary design controls.

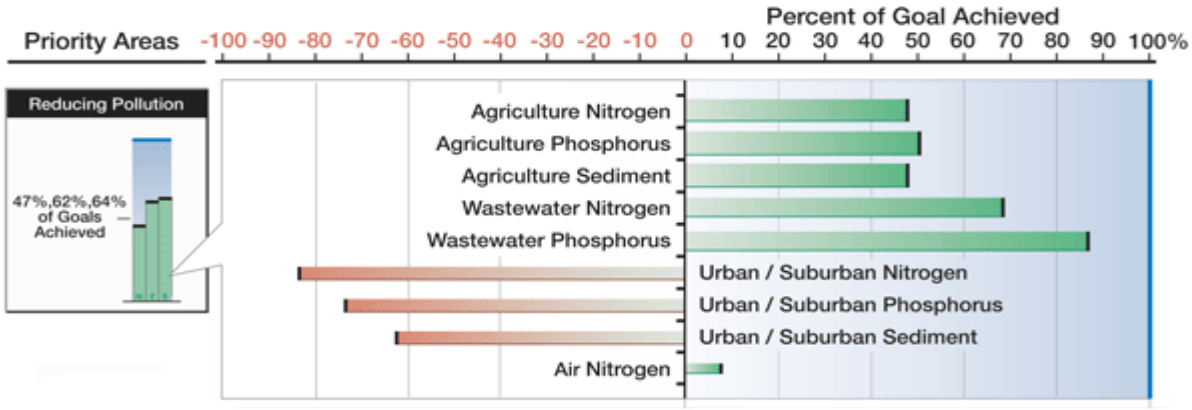
The 2008 report entitled *Urban Stormwater Management in the United States* released by the National Research Council of the National Academies noted that "[u]rbanization – the conversion of forests and agricultural land to suburban and urban areas – is proceeding at an unprecedented pace in the United States. Stormwater discharges have emerged as a problem because the flow of water is dramatically altered as land is urbanized. Typically, vegetation and topsoil are removed to make way for buildings, roads, and other infrastructure, and drainage networks are installed. The loss of the water-retaining functions of soil and vegetation causes stormwater to reach streams in short concentrated bursts. In addition, roads, parking lots, and other "impervious surfaces" channel and speed the flow of water to streams. When combined with pollutants from lawns, motor vehicles, domesticated animals, industries, and other urban sources that are picked up by the stormwater, these changes have led to water quality degradation in virtually all urban streams."

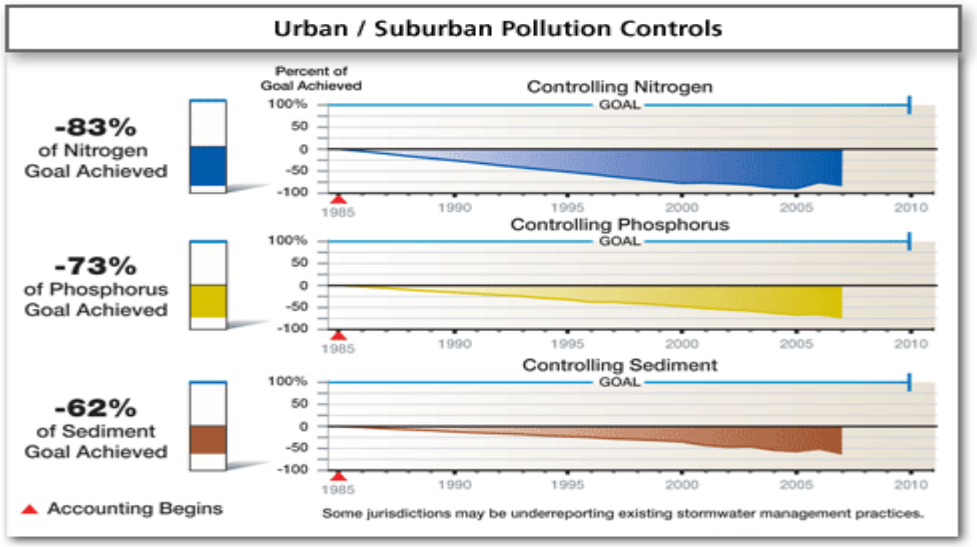
As such, it has been shown that additional stormwater controls are critically needed. While reductions are being made from other sources, especially municipal sewage treatment plants and agriculture, pollution loadings from developed and developing lands are increasing. In fact, between 1990 and 2000, the population in the Bay watershed increased by 8 percent while the increase in impervious surface increased by 41 percent. The 2008 State of the Chesapeake Bay

Program report states that "[s]uburban and urban stormwater runoff is the only source of pollution that is increasing". A January 2009 article in the *Bay Journal* on Bay Program Progress by Jeff Lape, the EPA Program Director, stated that "[p]rojections through 2030 show continuing explosive growth and construction in the watershed". He noted that "[e]very entity and individual in the watershed has a role in saving the Bay, including governments, businesses, nonprofit organizations and the 17 million residents".

The September 2007 EPA Office of Inspector General evaluation report entitled *Development Growth Outpacing Progress in Watershed Efforts to Restore the Chesapeake Bay* (Report No. 2007-P-00031) also noted that the population in the Bay watershed "is projected to surpass 19 million before 2030" thus potentially further exasperating today's suburban and urban runoff problems.

Per the Chesapeake Bay Program, the rapid rate of population growth and related residential and commercial development coupled with the ongoing issues associated with accounting for the existing practices has made this pollution source the only one in the Bay watershed which continues to grow, and thus showing the overall "progress" as negative. The attached graphics below reflect this status.





It is one of the focuses of these proposed regulations to slow or halt these increases, and where possible to make marked water quality improvements in this area. Although data is often based on necessary Chesapeake Bay Watershed reductions, the implications and the need for water quality improvements and water quantity controls is a statewide issue as water quality challenges and impairments exist across the Commonwealth. Without the appropriate and sufficient controls, stormwater inputs to receiving waters have the capacity to degrade the aquatic systems.

In order to address necessary water quality improvements, a statewide 0.28 lbs/ acre per year phosphorus standard is incorporated as a key element of these regulations. Generally, today, the standard is 0.45 lbs/ acre per year. A white paper drafted September 5, 2008 for the Regulatory Technical Advisory Committee entitled "Discussion Document on the Phosphorus Standard Established in the Proposed Regulations" outlines the derivation of this revised standard and is presented in Appendix B.

Estimated Chesapeake Bay and Southern Rivers restoration costs

The costs associated with improving the water quality of the Chesapeake Bay and the Southern Rivers are large and growing each year. These proposed regulations will work towards improving the water quality in Virginia's rivers and the Chesapeake Bay and the associated costs are but a fraction of the necessary clean-up expenditures. Implementation of the stormwater regulations is one step in avoiding an escalation in future clean-up costs should further waters become impaired and require expensive restoration.

- The estimated cost to restore the Chesapeake Bay to clean water has been estimated by the Chesapeake Bay Commission in January 2009 at $28.5 billion.

- The estimated cost to restore the impaired streams in the Southern Rivers portion of Virginia as of January 2009 is $3.7 billion. This is based on the current presence 184 consent decree impairments and 450 non-consent decree impairments (additional listed streams from 2000 - 2008). Impairments are due to bacteria, sediment and toxics (PCBs and mercury). It is anticipated that as listings for nutrient impairments increase the total estimated cost will escalate.

Benefits of the regulations

The benefits either directly or indirectly associated with these proposed regulations are extensive and will impact both the citizens of the Commonwealth and its visitors, as well as to generations that will follow. Stormwater benefits are represented in Figure 1 below. The Virginia Tech Report (Appendix C, page 27) states that "[a]s outlined in the proposed regulation, stormwater control practices alter flow and runoff quality stemming from land use change. These changes could then change a number of man-made and water-related services that are of value to people. These services include reductions in flood risk, avoided infrastructure costs, aquatic life support, recreation, and aesthetics (Braden and Johnston 2004). Commercial fisheries may also benefit from additional stormwater controls. Economic benefits are the value of these service changes to people."

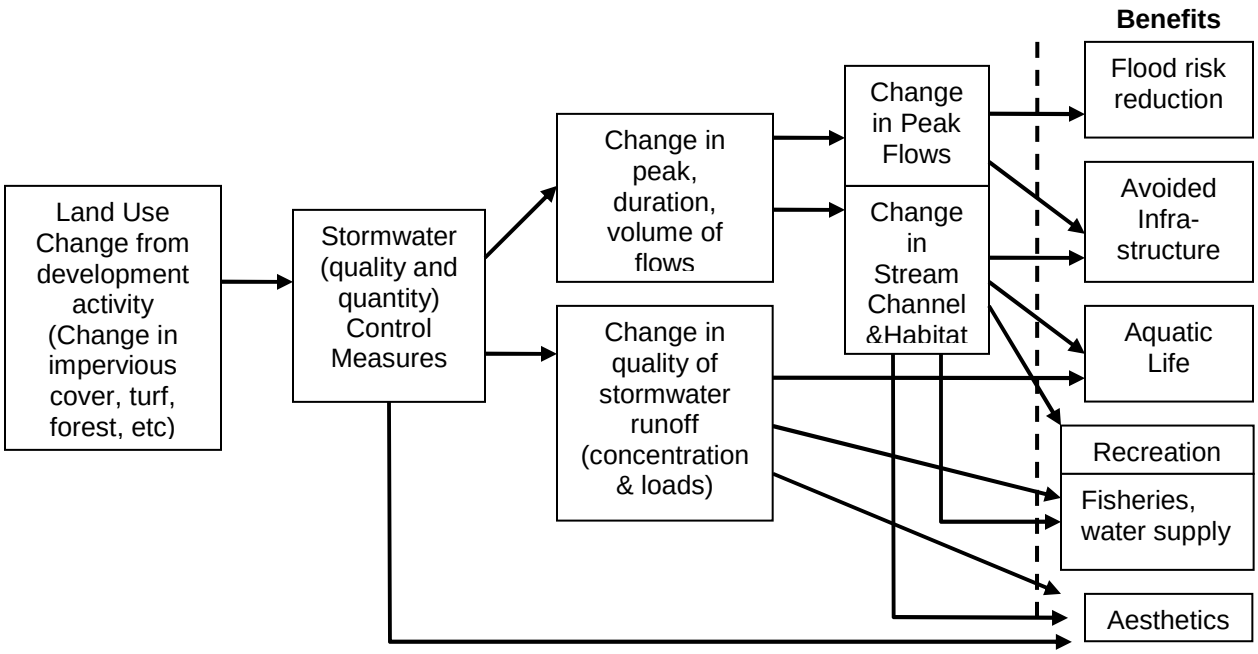


Figure 1: Benefits of Stormwater Control (From Virginia Tech Report, Appendix C, page 27)

The benefits of clean water have enormous economic impacts. Although stormwater is only one of the key contributors of pollutants that are degrading the water quality for Virginia's rivers, streams, and the Chesapeake Bay, it is a critical source to control. Figure 2 included below taken from a brochure on Virginia's Chesapeake Bay Act Program, and attributed to an illustration by A.J. Upson, clearly outlines in the broadest terms the impacts that pollutants have on Virginia's aquatic resources, all of which have significant economic attributes.

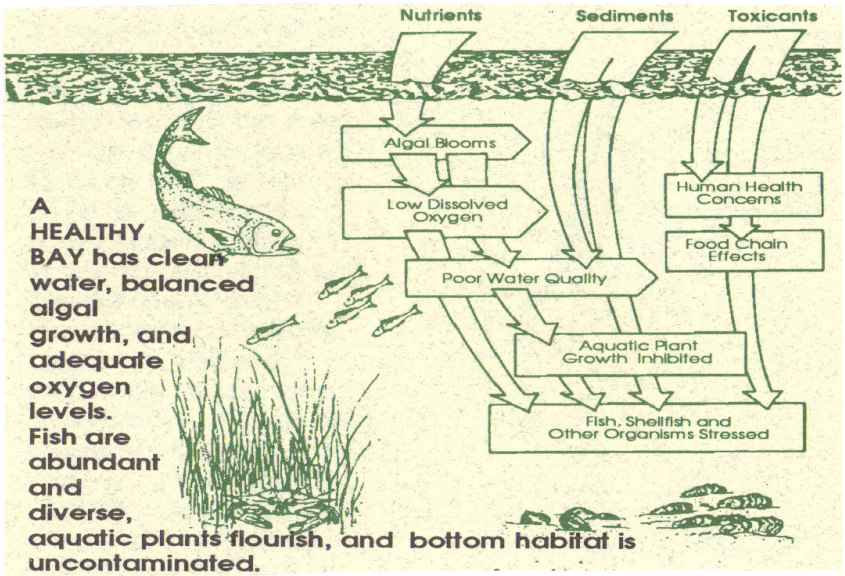


Figure 2: Effects of Pollutants in the Bay

According to a January 2000 EPA report entitled *A Benefits Assessment of Water Pollution Control Programs Since 1972: Part 1, The Benefits of Point Source Controls for Conventional Pollutants in Rivers and Streams*, under the Clean Water Act, states and jurisdictions are required to designate "beneficial uses" for each of their waterbodies and to report to EPA on the attainment of these uses. It is these uses that are diminished as pollutant loads, such as stormwater runoff, degrade water quality.

Table 1: Beneficial Uses of Water Bodies

Use Classification	**Description**
Aquatic life support	Provide suitable habitat for protection and propagation of aquatic organism
Fish consumption	Support fish free from potential health risk
Shellfish harvesting	Support shellfish populations free from potential health risk
Drinking water supply	Supply safe drinking water with conventional treatment
Primary contact recreation	Provide for recreational swimming without adverse health effects
Secondary contact recreation	Provide for "on-water" activities such as boating without adverse human health risks
Agriculture	Provide suitable water for irrigating fields or watering livestock
Ground water recharge	Support adequate surface supply and quality to protect uses of ground water
Wildlife habitat	Support habitat and resources for land-based wildlife
Culture	Support the water body's role in culture

- Original Source: U.S. Environmental Protection Agency. 1995. *National Water Quality Inventory: 1994 Report to Congress*. EPA 841-R-95-005. Washington, DC: Office of Water.
- Also included in Table 3.2 in a January 2000 EPA report entitled *A Benefits Assessment of Water Pollution Control Programs Since 1972: Part 1, The Benefits of Point Source Controls for Conventional Pollutants in Rivers and Streams*

These beneficial uses affect each individual differently and result in a varied degree of economic importance to each. As noted in a in a March 1983 EPA report entitled *A Comparison of Alternative Approaches for Estimating Recreation and Related Benefits of Water Quality Improvements*, user benefits arise from recreation uses of the river and are measured by users' willingness to pay for the water quality levels necessary to permit these recreation uses. That is, the valuation depends on the use of the waterbody. In this case, as depicted in Table 2, clean water in a waterbody is worth something because recreationists are going to fish, boat, swim in, or picnic along the river. Intrinsic benefits consist of two value types: option value and existence value. Relevant to both current users and potential future users, option value is the amount an individual would be willing to pay for improved water quality (over his expected user values) to have the right to use the river in the future when there is uncertainty either in the river's availability at a particular level or in his use of it (with the river meeting specified water quality conditions). Existence value, on the other hand, is an individual's willingness to pay for the knowledge that a resource exists. That is, an individual--either a user or a nonuser--might be willing to pay something to maintain a high level of water quality at a recreation site in a

particular area, even though he will not use it, so that his children may have future use of the site or simply to know that the ecosystem at the site will be maintained.

Table 2: A Spectrum of Water Quality Benefits

Potential Water Quality Benefits	Current User Benefits	Direct Use	In Stream	Recreational	fishing, swimming, boating, rafting, etc.
				Commercial	fishing, navigation
			Withdrawal	Municipal	drinking water, waste disposal
				Agricultural	irrigation
				Industrial/ Commercial	cooling, process treatment, waste disposal, steam generation
		Indirect Use	Near Stream	Recreational	hiking, picknicking, birdwatching, photography, etc.
				Relaxation	viewing
				Aesthetic	enhancement of adjoining site amenities
	Intrinsic Benefits	Potential Use	Option	Near-term potential use	
				Long-term potential use	
		No Use	Existence	Stewardship	maintaining a good environment for everyone to enjoy (including future family use-bequest)
				Vicarious consumption	enjoyment from the knowledge that others are using the resource

- Originally included in Figure 1-2 in a March 1983 EPA report entitled *A Comparison of Alternative Approaches for Estimating Recreation and Related Benefits of Water Quality Improvements.*

In 1983 when this report was released, the case study indeed found that citizens (in 1981 dollars) were willing to pay $60 or more annually per household for improving water quality to fishable and approximately $50 more annually for improving it to swimmable. Overall the option price for water quality improvements ranged from roughly $50 to $120 per year per household.

A June 1978 EPA report entitled *The Recreation Benefits of Water Quality Improvements: Analysis of Day Trips in an Urban Setting* also found that "people are willing to pay more to maintain water quality at a site with good water quality than at a site with poorer water quality. Over the range of water quality represented in the sample of sites, there are, therefore, increasing returns to water quality. This finding may be of significant practical importance in water quality planning since the incremental costs of water quality improvements tend to increase as higher levels of water quality are attained."

A survey by Mitchell and Carson detailed in their July 1993 report entitled *The Public's Willingness to Pay for Boatable, Fishable, and Swimmable Quality Water* in Water Resources Research, estimated that the aggregate benefits of achieving swimmable water from a baseline of non-boatable water to be $29.2 billion per year (1990 dollars). Household willingness to pay was $280 per year (1983 dollars).

The trend for citizens being willing to pay for clean water (which might translate to user fees, taxes, higher home prices, etc.) also appears to be increasing. In a February 2000 interim report to the EPA related to an on-going study on *Valuing Inland Water Quality Improvements*, the authors noted that "respondents were willing to pay an additional $22.40 per one percent increase in the level of water quality". They also noted that "[w]hether the starting point, in terms of the water quality level is low, medium, or high does not seems to be consequential in terms of how it affects the overall valuation amount".

Public support for clean water is also born out in public surveys. In a survey of Virginia voters (N=750) performed by the Kitchen Group and the Terrance Group, it was found that 97% of those surveyed responded that protecting air and water quality was an important issue to them.

1) Benefits to the aquatic based industries

Declines in the water quality of Virginia's rivers and the Chesapeake Bay, in part due to stormwater runoff, has been an element in the decline of Virginia's aquatic based industries and the aquatic resources they depend. An April 1988 report entitled *Benefits from Improvements in Chesapeake Bay Water Quality: Volume III of Benefit Analysis Using Indirect or Imputes Market Methods* prepared by the Department of Agricultural and Resource Economics at the University of Maryland for the EPA notes that "[t]here are other signs of declining water quality more cogent to the lay public. Landings of well-known anadromous species such as rockfish and shad have dropped precipitously in the past several decades. Oyster harvest and oyster reproduction have also declined in the past decade. There is some ambiguity in the use of landings as a measure of water quality, of course. A considerable increase in effort devoted to harvesting fish has happened to coincide with the increase of effluents over time. Further, natural phenomena such as hurricane Agnes (1972) induce cyclical variations in finfish and shellfish reproduction. Nevertheless, there can be little doubt that the quality of the Chesapeake Bay's waters has declined, both in terms of the ecological health of the estuary and the benefits to humans of its use."

1a) Commercial Fisheries

Maintaining and improving water quality is a fundamental step in sustaining and restoring the aquatic resources and its needed habitats within Virginia's rivers and streams and the Chesapeake Bay. Further degradation of the Commonwealth's waters may add to the continued decline of Virginia's remaining commercial fisheries and further assault the economic viability of these aquatic based industries.

- According to the Virginia Seafood Council, the Virginia seafood industry is one of the Commonwealth's largest industries with an annual economic impact of over a half billion dollars. Virginia is the nation's third largest producer of marine products and ranks as the

largest production state on the East Coast. Approximately 6,000 Virginians work on the water and over 200 seafood companies have their headquarters in Virginia. Ports are open year round with key transportation centers offering daily air transportation and freight services all over the world. Within 24 hours, a fleet of refrigerated trucks and planes deliver seafood to our customers.

The Council further notes that Virginia is the nation's third largest seafood producer and the largest on America's Atlantic coast. The waters of the Chesapeake Bay are the nation's largest and most biologically diverse estuary, yielding more seafood than any of the 840 other estuaries in our land. Some 665 million pounds of fin fish and shellfish caught from our rivers, coastal and Atlantic waters, and that's enough seafood to prepare 123 million meals annually.

- A January 2000 EPA report entitled *A Benefits Assessment of Water Pollution Control Programs Since 1972: Part 1, The Benefits of Point Source Controls for Conventional Pollutants in Rivers and Streams*, indicates that "[t]he success of commercial fishing activities is directly related to the health of the stock of commercially exploitable fish species. Because clean water provides life support for these species, poor water quality can result in increased harvest costs and prices for fish."

- A December 2005 Virginia Institute of Marine Sciences report for the Virginia Marine Resources Commission authored by James Kirkley et al. entitled *Economic Contributions of Virginia's Commercial Seafood and Recreational Fishing Industries: A User's Manual for Assessing Economic Impacts* - VIMS Marine Resource Report No. 2005-9, states that "[t]he commercial and recreational fisheries of Virginia are relatively important to the economies of Virginia and various coastal communities, as well as to the well being of society. In addition, anglers receive substantial value in the form of non-monetary benefits from the experience of angling, and watermen typically receive non-monetary benefits from being able to maintain a particular lifestyle. Both of these activities offer potentially substantial contributions to the economies of Virginia and coastal communities." The report compares its results to two 1994 Virginia Marine Resources Commission large-scale studies on the economic contributions and importance of the seafood industry and recreational angling to the Commonwealth. The report indicates that the seafood industry and recreational angling "generated in 2005 a total of $1.23 billion in output or sales, $717.4 million in value-added or income, and 13,015 full and part-time jobs for the economy of Virginia. Of the total $1.23 billion in sales and $717.4 million in value-added, the recreational sector contributed $823.7 million in sales or output and $478.4 million in value added or income. Out of the 13,015 full and part-time jobs, the recreational sector contributed 9,092 full and part-time jobs. The commercial seafood industry, which includes all economic activity from harvesters to restaurants, generated $407.9 million in sales or output, $239.0 million in value-added or income, and 3,923 full and part-time jobs."

  The report notes that "[w]hen results for the commercial sector of the present study are compared to the results for the older commercial study, a somewhat dismal picture emerges. First, despite an increase in the ex-vessel value of all species commercially landed in Virginia, the economic contributions of the seafood industry declined relative to 1994. In

1994, the seafood industry generated approximately $579.0 (2005 constant dollar value) million in sales or output, $406.4 million in value-added or income, and 10,798 full and part-time jobs. The $407.9 million in sales or output for the seafood industry in 2004 represents a decline of nearly 30% between 1994 and 2004. Moreover, the seafood industry was considerably more diversified in 1994, in which nearly all the species or species groupings generated large economic contributions in terms of sales or output. In addition, blue crabs topped the list of all the species in 1994 relative to the level of sales or output generated. In 2004, blue crabs dropped to second in terms of sales or outputs generated for the economy. Sea scallops accounted for nearly 71% of the total sales or output generated by the entire Virginia seafood industry in 2004; sea scallops accounted for 63.7% of the total number of full and part-time jobs generated by the seafood industry."

1b) Recreational Fisheries

Recreational fisheries, both fresh and saltwater, provide a variety of economic gains for the economy and can be reduced through water quality impairments that harm the fish populations or the aesthetic quality of the waters.

- According to the U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. *2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*, in 2006 in Virginia there were 662,000 freshwater anglers and 352,000 saltwater fishermen. Their annual combined expenditures in Virginia totaled $733,777,000.

- A report by Dr. Papadakis of the Center for Energy and Environmental Sustainability at James Madison University for the Shenandoah River Fish Kill Task Force in July of 2006 entitled *The Economic Impact of the 2005 Shenandoah River Fish Kill: A Preliminary Report* noted that "[i]n seven Shenandoah Valley counties affected by the ongoing fish kills, we estimate that freshwater anglers generated $16.2 to $21.4 million in economic value for local business and the Commonwealth in 2001". They continued by stating that although conservative, "[w]e estimate that the fish kill resulted in about 2,100 fewer licensed anglers in the region, equating to approximately $686,000 in lost retail sales and revenues to the state". The report notes that similar fish kills have been reported over recent years.

  The report also notes that downturns in the scale and scope of angling have economic consequences. "There are two principal sets of stakeholders who should be concerned about the economic impacts of the fish kill. First are the local businesses that benefit from angler spending. Anglers purchase a dizzying array of goods and services—ice, bait, boats, fuel, guide services, outfitter rentals, camping gear, tackle, accommodations, food, and so forth—that benefit local businesses directly and the local economy indirectly." "The second stakeholder is the Commonwealth itself. The state benefits indirectly through business income taxes for fishing-related enterprises. It also benefits directly in several critical ways:
  1. Revenues from the sale of fishing licenses.
  2. Revenues from the general sales tax.
  3. Revenues from food and accommodation sales taxes, boat titling and registration fees, and fishing-related equipment sales taxes.

4. Federal assistance from the Federal Aid in Sport Fish and Wildlife Restoration Funds, a fund that is financed by taxes on motor boat fuel and fishing and hunting equipment."

- A January/ February 2001 article by George Aponte Clarke et al. in the Journal for Surface Water Professionals: Stormwater entitled *Stormwater Strategies: The Economic Advantage* stated that "polluted stormwater runoff has a significant impact on communities that support water-based recreation and commercial activities. Americans take more than 1.8 billion trips to waters to fish, swim, boat, or just relax each year at an estimated daily value of $30.84 to each individual (USEPA, 1995). Some 35 million anglers spent more than $38 billion in pursuit of their pastime in 1996 (US Fish and Wildlife Service, 1996). Stormwater runoff costs the commercial fish and shellfish industries approximately $17 million to $31 million annually (USEPA, 1997). When stormwater pollution contaminates or suffocates fish, fills streams with mud and trash, and erodes streambanks, these commercial and recreational values are lost. Despite the importance of clean water and safe beaches to these economies, stormwater runoff often goes unchecked. This lack of management costs coastal communities money and jobs."

1c) Crabs

Research has shown that low-oxygen zones, sediment from runoff, algal blooms caused by nitrogen and phosphorus pollution, and overfishing have cumulatively attributed to the decline of the Bay's crab population. These cumulative impacts have caused a precipitous decline in the economic vitality of one of Virginia's renowned aquatic industries.

- A March 2009 article in Business Week noted that "[c]rab stocks are estimated to have declined 70 percent in the Chesapeake since the early 1990s because of overfishing and pollution, which harms crabs as well as the underwater grasses they need to thrive. Last year, the U.S. Commerce Department declared the crab fishery a federal disaster. Virginia and Maryland are splitting $20 million in disaster aid approved by Congress. The decline of the bay's crab and oyster stocks could be measured by membership in Virginia Watermen's Association. The association represents approximately 2,800 watermen in Virginia, perhaps one-third of the number that worked the bay 25 years ago."

- A May 2008 press release from Governor Kaine highlighted correspondence between the Governor and U.S. Secretary Gutierrez that petitioned the federal government to declare Virginia's blue crab population a Fishery Resource Disaster, allowing Congress to appropriate economic assistance for hard-hit watermen. The Governor noted that "[t]he blue crab fishery is in dire straits and our watermen are enduring serious hardship". The release noted that "[i]n the past 15 years, the Chesapeake Bay blue crab population plummeted 70 percent. In the early 1990s, there were approximately 400 million crabs of harvestable size in the Bay. Today there are fewer than 120 million. Virginia's blue crab harvest was at near record low levels of slightly more than 19 million last year." The press release also states that "[t]he blue crab fishery is estimated to be at least a $125 million Bay-wide industry. The economic impact to Virginia waterman as result of the new crab restrictions [put in place due to declining stocks] is estimated to be $11 million to $15 million over the next three years." The Governor noted that "[i]n addition to crab management measures, Virginia has undertaken additional aggressive regulatory and funding initiatives to significantly reduce

pollutant loads from point sources, agricultural lands and urban storm water, which are negatively impacting the Bay's crab population. Since 2006, Virginia has invested about $660 million in cleaning up Virginia's rivers and the Chesapeake Bay. These restoration efforts will produce results in the future, but have yet to yield near-term improvements in water quality and habitat sufficient to support a significantly improved blue crab population."

- A webpage of Maryland Recreational fisheries notes that "[d]espite the combined Maryland and Virginia commercial harvest in 2000 (50.9 million pounds) being the lowest in over 20 years, blue crabs are still the most valuable commercial species in the Chesapeake. With a dockside value of $54.2 million."

- A December 2008 report, by the Chesapeake Bay Foundation entitled *Bad Water and the Decline of Blue Crabs in the Chesapeake Bay*, notes that "dead zones kill an estimated 75,000 tons of bottom-dwelling clams and worms each year, enough to feed 60 million crabs annually. Dead zones are the result of nitrogen and phosphorus pollution which feeds algae and causes it to grow in massive "blooms." When the algal blooms die and the dead growth falls to the bottom of waterways, its decomposition uses a lot of oxygen. Bottom-dwelling species are victims of oxygen starvation. In addition, murky waters that result from algal blooms and sediment runoff from roads, building sites, and other impervious surfaces don't allow light to penetrate to underwater grasses that need sunlight to promote their growth. Such underwater grass provides key habitat for crabs, especially juveniles, to eat, reproduce, and hide from predators. More than half the eelgrass beds in the lower Bay have died since the early 1970s." CBF states that "[a]lthough at least 4,486 crabbing related jobs have been lost over the last decade in Maryland and Virginia, 6,760 of these jobs remain. And CBF wants people who earn a living from the Bay to remain employed. The jobs dependent on crab populations include watermen who catch crabs, workers who process them, wholesalers and retailers, grocers, and restaurant employees." CBF also notes that "When the broader impact on restaurants, crab processors, wholesalers, grocers, and watermen is all added up, the decline of crabs in the Bay meant a cumulative loss to Maryland and Virginia of about $640 million between 1998 and 2006 (the most recent year for which this economic data is available)." The report notes that "[i]n 2007, watermen suffered the worst crab harvest since Bay-wide record keeping began in 1945. 2008 was even worse in Virginia, and only slightly better in Maryland. Maryland and Virginia have endured more than $640 million in losses over the last decade because of the crab's decline".

1d) Native Shellfish

There is widespread agreement that oysters are critical to the Bay, in ecological, economic, and cultural ways. Declines in water quality including increasing rates of sedimentation have been partially responsible for the decline of Virginia's native oysters and the commercial fisheries they supported.

- The September 2007 *Bay Journal* noted in an article about the Blue Ribbon Oyster Panel that "[o]ysters were once the backbone of a powerful industry, but their population is now about 1 percent of their historic levels despite 15 years and $45 million of restoration efforts."

- A 2003 book by Howard R. Ernst entitled *Chesapeake Bay Blues: Science, Politics, and the Struggle to Save the Bay* (Published by Rowman & Littlefield) noted that "[t]he oyster population has long served as both an important commercial resource for Bay fishermen and as a valuable filter of the Bay's water. Unfortunately, the health of the Chesapeake Bay oyster population has been on the decline for the last fifty years. In the early 1950's, it was not unusual for annual oyster harvests to exceed 35 million pounds. As late as the early 1980s, annual harvests of 20 million pounds were recorded. By the mid-1990s, however, the deteriorating condition of the Bay, disease, and poor management practices led to the collapse of the oyster population." "Recent harvests have produced less than 600,000 pounds of oysters, a dramatic 98 percent reduction since the mid-1950s."

- On the website of the Natural Resources Defense Council, an article entitled *Stormwater Strategies: Community Responses to Runoff Pollution*, states that "[p]athogens in stormwater also contaminate shellfish beds, and this contamination, along with pollution from other sources, causes closure of shellfish beds nationwide. Data collected from five coastal states indicate that urban runoff and storm sewers are the most pervasive source of shellfish harvesting restrictions, contaminating over 30 percent of the area reported as subject to such restrictions in those states (EPA 1995). A key contributing factor is the fact that levels of bacteria and viruses are usually much greater -- 100 to 1,000 times greater -- in the bottom sediment, where shellfish live, than in the water above (Duda et al. 1982)."

- A December 2006 report by Robert Fisher from the Virginia Institute of Marine Science entitled *Initial Market Assessment of the Cultured, Non-native Oyster C. ariakensis* states that "[t]he highly valued oyster processing industry in Virginia has become heavily reliant on imported oysters from other producing states. Grass-root oyster restoration programs have been initiated in recent years, targeting native oyster replenishment and non-native oyster introduction, with the goal to rebuild the Virginia oyster resource for commercial harvesting and ecological benefit. The resurgence of locally grown and harvested oysters, would bolster the processing sector which, when combined with a re-established harvesting sector, could generate over $110 million in total economic output, $82 million in incomes, and over 3, 000 jobs for the state each year (Murray 2002)."

- A 2006 report published in Human Organization by Paolisso et al. entitled *Restoration of the Chesapeake Bay Using a Non-Native Oyster: Ecological and Fishery Considerations* notes that "[o]yster declines have seriously wounded the once thriving fishery and have consequently affected coastal economies, particularly watermen and those involved in the oyster industry." The "remaining oyster harvests are only a small percentage of past levels, and so is the income earning potential of oystering. In 1875, 14 million bushels of oysters were harvested in Maryland. In the 1974-75 season, 2.5 million bushels were harvested in Maryland, generating a dockside value of approximately $11.6 million dollars (MD DNR 2005). The same season yielded a harvest of 895,597 bushels in Virginia, from both private and public grounds (Wesson 2006). Remaining oyster populations have suffered dramatically in recent years, as a result of drought and extremely high disease levels. The 2003-2004 season produced a record low of only 26,495 bushels in Maryland, with a dockside value of $625,583 dollars. Virginia landings for the 2003-2004 season totaled only 23,260 bushels (Wesson 2005). Recent years have shown a slight rebound in harvests. The

2004-2005 season in Virginia yielded 65,530 bushels harvested (Wesson 2006). In 2005, Maryland harvests totaled 72,218 with a dockside value of over $1.1 million (MD DNR 2006)."

- The May 2007 *Report and Recommendations of the Blue Ribbon Oyster Panel* in Virginia noted that "[w]hile the Panel did not engage in extensive debate on water quality issues, it acknowledged that any degradation of water quality has the potential to undermine all oyster restoration efforts. A long-term commitment, therefore, must address funding for sewage treatment plan upgrades, storm water management, agricultural runoff, and atmospheric deposition." The report also states that "[a]s the commercial oyster industry and restoration efforts rely more heavily on hatchery based production, the need for good water quality will become even more important to the success of both. Hatcheries in MD and VA's Chesapeake Bay have experienced production problems as a result of poor water quality, suspected to stem from algal blooms from excess nitrogen pollution."

1e) Aquaculture

Improved water quality is necessary for Virginia's growing aquaculture industry.

- A June 2008 article on the Virginia Institute of Marine Science's website by Margaret Pizer entitled *Survey shows growth in VA clam, oyster aquaculture* reported that "'Virginia produces more farmed clams than any other state', says Tom Murray, Marine Business Specialist for Virginia Sea Grant. 'But unlike traditional farm crops like corn or wheat, there has been no consistent long-term effort to track economic trends in shellfish aquaculture.'" The article notes that "[t]o address this lack of economic data, Murray and Aquaculture Specialist Mike Oesterling began surveying Virginia clam and oyster farmers three years ago. This year's survey, covering the 2007 calendar year, documents continuing growth in both industries. More than 211 million farmed clams were sold in Virginia last year - up 9 percent from an estimated 2006 sale of 194 million clams. About 4.8 million farmed oysters went to market in 2007 - up from 3.1 million in 2006 and 840,000 in 2005. The limiting factor for the growth of oyster farming is the availability of oyster seed from hatcheries, says Oesterling. The farmers we surveyed projected a 14 percent increase in seed production in 2008, and an increase in market oyster sales to 7.3 million. Clam farmers also reported a 22 percent increase in the number of full-time jobs in their industry from 2006 to 2007, and a 14 percent increase in part-time employment. These numbers are significant, say Murray and Oesterling, especially for the economically depressed Eastern Shore communities where many of the state's shellfish aquaculture operations are based."

2) Benefits to Tourism and Eco-Tourism

Recreating on Virginia's waters is important to Virginia's citizens and visitors to the Commonwealth. This requires clean waters. Amongst Virginia's notable resources attracting travelers are its rivers and the Chesapeake Bay, healthy marshes and beach communities, and outstanding wildlife populations. These attributes also attract and give rise to special businesses catering to eco-tourists.

2a) Tourism and recreational resource use

- The Department of Conservation and Recreation's *2007 Virginia Outdoors Plan: Charting the Course for Virginia's Outdoors* notes that "[n]atural beauty and quality of the view were found by the Commission on America's Outdoors to be the most important criteria for tourists seeking outdoor recreation sites." "According to the *Virginia Outdoors Plan*, based on the *2006 Virginia Outdoors Survey*, more than half of the survey participants felt the most needed outdoor recreation opportunities include public access to state waters for boating, fishing, swimming and beach use." "Since planning for the Virginia Outdoors Plan began in 1965, fishing has remained a favorite outdoor recreation activity and continues to increase in popularity with each survey. Combined saltwater and freshwater fishing grew 8.7 percent between 2002 and 2006. Over the past five years, kayaking and canoeing has increased more than other water-dependent outdoor recreation activities with a 17.8 percent increase in participation between 2002 and 2006. According to the 2006 *Virginia Outdoors Survey*, swimming, sunbathing, fishing and boating are respectively the fifth, sixth, seventh, and 10th most popular outdoor recreational activities."

  "The 1965 *Virginia Common Wealth* projected that swimming would be the most popular activity in 2000. While swimming is still very popular as fourth among outdoor recreation opportunities, swimming has declined from 52 percent household participation in 2000, to 44 percent participation in 2006. Most swimmers choose an outdoor or indoor pool setting rather than a natural body of water. The concern for water quality in primary contact sports may be a factor in this trend."

  "The identification of outdoor recreation issues for the *2007 Virginia Outdoors Plan* was comprehensive and involved citizen comment through more than 80 public meetings, a statewide survey, an inventory of parks and recreation facilities for each jurisdiction, and substantial research by outdoor recreation and conservation professionals." Amongst a host of issues identified, those related to "Environmental impacts due to the loss of open space lands to development" included:
    - "Development tends to increase runoff and degrade water quality.
    - Loss of tree canopy affects ecosystems, temperatures and soil stability.
    - Lack of open space affects the functional capacity of the area's green infrastructure.
    - There is a loss of land for outdoor activities, especially those that require large parcels of land.
    - Declining air quality impacts vegetation, water quality and scenic viewing.
    - Land conversion to developed areas decreases traditional viewsheds and cultural landscapes."

- A November 2001 paper written by Cynthia Morgan and Nicole Owens and published in *Ecological Economics*, Volume 39, Issue 2, entitled *Benefits of water quality policies: the Chesapeake Bay*, notes that "[t]he Chesapeake Bay is a unique and treasured natural resource. It is the largest estuary on the Atlantic coast and one of the largest estuaries in the world." The study, which compares the 1996 water quality of the Chesapeake Bay with what it would have been in 1996 without the Clean Water Act and related legislation, states that "[t]he monetized annual boating, fishing, and swimming benefits of water quality

improvements in the Chesapeake Bay range from $357.9 million to $1.8 billion. These benefit estimates represent use values for persons living in the District of Columbia, and portions of Maryland and Virginia. Residents of Delaware, New York, and Pennsylvania, which are also part of the Bay Watershed, are not included in this analysis. As such, this range likely underestimates the true benefits of Bay water quality improvement."

- Virginia's waters are an important source of tourism and recreational pursuits. According to a September 2008 report prepared for the Virginia Tourism Authority by the Travel Industry Association entitled *The Economic Impact of Domestic Travel Expenditures on Virginia Counties 2007*, domestic travelers directly spent close to $18.7 billion in Virginia during 2007, up 5.8 percent from 2006. Of this amount, 7.5% was directly attributable to entertainment and recreation.

  Domestic travel expenditures directly generated 210,300 jobs within Virginia in 2007, an increase of 1.0 percent over 2006. These jobs generated by domestic travel spending in Virginia composed 5.6 percent of total commonwealth non-agricultural employment in 2007. Travel and tourism was the sixth largest industry by nonfarm employment in Virginia in 2007.

- An April 1988 report entitled *Benefits from Improvements in Chesapeake Bay Water Quality: Volume III of Benefit Analysis Using Indirect or Imputes Market Methods* prepared by the Department of Agricultural and Resource Economics at the University of Maryland for the EPA notes that "[w]ater quality was considered either moderately or very important in the selection of a boating area by 75 percent of the trailered boat owners and by 76 percent of the non-trailered boat owners".

  The report also notes that "a significant relationship appeared between objective measures of the Bay's water quality over time and the proportion of households who stopped using the Bay for recreation because they perceived the Bay's water quality to be unacceptable.

- On the website of the Natural Resources Defense Council, a May 1999 report entitled *Stormwater Strategies: Community Responses to Runoff Pollution*, states that "[t]he combination of potential human illness and aesthetic losses can cause loss of revenues from tourism and recreational activities. Urban stormwater runoff was a documented contributing factor to approximately 25 percent of the approximately 1,651 beach closings reported in 1997, and was probably a factor in many more beach closings for which the contaminant sources were undocumented. Coastal tourism is a major component of local economic activity across the nation, adding, for example, some $54 billion dollars and more than 320,000 jobs to the economies of nine California counties alone. Inland, along rivers and lakes, tourism and recreational activities dependent on clean water provide municipalities with tax revenues and employment opportunities. Each year, water-based recreation adds $26 million to $31 million and a minimum of 650 to 750 jobs to the economies of 13 New Hampshire towns along the Connecticut River, and over $13 million and 290 jobs to the economy of the upper Delaware Valley between New York and Pennsylvania (Dolan et al. 1990)."

2b) Eco-tourism

- On the website Business 24/7, Richard Ingham on July 1, 2008 in an article entitled *Economics of eco-tourism*, notes that "[o]ne of the fastest-expanding and well-heeled sectors of the travel industry, eco-tourism aims at serving the growing numbers of people who want to see exotic sights, rare wildlife and remote cultures, but feel guilty about the footprint they will leave. About 70 million people each year travel to places with fragile eco-systems and cultures under what you might call eco-tourism". The article notes that according to the Washington-based group The International Ecotourism Society, "global eco-tourism has been expanding at rates of between 20 and 34 per cent a year since 1990 – and in 2004, the business grew three times faster than the tourism sector as a whole."

- A 2001 article in Appalachia Magazine entitled *Ecotourism Takes Off in the "Heart of Appalachia"* notes that "[e]cotourism, as defined by the International Ecotourism Society, is "responsible travel to natural areas that conserves the environment and sustains the well-being of the local people," and it's proving to be good business in an area where lush mountain landscapes dominate and wildlife thrives. Ecotourism is the fastest-growing segment of the global tourism industry; and tourism is the fastest-growing industry in southwestern Virginia, with an average annual growth rate of 17 percent." The article further notes that "[t]he Heart of Appalachia region of Virginia comes with first-class credentials for ecotourism. A large portion of it has been designated as a bioreserve through the Nature Conservancy's Clinch Valley Program, and this area is one of only 40 places worldwide to be named part of the organization's "Last Great Places" ecosystem protection initiative."

3) Benefits of Water Quality and Quantity controls

Stormwater runoff carries with it pollutants that cause water impairments that require the develop of TMDLs and TMDL implementation plans, generate water treatment costs for water supplies, generate potential health hazards due to nutrient enrichment, and result in significant water clean-up costs. Unmanaged stormwater also results in downstream flooding and severe channel erosion. The water quality criteria and water quality and quantity controls set out in this proposed regulation will reduce water quality degradation and reduce future costs associated with associated cleanups and resources impacts outlined below.

3a) Benefits of flood control

The proposed regulations take significant steps towards moderating the amount of water coming off of the site of a land disturbing activity and controlling the timing and method of the release of those waters. The regulations work towards applying best management practice solutions that will keep the water onsite and promote the beneficial use of these waters.

The Virginia Tech Report (Appendix C, page 28) states that "[s]tormwater management also reduces the peak, duration and volume of stormwater runoff. The control of flows have significant consequences on stream habitat, flood related property damages, downstream infrastructure, and aesthetics (Streiner and Loomis 1995; Johnston, Braden and Price 2006). Virginia's current erosion and sediment and existing stormwater control programs provide some level of runoff control, primarily associated with control of peak flows. Johnston, Braden, and Price estimate differences in flood damage and infrastructure costs (primarily culverts) from conventional residential stormwater designs (stressing stormwater detention) versus conservation

design (greater emphasis on infiltration and disturbed practices). The additional volume control achieved under conservation design was estimated to provide additional flood risk reduction benefits (between 0.4% and 2.5% of the value of downstream properties) and a reduction in infrastructure (culvert) costs for the developed area. In other cases, some elements of conservation design may directly improve the aesthetic environment for surrounding property owners (see Figure [1]). For instance, the property owners are willing to pay more for properties adjacent to riparian areas and to open space (Qiu, Prato, and Boehm 2006)."

The Virginia Tech Report continues by noting that "[n]umerous studies have established a statistical correlation between urban land cover (as measured by impervious cover, effective impervious cover, road density, etc) and different measures of in-stream biotic diversity (ex. indices of biological integrity, measures of diversity of benthic macroinvertebrate life, etc.). Studies overwhelmingly report an inverse relationship between measures of urban land cover (measured as impervious surface, road density, etc.) and downstream biotic measures/indices (Davies and Jackson 2006; Center for Watershed Protection 2003; Wang et al. 2001; NRC 2008). Many studies report measures of biotic diversity begin to be reduced for relatively small amounts of impervious cover (~10%)."

The Virginia Tech Report also states that "[e]mpirical research of the extent to which these impacts might be reduced or avoided by various stormwater control practices is still emerging. Some existing studies suggest that control of peak flow alone has minimal impact on improving aquatic conditions (Maxted, J. R., and E. Shaver 1997; Roesner, Bledsoe and Brashear 2001). The proposed regulation, however, provides incentives to reduce runoff volume and imposes new water quantity criteria on controlling energy input to the stream. The proposed regulations requires more stringent requirements for unstable streams to energy inputs approximating forested conditions (§4VAC 50-60-66.A.3). The incentives to implement runoff reduction practices can also assist in efforts to more closely approximate the hydrology of predevelopment conditions. Reducing the volume, duration, and magnitude of flows will increase the probability of maintaining and improving biotic diversity in streams (NRC 2008). However, as the percentage of impervious cover increases in a watershed; the possibility that management efforts can restore biological conditions to pre-urban conditions in these watersheds is likely to diminish (Booth and Jackson 1997). Thus, the achievable stream restoration benefits (specifically aquatic diversity) may be small for new development or redevelopment in sub-watersheds with high percentages of impervious surfaces. The pro rata share provision of the regulation, however, offers some opportunities to redirect and target financial resources to other areas that have a higher probability to improve and maintain overall stream conditions."

The Report further notes that "the aquatic benefits from management of the runoff volumes generally accrue in relatively close geographic proximity to the stormwater control measures. Thus, the local citizens and governments incurring the higher stormwater control costs are also likely to be the same group of citizens that benefits most from these efforts."

A review of the literature clearly supports that when runoff is not controlled properly it can have significant impacts on aquatic life and may contribute to downstream flooding of residents and businesses and may through erosion result in property loss. However, when managed properly, stormwater may be an economic asset to a developer and homeowner.

- On the website of the Natural Resources Defense Council, a May 1999 report entitled *Stormwater Strategies: Community Responses to Runoff Pollution*, states that "[t]he most dramatic consequence of increases in the volume and rate of stormwater runoff is flooding and property damage". It continues by referencing studies (Klien 1979, Hollis 1975) that "estimated that because of the increase in impervious cover in a watershed a flood event that should be expected once in 100 years could occur once every 5 years when the impervious cover reaches 25 percent, and could become an annual event when impervious cover reaches 65 percent". It was further noted that the Hollis' study indicated that "that covering 30 percent of a watershed with impervious surface can double the size of the 100-year flood event and can enlarge more frequent flood events to an even greater extent".

- The report also notes that "by quickly channeling stormwater away from certain areas via paved channels, stormwater pipes, and stream bank stabilization techniques (e.g., riprap, cutbacks, plantings, and bulkheads) rather than providing for retention or infiltration, conventional stormwater management can simply transfer hydrologic impacts downstream (EPA 1997). At times, downstream areas experience greater habitat loss, increased channel widening and erosion, and worse flooding due to the reduced storage and facilitated runoff upstream."

- The Natural Resources Defense Council website also states that "[r]apidly flushing stormwater can increase erosion from all land, not just streambanks and streambeds. Stormwater then transports the eroded sediment downstream into the receiving waters. Eventually, when sediment-laden water is stilled, that sediment settles to the bottom of the stream, river, lake, or estuary. When sediments settle out, they may cover or destroy important habitat such as spawning beds or submerged aquatic vegetation. Pollutants such as phosphorus attach to sediment particles and become suspended or dissolved in receiving waters. The magnitude of the sedimentation problem is staggering: one study estimates that each year erosion from construction sites puts 80 million tons of sediment into receiving waters (Schueler 1997). Siltation and sedimentation has economic impacts as well. These excess deposits of sediment clog harbors and other water transport routes and reduce the storage capacity of reservoirs, obliging governments to spend billions of dollars each year to dredge and maintain those channels and facilities. The U.S. Army Corps of Engineers dredges 83 million cubic yards of sediment linked to pollution sources each year at an annual cost of $180 million (EPA 1997). In many cases, these dredged sediments are laden with nutrients, heavy metals, and toxic chemicals -- making disposal expensive. Siltation can also affect commercial and recreational fishing by degrading necessary habitat and can impede recreational boating by creating obstructions."

- An April 1997 announcement issued by the Federal Emergency Management Agency entitled *No One Safe From Flooding*, says that "[a]s more and more land is cleared for development and paved over, there is less and less available to soak up excess water. The runoff has to go somewhere, and places that never flooded before are now at risk." "The records of the Federal Insurance Administration indicate that approximately $1.1 billion in claims under the National Flood Insurance Program were paid in each of fiscal years 1995

and 1996. Those same records indicate that the Federal Insurance Administration paid flood insurance claims in every state of the union during that two-year period."

- A September 1995 EPA report entitled *Economic Benefits of Runoff Controls*, recognizes that "[u]rbanization also leads to loss of pervious areas (porous surfaces) that allow rainwater to soak into the ground. This can increase the amount and velocity of rainwater flowing to streams and rivers. This increased speed and volume can have many impacts, including eroded stream banks, increased turbidity and pollution, increased stream water temperature, and increased water flow. All of these can have an adverse effect on the fish and other organisms living in the stream and the receiving waters."

  The report also stated that "most waterbodies within developments can be used as marketing tools to set the tone for entire projects". They quoted a recent study conducted by the National Association of Home Builders that indicates that "whether a beach, pond, or stream, the proximity to water raises the values of a home by up to 28 percent." They also quoted a 1991 American Housing Survey conducted by the Department of Housing and Urban Development and the Department of Commerce that states that "when all else is equal, the price of a home located within 300 feet from a body of water increases by up to 27.8 percent". The article notes that a "practice becoming more prevalent is to site developments around man-made ponds, lakes, or wetlands created to control flooding and reduce the impacts of urban runoff on neighboring natural streams, lakes, or coastal areas" and that "urban runoff controls that are pleasing to the eye and safe for children can lead to increased property value".

  The report specifically notes that ""[i]n many cases, developers are able to make quicker sales and additional profits from units that are adjacent to a wet pond. If the urban runoff management control is also developed to allow passive recreation (e.g., a walking path around the lake or pond), the recreational area and the wet pond/ constructed wetland can become the feature attraction when advertising the property." The reports quotes a 1995 report by Sala that "[a]dding walking trails, fitness equipment, gazebos, bird houses, and other facilities to enhance a detention area can be costly, but eventually additional profits are realized". The report also notes that "[d]evelopers can charge premiums (extra charges) for property with water views, views of wooded land, or other amenities".

  The September 1995 EPA report also includes a number of specific economic studies citing the benefits of certain best management practices:

  <u>New Development</u>

  - A landmark survey by the National Institute for Urban Wildlife indicated that 75 percent of the residents of Columbia, Maryland, a community planned for a population of 100,000, prefer urban runoff ponds that contain permanent pools of water, wetlands, and wildlife over the dry ponds many municipalities prescribe for their subdivisions. Residents (94 percent) overwhelmingly believed that managing future runoff basins for fish and wildlife as well as for flood and sediment control would be desirable. Residents (92 percent) considered the view of birds and other wildlife to be particularly important and felt that the sight of them outweighed any nuisances they created. Perhaps most importantly, 75 percent of Columbia homeowners felt that permanent bodies of water added to real estate values and 73 percent said they would pay more for property located in a neighborhood with storm water control basins designed to enhance fish or wildlife use. The study in Columbia covered an area that contained 3 lakes, 22 runoff ponds with a permanent pool of water, and 9 dry detention basins (Adams et al., 1984; Tourbier and Westmacott, 1992)

- Residents of seven Champaign-Urbana, Illinois, subdivisions with urban runoff detention ponds were questioned about the role the pond played in their decision to purchase their home. Sixty-three percent of the respondents living adjacent to a wet pond identified the pond as what they liked most about their neighborhood. Seventy-four percent of homeowners surveyed believed that wet ponds contributed positively to the image of a subdivision as a desirable place to live. Only 3.5 percent felt a wet pond had a negative influence on the image of their neighborhood. Overall, respondents believed that lots adjacent to a wet pond were worth an average of 21.9 percent more than comparable nonadjacent lots in the same subdivision. Eighty-two percent of all respondents said they would, in the future, be willing to pay a premium for a lot adjacent to a wet pond (Emmerling-DiNovo, 1995).
- Built in 1993, the Sale Lake subdivision of single-family homes surrounds a 4-acre constructed wetland. Sale Lake demonstrates environmental sensitivity in suburban development. Lots located alongside the wetland sold for as much as $134,000, up to a 30 percent premium over lots with no water view (St. Germain, 1995).
- Highland Park, Illinois "Preservation is not a problem for developers; it's a golden opportunity," insists the president of the development company for Hybernia, a community of 122 single-family houses on a 133.5-acre site in Highland Parks, Illinois. The site, zoned for 40,000-square-foot lots, was laid out around a constructed pond/stream system and 27 acres of land approved as a state nature preserve. The site includes 16.5 acres of ponds. Forebays at urban runoff inlets catch sediments (Tourbier and Westmacott, 1992). Hybernia is a an example of ecological landscape planning. Waterfront lots, which now sell for $299,900 to $374,900, draw a 10 percent premium above those with no water view (Margolin, 1995).
- Virginia Chancery on the Lake, a condominium development in Alexandria, Virginia, is a residential project with an attractive 14-acre urban runoff detention area. Realtors are currently promoting the wet pond as the development's feature selling point. The wet pond will be surrounded by a walking trail, and a gazebo and fishing pier will also be built. According to Ginger Harden, Sales Associate of Chancery Associates LP, condominiums are priced between $129,990 and $139,990. Condominiums that front the lake are selling at a $7,500 premium. For the first four buildings on the market, a $5,000 premium was charged for units fronting the lake. The lakefront units were the only units selling, and now the premium has been raised to $7,500 (Harden, 1995).
- A development consisting of apartments and townhouses in St. Petersburg, Florida, Lynne Lake Arms, has four urban runoff detention ponds on site. Three of the ponds are 3 to 5 acres in size, and the fourth is a 25-acre pond with a large fountain in the center. Apartments or townhouses rent for between $336 and $566 a month. Units facing the three smaller ponds have a $15 per month waterfront premium; units facing the large pond are rented at a $35 per month premium (McInturf, 1995). A small channel connects the large detention pond and one of the smaller ponds. Even apartments fronting this channel have a $5 per month waterfront premium.
- The owner of a 72.3-acre parcel of land had plans to fill deteriorating wetlands before building a subdivision. He was persuaded to enhance them instead and now promotes enhanced and constructed wetlands as the feature selling point of The Landing. A lake with 3,750 feet of shoreline provides aesthetic and recreational value, as well as sensible detention of urban runoff. Waterfront lots currently sell for $18,000 to $40,000, a premium of up to $21,000 (150 percent) above comparable lots with no water view (Baird, 1995).

Existing Development

- Since their construction in 1971, units facing the constructed pond in the townhouse community of Pinewood Lakes have sold at a premium. Of the 497 units, all with exactly the same square footage according to tax records, only 20 have direct water views in either the front or the rear. Figures show the average 1994 sales price of townhouses lacking the water amenity to be $93,833. The average waterfront sales price is $100,000, a premium of $6,117. Higher sales prices for properties with views of the water have been consistent for 23 years (Wade, 1995). Evans Mills is an upscale community of 41 townhouses in the Tysons Corner area built around an existing pond. Fairfax County tax records show Evans Mills waterfront townhouses sell at higher prices. In 1994, waterfront homes sold for an average $17,467 premium above the average $419,200 price of homes not facing the pond (Wade, 1995).
- Single-family homes can have higher initial sale values as well as higher resale values when they face urban runoff detention areas. County tax records reveal that land values in Franklin Farms, an established residential neighborhood in northern Virginia, are highest when located in view of its 5-acre urban runoff detention area, which is surrounded by a walking path furnished by the developer. "Waterfront" homes in

this neighborhood sold for 10 to 20 percent more initially and again at resale than land with no water view (Downham, 1995).

Commercial Development

- Laurel Lakes Executive Park, commercial property in Laurel, Maryland, also has created an attractive wet pond system. Office space fronting the water rents at a premium of $100 to $200 per month depending on the size and layout of the office space (Kalish, 1995). On average, first-class office space located in Prince George's County with a lakefront view rents for between $17.50 and $20.00 per square foot, whereas properties without a view rent for between $16.50 and $18.50 per square foot (Duncan, 1995).
- Fairfax County, Virginia Commercial office space also can be valued higher when it fronts aesthetically designed runoff retention ponds. The lakefront Lakeside at Avion and Tysons Pond, both located in Fairfax County, Virginia, are examples of commercial projects that took advantage of the requirement to implement urban runoff management controls by enhancing a retention pond and then capitalizing on the presence of the pond when naming the project. In Fairfax, Virginia, the average cost of commercial office space without water as an amenity is approximately $15 per square foot. The average leasing rate for commercial waterfront office space is $16 per square foot (Constam, 1995; Goeller, 1995).
- In a soft commercial real estate market, where office space is overabundant, it can be difficult to ask for a premium of any kind. However, real estate brokers agree that, when all else is equal, commercial waterfront property rents considerably faster than space that does not front water (Berman, 1995; Constam, 1995; Goeller, 1995; Pepper, 1995).
- Although a tenant might not be charged for a water amenity, it can provide a steadier flow of income and fewer vacancies for the realtor (Berman, 1995). Mike Pepper, Vice President of CB Commercial Real Estate Group, Inc., declares that "There is absolutely a premium associated with commercial lakefront property. Anything adding to the aesthetic value is going to raise a property's value." Mr. Pepper concedes that in the saturated market of northern Virginia, property with a water view might or might not rent for a $1-$3 per square foot premium, but will always sell or be rented more quickly (Pepper, 1995).

- An April 1988 report entitled *Benefits from Improvements in Chesapeake Bay Water Quality: Volume III of Benefit Analysis Using Indirect or Imputes Market Methods* prepared by the Department of Agricultural and Resource Economics at the University of Maryland for the EPA notes that "[t]he abundance and smooth surface of water provide an economical means of moving people and goods. This service is primarily affected by water quantity rather than water quality because excessively low or high stream flow can impair these services.

- A 2006 article in Twineline a publication of Ohio Sea Grant included an article by Jill Jentes Banicki entitled *Hot Commodity: Cleaner Water Increases Lake Erie Waterfront Property Values* noted that "when water clarity and quantity increased, so did property values. The report found that "when water clarity (how far you can see into the water) increased to two meters, the price of that home increased considerably more, to between four to five percent."

3b) Impaired Waters and Total Maximum Daily Loads (TMDLS)

The cost of developing TMDLs and TMDL implementation plans as well as implementing the plans is significant and stream impairments are increasing each reporting period. If stormwater runoff is allowed to increase and to exasperate existing impairments or to create new impairments, the costs of addressing these impairments may be cost prohibitive. The proposed stormwater regulations are designed to reduce or eliminate the various impacts of stormwater runoff and should result in a reduction in necessary cleanup plans.

- In a March 2007 report prepared by the Department of Environmental Quality in cooperation with DCR and DMME entitled *TMDL Program Six Year Progress Report 2000-2006* it is shown that the development of 1,700 TMDLs through 2018 has a price tag of approximately

$32.3 million ($19,000/TMDL) associated with it. Further, the report indicates that 1,937 impairments are in need of the development of a TMDL Implementation Plan. These plans have been averaging $12,500 per impairment thus suggesting a need for plan development of an additional $24.2 million. Following development of a plan, the plans still require implementation for which extensive funding may also be necessary. The report notes that DCR's state funds are only targeted toward agricultural BMPs and that additional funds must be identified to address other nonpoint sources pollution sources such as on-site septic systems, urban stormwater, and mining issues. The report also states that urban non-point source BMPs can be more difficult to implement when compared with agricultural BMPs historically used throughout the state, primarily due to larger populations, limited property size requirements, and associated costs. Amongst it conclusions, the report states that additional legislative and regulatory tools now appear needed to reach Virginia's water quality goals.

- According to the website of the Virginia Department of Environmental Quality (DEQ), they "released the Final 2008 305(b)/303(d) Water Quality Assessment Integrated Report (Integrated Report) on December 22, 2008. The 2008 Integrated Report is a summary of the water quality conditions in Virginia from January 1, 2001, to December 31, 2006. The Virginia Department of Environmental Quality develops and submits this report to the U.S. Environmental Protection Agency every even-numbered year. The report satisfies the requirements of the U.S. Clean Water Act sections 305(b) and 303(d) and the Virginia Water Quality Monitoring, Information and Restoration Act. The goals of Virginia's water quality assessment program are to determine whether waters meet water quality standards, and to establish a schedule to restore waters with impaired water quality. Water quality standards designate uses for waters. There are six designated uses for surface waters:
  - aquatic life
  - fish consumption
  - public water supplies (where applicable)
  - shellfish consumption
  - swimming
  - wildlife

  Additionally, several subcategories of aquatic life use have been adopted for the Chesapeake Bay and its tidal tributaries. The standards define the water quality needed to support each of these uses. If a water body contains more contamination than allowed by water quality standards, it will not support one or more of its designated uses. Such waters have 'impaired' water quality. In most cases, a cleanup plan (called a 'total maximum daily load') must be developed and implemented to restore impaired waters." The document reports that "[i]mpaired area in rivers and streams increased from 9,002 miles in 2006 to 10,543 miles in 2008. Impaired area in estuaries decreased from 2,216 square miles in 2006 to 2,182 in 2008. Additionally, impaired area for significant lakes decreased from 109,208 acres in 2006 to 94,044 in 2008. This decrease was primarily due to the new assessment methodology for lake nutrient and dissolved oxygen (DO) Standards which became effective during 2007."

  The report also notes that "[t]he leading cause of impairment of designated uses in Virginia's rivers and streams is violation of the E. coli bacteria Standards (5,981 mi). In 2003, Virginia adopted three bacteria criteria for primary recreation (swimming) use including fecal

coliform, E. coli and enterococci. For 2008, DEQ has used E. coli (in freshwater) and enterococci (in estuaries) as the recreational use bacteria indicator, replacing fecal coliform criteria. However, previous fecal coliform impairments have been carried forward if no data has been collected for the new indicators. Agricultural practices appear to be one of the primary sources contributing to the bacteria Standards violations. However, urban runoff, leaking sanitary sewers, urban storm sewers, failing septic tanks, domestic animals and even wildlife can also be significant contributing sources."

- A November 2000 report by DEQ, DCR, and DMME to the Governor and General Assembly entitled *Total Maximum Daily Load Program: A Ten Year Implementation Plan*, stated that [b]ased on the cost estimates in the recently contracted Implementation Plans for fecal coliform bacteria TMDLs, costs range from $400,000 to $800,000 per watershed for implementation of the TMDL(s). Excluding shellfish TMDLs, overall TMDL implementation could be in the range of $150 million to $300 million."

- As noted in the January 2009 Bay Journal, "[a]ccording to the Waterkeeper Alliance, stormwater runoff in the Bay region has damaged more than 1,570 miles of rivers and 44 square miles of estuarine waters".

3c) Benefits of water reuse (rainwater harvesting)
The proposed regulations promote best management practices that retain water and thereby reduce stormwater runoff. The regulations also promote the reuse of waters captured through practices such as cisterns as the water should be recognized as a resource that has economic advantages.

- An August 2007 report by the Cabell Brand Center entitled *Virginia Rainwater Harvesting Manual*, indicates that the "[h]arvesting of rainwater has a long-term impact on the local water resources by reducing demands for surface and groundwater withdrawals. Also, harvesting rainwater protects the integrity of local waterways by reducing nonpoint source pollution. Including rainwater harvesting in local and regional water supply plans offers an alternative and sustainable water source while protecting the local environment." The report calculates that "Virginia population increases of nearly eight percent between 2000 and 2006 have resulted in an increase of 475,535 new homes. Assuming each home has 1,500 square feet of roof area, 713 million square feet of impervious roof surfaces were installed during this time, resulting in 19 billion gallons of rooftop runoff per year. These impervious roof surfaces contribute to Virginia's ongoing problem of nonpoint source pollution. Rainwater harvesting follows ecologically sound principles for water use as it reduces the impact on the land, promotes sustainable practices, reduces stormwater runoff, reduces peak flow levels, reduces reliance on ground and surface water, allows for groundwater recharge, and promotes water conservation."

  The manual reports that "[t]he cost of municipally supplied water nationwide has increased by 9.8% from 1998 to 2001 (Water Bank 2005), 4% between 2001 and 2002 (Soultanian 2005), and 27% in the last five years (Clark 2007). Prices will continue to rise due to increasing costs to treat water to adapt to EPA's Safe Drinking Water Act guidelines, upgrade declining infrastructures, and instill conservation programs. Most US infrastructure

was first installed after World War II and many are at or past the 50 year expected lifespan. Therefore, water costs are sure to rise to help offset the replacement/rehabilitation cost. Reducing potable water demand through rainwater harvesting could eliminate the need for infrastructure expansion. Installing a rainwater harvesting system can help residents reduce their water supply costs. With rainwater harvesting systems, most of the cost is upfront cost, but systems ultimately pay for themselves within a few years, depending on the system and local water prices. This time could be reduced, depending on how quickly municipal water costs increase. Appropriately designed rainwater harvesting systems will have minimal maintenance costs associated with its upkeep and therefore will show the best long-term relationship between cost and financial benefit." The report also notes that "[r]ainwater harvesting systems typically increase residential property value and offer current and future residents the opportunity to live an environmentally responsible lifestyle."

3d) Environmental (or Better) Site Design or Low Impact Development

The proposed regulations and the accompanying Virginia Runoff Reduction Method and worksheet have been designed to promote early site design for stormwater management in an environmentally sound manner. This process includes the use of environmental site design or low impact development and the regulations encourage the reuse of stormwater that should be looked upon as beneficial resource and asset that may be utilized to reduce costs. Employing these strategies is environmentally sound and cost effective.

- Larry Coffman, the Associate Director for Prince George's County [Maryland] Department of Environmental Resources Programs and Planning Division noted in an article entitled *Low Impact Development: Smart Technology For Clean Water; Definitions, Issues, Roadblocks, and Next Steps*, that LID "is sensitive to addressing local government's unique environmental and regulatory needs in the most economical manner possible by reducing costs associated with stormwater infrastructure design, construction, maintenance and enforcement. LID also provides for local government's need for economic vitality through reasonable and continued growth and redevelopment. LID allows for greater development potential with less environmental impacts through the use of smarter designs and advanced technologies to achieve a better balance between conservation, growth, ecosystem protection and public health/ quality of life." He continues, "[i]nstead of the large investments in complex and costly centralized conveyance and treatment infrastructure, LID allows for the integration of treatment and management measures into urban site feature. LID encourages the multifunctional cost-effective use of the urban greenspace, buildings, landscaping, parking lots, roadways, sidewalks, and various other techniques to detain, filter, treat and reduce runoff."

  Mr. Coffman also states that "[it] costs less than conventional stormwater management systems to construct and maintain, in part, because of fewer pipes, few conveyance structures and less impervious surface. Space once dedicated to stormwater ponds can now be used for additional development to increase lot yields or provide for more conservation." LID "is a more environmentally sound technology and a more economically sustainable approach to addressing the adverse impacts of urbanization."

He notes that "[i]f a developer uses the entire suite of LID techniques it cost less for sediment control, clearing, grading, roadways, curbs, gutters, sidewalks, inlets, pipes and ponds. The developer can recover more developable space since there is no need to waste space for a stormwater pond. Generally, greenfields single-family residential development cost savings are typically four to five thousand dollars per unit or a 30% reduction in overall infrastructure costs. The reduced infrastructure construction eventually translates into reduced future costs for infrastructure maintenance. The infrastructure reduction savings far out weight any of the cost increases due to LID techniques."

- In a Department of Conservation and Recreation brochure entitled *Better site Design: An Informational Brochure for Virginia Communities Implementing the Chesapeake Bay Preservation Act* and written by the Center for Watershed Protection, it notes that the "careful application of the Model Development Principles can reduce impervious cover, minimize clearing and grading, and conserve natural areas and indigenous vegetation". It highlights a redesign exercise of 108 lots where "impervious cover was reduced by 25%, disturbed land was reduced by 36%, and the cost of development was reduced by 20%".

- A Department of Conservation and Recreation brochure entitled *Virginia's Chesapeake Bay Preservation Act & Local Bay Act Programs" Working Together to Protect Streams, Rivers, and the Bay*, notes that riparian buffers, an important best management practice in these proposed regulations, continues "to be one of the most reliable mechanisms for removing pollutants from runoff". The document states that riparian buffers:
  - "Control streambank erosion and flooding
  - Promote infiltration and groundwater discharge
  - Provide food and cover for fish and other aquatic life
  - Provide shade and decrease water temperatures
  - Provide habitat for wildlife
  - Provide recreational opportunities
  - Reduce sediment up to 97 percent
  - Reduce nitrogen up to 80 percent
  - Reduce phosphorus up to 77 percent"

- A report prepared by LimoTech and Casey Trees for the EPA entitled The Green Build-out Model: Quantifying the Stormwater Management Benefits of Trees and Green Roofs in Washington, DC, indicated that "trees, green roofs, and larger tree boxes provide substantial overall reductions in stormwater runoff and discharge volumes in sewer systems District-wide. In addition to stormwater management benefits and for the same investment, an increase in tree cover, more green roofs, and larger tree boxes would also provide improvements in air quality, public health, social capital, and economic development, and reductions in carbon dioxide, energy costs, UV radiation, and the urban heat island effect." "The Green Build-out Model is a planning tool that quantifies the cumulative stormwater management benefits of trees and green roofs for different coverage scenarios across the District of Columbia. It calculates potential reductions in stormwater runoff within the municipal separate storm sewer system (MS4) and the combined sewer system (CSS) that contribute to water quality impairment in the Nation's capital." As part of the modeling, "[a]n estimate of pollutant load reductions achieved with green roofs was developed by

considering the difference in pollutant loading from a conventional roof and that of a green roof. Annual operational savings for DC WASA from reduced pumping and treatment costs as a result of stormwater flow reductions were estimated using $.01 per gallon. Additional key findings showed:

- For an average year, the intensive greening scenario prevents over 1.2 billion gallons of stormwater from entering the sewer systems, resulting in a reduction of 10% or over 1 billion gallons in discharges to the District's rivers, and a 6.7% reduction in cumulative CSO frequencies (74 individual CSO discharges).
- For an average year, the moderate greening scenario prevents over 311 million gallons of stormwater from entering the sewer systems, resulting in a reduction of 3% or 282 million gallons in discharges to the District's rivers, and a 1.5% reduction in cumulative CSO frequencies (16 individual CSO discharges).
- Reductions in stormwater runoff volume are up to 7% across the city, with up to 27% reductions in individual sewersheds under the intensive greening scenario.
- Reductions in discharge to the District's rivers from the CSS [combined sewer system] area are 6% for the moderate greening scenario and over 22% for the intensive greening scenario.
- With the intensive greening scenario, installing 55 million square feet of green roofs in the CSS area would reduce CSO discharges by 435 million gallons or 19% each year.
- Stormwater management benefits from incremental tree cover were approximately 5 times greater for trees over impervious surfaces, such as streetscapes and parking lots, than for trees over pervious surfaces.
- Larger tree boxes in the downtown area could reduce stormwater runoff by 23 million gallons each year.
- Replacing conventional roofs with green roofs has the potential to keep thousands of pounds of nutrients, metals, and other pollutants out of area waterways.
- WASA could potentially realize between $1.4 and $5.1 million per year in annual operational savings in the CSS area due to reduced pumping and treatment costs."

3e) Positive attributes of leaving trees on project sites

The proposed regulations encourage site planning and the use of nonstructural control practices, such as leaving portions of a site forested in order to reduce and manage stormwater runoff. Leaving trees can reduce stormwater runoff and reduce necessary infrastructure costs.

- A January 2003 report from the Chesapeake Bay Commission entitled *The Cost of a Clean Bay: Assessing Funding Needs Throughout the Watershed* noted that "[t]he importance of natural systems in retaining and filtering pollutants cannot be underestimated, from either an environmental or economic perspective. A study by a national organization, American Forests, of urban tree loss in the D.C. metropolitan region calculated the pollution control benefits provided by its existing urban forest. The metropolitan D.C. area's trees remove 20 million pounds of pollutants from the air each year, a benefit worth $50 million annually. The ability of trees to absorb stormwater, lessen erosion and reduce peak flow was also analyzed. Urban tree were estimated to retain 949 million cubic feet of water. If these trees were lost and replaced by impervious surfaces, building equivalent retention facilities would cost the region $4.7 billion."

- On the website of the Natural Resources Defense Council, a May 1999 report entitled *Stormwater Strategies: Community Responses to Runoff Pollution*, states that "[n]ot only do impervious surfaces prevent infiltration, they often warm stormwater as it runs off. Unshaded rooftops, parking lots, and other impervious areas can be 10–12° F warmer than fields and forests and consequently can heat the stormwater passing over them, often to 90° F or more, even before it reaches a stream or lake (Schueler 1995, Klein 1999). Research has found that the average stream temperature increases directly with the percentage of impervious cover in the watershed (Homer et al. 1994). One study documented a temperature difference of almost 20° F between a wooded section of a Maryland stream and an open section of the same stream 7/10ths of a mile downstream (Klein 1979). Furthermore, trees shade waterbodies keeping them cool, while development often replaces trees with impervious surfaces."

- A fact sheet from the Center for Urban Horticulture at the University of Washington, College of Forest Resources entitled *Urban Forest Values: Economic Benefits of Trees in Cities* cited the following benefits of trees:
  - City-wide, the amount and quality of trees influence both biological and physical urban environments. Plants, if strategically placed and cared for, can become a "living technology," a key part of the urban infrastructure that contributes to more liveable urban places.
    - Heating and Cooling Costs - A 25 foot tree reduces annual heating and cooling costs of a typical residence by 8 to 12 percent, producing an average $10 savings per American household. Also, buildings and paving in city centers create a heat-island effect. A mature tree canopy reduces air temperatures by about 5 to 10° F, influencing the internal temperatures of nearby buildings.
    - Air Quality and Cleansing - A typical person consumes about 386 lb of oxygen per year. A healthy tree, say a 32 ft tall ash tree, can produce about 260 lb of oxygen annually - two trees supply the oxygen needs of a person each year! Also, cooler air temperatures created by tree canopies reduce smog levels by up to 6%, producing savings in air clean-up campaigns. Finally, a mature tree absorbs from 120 to 240 lbs of the small particles and gases of air pollution. In Sacramento, CA, for instance, this represents a value of $28.7 million.
    - Improved Water Quality - The canopy of a street tree absorbs rain, reducing the amount of water that will fall on pavement and then must be removed by a stormwater drainage system. In one study, 32 feet tall street trees intercepted rainfall, reducing stormwater runoff by 327 gallons. Savings are possible since cities can install surface water management systems that handle smaller amounts of runoff.
  - House prices are also influenced by the presence of trees. Developers can maximize profits by retaining existing trees or replanting an urban forest after construction is completed.
    - Increased Home Sales Prices – Several studies have analyzed the effects of trees on actual sales prices of residential properties. Homes with equivalent features - square footage, number of bathrooms, location - are evaluated. In one area a 6% increase in value was found to be associated with the presence of trees; an increase of 3.5 to 4.5% was reported in another study.

- Unimproved Property values - Using a scale model of a land parcel, researchers found that there was a 30% difference in appraised value based on the amount and variation of tree cover. Taking into account the potential value of a house built on the site, the value increase would be close to 5%.

3f) Submerged Aquatic Vegetation (SAV)

Aquatic vegetation is an important habitat within the Chesapeake Bay that has experienced significant declines due to increased turbidity. These regulations will control water quantity and water quality both of which are targeted at removing sediment runoff from land disturbing activities and from impacting the Commonwealth' s aquatic resources.

- An April 1988 report entitled *Benefits from Improvements in Chesapeake Bay Water Quality: Volume III of Benefit Analysis Using Indirect or Imputes Market Methods* prepared by the Department of Agricultural and Resource Economics at the University of Maryland for the EPA notes that "[t]he decline in submerged aquatic vegetation (SAV) is another indicator of the decline in the Bay's water quality. The decline in SAV is connected with turbidity and growth of epiphytes and phytoplankton, by excessive nutrification. The loss of SAV means less suitable habitat for spawning finfish and shellfish."

3g) Water supply costs

Controls on stormwater runoff through these regulations will provide greater protection to the Commonwealth's public water supplies.

- On the website of the Natural Resources Defense Council, a May 1999 report entitled *Stormwater Strategies: Community Responses to Runoff Pollution*, states that "[i]n urbanized areas, runoff pollution is a serious concern for water supply agencies. Over 90 percent of the people in the United States rely on public supplies of drinking water. Of that 90 percent, 19 percent are served by systems with reported health violations (EPA 1998). A nationwide survey of surface drinking water supply utilities found that with an increase in urbanization there arose an increased concern among managers over runoff pollutants, particularly nutrients, bacteria, and toxic organic chemicals (Robbins et al 1991). The costs can be astronomic. For example, runoff pollution from suburban and agricultural sources is one of the largest threats to New York City's currently unfiltered drinking water supply. If this pollution cannot be prevented, New York City may need to filter its water supply at a capital cost of perhaps $5 billion or more (Marx et al. 1999).

  The report also notes that "[e]xcess nutrient loads can cause severe algal blooms, which coat the surface of water with an unpleasant scum, cloud the water, and add unpleasant odors and taste to water used for swimming or drinking (EPA 1993). The fish kills that urban stormwater pollution can cause are also community nuisances."

3h) Benefits to public health

Sources of nutrient enrichment to the Commonwealth's waters, such as stormwater runoff, may result in harmful algal blooms and the proliferation of microorganisms such as *Pfisteria* that have know health risks associated with them. *Pfiesteria* for instance, is a single-celled microorganism that lies dormant in the sediment of fresh and brackish water estuaries, but in combination with

high nutrient concentrations potentially becomes a toxic predator of a number of local fish species. *Pfiesteria* has been linked to fish kills in Virginia, Maryland and Delaware. In addition to the scientific questions concerning the effects of *Pfiesteria* on the ecological health of the Mid-Atlantic region's estuary system, public perception of *Pfiesteria* and other harmful algal blooms has the potential to impose significant economic losses on the region. Lost use of recreational resources, lost tourism revenues, decreased consumption of seafood, lost fishing time due to estuary closures, possible medical costs for treatment and increased regulation on industries that impact the estuary systems all represent decreases in the economic welfare to the Mid-Atlantic region.

- A May 2002 report for the National Sea Grant College Program, National Oceanic and Atmospheric Administration entitled *The Economic Effects of Pfiesteria in the Mid-Atlantic Region*, stated that [t]he economic effects of a *Pfiesteria*-related fish-kill are significant. This report demonstrates that the direct economic effects (in the form of reduced seafood consumption) and indirect effects (in the form of increased perceived risks) of *Pfiesteria*-related fish kills are substantial. The lost consumer surplus due to a published/reported fish kill is estimated to be between $1.70 and $3.31 per meal if no information, counter information or seafood inspection program is provided to the consumer. Aggregating this number to the population of seafood consumers (13.08 million residents, of which 41.6% seafood consumers eat 4 meals per month on average), the lost consumer surplus due to a fish kill event is $37 million to $72 million in the month following the fish kill. Further evidence of the significance of the lost welfare due to uncertainty regarding the safety of seafood is the respondents' stated willingness to pay of $10.76 per meal for a mandatory seafood inspection and certification program, or $2.8 billion annually. The estimated welfare improvements derived from the seafood inspection program are broader in scope that *Pfiesteria*-related fish-kill events. This figure is significantly higher than the estimated welfare losses associated with a fish kill, and represents a willingness to pay estimate for general seafood safety. This includes uncertainty about safety in relation to *Pfiesteria*, and other safety concerns."

- A June 2005 report for the National Sea Grant College Program, National Oceanic and Atmospheric Administration entitled *The Welfare Effects of Pfiesteria-Related Fish Kills: A Contingent Behavior Analysis of Seafood Consumers*, noted that that *Pfiesteria* related fish kills have a significant negative effect on the demand for seafood. The authors estimated that the aggregate avoidance costs incurred in the month immediately following a *Pfiesteria* related fish kill is $50-$130 million.

- An April 2004 paper by Jade Alvey entitled *The Human implications of Pfiesteria: The Eastern Shore of Maryland and the impacts of a toxic dinoflagellate bloom on the culture, health, and economics of a community*, found that "[t]he concerns over health implications expressed by the watermen are another important impact of *Pfiesteria* on the Eastern Shore community. While working on the Pocomoke estuary during 1996, waterman began to experience health problems. Symptoms appeared to increase significantly during the large outbreak of *Pfiesteria* that was identified in 1997 (Grattan et. al, 1998, p. 532). The dinoflagellate's toxin is released into the water but can also aerosol and become present in the air in the immediate vicinity of affected waterbodies (Kempton & Falk, 2000, p. 274).

The aerosol process means that a human in the area of a fish kill caused by *Pfiesteria* would be exposed to the toxin and could develop health problems as a consequence. Three groups of humans exposed to the toxin that developed health problems identified by Kempton and Falk were: watermen working on boats over water during the outbreak, fishers who put their hands into the water or touched affected fish during the outbreak, and researchers in labs breathing from improperly ventilated tanks containing high concentration of *Pfiesteria* (Kempton and Falk, 2000, p. 274). No conclusive documentation on the health affects of consuming affected fish has been found, although the lesions can carry pathogenic microbes. Human health affects that have been found from coming into contact with the toxic include skin rashes, nausea, burning eyes, headaches, and memory disturbance of up to six months (Paolisso, 1999, p. 54). One of the most recognized health impacts is that of neurological disturbances. Many watermen who came into contact with the toxin experienced loss of memory and confusion for a significant period of time after they had left the affected area. One man with neuropsychological symptoms could not remember where his destination was or why he was going there after he had already begun to drive his vehicle to the destination (Grattan et. al, p. 535). A study of people highly to moderately exposed to the Pocomoke River during the outbreak found more severe effects on those with chronic exposure to the water when toxin-producing Pfiesteria were present. The most consistent finding among exposed individuals was a deficit in new learning and selective or divided attention (Grattan et. al, 1998, p. 537)."

- The paper continues "[i]ncreased public knowledge about such health impacts may have caused there to be more unwillingness to consume seafood products. In turn, the Eastern Shore waterman and the economy of the area in general were negatively affected. As news about the Pfiesteria outbreak continued to grow in late August and September of 1997, there was a steep and definite decline in the sales volume of seafood products associated with the Eastern Shore (Lipton, 1999). Although no definite findings had been reported concerning a link between consumption of seafood and negative health affects during the outbreak, this did not quell the concerns of the public. The uneasiness of consumers over the toxic *Pfiesteria* outbreak in the Chesapeake Bay watershed could be clearly seen in the drop of sales. During the outbreak many stores put out advertisements that they did not sell any Maryland seafood, not just seafood form the Eastern Shore, as seafood sales declined (Magnien, 2001, p. 847). By Lipton's calculations, a total of forty-three million dollars were lost in seafood sales because of the public's concern about seafood safety (Lipton, 1999). Those with the biggest losses were sellers who specialized in the distribution of Chesapeake Bay products. The fish and other seafood from the Chesapeake Bay was seen as more of a health threat since it was closer to the source of the *Pfiesteria* outbreak. Recreational fishing in the area also suffered monetary losses due to the outbreak. Although many areas used by the recreational fishing industry were not on the Pocomoke or its tributaries, the perceived high risk of exposure to *Pfiesteria* kept many people away. Recreational fishing losses to charter boat captains and fishermen were only four million dollars."

- The website of the U.S. National Office for Harmful Algal Blooms (NOAA affiliated) states that a "preliminary and highly conservative nationwide estimate of the average annual costs of HABs [harmful algal blooms] is approximately $50 million. Public health is the largest component, representing nearly $20 million annually, or about 42% of the nationwide

average cost. The effect on commercial fisheries averages $18 million annually, followed by $7 million for recreation and tourism effects, and $2 million for monitoring and management. The actual dollar amount of these estimates is highly uncertain due to a lack of information about the overall effect of many HAB events and a difficulty in assigning a dollar cost to those events that we do understand. While many expenses may be difficult to quantify, there is little doubt that the economic effects of specific HAB events can be serious at local and regional levels."

- On the website of the Natural Resources Defense Council, a May 1999 report entitled *Stormwater Strategies: Community Responses to Runoff Pollution*, states that "[s]tormwater carries disease-causing bacteria, viruses, and protozoa. Swimming in polluted waters can make you sick (Paul 1998). A study in Santa Monica Bay found that swimming in the ocean near a flowing storm sewer drain during dry weather conditions significantly increased the swimmer's risk of contracting a broad range of health effects. Comparing swimming near flowing storm-drain outlets to swimming at a distance of 400 yards from the outlet, the study found a 66 percent increase in an group of symptoms indicative of respiratory disease and a 111 percent increase in a group of symptoms indicative of gastrointestinal illness within the next 9 to 14 days. Increased sediment in receiving water is also related to human illness: sediment prolongs life of pathogens and makes it easier for them to reproduce."

3i) Aesthetic value

Water quality improvements achieved through implementation of these regulations may also improve the overall appearance of the Commonwealth's waters.

- A January 2000 EPA report entitled *A Benefits Assessment of Water Pollution Control Programs Since 1972: Part 1, The Benefits of Point Source Controls for Conventional Pollutants in Rivers and Streams*, noted that "[t]hroughout history, water has been cherished for its aesthetic value. For many people, the onsite observation of water resources and associated living and physical systems is a source of inspiration. Often, aesthetic services are referred to as passive uses. Both water quantity and quality may affect the quality of aesthetic amenities. Any degradation of water, whether it be excessive flow that erodes stream banks or chemicals that harm aquatic organisms, may reduce the enjoyment humans receive from viewing water resources."

3j) Threatened and Endangered Species

Stormwater runoff can also impact the habitat of threatened and endangered species and affect the health of these populations and at times hinder their survival or restoration. As noted on the NOAA Coastal Storms Program website, several studies have shown a negative correlation between the abundance and diversity of sensitive aquatic species and the degree of urbanization (Weaver and Garman 1994; Wheeler et al. 2005; Urban et al. 2006; Gresens et al. 2007). These regulations work to minimize those potential impacts.

- A 2001 technical report produced by the California EPA entitled *Mitigation Of Storm Water Impacts From New Development In Environmentally Sensitive Areas* notes that "[u]rban storm water contains pollutants that degrade water quality and adversely impact aquatic habitat. Pollutants found in storm water include suspended solids, heavy metals and a broad

suite of organic compounds including pesticides, nutrients, petroleum compounds, pathogen indicators and other by-products of urban activities. Urban storm water has also been shown to alter water quality parameters such as pH, oxygen demand, specific conductance, temperature and turbidity. Finally, urbanization modifies the hydrologic properties of a site, generally leading to increased volumes of runoff from a given amount of precipitation, and a more rapidly developing runoff peak. These pollutants and hydromodifications can directly result in negative impacts to biota and degrade ecosystems. Metals, organic compounds and other pollutants can have acute and/or chronic toxic effects to aquatic flora and fauna, and flow modifications can directly degrade the physical conditions of a habitat through erosion and deposition of sediments. A growing body of research links urban storm water runoff to water quality impairments and habitat degradation. Rivers and tributary streams, lakes, wetlands, estuaries and near shore ocean waters are susceptible to storm water impacts. Adjacent habitats may be indirectly impacted by the degradation of aquatic areas. Fauna in riparian habitats may be negatively impacted by water quality degradation through reduced aquatic food sources, alteration of reproductive environments and habitat alteration that fosters proliferation of non-native species." The report also notes that "[t]he most effective and economic way to accomplish the mitigation of storm water pollution from new development is to identify and implement water quality control techniques at the planning and design stage rather than require post-construction retrofits."

- On the River Network website on a page entitled *Understanding the Clean Water Act*, it states that "[p]ollutants carried into water bodies by stormwater have negative effects on many uses such as aquatic life, recreation and public water supplies. Sediment is known to be one of the pollutants causing the most damage in aquatic environments, for example, by carrying chemical substances into the water, clogging spawning and feeding areas, causing damage to fish gills, and leading to changes in fish communities. Unnatural high flows, caused by runoff over increasing amounts of impervious surface, result in significant changes to hydrology and stream channels. These high flows scour the stream banks, remove vegetation (which leads to increased temperatures), carry away large debris critical for fish survival, and reduce the opportunity for groundwater recharge. Long-term effects of poor stormwater management are very site specific and are related to habitat degradation, deposition and accumulation of toxic sediments, or the inability of the aquatic organisms to adjust to repeated exposures to high concentrations of toxic materials or high flow rates." (Pitt, Robert, Ph.D., *Effects of Stormwater Runoff from Development*, River Voices, vol.14, no.3)

Examples of species impacted (plants, mussels, and fish) by the effects of stormwater include:

- The U.S. Fish and Wildlife Service (New Jersey Office) website notes that "[t]he primary threats to swamp pink [a species known in Virginia] are the indirect effects of off-site activities and development, such as pollution, introduction of invasive species, and subtle changes in groundwater and surface water hydrology. Hydrologic changes include increased sedimentation from off-site construction, groundwater withdrawals or diversion of surface water, reduced infiltration (recharge) of groundwater, increases in erosion, increases in the frequency, duration, and volume of flooding caused by direct discharges to wetlands (such as stormwater outfalls), and increased runoff from upstream development."

- A November 2001 article by Jerome Diamond et al. in Environmental Science & Technology entitled *Identifying sources of stress to native aquatic fauna using a watershed ecological risk assessment framework* noted that "[t]he free-flowing Clinch and Powell River Basin, located in southwestern Virginia, United States, historically had one of the richest assemblages of native fish and freshwater mussels in the world. Nearly half of the species once residing here are now extinct, threatened, or endangered." The article continues by stating that "[o]ur analyses indicate that agricultural and urban land uses as well as proximity to mining activities and transportation corridors are inversely related to fish index of biotic integrity (IBI) and mussel species diversity." The research concluded "that agricultural and urban land use contribute sediment to the stream causing embeddedness, poor cover for fish and invertebrates, and, consequently, impaired fish and mussel assemblages". The article also notes that "protection and enhancement of naturally vegetated riparian corridors, better controls of mine effluents and urban runoff, and increased safeguards against accidental chemical spills, as well as reintroduction or augmentation of threatened and endangered species, may help sustain native fish and mussel populations in this watershed."

- A webpage of the Ecosystem Restoration Institute at University of Maryland's Center for Environmental Science states that "[t]he decline in Bay sturgeon populations, caused by over-harvest and by habitat and water quality degradation, has persisted for over a century. Thus sturgeon are the only resource species that is near extinction today. It notes that "[s]oil erosion from human disturbances or weather events can significantly increase sediment deposition and degrade sturgeon spawning grounds. Additionally, young and adult sturgeon are bottom feeders that prefer small crustaceans, bivalves, and worms. Excessive sediment accumulation and hypoxic bottom conditions caused by eutrophication and elevated nitrogenous compounds can further affect sturgeon negatively, especially fry and juveniles." The webpage states that "[s]uccessful recovery of sturgeon hinges on many factors, including spawning and nursery habitat restoration, pollution reduction and other water quality improvement, and potential reintroduction of stocks."

3k) Reduction in climate change effects

The regulations will work to reduce future impacts on stormwater by advancing the use of infiltration practices where applicable to attenuate runoff.

- The December 2008 report submitted to Governor Kaine by The Honorable L. Preston Bryant, Jr., Secretary of Natural Resources as Chair of the Governor's Commission on Climate Change entitled *Final Report of The Governor's Commission on Climate Change: A Climate Change Action Plan* noted that "Virginians will face increased costs related to climate change. While these costs are difficult to calculate with any level of certainty, it is certain that Virginia residents, governments, and businesses will face increased costs to adapt to the effects of climate change. For example, as sea level rises, businesses as well as federal, state, and local governments will be forced to move or raise the elevation of public works and build protective barriers to protect existing infrastructure. The Hampton Roads area is particularly vulnerable due to the low elevation of the land and the existence of civilian and military ports, buildings, and infrastructure. Stormwater systems will need to be designed to handle larger flows with increased storm intensity. Utility infrastructure will need to be constructed to withstand greater natural forces." The report also finds that "DCR

should monitor available forecasting tools and amend its stormwater regulation as needed to ensure the implementation of stormwater management measures that will continue to function effectively in an altered precipitation regime." The proposed regulations do work to attenuate runoff and to divert increased flows to infiltration practices or to capture flows for water reuse. Such water quantity controls should benefit the public and work towards alleviating the impacts of climate change on stormwater management.

4) Benefits to regulated community and their consultants

Independent of the potential costs associated with these regulations also comes economic benefits to developers and their consultants through project review streamlining and greater assurances on project design acceptability.

4a) Benefit to home prices

As noted in the Benefits for Water Quality and Quantity discussion above, implementation of stormwater runoff control strategies through early site planning and the use of BMPs and site design strategies that reduce water quality impacts also may have a fiscal benefit to the developers. Developers utilizing the tools and strategies advanced in these regulations should gain economic advantages over those that continue stormwater management using current day approaches.

4b) Administrative benefits

The proposed regulations will allow erosion and sediment control and stormwater plan reviews to be conducted in a coordinated fashion by a qualifying local program. Upon satisfaction of the plan reviews and registration requirements, developers can begin land disturbing activities under construction general permit coverage also authorized by the regulation to be issued by the locality. This streamlined, locally driven process will allow for "one-stop shopping" by the developer and reduce today's situation where the Department of Conservation and Recreation may visit a site after plan approval has been completed and the land disturbing activity commenced and finds deficiencies in the site designs that merit correction. Additionally, today developers must receive construction general permit coverage from the Department. Under this new administrative process, developers should have a greater sense of assurance that once their local approvals are received that their project may proceed.

4c) Compliance with federal and state Code requirements

The proposed regulations will ensure that federal, state, and local Code and regulatory requirements are addressed comprehensively during the review of the project by the qualifying local program in order to assure that water quality requirements are met on the project site. If land disturbing activities are conducted in accordance with the approved plans and BMPs are properly installed and maintained, enforcement actions should be minimal.

4d) Allowance for Offsite Compliance and Pro-rata fees

In situations where complete compliance with the necessary water quality phosphorus load reductions on site is difficult, as may be the case for infill and urban redevelopment sites, the regulations allow for off-site controls in part or in whole in accordance with a Department-approved comprehensive watershed stormwater management plan. If no comprehensive watershed stormwater management plan exists, the criteria may still be allowed to be met off-site

in accordance with the criteria set out in the regulations. Additionally, if allowed by the qualifying local program, reductions required for a site may be achieved by the payment of a pro-rata fee sufficient to fund improvements necessary to adequately achieve those reductions. As a last resort, a local program may also waive the water quality requirements through the granting of an exception if specific conditions are applicable. These allowances provided in the regulations have can have a significant economic benefit to the developer.

[NOTE: Additionally, HB2168 of the 2009 Session, effective July 1, 2009, created a new section numbered 10.1-603.8:1 relating to stormwater nonpoint nutrient offsets that stipulates that a permit issuing authority may allow compliance with stormwater nonpoint nutrient runoff water quality criteria through the use of the permittee's acquisition of nonpoint nutrient offsets in the same tributary.] This will also provide for an additional mechanism to enable developers to comply with the proposed regulations.

Summary of Benefits

While unable to provide a comprehensive single fiscal estimate of the benefits in all cases as they apply directly to stormwater impacts, it should be self-evident from the preceding discussion, and the preponderance of indirect information provided, that the cost of water quality impairments attributed to stormwater runoff can have a multi-billion dollar economic impact associated with it. DCR does believe that the benefits do justify the costs associated with the proposed regulations; however, DCR is equally prepared following the public comment period to weigh additional materials provided and to right-size the regulations and associated costs as may be warranted.

Although a cost-benefit ratio cannot be provided for this regulation, an interesting anology might be found in EPA's October 1999 Economic Analysis of the Final Phase II Storm Water Rule that is largely being implemented through the Commonwealth's stormwater management regulations. The results of EPA's study indicated that the cost-benefits ratio of implementation of those regulations nationwide was roughly a 1:3 ratio. Specifically, the study found that the estimated total annual costs (in 1998 dollars) to construction operators, including the implementation of erosion and sediment control and post-construction controls, to be between $545.0 and $678.7 million nationally. The total benefits of Phase II controls were conservatively estimated to be $1.63 billion per year. Sensitivity analyses, where different levels of pollutant removal efficiencies were assumed, resulted in a further increase in benefits of $200 to $300 million. The study also articulates details concerning additional benefits that may be realized beyond those outlined in this discussion but that may be equally applicable.

1) Projected cost to the state to implement and enforce the proposed regulation, including (a) fund source / fund detail, and (b) a delineation of one-time versus on-going expenditures

Overview

Two primary state entities are affected by these regulations (although all state agencies engaged in regulated construction activities may be impacted by the enhanced water quality and quantity standards advanced by these proposed regulations). The two agencies are DCR and the Virginia Department of Transportation. Impacts to each will be discussed in this section.

One of the key elements of these proposed regulations is to establish a stormwater management program in every locality in the Commonwealth that can be administered in conjunction with a locality's existing erosion and sediment control program. This approach will improve efficiencies in the administration of land disturbing projects and provide developers with one-stop shopping for erosion and sediment control and stormwater reviews and approvals. This concept was embodied in the Code of Virginia when the Stormwater Management Act was amended in 2004. The Code specifies that:

> §10.1-603.3. Establishment of stormwater management programs by localities.
>
> A. Any locality located within Tidewater Virginia as defined by the Chesapeake Bay Preservation Act (§10.1-2100 et seq.), or any locality that is partially or wholly designated as required to obtain coverage under an MS4 [Municipal Separate Storm Sewer System] permit under the provisions of the federal Clean Water Act, shall be required to adopt a local stormwater management program for land disturbing activities consistent with the provisions of this article according to a schedule set by the Board. Such schedule shall require adoption no sooner than 15 months and not more than 21 months following the effective date of the regulation that establishes local program criteria and delegation procedures, unless the Board deems that the Department's review of a local program warrants an extension up to an additional 12 months provided the locality has made substantive progress. A locality may adopt a local stormwater management program at an earlier date with the consent of the Board.
>
> B. Any locality not specified in subsection A may elect to adopt and administer a local stormwater management program for land disturbing activities pursuant to this article. Such localities shall inform the Board and the Department of their initial intention to seek delegation for the stormwater management program for land disturbing permits within six months following the effective date of the regulation that establishes local program criteria and delegation procedures. Thereafter, the Department shall provide an annual schedule by which localities can submit applications for delegation.
>
> C. In the absence of the delegation of a stormwater management program to a locality, the Department will administer the responsibilities of this article within the given jurisdiction in accordance with an adoption and implementation schedule set by the Board.

A portion of the Department's responsibilities are derived from subsection C above. It is anticipated that DCR will become responsible for administering a local stormwater management program in those localities not amongst the cumulative 103 Chesapeake Bay Act and those covered by Municipal Separate Storm Sewer System (MS4) permits that are required by statute to administer a local stormwater management program. Many of the localities that DCR may be responsible for establishing a local stormwater management program in are the more rural localities across the Commonwealth that may find it more fiscally challenging and less cost effective due to lower numbers of permits to run their own program. The Department estimates that there could be as many as 222 localities that do not adopt a program [12 cities, 62 counties, and 148 towns]. The Department would collectively administer these programs as 74 local programs (towns would be handled as part of counties). A list of the subject localities and the estimated costs associated with administering such programs is presented in Appendix A and will be discussed in more detail below.

The Virginia Tech Report (Appendix C, page 36) acknowledges that "DCR, however, may be able to achieve some administrative economies of scale by consolidating administrative activities across larger geographic regions in their regional offices."

The Department of Conservation and Recreation will also have statewide program oversight responsibilities associated with the local administration of this federal permitting and pollutant control program. Additionally, while enforcement authority is expected to be passed to the localities with EPA's concurrence, the Department, as does the federal government with the state, retains over-filing authority to address enforcement actions directly should it be necessary. Specifics associated with the estimated program oversight costs are also presented in Appendix A and will be discussed in more detail below.

The majority of the costs advanced in this section will be on-going with the exception of the development of the Enterprise Website that will be one-time (although maintenance and system updates would continue). As noted in Appendix A, in order to facilitate smooth transmittal of permit data, permit coverage issuance, reporting, applying for permits, payment and tracking of fees, BMP tracking, training, and the delivery of other services, the Department is working on the design of an Enterprise website. The cost of developing the database is unknown at this time but could be in the neighborhood of $1 million. The source of this funding is also unknown at this time but may require a special appropriation from the General Assembly or a Treasury loan.

Additionally, the locality and DCR staff implementing the consolidated stormwater management program will require training on stormwater management principles and practices. A certification program will be required for locality and DCR staff. The development and implementation of the training program is expected to cost approximately $250,000 per year. It should be noted the costs of the training and certification program will be covered by fees for class attendance and exams and is not considered to be included in the 28% program oversight fees, nor are the FTE that would be necessary to administer the training program.

Estimated workload and revenue to cover costs associated with Local Program Administration and Statewide Program Oversight through permit fees

As part of calculating state costs, the first step was to estimate the number of permits that might be administered on an annual basis by the 74 mandatory programs (represents 222 localities). Utilizing a series of computations discussed in Appendix A and highlighted in Figures A-1 and A-2 and Tables A-1 through A-10, it was determined that 5,000 permits per year would be a reasonable estimate of the permit load statewide. The computations next estimated how long plan review, inspections, and the various elements of program administration take as well as the associated costs. Tables A-11 through A-14 present the amount of time and estimated costs associated with program administration from each construction project (dependent on size of project).

Utilizing these computations, and after removing the localities' anticipated workload, it was estimated that the 74 DCR run local programs would administer 1,576 of the permits. Table A-18 indicates that DCR should have $4.4 million in expenses and the need for 54 staff associated

with construction program administration (some of which it already retains). The fees have been modified to a level to support these identified costs.

Like the localities, DCR will be responsible for:

- Stormwater BMP plan review and approval
- Stormwater BMP construction inspection
- Stormwater BMP record keeping/tracking
- General Permit coverage issuance
- General Permit enforcement
- Stormwater BMP long-term post-construction compliance monitoring & enforcement
- Receipt of permitting and program administration fees

It was then calculated in Appendix A the oversight costs that DCR would have associated with this statewide responsibility. Although not a comprehensive list, key responsibilities for DCR will generally include:

- Review of all local program approval packages submitted to the Virginia Soil and Water Conservation Board for consideration.
- General training and educational outreach.
- Ordinance development and review.
- Local program technical assistance including local plan review, inspection, and BMP questions.
- Response to complaints not resolved at the local level.
- Enforcement responsibilities as deemed necessary.
- Response to issues related to permit issuance and fee accounting.
- BMP Clearinghouse and the enterprise website development and maintenance and maintain the stormwater management handbook.
- Statewide program oversight responsibilities for the auditing of all local programs on a periodic cycle to insure compliance.
- Oversight of state stormwater management projects.

Table A-19 and the discussion that precedes it outline the staffing and fiscal needs associated with these oversight services. They indicate that DCR should have $2.8 million in expenses and the need for 33 staff associated with construction program oversight (some of which it already retains). The fees have also been modified to a level to support these identified costs and correspond to 28% of all construction general permit coverage fees collected.

Although only peripherally associated with this action and directly associated with the fee action, Table A-20 outlines the MS4 Program Oversight costs. With the enhancement of the state's stormwater management program technical and administrative functions, MS4 program responsibilities will commensurately grow. DCR should have approximately $446,000 in expenses and the need for 5 staff associated with MS4 program oversight.

Table 2 (from Appendix A, Table A-31) outlines the necessary staff, projected costs for DCR and the revenue expected to be generated by fees for DCR. As noted in the table, DCR will receive revenue from the initial permit fees for the programs it administers (72%), revenue from

all permit fees for program oversight (28%), the maintenance fees should DCR administered projects extend multiple years (some are projected to last as long as 10 years), and some revenue from those projects where plan review may be conducted but the project does not advance and seek general permit coverage (1/2 of the permit fee costs). The fees that were modified to cover the responsibilities outlined in Appendix A, Table A-24 and to generate the necessary revenue are presented in Tables A-25 and A-26.

Table 2 (From Appendix A; Table A-31): DCR Total Costs and Revenue Calculations [Includes existing staff and potential contract staff in the computations: SEE DISCUSSION BELOW]

Category	Staff (FTE)	Total Projected Cost	Revenue
Construction: Program Oversight	33 (From Table A-19)	$2,897,974 (From Table A-19)	28% = $3,306,229 (From Table A-30)
Construction: Administration of 74 local programs	54 (From Table A-18)	$4,414,867 (From Table A-18)	72% = $3,800,592 (From Table A-29)
10% increase for contracting		$441,487	
Construction: Maintenance Fees Generated	0		$477,768 (From Table A-36)
MS4: Program Oversight (From Table A-20)	5	$445,947	$446,800
Fees generated from the 5% of projects that have plan review but do not seek General Permit coverage (1/2 fee) [1,576 *.05] = 78 * $2,412[1]*.5 = $94,068	0		$94,068
Totals	92	$8,200,275	$8,125,457

Note 1: $3,800,592 (from Table A-29) / 1,576 = $2,412

Of the 92 stormwater staff identified above, DCR currently has 18 filled positions allocated solely to stormwater paid out of the existing revenue generated by fees and has another 8 stormwater allocated positions vacant. Insufficient fee revenue currently exists until the new fees are implemented to allow for the full filling of the currently authorized 26 positions in total. Once the revenue stream begins, DCR will over several years need to request in the budget additional positions as found necessary to fully implement the program as outlined in Appendix A, contract out with other entities to administer the programs, or both. (Contracting may be DCR's preferred alternative in order to better manage the implementation of the program.) DCR will also evaluate staffing in other related portions of the Agency and see where resources may be allocated to stormwater implementation at least in the short-term to allow a reasonable phase-in of program personnel. It should also be noted that should permit loads not meet the estimate, DCR would not require as many individuals to administer the program and would have lower costs (and commensurately less revenue would be generated). Out of the projected $8.2 million, DCR currently generates from fees about $1 million per year of this amount (See Table A-27).

One note of concern to the Department is the costs associated with long-term inspection and maintenance of BMP's. Unlike localities that may have the authority to pursue other sources of revenue to cover these costs, DCR has no additional sources of funding to cover these needs.

DCR will be working with BMP owners in the localities where it will be administering local programs to ensure to the best of its ability that these responsibilities are being met. As the magnitude of this issue becomes known in the rural communities, DCR may need to seek Code authorities or budgetary support to address this on-going fiscal need.

Virginia Department of Transportation

In terms of the Virginia Department of Transportation, the proposed regulations work to reduce the known impacts of stormwater runoff from transportation land disturbance projects.

The Chesapeake Bay Commission in January of 2009 in *Resolution #09-1* stated that "highways, roads and other paved surfaces are enormous sources of stormwater runoff and also alter natural hydrology in the watershed. In the Chesapeake Bay region, it is estimated that runoff from highways contributes nearly seven million pounds of nitrogen, one million pounds of phosphorous and 167,000 tons of sediment annually to the Bay. Improving the capacity of transportation programs to remediate stormwater pollution is essential to restoring clean water."

The specific cost of the impacts to Transportation is unknown, although most of their projects would be considered redevelopment projects for existing roads and therefore would have reduced cost expectations. In testimony provided when the proposed regulations were brought before the Board in September of 2008, a VDOT representative noted that in the charrettes conducted on the proposed criteria, the numbers worked on some sites but there were some linear projects that presented some problems; however, VDOT would most likely end up doing offsite mitigation for those types of projects which is allowed by the regulations.

The Virginia Tech Report (Appendix C, page 39) noted that "the cost of road construction will increase as a result of the proposed regulation. While costs will increase, a total annual estimate of the increased cost to comply with the proposed standards, however, could not be estimated at this time. Between 2005 and 2007, Virginia Department of Transportation road construction projects obtained permits to cover slightly more than 1,000 disturbed acres per year for the state." See Table A-2 for a complete historical accounting of general permit coverages issued.

The Virginia Tech Report (Appendix C, page 39) continues "the proposed regulation will increase both road construction and post construction maintenance costs. The redevelopment water quality criteria would apply for road construction and improvement projects to existing roads. New road or major expansions of existing roads will likely be subject to the proposed 0.28 lb/ac phosphorus water quality standard. Under current regulations, the vast majority of stormwater control structures constructed for road projects are extended dry detention basins. To achieve compliance with the new water quality criteria will require greater reliance on filtration and infiltration types of BMPs. As noted in the cost discussion above, such practices are often more costly to both construct and maintain. Furthermore, new road construction will likely require wider right-of-ways in order to install stormwater control practices, thus increasing land acquisition costs. VDOT expects achieving the redevelopment water quality criteria for projects located in urban areas and rural secondary roads will be more technically challenging and costly than for new road projects. Urban areas and rural secondary roads typically have narrow right-of-ways. Urban streets may face additional challenges to treating water in high percentages of impervious surface and curb-and-guttered streets. All limit the suitable land areas for treating

stormwater runoff. In many cases, VDOT expects to rely on some off-site controls to achieve compliance."

Summary

It is recognized that the proposed regulations will increase costs to the Department of Conservation and Recreation, Department of Transportation, and perhaps other state entities that are conducting land disturbing activities. However, the Department suggests that the fees established will be sufficient to address the Department of Conservation and Recreation's increased costs and that the costs to other agencies is justified given the significant benefits outlined previously associated with clean water. The state needs to lead by example and be model stewards of the Commonwealth's aquatic resources.

2) Projected cost of the regulation on localities

Overview

One of the key elements of these proposed regulations is to establish a stormwater management program in every locality in the Commonwealth that can be administered in conjunction with a locality's existing erosion and sediment control program. This approach will improve efficiencies in the administration of land disturbing projects and provide developers with one-stop shopping for erosion and sediment control and stormwater reviews and approvals. This concept was embodied in the Code of Virginia when the Stormwater Management Act was amended in 2004. The Code (as amended during the 2009 Session in HB1991; effective July 1, 2009) specifies that:

> § 10.1-603.3. Establishment of stormwater management programs by localities.
>
> A. Any locality located within Tidewater Virginia as defined by the Chesapeake Bay Preservation Act (§ 10.1-2100 et seq.), or any locality that is partially or wholly designated as required to obtain coverage under an MS4 [Municipal Separate Storm Sewer System] permit under the provisions of the federal Clean Water Act, shall be required to adopt a local stormwater management program for land disturbing activities consistent with the provisions of this article according to a schedule set by the Board. Such schedule shall require adoption no sooner than 15 months and not more than 21 months following the effective date of the regulation that establishes local program criteria and delegation procedures, unless the Board deems that the Department's review of a local program warrants an extension up to an additional 12 months provided the locality has made substantive progress. A locality may adopt a local stormwater management program at an earlier date with the consent of the Board.
>
> B. Any locality not specified in subsection A may elect to adopt and administer a local stormwater management program for land disturbing activities pursuant to this article. Such localities shall inform the Board and the Department of their initial intention to seek delegation for the stormwater management program for land disturbing permits within six months following the effective date of the regulation that establishes local program criteria and delegation procedures. Thereafter, the Department shall provide an annual schedule by which localities can submit applications for delegation.
>
> C. In the absence of the delegation of a stormwater management program to a locality, the Department will administer the responsibilities of this article within the

given jurisdiction in accordance with an adoption and implementation schedule set by the Board.

The Code, also contemplating efficiencies that may be gained through this regulatory action, noted that:

§ 10.1-603.3. Establishment of stormwater management programs by localities.

E. Each locality that is required to or that elects to adopt and administer an approved local stormwater management program shall, by ordinance, establish a local stormwater management program that may be administered in conjunction with a local MS4 program and a local erosion and sediment control program…

H. Localities that adopt a local stormwater management program shall have the authority to issue a consolidated stormwater management and erosion and sediment control permit that is consistent with the provisions of the Erosion and Sediment Control Law (§ 10.1-560 et seq.).

All counties, cities, and towns covered by the Chesapeake Bay Preservation Act (17 cities, 29 counties, and 38 towns) and counties, cities, and towns covered by Municipal Separate Storm Sewer System (MS4) permits (27 cities, 15 counties, and 7 towns) are required by statute to administer a local stormwater management program. As some overlap exists in these lists, it is anticipated that 103 localities will need to adopt the stormwater management program. All of these localities are today administering some level of a stormwater management program due to the Chesapeake Bay Act and or the federal MS4 requirements. See Appendix A for a listing of all localities required to adopt a local stormwater management program. These localities represent approximately three quarters of the state population.

Per this Code requirement, the Department of Conservation and Recreation, as discussed above, will likely be responsible for administering collectively 74 local stormwater management programs as the localities may find it fiscally challenging to run their own program in some of the more rural localities. These program costs will be reflected in the state costs associated with these regulations.

Although efficiencies will be realized by localities through the increased integration of erosion and sediment control and stormwater management requirements, it is anticipated that additional staff may be required by some jurisdictions. However, it is anticipated that fees established pursuant to the Department's fee regulatory action that is running parallel to this regulatory action will cover those staffing needs. Appendix A outlines both the anticipated program costs and the proposed fees that were developed based on those costs.

The Virginia Tech Report states (Appendix C; page 31) that "the proposed regulation will require local governments to spend additional resources on administering stormwater control" notes that "in general, local administration of a stormwater program involves a number of activities including:

- Stormwater BMP plan review and approval
- Stormwater BMP construction inspection
- Stormwater BMP record keeping/tracking

- General Permit coverage issuance
- General Permit enforcement
- Stormwater BMP long-term post-construction compliance monitoring & enforcement
- Receipt of permitting and program administration fees"

In order to determine the potential workload and necessary staffing, analysis of a variety of information was conducted by the Department and the Virginia Tech economist. The Virginia Tech Report notes (Appendix C, page 31) that "the analysis identifies possible ways the proposed changes will impact program administration costs to state and local government. The expenditure of additional resources to implement the proposed changes represents a societal cost that is in addition to practices and actions associated with constructing and maintaining stormwater control practices. Any changes in program administration cost, however, must be distinguished conceptually from those who will pay the cost. Although program costs are expected to increase for state and local governments in ways described below, the proposed fee structure will mean that a portion of those costs will be paid by the regulated community."

DCR Survey of Localities Staffing Needs

In August of 2006, prior to the specifics of the regulations being known, DCR conducted a survey of local stormwater and erosion and sediment control programs. Thirty-four counties, nine cities, and 12 towns completed or partially completed the survey. Through this survey, the Department wished to evaluate the number of staff currently allocated to the erosion and sediment control program and to the local stormwater program (if the locality had one), as well as information on how many additional staff are needed to properly run these programs. As part of the information received, 15 of the localities responded to the question related to the need for additional staff to administer construction general permit issuance. From the responding localities, it was estimated that on average, 2.25 additional employees per locality were needed to properly administer construction general permit coverage issuance. However, overall from the data, it was also noted that size of programs and potential needs had a very wide range and, upon review, it was determined that this was not an appropriate or accurate vehicle to determine staffing needs and to determine sufficient permit fees. Additionally, it was difficult to separate existing needs from those associated with the proposed regulations. Instead, it was determined that the Department should study in a more detailed process the costs of plan review, inspections, etc. to generate better estimates for staffing needs and in estimating appropriate permit fees.

VT Economist Interviews with localities regarding staffing needs

The Virginia Tech Report (Appendix C, page 31) states that "during the fall 2008, interviews were conducted with staff for 7 large stormwater programs within the Chesapeake Bay Preservation Act area (jurisdictions representing about a third of Virginia's total population)." The Report (Appendix C, page 34) notes, speaking to all localities, that "the cost to these jurisdictions to implement the new regulations is subject to considerable uncertainty". The Report states that "most local governments interviewed were reluctant or unable to provide an estimate of the amount of new resources needed for implementation. All agreed that additional staffing and budgetary resources would be necessary (These additional costs would be fully or partially covered by new stormwater fees). The challenge of estimating future costs is compounded by the fact that many localities felt that additional resources were needed to adequately implement *existing* stormwater and erosion and sediment control programs." The

Report notes that "the overlapping responsibilities of program administration (E&S, stormwater, public works) and the challenge of separating costs across existing and new proposed activities further complicate estimating the increase in costs associated with proposed regulation."

The Virginia Tech Report (Appendix C, pages 34-35) noted that "either through the interview process or a portion of the data from the DCR survey (outlined above), eleven local stormwater programs provided an estimate of the increase in costs or staff needed to comply with the proposed regulations. These programs represented almost one fourth of all disturbed acres in the set of localities identified above. These 11 localities estimated 31 to 41 additional staff in total would be needed to administer the proposed regulation [this equates to an average of 2.8 to 3.7 per locality]. Three localities provided a minimum estimate of additional staffing needs (e.g. "need at least 2 additional staff"). Assuming a full time equivalent staff paid at $36/hour (wage + fringe) plus 10% overhead costs, a rough estimate of the incremental staffing costs for these 11 localities would be between $2.6 and $3.4 million per year. Assuming the remaining localities with existing stormwater programs would have to increase in the roughly the same proportion as this sample, total estimated local government staffing costs may be between $10.6 and $14.2 million per year." The Department notes that it is intended for these additional costs to be fully covered by new stormwater fees although the Department does not calculate the costs (DCR's computations noted below) to be of this magnitude. Part of this may be attributed to a majority of the interviews being conducted with large stormwater management programs that are functioning in highly urbanized areas and may not be fully representative of statewide costs.

Additionally, per the Virginia Tech Report (Appendix C, page 35), "these totals exclude increases in long-term maintenance and repair costs that may be assumed by the local programs as a result of the implementation of the proposed regulation. These cost estimates do not include additional educational and technical materials that must be developed to successfully implement the new program. Finally, these costs also exclude the annual increase in inspection, tracking, and enforcement costs that will occur as the stormwater infrastructure inventory grows."

Estimated workload and revenue to cover costs through permit fees

As was the case above in estimating the state costs, as part of calculating expenses, the first step in estimating locality costs was to estimate the number of permits that might be administered on an annual basis by the 103 mandatory programs. Utilizing a series of computations discussed in Appendix A and highlighted in Figures A-1 and A-2 and Tables A-1 through A-10, it was determined that 5,000 permits per year would be a reasonable estimate of the total statewide permit load. The computations next estimated how long plan review, inspections, and the various elements of program administration take as well as the associated costs. Tables A-11 through A-14 present the amount of time and estimated costs associated with program administration from each construction project (dependent on size of project).

Utilizing these computations, and after removing the Department of Conservation and Recreation's anticipated workload, it was estimated that the 103 localities would administer 3,424 of the permits. Tables A-22 and A-23 indicate that the localities should have $6.7 million in expenses associated with construction program administration. The fees have been established at a level to support these identified costs.

Table 3 (from Appendix A, Table A-32) outlines the necessary staff, projected costs for localities and the revenue expected to be generated by fees for localities. As noted in the table, localities will receive revenue from the initial permit fees (72%), the maintenance fees should projects extend multiple years (some are projected to last as long as 10 years), and some revenue from those projects where plan review may be conducted but the project does not advance and seek general permit coverage (1/2 of the permit fee costs). The fees that were established to cover the responsibilities outlined in Table A-24 and to generate the necessary revenue are presented in Table A-25.

Table 3 (from Appendix A, Table A-32): Locality Total Costs and Revenue Calculations

Category	Staff (FTE)	Total Projected Cost	Revenue
Administration of 103 local programs	82 (From Table A-23)	$6,704,058 (From Table A-23)	72% = $5,818,766 (From Table A-28)
Construction Maintenance Fees Generated	0		$703,792 (From Table A-36)
Fees generated from the 5% of projects that have plan review but do not seek General Permit coverage (3,424*.05) = 171 * $1,699[1] * .5 = $145,265			$145,265
Totals	82	$6,704,058	$6,667,823

Note 1: $5,818,766 (from Table A-28) / 3,424 = $1,699

It is expected that some localities may supplement these fees with other sources of revenue. Throughout the Regulatory Technical Advisory Committee process, localities inquired whether they could charge additional fees to supplement their revenue under other authorities. The Department indicated that this would be a determination and decision of the local jurisdictions.

Municipal Separate Storm Sewer Systems (MS4s) Fees

Although more germane to the discussion of the fee regulation, localities that manage Municipal Separate Storm Sewer Systems (MS4s) will be responsible for annually paying a maintenance fee to the Department of Conservation and Recreation for MS4 program oversight. The Department of Conservation and Recreation's program costs are presented in Table A-21 and the resulting fees that were established to cover the Department's program costs are outlined in Table A-26. The annual revenue received from localities to cover the Department's costs is projected to be $446,800 (Table A-31). Of this amount, localities are already paying an average of $60,400 annually (Table A-27) resulting in a net annual increase of $386,400.

Potential Costs Associated with BMP Inspections, Maintenance, and Tracking

As mentioned in Appendix A, localities will have clear long-term responsibilities associated with conducting periodic inspections of BMPs after the land disturbing activity has ended to ensure the BMPs continue to function as intended. Some localities are already doing this, although the potential addition of more small-scale BMPs across the project sites in response to the new water quality and quantity criteria may increase the inspection responsibilities and costs. The owners will also have increased responsibilities associated with inspections that may reduce localities'

costs. Although the long-term inspection costs were not included in the permit fees that the developers are paying based on conversation with and direction from the Regulatory Technical Advisory Committee, localities may utilize stormwater utility fees pursuant to § 15.2-2114 of the Code of Virginia to cover a portion or all of these costs as well as localities have the authority for certain proffers that may assist with stormwater.

On this issue, the Virginia Tech Report (Appendix C, page 32) notes that "the stormwater infrastructure inventory represents a long-term regulatory responsibility and growing cost obligation to local stormwater programs. The new emphasis on run-off reduction, however, may offset some of these costs because of avoided future administration and remediation costs from local drainage problems." The Report (Appendix C, pages 32-33) also notes that the "proposed regulations, however, offer opportunities to manage these additional costs of a long-term inspection and maintenance program. The proposed regulation requires local stormwater programs to develop an inspection program. The inspection program, however, includes a priority system that would allow a locality to target inspections (frequency, type, etc.) based on a number of factors including the type of stormwater practice, contributing drainage area, and downstream conditions (4VAC50-60-114D). In concept such a priority system could target inspection in relation to the relative contribution of any given practice to water quality improvement or the probability of failure. DCR is also considering developing a stormwater practice tracking and reporting system that could help reduce inspection administration costs."

The Virginia Tech Report (Appendix C, page 33) adds that "local stormwater programs can also rely on the private sector to carry out some of the inspection activities. Private inspections are allowed if conducted by a licensed professional and paid for by the owner of the stormwater facility (4VAC 50-60-114C and 114.D4) and in accordance with the inspection schedule outlined in the stormwater facility maintenance agreement (4VAC50-60-124). Although such provisions do not avoid the social cost of inspections, it does allow the local stormwater program to shift some inspection costs to the private sector."

The Virginia Tech Report (Appendix C, page 33) also suggests that "local government programs might face higher long-term costs associated with maintaining BMPs. The proposed regulations encourage the assignment of long-term maintenance costs to private landowners. The regulation states that the responsibility for long-term operation and maintenance of stormwater facilities shall remain with property owner or other legally established entity, unless assumed by a government agency (4VAC50-60-124). In many local programs, however, the responsibility of long-term maintenance is frequently assumed or partially assumed, particularly in residential areas, by the local government. Often the landowner or homeowner association will assume responsibility for routine maintenance while the local program will assume responsibility for major retrofits and repairs. Local programs will elect to assume partial responsibility for some types of stormwater practices in some situations because of a perceived inability of the private landowner to effectively carry out the long-term maintenance requirements (Ruppert and Clark). In this regard, the Report notes that the proposed stormwater revisions also allow local governments to conduct necessary repairs or maintenance on negligent stormwater facility owners and then recover the costs from the owner (4VAC50-60-124A)." The Department notes that the assumption of BMP maintenance is clearly up to the local jurisdiction and that a mechanism for the locality to recoup expenses has been included in the regulations, as the Virginia Tech Report observes.

The Virginia Tech Report (Appendix C, page 32) indicated that "an effective stormwater program requires a system to inventory and track BMPs, long-term compliance monitoring (inspection), and enforcement against noncompliance. Such a system is essential to ensure that practices continue to provide water quality and quantity control services over time. A long-term compliance system requires developing a BMP tracking system, system of inspection, administration and follow-up for violations, and initiation of enforcement actions if deficiencies and violations are not corrected. Recent reports conclude that a major challenge confronting stormwater programs across the United States is inadequate plans and resources to ensure the long-term maintenance of stormwater infrastructure (GAO 2007; NRC 2008)." The Department of Conservation and Recreation notes that it is anticipated that the Department's Enterprise Website will include BMP tracking elements to assist localities that may not have this capability.

Additionally, like any regulated entity, a locality, will be subject to the increased costs associated with construction projects that the locality itself plans to initiate. The stormwater fee regulations do provide authority to a locality to waive or reduce fees. This was inserted to allow localities to waive their own costs or in other special situations for others. However as is noted in 4VAC50-60-780, "if a qualifying local program waives or reduces any fee due in accordance with 4 VAC50-60-829, the qualifying program shall remit the 28% portion that would be due to the Virginia Stormwater Management Fund if such fee were charged in full". Additionally, 4VAC50-60-700 also authorizes that "should a qualifying local program demonstrate to the board [Virginia Soil and water Conservation Board] its ability to fully and successfully implement a qualifying local program without a full implementation of the fees set out in this Part, the board may authorize the administrative establishment of a lower fee for that program provided that such reduction shall not reduce the amount of fees due to the department for its program oversight and shall not affect the fee schedules set forth herein."

Summary

It is recognized that the proposed regulations will increase costs to localities. However, the Department suggests that the fees established will be sufficient to address these increased costs and that the regulations and existing Code authorities for localities provide sufficient opportunities for the localities to be able to manage costs associated with activities beyond completion of the project such as long-term inspections and BMP maintenance.

3) Description of the individuals, businesses or other entities likely to be affected by the regulation

Overview

The Virginia Tech Report (Appendix C, page 7) notes that "the proposed regulation revises water quality and quantity control requirements for land disturbing activities. As such, the proposed regulations will primarily impact private land developers, public land developers, businesses, and homeowners. Private land developers across the state may face increased land development costs associated with these new regulations in many situations. A portion of those costs will be passed down to buyers of newly constructed properties, homeowners and businesses. Although maintenance of stormwater control facilities should be conducted under today's regulations, many commercial property owners and some residential property owners

across the state may still face higher long-term costs associated with maintenance of stormwater control facilities because of the potential for the installation of a greater number of these facilities to meet the proposed requirements and higher maintenance costs associated with some types of BMPs. Virginia residents will also likely pay for the higher costs associated with local stormwater program requirements".

The Virginia Tech Report (Appendix C, page 7) also notes that "public agencies (such as state colleges and universities, state agencies, and municipalities) involved in public works and construction projects will also be required to comply with these requirements. The Virginia Department of Transportation, for example, will be subject to revised runoff control requirements associated with road construction and modification activities (see above response to question 1 related to state agency impacts)."

Additionally the Report states that "the direct expenditures (costs) associated with implementing the proposed stormwater requirements may increase upon the current demand for stormwater design and construction services. The comprehensive nature of the regulations and the additional technical requirements will necessitate the greater use of environmental consultants and engineers to design stormwater plans and oversee the implementation of stormwater practices. Businesses providing construction and earthmoving services will also be impacted, although the direction of change is difficult to assess since the type and magnitude of construction and earthmoving activities will change simultaneously."

Finally, the Virginia Tech Report specifies that "the general public as a whole also benefits from additional stream channel and flood protection. Additional stream channel protection will provide the public additional assurances that habitat and aquatic diversity will be protected from the impacts of urban land use change. The emphasis on runoff reduction may increase local groundwater recharge and thus protect local stream baseflow during drier parts of the year. The proposed revisions in the water quality criteria will provide reductions in nutrient loads from development activities from what otherwise would have occurred in absence of the revisions."

The Department adds that the benefits of the regulation are wide reaching (see earlier introductory discussion of benefits) and substantial. In some form or fashion it can truly be said that this regulation will have impacts on virtually every citizen of the Commonwealth as well as future generations.

Costs Associated with Permit Fees

In order for DCR and localities to properly administer local programs and for DCR to provide necessary program oversight, existing fees are being amended to meet these needs. The Code of Virginia specifies in §10.1-603.4 of the Code of Virginia that fees shall be set at a level sufficient for the Department [or the local program administering the program for the Department] to carry out its responsibilities under this stormwater law.

Computations in Table A-27 indicated that DCR currently generates on average $1,051,716 per year in fee revenue, although there is an expectation that revenue will continue to decline in 2009 with the sagging economy. This revenue is comprised of $60,400 from MS4 permits and $991,316 from construction permits.

Table A-31 indicates that the Department's projected revenue from the new fees would be $8,131,892, comprised of $446,800 in fees from MS4s [from localities] and $7,685,092 in fees from construction [from developers]. Additionally the revenue to localities from their portion of the fees is estimated in Table A-32 to be $6,667,823 from construction [from developers]. The total fee revenue generated will therefore be $14,799,715 per year. This represents an increase in fee revenue of $13,747,999 per year. Of this amount, the increase from MS4s is $386,400 [from localities] and $13,361,599 from construction [from developers]. Should the actual number of land disturbing projects decline from the projected permit numbers, the total cost to developers will decline, as will the revenue available to the Department and localities for program administration.

The necessary fee levels were set utilizing the computations provided in and discussed throughout Appendix A and were arrived at through discussions of a subcommittee of the Technical Advisory Committee and discussions with the overall TAC. Additionally, in order to keep pace with the cost of living, the regulations do contain a CPI adjuster as follows:

> **4VAC50-60-840** The fees set out in sections 4VAC50-60-800 through 4VAC50-60-830 shall be increased each July 1st by multiplying the fee by the percentage by which the consumer price index for all-urban consumers published by the United States Department of Labor (CPI-U) for the 12-month period ending May 31 of the preceding year exceeds the CPI-U for the 12-month period ending May 31, 2007, and the result shall be rounded to the nearest $1 increment. The fee schedule shall be posted to the department's website and distributed to each qualified local program in advance of each fiscal year. Notwithstanding the foregoing, in no event shall the permit fee be decreased and in no event shall any increase exceed 4% per annum, without formal action by the board.

Also, in case a locality is already levying a local fee that it wishes to keep in place, the regulations also specify that "[s]hould a qualifying local program demonstrate to the board its ability to fully and successfully implement a qualifying local program without a full implementation of the fees set out in this Part, the board may authorize the administrative establishment of a lower fee for that program provided that such reduction shall not reduce the amount of fees due to the department for its program oversight and shall not affect the fee schedules set forth herein." The regulations also specify that " [a]s part of its program oversight, the department shall periodically assess the revenue generated by both the localities and the department to ensure that the fees have been appropriately set and the fees may be adjusted through periodic regulatory actions should significant deviations become apparent. The department may make such periodic adjustments in addition to the annual fee increases authorized by 4VAC50-60-840."

Costs to the Development Community and Off-site Options to Reduce Costs

In terms of the cost of the regulations on the development community, the Virginia Tech Report (Appendix C, page 7) notes that "given to the project site-by-site differences related to stormwater control designs, the high degree of variability in costs associated with BMP selection, local program allowances, and off-site alternatives, no comprehensive cost estimate of the proposed regulatory change could be produced. To the extent possible, the analysis

compares different stormwater water quality and quantity criteria requirements to the existing regulations in order to illustrate how opportunity costs may change due to the regulatory revisions. Case scenarios are also included that provide examples that illustrate the potential economic scope of the regulations."

Understanding the site specific nature of these regulations, the Department has worked diligently to develop construction project scenarios that have been tested across the state in three series of charrettes. Coming out of each of these has been the general understanding that for most plan scenarios tested, the regulations are achievable and where problems arise, the Department has worked to provide or improve the tools available to meet the necessary load reductions. However, fully understanding the on-site difficulties and costs that may exist in certain situations to meet the proposed load reductions, the Department has sought to provide flexibility to these regulations to allow for more cost effective off-site strategies in accordance with the following proposed language:

> 4VAC50-60-65. Water quality compliance.
>
> F. If a comprehensive watershed stormwater management plan has been adopted pursuant to 4VAC50-60-96 for the watershed within which a project is located, then the qualifying local program may allow off-site controls in accordance with the plan to achieve the post-development pollutant load water quality technical criteria set out in subdivisions A 1 and A 2 of 4VAC50-60-63. Such off-site controls shall achieve the required pollutant reductions either completely off-site in accordance with the plan or in a combination of on-site and off-site controls.
>
> G. Where no plan exists pursuant to subsection F, off-site controls may be used to meet the post-development pollutant load water quality technical criteria set out in subdivisions A 1 and A 2 of 4VAC50-60-63 provided:
>
> 1. The local program allows for off-site controls;
>
> 2. The applicant demonstrates to the satisfaction of the local program that off-site reductions equal to or greater than those that would otherwise be required for the site are achieved;
>
> 3. The applicant demonstrates to the satisfaction of the local program that the development's runoff and the runoff from any off-site treatment area shall be controlled in accordance with 4VAC50-60-66;
>
> 4. Off-site controls must be located within the same HUC or the adjacent downstream HUC to the land-disturbing site; and
>
> 5. The applicant demonstrates to the satisfaction of the local program that the right to utilize the off-site control area and any necessary easements have been obtained and maintenance agreements for the stormwater management facilities have been established pursuant to 4VAC50-60-124.
>
> H. Alternatively, the local program may waive the requirements of subdivisions A 1 and A 2 of 4VAC50-60-63 through the granting of an exception pursuant to 4VAC50-60-122.

It should also be noted that, during the 2009 General Assembly Session, nutrient off-set legislation was passed to complement and expand upon the concepts already embodied in the regulations. HB2168 (2009 Legislative Session) authorizes permit-issuing authorities (within the

Chesapeake Bay Watershed) to allow stormwater permit holders to comply with nonpoint nutrient runoff water quality criteria by acquiring nonpoint nutrient offsets that have been certified under the Chesapeake Bay Nutrient Exchange Program. The offsets have to be in the same tributary as the permitted activity and generated in the same or adjacent eight digit hydrologic unit code (unless otherwise allowed pursuant to the legislation). The permit issuing authority may only allow the use of nonpoint nutrient offsets when the permit applicant demonstrates that (i) alternative site designs have been considered that may accommodate on-site best management practices (BMPs), (ii) on-site BMPs have been considered in alternative site designs to the maximum extent practicable, (iii) appropriate on-site BMPs will be implemented, and (iv) full compliance with post-development nonpoint nutrient runoff compliance requirements cannot practicably be met on site. The legislation does not change the requirement for on-site control of water quantity. The bill also specifies that when off-site options are considered, the permit issuing authority shall give priority to the use of nonpoint nutrient offsets unless a local fee-in-lieu-of, pro-rata share, or similar program has been approved by the Virginia Soil and Water Conservation Board (VSWCB) as being substantially equivalent in nutrient reduction benefits.

This legislation authorizes and will result in a need for the VSWCB to make further amendments to the regulations in accordance with this legislation. The legislation:

1) Authorizes the VSWCB to establish by regulation a stormwater nutrient program for portions of the Commonwealth that do not drain to the Chesapeake Bay.
2) Requires the VSWCB to establish criteria for determining whether a local fee-in-lieu-of, pro-rata share, or similar program is substantially equivalent in nutrient reduction benefits to a brokered offset generating facility. These criteria will be utilized by the Board when it approves local programs in the future in accordance with § 10.1-603.3.
3) Authorizes the VSWCB to adopt regulations as may be deemed necessary to clarify/ explain the implementation of the offset program established by this legislation. However, the bill specifies that no regulations are necessary prior to the implementation of the legislation.

NOTE: Authorization for the Department to develop guidance for the VSWCB's consideration and to file a NOIRA to develop necessary regulations was passed by the VSWCB at their March 19, 2009 meeting.

The legislation also requires an offset broker to pay the permit-issuing authority a fee equal to six percent of the amount paid by the permittee for the offsets. The Code specifies that if the permit issuing authority is a locality, that the fees shall be used solely in the locality where the associated stormwater permit applies, for inspection and maintenance of stormwater best management practices, stormwater educational programs, or programs designed to protect or improve local water quality. It is anticipated that the Department may use this revenue for some of these same purposes, as well as initially for items such as Enterprise Website development. No estimates are available as to how much revenue this may generate for the Department or localities. It would be expected that use of this option may increase when the proposed criteria are put in place and as more offset banks are approved.

It is most likely that with the off-site strategies provided in the regulations and subsequently offered in the Code during the 2009 Legislative Session, that projects located in urban areas, and

particularly those related to redevelopment or infill projects, will have sufficient alternatives available to them to comply with the new regulations. However, wanting to make sure that the regulations do not discourage urban renewal and promote sprawl, the Department is continuing to explore options and discuss potential alternatives in areas such as Urban Development Areas (UDAs) and urban infill sites and will consider all alternatives advanced during the public comment period.

Project Cost Examples

As was referenced earlier, the Virginia Tech Report concluded that no comprehensive cost estimate of the proposed regulatory change could be produced nor could it be reliably projected. The Report (Appendix C, pages 12-13) states that "the uncertain behavioral responses (both by the land disturber and locality), variation in site specific conditions, and the complexity of the application of the technical requirements make estimation of total state costs unreliable." The Report (Appendix C, page 16) also states that "extrapolating existing empirical cost analysis to field conditions is challenging given that stormwater treatment exhibits considerable site-specific variation resulting from different soil, topography, climatic conditions, development forms, local economic conditions, and regulatory requirements (Lambe et al., 2005)." However, the Report does include an in-depth discussion of the various factors that will likely influence (increase or decrease) compliance costs. The case study examples (found in the report) do provide insight into the wide variety of alternatives/situations that may be encountered and how complicated it would be to be able to provide statewide cost estimates.

The Department has worked to develop a wide and increased variety of best management practices and other control method options that may be utilized to meet the new regulatory criteria. In many cases, the efficiencies of the new BMP standards exceed today's standards and will make compliance with the proposed standards easier and less costly. However, the actual application of BMPs to address the regulations is outside of the controls of the Department. As the Report (Appendix C, page 13) articulates "what type of controls [are] available to land disturbers, however, will [also] depend on which type of stormwater control measures are allowed by a local program." The Report continues, "to the extent compliance choices are limited, the cost for land disturbers to comply with the water quality requirements increases." The Report (Appendix C, page 14) also notes that "the proposed regulation increases stormwater quality criteria for new development. Where localities are not already employing more stringent standards [which localities already have the authority to do so and in a number of cases have done such], the proposed criteria will require the implementation and maintenance of additional stormwater controls." Additionally, the Report (Appendix C, page 17) indicates that "the proposed regulation offers opportunities to reduce phosphorus by altering the design of any development, independent of the specific control practices imposed." The Department is convinced that if developers consider potential stormwater management strategies early in their planning process, costs to the developer may potentially be reduced, and often the value of the properties increased, through the use of innovative strategies that will green the property and allow for water reuse. However, it will take significant educational outreach on the part of the Department to institute acceptance of these practices and change within the development community.

One way of looking at fiscal impacts is to investigate the cost per pound associated with nutrient reduction practices. It has long been recognized that the necessary reductions in nutrients within urban areas will come at a higher cost than those associated with other land uses. The Virginia Tech Report (Appendix C, pages 18-19) states that "the cost of reducing nutrients *on a per pound* basis will typically be hundreds and sometimes thousands of dollars per pound (Aultman 2007; Brown and Schueler 1997). For example, based on removal effectiveness and costs estimates from Brown and Schueler (1997), the annual cost to reduce a pound of phosphorous with wet ponds or bioretention areas ranged from $560 to $1,500/lb/yr (assumes all water quality control costs are allocated to phosphorus removal only). These estimates include construction, land, and operation and maintenance costs for a hypothetical five acre commercial site and a 25 acre residential site." The Report (Appendix C, page 19) continues that "these control costs are significantly higher than nutrient control costs from point sources or agricultural nonpoint sources (Chesapeake Bay Commission 2004; Shulyer 1995). A recent Chesapeake Bay Commission (2004) report estimated annual point source phosphorus control costs to be $74/lb. Enhanced nutrient management (currently considered beyond a Tributary Strategy baseline practice) cost an estimated $96 per pound of phosphorus." The Report also articulates that "in Virginia's tributary strategy document, urban runoff contributes 18% of Virginia's phosphorus load to the Bay [this contribution has increased – see earlier **Purpose for this regulatory action** discussion], but crude cost analysis estimates that urban runoff controls will make up 75% of the cost to meet Virginia's reduction commitment (Virginia Secretary of Natural Resources 2005)."

Some preliminary information (may be subject to refinement) provided to the Department from the Center for Watershed Protection offered the following numbers that local governments might utilize to calculate pro-rata fees (per pound costs) and may offer some insight into costs per pound of constructing new facilities (Table 4):

Table 4: Pro-rata Fee Computations by the Center for Watershed Protection

Pond Retrofit	1-acre commercial site; 72.2% impervious	TP = $12,339 per lb of total phosphorus TN = $3,115 per lb of total nitrogen
New Storage Retrofit	1-acre commercial site; 72.2% impervious	TP = $20,598 per lb of total phosphorus TN = $5,200 per lb of total nitrogen
Urban On-Site Retrofit	1-acre commercial site; 72.2% impervious	TP = $88,860 per lb of total phosphorus TN = $22,431 per lb of total nitrogen
Pond Retrofit	50-acre commercial site; 72.2% impervious	TP = $11,120 per lb of total phosphorus TN = $2,791 per pound of total nitrogen

Note: None of the fees include land acquisition or maintenance costs
Citation: Center for Watershed Protection (CWP). In Press. Storm Water Retrofit Practices. Manual 3 of the Urban Subwatershed Manual Series. Elliott City, MD.

Several years ago, the Center for Watershed Protection also assembled Table 5, which presents some additional information regarding what certain entities charged per pound of nutrient reduction for offsets at that time.

Table 5: Stormwater Offset Fees – Review of Existing Programs

Locality	Fee	Costs Covered by Fee	Other Notes
Henrico	- $8,000/ lb of P	- Annual cost of providing equivalent pollutant removal - - Fee can be reduced by providing forested stream protection area and energy dissipators	- Fee goes into Co.'s Environmental Fund and is used for water quality projects within the Co.
North Carolina: Neuse River	- $11/ lb of N	- Not specified	- Fee set for drainage areas to Neuse River - Funds used toward restoration of wetlands and riparian areas within the Neuse River Basin - Fees too low to cover equivalent water quality improvement projects – are getting ready to revise fee
Maine	- Gives authority for fee capped at $10,000 lb of P for lake sheds - $20,000/ lb of P for severely blooming lake	- Back-up documentation does not exist – fee set by stakeholder group in 1995 and has not been revisited since that time	- Projects funded through fees must be located in same watershed - Fee does vary by municipality - Fee does not fully cover their construction costs and they will be looking to revise soon. Found that retrofits are more expensive.
MD CAC 10% Rule	- Equivalent Cost: $38,400/ lb of P - Retrofit Cost: $22,500/ lb of P	- Design, engineering, permitting, construction, admin, and maintenance	- Funds intended for use within same watershed and to replace equivalent water quality improvement projects
Fairfax County	- Determined on case by case basis - Based on impervious area	- shall include: design, land acquisition, utility relocation, construction, administrative costs - may include cost of engineering studies	- can only be expended for the established watershed improvement program for which the payment was calculated
Austin	- Starts at $35K/impervious ac for residential and $60K/ impervious ac for commercial - Cost for land acquisition added directly to above cost - Based on impervious cover scale (ie, fee for first acre is highest, fee additional acres is less)	- design, permitting, construction, and land	- Compared costs between residential and commercial cost factors (residential significantly less) - To encourage development in urban watersheds (lot of redevelopment) City will cover 75% of fee in these areas

A second way of documenting potential costs is through actual site plan review comparisons. The Virginia Tech Report (Appendix C, pages 19-21) noted that "the proposed criteria was tested on a limited number of existing and planned developments to gain a better understanding of what type of incremental actions and costs would be required to meet the new water quality and quantity criteria. The information provided in this section came from three general sources. First, DCR conducted design "charettes" in the fall of 2008 [with additional charrettes held in 2009]. Stormwater design teams proposed plans to meet the revised water quality and quantity

test for a small commercial site and a medium density residential development. Second, land developers (permittees) and consulting firms voluntarily supplied alternative stormwater designs for 5 recently completed or planned developments. Finally, one environmental group commissioned stormwater plan designs for 6 developments. These developments do not represent a random sample, although they do characterize many types of developments occurring across the Commonwealth. The examples used are drawn mainly from the eastern portion of the state and are provided by the volunteer efforts of a variety of groups. In each case, efforts were made to identify the activities and costs required to meet both the existing and proposed regulation."

The Report continued "with these caveats, the developments evaluated are summarized in Table [6]. The developments do represent a broad cross section of different development types. The developments were almost evenly split between residential and commercial development types. Two of the six commercial developments were redevelopment projects (see Comm5 and Comm6, Table [6]). All remaining projects were new developments. The residential developments tended to be low to medium density development with only one site above 4 dwelling units per acre. None of the developments occurred in ultra-urban areas (over 75% impervious surface)."

As noted in the Virginia Tech Report, "**all development cases in Table [5] were able to meet stormwater quality and quantity requirements on-site**. The two low density residential developments met the revised water quality standard in their existing form (Resid3 and Resid7 in Table [6]). Both developments had less than 10% impervious cover and significant forest cover on remaining (pervious) land." "The proposed revisions to the water quantity requirements were the binding regulatory constraint for two of the 13 development projects (Resid 3 and Comm6). For water quality controls, the stormwater development designs reflect a mix of conventional treatment and runoff volume reduction practices. The use of bioretention areas, ponds, and swales were commonly used control practices. The residential development with the highest development density (dwelling unit/ac) was able to meet water quality criteria by upgrading the treatment level of a large stormwater pond (Table [6], Resid2). For this development, compliance was achieved without any reductions in runoff volume and reflected the impact of revisions to the phosphorus removal efficiencies (75% P concentration reduction for level 2 wetpond). The two redevelopment sites were also able achieve the new water quality and quantity criteria."

Table [6]: Descriptions of Developments Used to Evaluate Revised Regulatory Requirements

NAME	Dev Type	Dev Size (ac)	% Land Cover (Imperv/Turf/Forest)	Density DU/ac	Additional Actions Required to Meet Proposed Regulatory Requirements
Comm1	New	0.75	47%/53%/0%	N/A	Reduction in parking spaces, bioretention areas, dry swale, detention facility.
Comm2	New	15.2	43%/57%/0%	N/A	Eight additional biofilters; some substitution of impervious with permeable pavement
Comm3 [WEG 1]	New	15.6	67%/33%/0%	N/A	New criteria can be met with current underground detention/stormwater filtration and upgrading large wet pond from type 1 to type 2 treatment level.
Comm4 [WEG 2]	New	11.1	66%/32%/2%	N/A	The current stormwater design utilizes an LID approach with 25,000 s.f. of bioretention facilities and soil amendments. New requirements could be met with a type 2 wet pond. Meeting new criteria with LID approach would require upgrading the bioretention to meet new design standards but with a similar area.
Comm5 [WEG 6]	Re Dev	1.65	Imp Predev,65% Imp Postdev,75%	N/A	Existing detention basin is converted to extended detention basin, 1/6th of the new pavement is permeable and 2,000 gallon cistern.
Comm6	Re Dev	54	Imp Predev,58% Imp Postdev,69%	N/A	Water quality redevelopment criteria met with no additional controls (existing 2.4 acre retention pond), but new water quantity criteria requires reconfiguration of piping and addition of rain tank and pump system.
Resid1	New	8.8	25%/42%/33%	3.3	Grass swales, expanded bioretention areas, forest cover preservation
Resid2	New	26.5	50%/50%/0%	7	Upgrade large wet pond from type 1 to type 2 treatment level.
Resid3	New	42.6	9.1%/35%/56%	0.66	Existing cluster development (19 ac disturbed) meets WQual criteria with no additional treatment. Activities to meet WQuant requirement: roof disconnect, grass swales, porous pavement.
Resid4	New	43.3	21%/49%/30%	1.82	Roof top disconnect, porous

					pavement, added size for infiltration basin. One pond to meet WQuantity requirements.
Resid5 [WEG 3]	New	55	40%/53%/7%	3.73	Upgrade and expand dry detention basin to type 2 wet pond, in addition to the other planned stormwater facilities.
Resid6 [WEG 4]	New	14.9	Traditional: 25%/58%/17% Cluster: 20%/63%/17%	1.68	Change from 9.583 s.f. of bioretention and swales to 9,500 s.f. of level 1 dry swale, 700 l.f. of grassed swale, 5,000 s.f. of soil amendments and 50 rain barrels.
Resid7 [WEG 5]	New	270	5%/16%/79%	0.13	None. No stormwater controls required.

Note: Additional information regarding those projects labeled with [WEG #] may be found in Table 8.

Further, the Virginia Tech Report (Appendix C, page 21) states that "the incremental phosphorus removed from revisions to the water quality criteria, and the added cost to achieve these reductions, are shown in Table [7]. Incremental phosphorus reductions achieved is an estimate of the additional annual reductions in phosphorus loads achieved above existing (current) water quality requirements. Incremental upfront costs are construction, material, land and design costs associated with the additional controls needed to comply with the proposed regulations. Incremental annual costs are the annualized cost of incremental upfront costs plus an estimate of the annual operation and maintenance costs. Finally, the incremental (marginal) cost to achieve the additional phosphorus reductions achieved by the revised water quality criterion is reported in the last column of Table [7]. In two cases, additional costs were necessary to comply with water quantity criteria, but not the water quality criteria. In these cases, the cost per pound of phosphorus removal measure is not applicable (incremental costs were attributed to water quantity requirements). Data for three developments (Comm1, Resid1, and Resid2) are not reported in Table [7] due to inadequate baseline information or lack of cost data."

The Report continues stating that "the incremental upfront costs to maintain compliance with the proposed revisions ranged from $0 to $750,000 per development project. For residential projects, stormwater BMP upfront costs (construction and land costs) were between $0 and $6,000 per dwelling unit depending on the scenario. For projects requiring additional phosphorus control, the addition reduction in P loads achieved per development site range from 0.23 to 19.2lbs/yr (between 0.14 to 0.41 pounds/ac). The incremental (marginal) phosphorus control costs (including upfront costs and operation & maintenance costs) range from $825 to $15,300 per pound per year (assuming all costs are assigned to P removal and no cost assigned to reductions in other constituents such as nitrogen, sediment, etc). Expressed on a cost per pound basis, phosphorus control costs appear to loosely increase with impervious area. The projects with the highest estimated per unit costs were a commercial development (Comm2) and a redevelopment site (Comm5)."

Table [7]: Incremental Phosphorus Reductions and Costs of Selected Developments

NAME	Dev Size (ac)	Incremental P Reduction for Site‡	Increase in Incremental Upfront Costs	Incremental Annualized Cost*	Incremental Cost per Pound per Year
Comm2	15.2	3.9	$551,570	$59,657	$15,296
Comm3 [WEG 1]	15.6	4.4	$40,000 to $70,000	$3,638 (low) $9,867 (high)	$825 $2,237
Comm4 [WEG 2]	11.1	3	$60,000 to $120,000	$5,457 (low) $16,914 (high)	$1,819 $5,638
Comm5 [WEG 6]	1.65	0.23	$17,500	$1,592 (low) $2,467 (high)	$6,920 $10,725
Comm6	54	None Needed	$100,000◊	$7,095Δ	Not Applicable
Resid3	42.6	None Needed	$99,600◊	$8,490	Not Applicable
Resid4	43.3	8.3	$206,279	$21,922	$2,641
Resid5 [WEG 3]	55	19.2	$350,000 to $750,000	$31,833 (low) $105,714 (high)	$1,658 $5,506
Resid6 [WEG 4]	14.9	5.7 to 6.05	$54,500 to $154,500	$4,956 (low) $21,777 (high)	$868 $3,600
Resid7 [WEG 5]	270	0	0	0	Not applicable

‡Represents estimated or an approximate additional P reduction. Comparing changes in load from existing and proposed regulations is complicated by the fact that load estimation methods and BMP sizing/design criteria differ between existing and proposed regulations.

*Unless otherwise noted, includes estimates of capital, land, and maintenance costs. Costs annualized over 25 years at 5% discount rate. High and low estimates based on assumptions that annual maintenance costs range from 2% to 7% of incremental upfront costs.

◊ Cost to meet revised water quantity criteria only.

Δ Does not include maintenance costs.

Note: Additional information regarding those projects labeled with [WEG #] may be found in Table 8.

As noted previously, six of the site design analyses resulted from work conducted by the Williamsburg Environmental Group (WEG) under contract with the James River Association (JRA) in order to apply the proposed regulations and associated methodology to a number of real world example development projects. Additional details concerning these projects are provided in Table 8. WEG selected sites for which they had the existing site information necessary to apply the new regulations and methodology. For both current and proposed regulatory criteria, WEG determined the water quality and quantity requirements, designed generalized locations, sizing and footprints of necessary stormwater facilities in consideration of actual site conditions and constraints, and calculated budget level costs.

The analysis and results produced by WEG provided several insights and conclusions stated by JRA in their project summary. These included:

- "The results re-affirm that the proposed rules are technically sound and attainable across a variety of different types of development. For each site examined by WEG, compliance with the proposed regulations and criteria was achieved on-site.

- In most cases, additional or enhanced stormwater facilities were required in order to achieve the new stormwater criteria, but one site was able to comply solely by re-designing the existing stormwater facility. The low density residential site did not require any stormwater facilities under either the current or the proposed criteria.

- The results identified some situations where the new regulations did not require major changes to stormwater facilities and others where they did. The stormwater requirements for high impervious cover sites, such as office parks and big box store developments, did not change significantly, as the additional pollution reduction requirements were largely offset by improved pollution removal efficiencies of the new stormwater BMP designs. Conversely, the developments with substantial areas of lawns and turf, such as medium density residential developments, did have significantly greater pollution removal requirements. In the cases examined by WEG that involved turf cover, 40% to 65% of the additional pollution removal required by the new regulations was due to the accounting for pollution loads from turf. Pollution loads under the current regulations are based only on impervious cover and do not consider the loads from turf at all.

- It will require greater effort and investment to reduce stormwater pollution. Accordingly, the cost of complying with the stronger water quality criteria in the proposed regulations was greater than under current regulations. However, the cases examined by WEG also demonstrate that:
    - Compliance costs are in the ballpark of what some localities are already requiring;
    - Compliance for projects with significant site constraints regarding implementation of stormwater controls can be difficult and expensive. These situations occur under the current regulations, but the increased pollution removal required under the proposed regulations will cause more projects to face these challenges.
    - Adjustments to supporting regulatory tools can reduce costs while still achieving Virginia's water quality goals. Specifically, the use of offsets to achieve compliance would be very helpful on sites with significant constraints [Which are now formally authorized as part of 2009 Session legislation]. Additionally, providing a mechanism in the Runoff Reduction Method to appropriately account for unmanaged pervious areas could help new developments to address the increased pollution reductions associated with turf.
    - The results also demonstrate that every development site is unique, and multiple factors, often beyond the stormwater criteria, significantly influence the implementation and cost of stormwater requirements.

Overall, the analysis performed by WEG confirms that the technical criteria proposed [in the] Virginia stormwater regulations are attainable across a variety of development projects. Achieving the greater water quality benefits of the proposed regulations will require in many cases greater investment in stormwater facilities, but adjustments to the implementation tools has the potential to control costs without sacrificing water quality. The proposed regulations represent an important step in Virginia's efforts to address the impact of stormwater pollution on the Commonwealth's waterways while accommodating future growth."

In addition to the overview provided by JRA, WEG released a technical memo explaining the Table 8 results. WEG stated in their January 22, 2009 memo that "[t]he following provides a brief summary of the results from our five case studies for new development and one case study for redevelopment:

- The technical requirements did appear to be achievable on the sites evaluated, irrespective of cost.
- The various case studies and costs cited did consider costs associated with loss of developable density/yield needed for compliance (compared to the current requirements).
- The costs per residential lot (3 residential case studies) were evaluated under multiple scenarios (the minimum current compliance criteria and the actual proffered stormwater implementation). One site, a low density residential development (estate lots), resulted in sufficiently low nutrient loadings that no water quality treatment was required under the current or proposed criteria. The results of the other two residential case studies showed per lot increased (incremental costs) ranging from approximately $1,700-$6,200/residential unit.
- Costs differences versus basic/minimal compliance criterion were at the higher end of the range. Given that development and stormwater planning is influenced by a number of other factors external to the basic compliance criteria (e.g. proffer commitments, permit-related commitments, etc.), the incremental costs of the new regulations versus the actual implementations were not as severe.
- These costs should not be considered minimum and maximum. We have no doubt that there will be sites where compliance may be more costly, or very difficult if not impracticable, and that there will be other sites where compliance may be slightly easier. However, our sites were selected as being fairly representative of the typical sites we see.
- Including commercial site implementations, the incremental cost for additional pollutant removal varied widely. Costs per pound of annual Total Phosphorus (TP) removal ranged from $8,000 - $50,000 for new development.
- Incremental costs per impervious acre ranged similarly showed significant variability, ranging from $2,000-$52,000/impervious acre.
- Redevelopment costs were evaluated for a variety of scenarios. In the actual case study employed, the incremental cost per lb annual TP removal was approximately $76,000. Costs for redevelopment are expected to vary even more widely due to dramatic differences in ease of retrofitting on given sites and economy of scale or lack thereof.
- In most new development instances, approximately half of the incremental increase in required pollution reductions was associated with the establishment of a 0.28 lb/ac/yr TP target (versus current requirements of 0.45), which drives down the 'bottom line'. The other half of the increased load reduction was associated with spreadsheet accounting for nutrient loadings for managed pervious cover (i.e. turf), resulting in increases to the 'top line.' The latter has historically been disregarded in nutrient load computations in Virginia, but has been identified by the CWP as a significant contributor of nutrients."

The WEG discussion continues by noting that in their opinion, "the cost data suggest that an offset program would be a critical piece to the implementation of these criteria in order to ensure that available monies for water quality protection, in difficult economic times, are directed in the most efficient manner to projects with the most benefit. Further, the use of an offset program could reduce the number of more expensive small-scale implementations of difficult to maintain

technologies (which may yield little in the way of nutrient reduction benefit), in favor of better programmatic solutions." Again, the Department notes that offset legislation was passed during the 2009 Legislative Session (see previous discussion of HB2168) to address many of the concerns raised prior to the Session.

WEG also notes that "evaluation of these criteria give consideration to strong vesting and grandfathering language for projects which have received approvals (even early stage reviews and approvals) through local, state or federal agencies, and that such grandfathering be extended for the life of the project." Again, this is a concept that has been shared with the Department by a number of developers. Such assurances are already included in the new 5-year construction general permit expected to be approved by the Virginia Soil and Water Conservation Board on March 19, 2009. Projects currently permitted will be held to today's 0.45 lbs/acre/yr. phosphorus water quality standard for the next five years. Additionally, DCR is also considering recommendations to modify the proposed Technical Criteria to further clarify the grandfathering provisions for developments that have received approval of a preliminary or final plan of development from a locality. In such cases, the projects would also be held to today's 0.45 standard until the project terminates or for some extended period of time. These changes will be made in the final regulations following public comment.

Table 8

James River Association
Analysis of Proposed Virginia Stormwater Regulations
Performed by Williamsburg Environmental Group
Summary Table

Type of Development	Size (acres)	Units (Commercial Space/ Residential Units)	Soil Class	Land Cover (%): Imp/Turf/Forest	Annual TP Load Current/Proposed (lb)	Annual TP Reduction Required Current/Proposed (lb) Current/Proposed (%)	Additional Actions Required to Meet Proposed Regulatory Requirements	Stormwater Costs Under Current Regulations	Stormwater Costs Under Proposed Regulations	Attainment Of Proposed Criteria On Site
High Impervious – Big Box [WEG 1]	15.6	100,000 s.f.	B	67%/33%/0%	23.23 lb / 24.99 lb	16.21 lb. / 20.62 lb. 70% / 83%	New criteria can be met with current underground detention/stormwater filtration and upgrading large wet pond from type I to type 2 treatment level.	$500,000	$540,000 $570,000	Yes
High Impervious – Office Complex [WEG 2]	11.1	180,000 s.f.	C	66%/32%/2%	16.3 lb / 17.62 lb	11.4 lb. / 14.4 lb. 69% / 82%	The current stormwater design utilizes an LID approach with 25,000 s.f. of bioretention facilities and soil amendments. New requirements could be met with a type 2 wet pond. Meeting new criteria with LID approach would require upgrading the bioretention to meet the new design standards but with a similar area.	Conventional - $125,000 LID (As designed) - $180,000	Conventional - $245,000 LID – $240,000	Yes
Residential – 1/5 acre lots [WEG 3]	55	205 houses	B/C	40%/53%/7%	51.41 lb / 61.63 lb	26.2 lb. / 45.4 lb. 52% / 75%	Upgrade and expand dry detention basin to type 2 wet pond, in addition to the other planned stormwater facilities.	Conventional $550,000 LID (As designed) $745,000	Conventional – $900,000 LID – $1,495,000	Yes
Residential – 1/2 acre lots [WEG 4]	14.9	25 houses	C	Traditional 25%/58%/17% Cluster 20%/63%/17%	9.36 lb / 12.98 lb 7.86 lb / 11.15 lb	2.76 lb./8.81 lb. 30% / 68% 1.26 lb / 6.97 lb 16% / 63%	Change from 9.583 s.f. of bioretention and swales to 9,500 s.f. of level 1 dry swale, 700 l.f. of grassed swale, 5000 s.f. of soil amendments and 50 rain barrels.	Conventional $44,000 LID (As designed) $144,000	$198,500	Yes
Residential – 3 acre lots [WEG 5]	270	35 houses	B/C	5%/16%/79%	58.48 lb / 49.94 lb	0 lb./ 0 lb. 108% / 51%	None. No stormwater controls required.	$0	$0	Yes
Redevelopment: Office/Retail [WEG 6]	1.65	16,000 s.f.	N/A	Imp. Pre – 65% Imp. Post – 75%	2.71 lb. / 2.86 lb.	0.57 lb. / 0.80 lb. 21%/28%	Existing detention basin is converted to extended detention basin, 1/6th of the new pavement is permeable and 2000 gallon cistern.	$11,250	$28,750	Yes

Note: “LID (As designed)” refers to sites which were actually designed using low impact development techniques for stormwater management, rather than conventional stormwater facilities. In these cases, a conventional stormwater management design was also assessed for comparison purposes.

Summary

The Department recognizes that the cost per pound reductions for nutrients in urban/suburban settings may be more expensive than from other sources, particularly for BMP retrofits, but reiterates that the proposed regulations are a necessary part of the required overall reduction strategies. We need to implement actions across agriculture, point sources, air deposition, and urban and suburban runoff in a comprehensive and inclusive fashion. If sufficient reductions are secured from all potential sources, the benefits to the aquatic resources and those that depend upon or utilize these resources may be realized.

Additionally, the Department believes that the proposed standards are generally achievable and that offset strategies will assist in lowering costs where compliance may be more difficult and costly. The Department also has pledged in the final regulations to address the grandfathering of certain projects in order to reduce the costs associated with potential project redesigns that could be costly if required.

4) Agency's best estimate of the number of such entities that will be affected. Please include an estimate of the number of small businesses affected. Small business means a business entity, including its affiliates, that (i) is independently owned and operated and (ii) employs fewer than 500 full-time employees or has gross annual sales of less than $6 million.

Substantial discussion in the sections preceding this question outline the wide variety of entities that will be affected by this proposed regulation and the potential costs or benefits associated with the regulations to these entities. Such discussions and computations shall not be repeated here. The regulation will affect state and federal agencies, localities, developers and their consultants and engineering firms, home buyers, the public that benefits both aesthetically and perhaps financially in terms of water treatment and other utility fees, and all of the various businesses that are dependant upon a healthy aquatic environment. Due to the magnitude of businesses that will be both positively and potentially negatively affected by these regulations, the Department is unable to offer specific numerical estimates of businesses that will be affected. However, it should be noted that the Department, over this three and a half year period that the regulation has been developed, has consistently worked towards informing all affected parties of the potential impacts of these regulations and has fostered active on-going discussions with many of them. Release of these regulations for public comment will continue the outreach efforts to the general public and other affected entities.

In terms of developers, computations in Appendix A do indicate that approximately 5,000 construction general permit coverages are sought by developers on an annual basis for their land disturbing activities. Each of these developers has routinely employed the services of engineering companies and consultants to develop the associated development plans. Potential costs to developers for complying with the water quality and quantity requirements as well as the fee impacts are provided in the previous question. It should be noted that where developers have discretion, their increased costs will often be passed on to the consumers.

As noted previously, localities will be impacted by the regulation as they are authorized by the Board to administer a local program. Again, cost estimates associated with this are provided in Appendix A and the preceding discussion. The other key entity to be impacted by these

regulations is the Department of Conservation and Recreation that will both be responsible for stormwater management program oversight as well as the administration of a number of local programs. These cost estimates are also provided in Appendix A and the preceding discussion.

5) All projected costs of the regulation for affected individuals, businesses, or other entities. Please be specific. Be sure to include the projected reporting, recordkeeping, and other administrative costs required for compliance by small businesses.

Appendix A has been developed to thoroughly outline the expected program implementation costs for both localities and the Department of Conservation and Recreation. It also provides the supporting documentation for the derivation of fees that the regulated entities will be subject to. These results have been summarized and discussed in the prior questions.

The preceding discussions have also outlined the potential cost of the regulations to developers and the potential benefits to other entities that may be realized upon implementation of these proposed requirements.

Additional insights into the cost implications of the regulations can also be found in the Virginia Tech Report, which may be found in its entirety in Appendix C.

Alternatives

Please describe any viable alternatives to the proposal considered and the rationale used by the agency to select the least burdensome or intrusive alternative that meets the essential purpose of the action. Also, include discussion of less intrusive or less costly alternatives for small businesses, as defined in §2.2-4007.1 of the Code of Virginia, of achieving the purpose of the regulation.

Provisions of the Stormwater Management Act, §10.1-603.1 et seq. of the Code of Virginia, require the Board to develop procedures for authorizing localities to administer local stormwater management programs and for the Department to administer local programs within jurisdictions that are not required or do not elect to adopt locally-administered stormwater management programs. The Act also requires the Board to adopt minimum technical criteria and statewide standards for stormwater management from land-disturbing activities of regulated size and to act to protect the quality and quantity of state waters from the potential harm of unmanaged stormwater.

With the Board's mandate in mind, the proposed regulations were developed over the past three and one half years with the assistance of two technical advisory committees, with the most recent comprised of 29 members, a water quantity workgroup, a BMP Clearinghouse advisory committee, and a Stormwater Management Handbook committee. Over 50 public meetings have been held concerning the regulations including a series of plan review charrettes that have been attended by over 350 individuals. Through the charrettes, as well as a growing number of statewide public meetings and presentations, the Department has already exposed thousands of potentially affected entities to these regulations and is already weighing the on-going responses received. The Department also contracted with the Center for Watershed Protection to assist with the development of the proposed water quality criteria based on the best scientific

information available nationally and to develop a sound and defensible compliance methodology. In all, the regulatory process to date has considered, time and again, alternatives to the proposed regulations, and this proposal reflects the outcome of that consideration.

That being said, the Department and the Virginia Soil and Water Conservation Board are committed to continuing to seek solutions and to making refinements to the proposed regulations following the upcoming public comment period. Agency officials have reassured stakeholders that all public comments will be carefully considered in developing final regulations. The Department has been already been discussing specific areas of concern with stakeholders and will continue to do so as the regulations move forward. The Agency's recent regulatory actions demonstrate a history of being responsive to comments received.

Over the period of developing the proposal, many different alternatives related to requirements for local stormwater management programs were discussed and considered. These requirements are found in Parts IIIA and IIIB of the proposal and are discussed at some length in other sections of this document. Over the course of the technical advisory committees' work, requirements for items such as plan review, exceptions, inspections, enforcement, facility maintenance, fee acceptance, and reporting and recordkeeping were developed and refined, resulting in a proposal that is believed to impose the minimum burden necessary on local governments and the Department while still providing a properly-functioning local stormwater management program in each jurisdiction statewide. Reviews of these local programs will be conducted at least once every five years, the minimum frequency allowed by the Stormwater Management Act.

It should also be noted that fees have been set at sufficient level to fund the administration of local programs by the Department of Conservation and Recreation and localities and for the Department to provide appropriate program oversight. The fees were also the result of conversations with the technical advisory committee and research into actual costs of the components that comprise stormwater management program implementation and permit coverage issuance.

Many alternatives related to Part II of the proposed regulations (water quality and quantity) were also considered during the technical advisory committee process. While it was not the initial discussion proposal before the TAC, the 0.28 lbs. per acre per year phosphorus standard included in 4VAC50-60-63 has remained a constant since its introduction, as it is the discharge level necessary for Virginia to meet its Chesapeake Bay goals (any lesser pollutant reduction requirement would result in those goals not being met with regard to construction stormwater management). The compliance methodology associated with that standard, however, has gone through changes over time with the assistance of the TAC and the Center for Watershed Protection as well as the input of participants in the charrettes, finally resulting in the Virginia Runoff Reduction Method that is incorporated by reference into the proposed regulations. The regulations additionally allow for another methodology to be presented to the Board for approval, for offsite and regional compliance options to be considered [and now for offsets pursuant to HB2168; 2009 Session], and, in the event that compliance cannot be achieved, for an exception to the requirements of Part II to be granted if certain conditions are met. With regard to the water quantity requirements of Part II, a special workgroup of technical experts and

stakeholders was convened for the explicit purpose of developing the criteria contained in 4VAC50-60-65. This group considered many options related to quantity and endeavored to develop the best possible criteria that met the Board's requirements under the Stormwater Management Act.

It was also initially determined that implementing different stormwater water quality criteria across different watersheds would represent a minimal change in administrative costs but might add significant competitive disadvantages for those localities required to administer the more stringent criteria. As such, criteria have been developed to be applied equally statewide. However, that does not preclude the Department during development of the final regulations from considering standards that may encourage redevelopment and infill and development within Urban Development Areas through modified standards, as the Department does not want to discourage development in these areas and contribute to sprawl.

Also in the final regulations, it is likely that the Department will consider grandfathering provisions where developers have already received certain project approvals and would be subject to increased costs to revise plans in accordance with the new criteria. In these cases, the developers would be held to today's water quality and quantity standards until the project terminates or for some extended period of time. The Department is already working on language in this regard that would be considered for incorporation into the final regulations following the public comment period.

Regulatory flexibility analysis

Please describe the agency's analysis of alternative regulatory methods, consistent with health, safety, environmental, and economic welfare, that will accomplish the objectives of applicable law while minimizing the adverse impact on small business. Alternative regulatory methods include, at a minimum: 1) the establishment of less stringent compliance or reporting requirements; 2) the establishment of less stringent schedules or deadlines for compliance or reporting requirements; 3) the consolidation or simplification of compliance or reporting requirements; 4) the establishment of performance standards for small businesses to replace design or operational standards required in the proposed regulation; and 5) the exemption of small businesses from all or any part of the requirements contained in the proposed regulation.

It is recognized that many of the development interests that will be affected by the proposed regulations are small businesses. As discussed in the immediately preceding section, however, the proposed regulations were developed to impose the minimum burden necessary while still allowing the Board to meet its mandate under the Stormwater Management Act and for the achievement of Virginia's water quality and Chesapeake Bay goals. Several compliance methodologies have been made available for use under the water quality portion of Part II (see 4VAC50-60-65), and the primary compliance methodology, the Virginia Runoff Reduction Method, is designed to provide many options for compliance to site planners. The Board and the Department look forward to receiving public comment on the proposed regulations and will consider any comments that indicate that a lesser burden may be imposed on small businesses while upholding the intent of the Stormwater Management Act and the requirements of the Clean Water Act. At this time, however, it is believed that the proposal reflects the best methodologies available to achieve the requirements placed upon the Board by law.

Public comment

Please summarize all comments received during public comment period following the publication of the NOIRA, and provide the agency response.

The Department has done much to encourage public comment on this regulatory action both during the official public comment periods and during the technical advisory group meetings, the subcommittee meetings, the meetings of the associated workgroups, and during the charrettes that have been utilized to conduct plan review scenarios with the participants utilizing the proposed criteria and tools. Through the over 50 public meetings held, special meetings with constituent groups, and feedback received through other venues, the Department has remained responsive to the comments received and will continue to be so as we enter the comment period on the proposed regulations. Attached below, are the comments received and the Department's responses developed related to both of the NOIRAs issued related to the technical criteria action as well as those received pursuant to the fee NOIRA as often the comments were submitted in the same response and the public meetings considered both regulatory actions together.

Comments received during the comment period on the revised NOIRA from March 17, 2008 through April 16, 2008 are as follows:

Commenter	Comment	Agency response
Michael Schaefer (Virginia Municipal Stormwater Association)	If technical criteria require further analysis, advance delegation rules separately to minimize delays.	The technical criteria are a common element to all of the actions we are working on and we continue to believe that both elements (technical criteria and program development) are integrated components of a stormwater regulatory product. As such, we believe that without resolution on this important piece it will be difficult to properly develop the other integrated regulatory, guidance, website, and related pieces. The current approach will result in a more cohesive "qualifying local program" that each locality will administer and will have the greatest benefit to water quality. The completion of this integrated regulatory action is important to this Administration. The Secretary of Natural Resource's noted at the first meeting of the technical advisory committee (TAC) that "I believe it is critical that the final regulations address improvements to water quality and quantity criteria associated with construction activities". Additionally, we suspect that approval by the U.S. Environmental Protection Agency (EPA) of moving the administration of the General Permit to localities as a part of the stormwater program revisions ["qualifying local program"] is

		less likely without the water quality and quantity regulatory improvements that are included in the proposed regulations. The technical criteria are truly a fundamental and necessary element of a "local qualifying program". Without them, those localities that currently do not have a stormwater program would have limited information regarding operational standards. With the proposal of the regulations by the Board on September 24, 2008, the Board supported the position that Parts I, II, and III should advance together.
Michael Schaefer (Virginia Municipal Stormwater Association)	Structure delegation rules to promote successful implementation at local level. Concerns about the difficulties of enforcing existing laws due to legal limitations regarding penalties.	Various sections of the Stormwater Management Act (including §10.1-603.2:1, §10.1-603.11, and §10.1-603.14) grant enforcement authorities to localities operating qualifying local programs. Section 10.1-603.14(A) specifies that civil penalties collected by localities are to be paid into the local treasury for the purpose of minimizing, preventing, managing, or mitigating pollution of the waters of the locality and abating environmental pollution therein in such manner as the court may direct. 4VAC50-60-116 of the proposed regulations references these enabling sections and additionally provides a recommended table which may be utilized in setting civil penalty amounts.
Michael Schaefer (Virginia Municipal Stormwater Association)	Structure delegation rules to promote successful implementation at local level In addition, the burden of enforcing a larger, more complex program, including BMPs located on private property, is problematic.	The proposed regulations do recognize additional inspection and enforcement responsibilities that will be assumed by localities that adopt qualifying local programs. Section 114(D) of the regulations provide guidelines by which a qualifying local program may design an inspection program for BMPs. These programs must ensure that all BMPs are inspected by the locality at least once every five years, although inspections conducted by the owner may be utilized for this purpose if they are completed in accordance with section 114(C). In conjunction with this regulatory action, the Board is also conducting a regulatory action to amend the fees associated with the administration of the VSMP program. These fees are proposed to be established at a level that will provide sufficient funding for localities to carry out their responsibilities under the regulations.
Michael Schaefer (Virginia Municipal Stormwater Association)	Encourages DCR to ensure that localities are provided strong, clear and efficient authority to meet DCR's objectives.	The proposed regulations have been drafted to reflect and clarify the authorities available to localities under the Virginia Stormwater Management Act (§10.1-603.1 et seq.). Strong locality representation was also included on the technical advisory committee that assisted with the drafting of these proposed regulations to ensure that locality concerns were heard and considered in the drafting process.
Michael Schaefer	Fully consider feasibility, costs and cost-effectiveness in revising any technical criteria.	The Department contracted with the Center for Watershed Protection to provide recommendations to the Department and the Board regarding the

(Virginia Municipal Stormwater Association)	Urge DCR to take the time necessary to develop and thoroughly test any criteria revisions and the LID crediting system in terms of technical attainability, economic impact and cost-effectiveness.	water quality and quantity criteria portions of the regulations. The Center, utilizing the best stormwater data sets and scientific methodologies available in the nation, put forth technical recommendations to the Department and developed the Virginia Runoff Reduction Method and worksheet. This Method built upon and replaced the earlier draft LID crediting system. These recommendations and processes have been incorporated into the current proposed regulations. Between January 31, 2008 and September 16, 2008, the Department held 7 charrettes across the Commonwealth to test the Virginia Runoff Reduction Method and the achievability of the regulations as well as to familiarize the public with the method. Approximately 300 different people attended these charrettes, with 55-60% of those from consulting firms or construction companies, and about 25-30% from local governments. An additional series of at least four charrettes have been held or are being scheduled for between February and April 2009. Additionally, the James River Association contracted with Williamsburg Environmental Group to methodically test the regulations and methodology. The study reviewed a range of sites from low to high imperviousness, residential to commercial, as well as testing a redevelopment site. This information is incorporated into the economic analysis portion of the regulatory discussion document.
Michael Schaefer (Virginia Municipal Stormwater Association); J. Michael Flagg (Hanover County)	Fully consider feasibility, costs and cost-effectiveness in revising any technical criteria. Urge DCR to thoroughly investigate the economic impacts of this regulatory action and to involve parties including the Department of Planning and Budget with the expertise to address economic impacts.	The Department of Planning and Budget is required to conduct an economic analysis of the regulations when the proposed regulations are submitted to the Administration for review. This analysis is both based on the information provided in the Board's regulatory submittal package as well as their independent expertise. To aid in the development of the Board's package, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C. The economic information is made available when the proposed regulations

		are released to the public for a 60-day public comment period.
Michael Schaefer (Virginia Municipal Stormwater Association)	Fully consider feasibility, costs and cost-effectiveness in revising any technical criteria. DCR should strive to maximize flexibility at the local level, which is important for cost-effectiveness. It would be important to allow flexibility for both on-site and off-site solutions to address local needs and to accommodate regional and watershed plans that are already in place or that may be developed.	The technical criteria within the proposed regulations contain a large amount of flexibility. The additional control options and phosphorus removal possibilities provided in the regulations increase choice and reduce the structural controls required to treat stormwater and may tend to reduce the cost of phosphorus removal. A number of onsite and offsite methodologies are available to meet compliance. Permittees will first seek to attain the statewide water quality and quantity technical criteria onsite. If the water quality technical criteria can not be met on-site, off-site controls in part or in whole will be allowed by a qualifying local program in accordance with a Department-approved comprehensive watershed stormwater management plan. If no comprehensive watershed stormwater management plan exists, the criteria may still be allowed to be met off-site if specified terms are met. If allowed by the qualifying local program, reductions required for a site may be achieved by the payment of a pro-rata fee sufficient to fund improvements necessary to adequately achieve those reductions. A local program may also waive the water quality requirements through the granting of an exception in accordance with Part III. [NOTE: Additionally, HB2168 of the 2009 Session, effective July 1, 2009, created a new section numbered 10.1-603.8:1 relating to stormwater nonpoint nutrient offsets that stipulates that a permit issuing authority may allow compliance with stormwater nonpoint nutrient runoff water quality criteria through the use of the permittee's acquisition of nonpoint nutrient offsets in the same tributary.]
Michael Schaefer (Virginia Municipal Stormwater Association)	Urge DCR to incorporate provisions in the proposed regulations that will allow local programs to utilize alternative means of analysis in demonstrating compliance with water quality protection and/or quantity control requirements provided such means of analysis produce equivalent results to state developed methodologies.	Section 65 of the proposed regulations, which deals with water quality compliance, includes a provision in subsection A which allows alternative compliance methodologies to be utilized if they are demonstrated by the qualifying local program to achieve equivalent or more stringent results and approved by the Board. Similar language providing localities with increased flexibility is contained in many provisions of the water quantity criteria (section 66) as well, including subdivisions (A)(3), (A)(4), and (B)(5).

Michael Schaefer (Virginia Municipal Stormwater Association)	Strongly recommend that the evaluation and development of proposed changes to the stormwater quantity control requirements must include a review of the adequate outfall requirements in the Erosion and Sediment Control Regulations, 4VAC50-30-40, minimum standard #19.	A designated Water Quantity Workgroup was formed as a part of the technical advisory committee process to deal especially with water quantity issues. Section 66 of the proposed regulations is the result of that workgroup's efforts. Although it will necessitate a separate regulatory action at a later time, it is anticipated that this group's product will be utilized to amend the Erosion and Sediment Control Regulations, including MS-19. This will be undertaken sometime following this proposed regulation becoming final and effective.
Michael Schaefer (Virginia Municipal Stormwater Association); Andrew Gould (Timmons)	To understand fully the implications of the regulations and provide a meaningful comment opportunity on the proposed regulation amendments, it is important for both [Stormwater Management Handbook and BMP Clearinghouse] to be made available prior to or concurrently with the draft regulations.	Processes to develop both the Handbook and the BMP Clearinghouse have been underway for some time now. Both processes are utilizing separate technical advisory committee processes to ensure that stakeholder input is received in their development. The initial version of the BMP Clearinghouse was made available at the time that these regulations were proposed by the Board (http://www.vwrrc.vt.edu/swc/); the Clearinghouse will continue to develop as additional BMP information is added. The Handbook revisions are expected to be substantively complete prior to or at the time that the public comment period begins on the proposed regulation, meaning that the public will have the opportunity to comment on the regulations while viewing both the Clearinghouse and Handbook proposed revisions.
Michael Schaefer (Virginia Municipal Stormwater Association)	Concern about the relocation of technical requirements to the Stormwater Management Handbook. Unless the Handbook is strictly for guidance purposes and all required standards are properly promulgated and included in the regulations, as is currently the case, we believe the Handbook would be invalid under the Administrative Process Act.	All substantive requirements of the regulations have been included in the regulations in order to comply with the requirements of the Administrative Process Act. If items contained within the Handbook are to be considered to have the force of regulation, the Handbook will be incorporated into the final regulations by reference explicitly (and thus become a part of the regulations).
Andrew Gould (Timmons Group); David Nunnally (Caroline County); J. Michael Flagg (Hanover County)	We strongly encourage the Board and the Department to hold a series of public hearings to solicit further comment on this NOIRA and future draft regulations.	The proposed regulations were formulated with the assistance of a technical advisory committee composed of local governments, environmental groups, state agencies, federal agencies, consultants, engineers, and planning district commissions. Subcommittees of the TAC were also formed to deal with specific issues. In addition, advisory committees were formed to assist with the development of the BMP Clearinghouse website and with revisions to the Stormwater Management Handbook, and a series of design charrettes was held to gather input on the water quality requirements of the proposed regulations. In all, over 50 public meetings have been held that were associated with these regulations. The Department will additionally hold a series of public hearings associated with the proposed regulations; dates and locations of those hearings are referenced elsewhere in this document and posted on the Virginia Regulatory TownHall.

Andrew Gould (Timmons Group)	We suggest that changes in the administration of local stormwater management programs be addressed and implemented prior to and separately from changing the technical criteria applied to the design of stormwater quality and quantity. Many fledgling programs dealing with new technical criteria will likely lead to misinterpretation and inconsistencies across the state. We recommend that the Department and localities work together to implement a consistent program statewide before reworking the technical criteria.	The proposed regulations do include both amendments to Part II (technical criteria) and Part III (local program requirements). The technical criteria are a common element to all of the actions we are working on and we continue to believe that both elements (technical criteria and program development) are integrated components of a stormwater regulatory product. As such, we believe that without resolution on this important piece it will be difficult to properly develop the other integrated regulatory, guidance, website, and related pieces. The current approach will result in a more cohesive "qualifying local program" that each locality will administer and will have the greatest benefit to water quality. While it is recognized that this will require programs that are accustomed to implementing older technical criteria to amend their programs, it is believed that these updates can be achieved by these programs and the Department intends to remain engaged through technical assistance to these localities. For those localities that have not previously operated local stormwater management programs, adopting the new technical criteria now avoids the need to further amend new programs that are established in response to these regulations. The completion of this integrated regulatory action is important to this Administration. The Secretary of Natural Resource's noted at the first meeting of the technical advisory committee (TAC) that "I believe it is critical that the final regulations address improvements to water quality and quantity criteria associated with construction activities". Additionally, we suspect that approval by the U.S. Environmental Protection Agency (EPA) of moving the administration of the General Permit to localities as a part of the stormwater program revisions ["qualifying local program"] is less likely without the water quality and quantity regulatory improvements that are included in the proposed regulations. The technical criteria are truly a fundamental and necessary element of a "local qualifying program". Without them, those localities that currently do not have a stormwater program would have limited information regarding operational standards. With the proposal of the regulations by the Board on September 24, 2008, the Board supported the position that Parts I, II, and III should advance together.
Andrew Gould (Timmons Group)	As the technical criteria is being developed, we strongly encourage that cost effectiveness be given due consideration in the process. This	An economic analysis of the proposed regulations has been completed as a part of the regulatory process and is included within the regulatory discussion document. Information regarding costs has also been developed and

	consideration should take into account reductions in lot yield and maintenance costs.	provided to the Department throughout the development of these proposed regulations. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C. Additionally, the James River Association contracted with Williamsburg Environmental Group to methodically test the regulations and methodology. The study reviewed a range of sites from low to high imperviousness, residential to commercial, as well as testing a redevelopment site. This information is incorporated into the economic analysis portion of the regulatory discussion document. The economic information is made available when the proposed regulations are released to the public for a 60-day public comment period.
Andrew Gould (Timmons Group)	We suggest that the proposed regulations allow flexibility at the local level to account for unique watershed characteristics and regional opportunities. We encourage the Board and the Department to recognize the value of these local programs and allow for the continuation of these programs.	Section 96 of the proposed regulations allow local programs to utilize comprehensive watershed stormwater management plans in meeting water quality and water quantity requirements. Such plans must be approved by the Department and must ensure that offsite reductions equal to or greater than those that would be required for each site are achieved within the same Hydrologic Unit Code, or within another locally-designated watershed.
Andrew Gould (Timmons Group)	We encourage the Board and the Department to look for opportunities to streamline the implementation and enforcement of local programs. In some cases local inspectors visit a site to inspect erosion, sediment control and stormwater management measures, and then a state inspector will inspect the same site for the same issues. This is redundant and inefficient use of resources.	This regulatory action, in particular the amendments to Part III, is designed to enable the local operation of a stormwater management program in conjunction with the Erosion and Sediment Control programs that localities are currently operating. While DCR will still retain oversight of the local programs and may conduct its own site inspections in some cases, it is intended that responsibility for inspections will lie with a qualifying local program (section 114). Enforcement will also be carried out by localities under section 116 of the proposed regulations.
Uwe Kirste (Prince William County)	The proposed regulations on water quality are far reaching in the sense that they will likely impose excessive and unrealistic burdens on	The Department contracted with the Center for Watershed Protection for the specific purpose of testing the feasibility of the proposed requirements and providing recommendations to the Department. The Center, in conjunction

	both localities and developers.	with the Chesapeake Stormwater Network, developed the Runoff Reduction Method and associated worksheet that is intended to be used in complying with the regulations. Information related to the Method and the work of the Center can be found at: http://www.dcr.virginia.gov/lr2f.shtml. As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C.
Uwe Kirste (Prince William County)	The State should undertake a cost-benefit or feasibility analysis to determine whether the proposed water quality limits are in fact attainable. It is more likely that a tiered and gradual step approach is the better method to attain these goals.	The Department contracted with the Center for Watershed Protection for the specific purpose of testing the feasibility of the proposed requirements and providing recommendations to the Department. The Center, in conjunction with the Chesapeake Stormwater Network, developed the Runoff Reduction Method and associated worksheet that is intended to be used in complying with the regulations. Information related to the Method and the work of the Center can be found at: http://www.dcr.virginia.gov/lr2f.shtml. As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and

		has been included in its entirety in Appendix C.
Uwe Kirste (Prince William County)	We believe that the requirements, as proposed, will have serious implications on the cost of land development without a corresponding actual increase in water quality benefits. We strongly suggest that further evaluation studies be conducted before amending the regulations.	The Department contracted with the Center for Watershed Protection for the specific purpose of testing the feasibility of the proposed requirements and providing recommendations to the Department. The Center, in conjunction with the Chesapeake Stormwater Network, developed the Runoff Reduction Method and associated worksheet that is intended to be used in complying with the regulations. Information related to the Method and the work of the Center can be found at: http://www.dcr.virginia.gov/lr2f.shtml. As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C. It is additionally of note that the proposed regulations were formulated with the assistance of a technical advisory committee composed of local governments, environmental groups, state agencies, federal agencies, consultants, engineers, and planning district commissions. Subcommittees of the TAC were also formed to deal with specific issues. In addition, advisory committees were formed to assist with the development of the BMP Clearinghouse website and with revisions to the Stormwater Management Handbook, and a series of design charrettes was held to gather input on the water quality requirements of the proposed regulations. To date, over 50 public meetings have been held associated with these regulations. This has allowed the Department to ensure that the proposed regulations have gained extensive exposure and vetting among all interests.
Uwe Kirste (Prince William County); J. Michael Flagg	We are of the opinion that great strides in improving water quality can be made by bringing localities with deficient programs to a higher level, prior to making significant changes	The proposed regulations do include both amendments to Part II (technical criteria) and Part III (local program requirements). While it is recognized that this will require programs that are accustomed to implementing older technical criteria to amend their programs, it is believed that these updates

(Hanover County)	in stormwater regulations throughout the state.	can be achieved by these programs and the Department intends to remain engaged through technical assistance to these localities. For those localities that have not previously operated local stormwater management programs, adopting the new technical criteria now avoids the need to further amend new programs that are established in response to these regulations.
Uwe Kirste (Prince William County); J. Michael Flagg (Hanover County)	Further improvement in water quality can be achieved through improved implementation and enforcement of existing programs; this should be the first step before any new regulations are imposed on local governments during these difficult economic times.	The proposed regulations are intended to better develop currently-existing local stormwater management programs, in addition to providing the framework for the establishment of programs in localities that do not currently have programs. In conjunction with this regulatory action, the Board is also conducting an action to amend the fees associated with the stormwater program (Part XIII). That action proposes to establish permit fees at a level that provides adequate funding to support the administration of a qualifying local program.
Uwe Kirste (Prince William County)	4VAC5-60-53 General Requirements This requires that the water quality in receiving state waters meet the "State designated use" water quality standards, a goal originating from TMDL requirements. By inserting this requirement under the general stormwater regulations, TMDLs are now an unfunded mandate, with the entire burden of responsibility transferred from the State to local governments. The County is of the opinion that TMDLs are a shared responsibility between the State and localities with needed financial assistance from the state, furthermore, this requirement should not be part of general stormwater regulations.	This comment misunderstands the application of section 53 of the proposed regulations. This section is found in Part II of the regulations, which sets forth the technical criteria which is to be employed by a qualifying local program in administering a construction stormwater management program. Section 53 is part of this technical criteria. Under this section, localities themselves are not responsible for waters meeting state designated uses; rather, this section states that one of the goals for a qualifying local program is that construction activities that they approve and oversee be consistent with those uses.
Uwe Kirste (Prince William County)	4VAC50-60-63, Water Quality Requirements Under this Section, the State is imposing specific numeric water quality standards for nitrogen and phosphorous originating from new developments. We concur with this intent as a general goal only, and not as a site-specific requirement for each development under general stormwater regulations. The state has not conducted any study on either the attainability, or an analysis of the cost-benefits of the proposed requirement. It appears that the numeric water quality standards have been	The Department contracted with the Center for Watershed Protection for the specific purpose of testing the feasibility of the proposed requirements and providing recommendations to the Department. The Center, in conjunction with the Chesapeake Stormwater Network, developed the Runoff Reduction Method and associated worksheet that is intended to be used in complying with the regulations. Information related to the Method and the work of the Center can be found at: http://www.dcr.virginia.gov/lr2f.shtml. As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for

	established based on the Tributary Strategy model without making any attempts to physically apply the requirement to a typical development and evaluating the feasibility of implementing the requirement with a cost analysis. Until such study is undertaken by the state, it would be too premature to impose a requirement which may not be feasible to comply with.	consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C. It is additionally of note that the proposed regulations were formulated with the assistance of a technical advisory committee composed of local governments, environmental groups, state agencies, federal agencies, consultants, engineers, and planning district commissions. Subcommittees of the TAC were also formed to deal with specific issues. In addition, advisory committees were formed to assist with the development of the BMP Clearinghouse website and with revisions to the Stormwater Management Handbook, and a series of design charrettes was held to gather input on the water quality requirements of the proposed regulations. In all, over 50 public meetings have been held associated with these regulations. This has allowed the Department to ensure that the proposed regulations have gained extensive exposure and vetting among all interests.
Uwe Kirste (Prince William County)	4VAC50-60-63, Water Quality Requirements The state should retain local control over implementing regional and offsite stormwater facilities, and programs based on technical, cost and other factors that influence a locality in making this determination. There are many factors that determine the stormwater technique appropriate to a specific situation based on specific problems that need to be addressed. In view of these, the locality should continue to retain control over addressing its local stormwater decisions.	The proposed regulations do allow for local flexibility in addressing water quality. Section 96 of the regulations allows qualifying local programs to adopt comprehensive watershed stormwater management plans to meet the water quality and water quantity requirements of the regulations. The regulations also recognize that a pro-rata fee program may be established (subsection B of 4VAC50-60-96). Local programs may also allow for off-site controls to be utilized when appropriate in accordance with 4VAC50-60-65(G). [NOTE: Additionally, HB2168 of the 2009 Session, effective July 1, 2009, created a new section numbered 10.1-603.8:1 relating to stormwater nonpoint nutrient offsets that stipulates that a permit issuing authority may allow compliance with stormwater nonpoint nutrient runoff water quality criteria through the use of the permittee's acquisition of nonpoint nutrient offsets in the same tributary.]

Uwe Kirste (Prince William County)	List of LID Practices Disallowed The State wants localities to report a list of LID practices not allowed in the locality in writing to DCR. Even though the County does allow most LID practices, the County may choose not to allow some of these practices wherever the feasibility of such practices to operate efficiently over time is questionable. Other situations may include disallowing in-lot BMPs in smaller lots/parcels, over less pervious soils and in higher density areas. The State should leave this responsibility with the locality, particularly when a locality has assumed the responsibility to maintain these BMPs.	4VAC50-60-65(D) allows for limitations to be established for the use of BMPs, including LID practices. The qualifying local program establishing the use limitation is required to notify and provide written justification to DCR prior to implementing the limitation. This ensures that DCR is aware of the limitations that are set statewide when it reviews local programs, responds to requests for technical assistance, and responds to questions posed by the regulated community. It also ensures that local programs do not establish use limitations that are not justified and limit viable options for development.
Uwe Kirste (Prince William County)	Table 2 Table 2 refers to volume reduction credit. The County wants to clarify that the stormwater regulations are not being expanded to incorporate/regulate stormwater volume control. Volume control is difficult to attain.	4VAC50-60-66 contains the water quantity criteria established by the proposed regulations. These criteria do include requirements related to volume control. These requirements were established with the assistance of a special water quantity committee which consisted of engineers and consultants, local government representatives, and environmental groups.
Uwe Kirste (Prince William County)	4VAC50-60-65 Water Quality Compliance The State regulations allow the use of either the Performance or Technology based approach to comply with the water quality criteria to design BMPs. This flexibility should be retained. Changes should not be made without feasibility and cost benefit analysis.	Both the performance and the technology approach have been replaced with the Virginia Runoff Reduction Method, which establishes a design standard targeted at a particular pollutant load for each site. Qualifying local programs may utilize other methodologies that achieve equivalent or more stringent results if Board approval is obtained. The Department contracted with the Center for Watershed Protection for the specific purpose of testing the feasibility of the proposed requirements and providing recommendations to the Department. The Center, in conjunction with the Chesapeake Stormwater Network, developed the Runoff Reduction Method and associated worksheet that is intended to be used in complying with the regulations. Information related to the Method and the work of the Center can be found at: http://www.dcr.virginia.gov/lr2f.shtml. As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration.

		Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C. It is additionally of note that the proposed regulations were formulated with the assistance of a technical advisory committee composed of local governments, environmental groups, state agencies, federal agencies, consultants, engineers, and planning district commissions. Subcommittees of the TAC were also formed to deal with specific issues. In addition, advisory committees were formed to assist with the development of the BMP Clearinghouse website and with revisions to the Stormwater Management Handbook, and a series of design charrettes was held to gather input on the water quality requirements of the proposed regulations. In all, over 50 public meetings have been held associated with these regulations. This has allowed the Department to ensure that the proposed regulations have gained extensive exposure and vetting among all interests.
Uwe Kirste (Prince William County)	Table 3 on BMP Efficiency The table shows very high efficiencies for some LID practices. There has not been any study on either the efficacy or the long-term sustainability of LID practices to operate with high pollutant removal efficiencies over time.	All efficiencies established by Table 1 in 4VAC50-60-65 were set by the Center for Watershed Protection utilizing the best data available on these practices. The efficiencies utilized are believed to be accurate based upon the known science. Other BMPs and LID practices will be made available on the Virginia Stormwater BMP Clearinghouse website. Prior to being listed on that site, those practices must be approved and their efficiencies justified before a working group and the Department.
Uwe Kirste (Prince William County)	The LID components with proposed higher efficiencies are all infiltration-based. Soil permeability, shallow rock, higher density, and high groundwater conditions restrict the use of these facilities in Northern Virginia. If the State plans to achieve very high pollutant load reductions by relying on LID components, Northern Virginia will be at a disadvantage because of the limitations it has for incorporating LID practices and the associated land costs.	It is recognized that variable conditions across the Commonwealth will impact which BMPs are suitable for implementation on a given site. This is why qualifying local programs are given discretion to establish use limitations for BMPs by 4VAC50-60-65(D). As for the suite of BMPs available, Table 1 in 4VAC-50-60-65 is only the beginning of the available options. Additional BMPs will be made available as they are developed on the Virginia Stormwater BMP Clearinghouse website.

Uwe Kirste (Prince William County)	The keystone pollutant for many years has been phosphorous, and the required BMP efficiencies for all the local programs have been established based on phosphorous removal only. It is our understanding that the nitrogen removal requirement will be introduced as part of the proposed stormwater regulations. The conventional BMPs do not remove nitrogen; therefore, any introduction of required nitrogen removal from new developments will push all regulations towards incorporating LID and infiltration practices only.	The proposed regulations establish requirements related only to phosphorus; although many of the practices employed under the proposed regulations will have a nitrogen removal benefit as well as phosphorus, no nitrogen requirements are proposed.
Uwe Kirste (Prince William County)	4VAC 50-60-66 Water Quantity The proposed requirement to protect properties and State waters from the changes to runoff volume and the requirement to replicate predevelopment hydrology will necessitate the preservation of large areas of open space with pervious soils. The required areas of open space to control runoff volume increases with the decrease in pervious areas and the density of land use. The proposed requirement has a direct impact on zoning, land use, density of land use as well as the cost of land development.	4VAC50-60-66 contains the water quantity criteria established by the proposed regulations. These criteria differ greatly from the draft language cited by the comment. These requirements were established with the assistance of a special water quantity committee which consisted of engineers and consultants, local government representatives, and environmental groups. The criteria developed by this committee was also considered by the full technical advisory committee, which was composed of local governments, environmental groups, state agencies, federal agencies, consultants and stormwater engineers, and planning district commissions. As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C.
Uwe Kirste (Prince William County)	The proposed requirement for situations when "the stream channel erosion or localized flooding exists at the site prior to proposed land disturbance activity" is not clear. How do we	4VAC50-60-66 contains the water quantity criteria established by the proposed regulations. These criteria differ greatly from the draft language cited by the comment. These requirements were established with the assistance of a special water quantity committee which consisted of

	determine the fair contribution or justifiable improvement necessary based on the proposed project size or density? Will this necessitate offsite channel improvements? Necessitating offsite channel improvement can have potentially serious implications.	engineers and consultants, local government representatives, and environmental groups. The criteria developed by this committee was also considered by the full technical advisory committee, which was composed of local governments, environmental groups, state agencies, federal agencies, consultants and stormwater engineers, and planning district commissions. As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C.
Uwe Kirste (Prince William County)	It appears that the proposed regulations mandate the peak flow attenuation of 1.5-, 2- and 10- year storms. The questions pertaining to this requirement are: Has their been a study for the evaluation of size of the stormwater facility for regulating 1.5 year storm event, in addition to other storm events? Is the requirement to regulate 1.5-year storm to address the adequate outfall (MS-19) requirements? Does the assumption of good forested condition apply to pervious lands only?	4VAC50-60-66 contains the water quantity criteria established by the proposed regulations. These criteria differ greatly from the draft language cited by the comment. These requirements were established with the assistance of a special water quantity committee which consisted of engineers and consultants, local government representatives, and environmental groups. The criteria developed by this committee was also considered by the full technical advisory committee, which was composed of local governments, environmental groups, state agencies, federal agencies, consultants and stormwater engineers, and planning district commissions. As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's

		waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C. Although it will necessitate a separate regulatory action at a later time, it is anticipated that this group's product will be utilized to amend the Erosion and Sediment Control Regulations, including MS-19. This will be undertaken sometime following these proposed regulations becoming final and effective.
Uwe Kirste (Prince William County)	The State should limit the amount of reporting; Excessive or duplicative efforts in reporting stormwater activities to multiple agencies will raise costs without providing additional benefits.	4VAC50-60-126 of the proposed regulations establishes reporting requirements for qualifying local programs. The information required to be reported has been kept to the minimum necessary, and includes items related to stormwater management facilities, project inspections, enforcement actions, and exceptions.
Uwe Kirste (Prince William County)	As part of reporting, the State is proposing to require documentation on GPS coordinates for each stormwater facility. This requirement should not be applied retroactively to existing/older facilities.	The reporting requirements apply prospectively only; i.e., only to facilities which are approved and constructed under the new regulations (note that 4VAC50-60-126(A)(1)) specifies that data is to be reported on each facility "completed during the fiscal year").
Uwe Kirste (Prince William County)	Funding and Staffing Plan; if the proposed regulations require the localities to increase its staff level(s), will there be a funding assistance from the state?	In conjunction with this regulatory action, the Board is also conducting a regulatory action to amend the fees associated with the administration of the VSMP program. These fees are proposed to be established at a level that will provide sufficient funding for localities to carry out their responsibilities under the regulations.
Uwe Kirste (Prince William County)	Prince William County agrees with the components of the proposed regulations pertaining to streamlining the Virginia Storm Water Management Program to reduce duplicative efforts, and clarifying the mutual roles and responsibilities at the State and local levels.	Streamlining of program administration is one of the major goals of this regulatory action, as it was of the legislation (HB1177 in 2004) that created the Virginia Stormwater Management Program.
Uwe Kirste (Prince William County)	We request that the new regulations focus on manageable programs that can be funded through existing funding streams with targets that are attainable economically.	The Department contracted with the Center for Watershed Protection for the specific purpose of testing the feasibility of the proposed requirements and providing recommendations to the Department. The Center, in conjunction with the Chesapeake Stormwater Network, developed the Runoff Reduction Method and associated worksheet that is intended to be used in complying with the regulations. Information related to the Method and the work of the Center can be found at: http://www.dcr.virginia.gov/lr2f.shtml. As a part of this regulatory process, the Department has additionally

		conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C. It is additionally of note that the proposed regulations were formulated with the assistance of a technical advisory committee composed of local governments, environmental groups, state agencies, federal agencies, consultants, engineers, and planning district commissions. Subcommittees of the TAC were also formed to deal with specific issues. In addition, advisory committees were formed to assist with the development of the BMP Clearinghouse website and with revisions to the Stormwater Management Handbook, and a series of design charrettes was held to gather input on the water quality requirements of the proposed regulations. In all, over 50 public meetings have been held associated with these regulations. This has allowed the Department to ensure that the proposed regulations have gained extensive exposure and vetting among all interests. In conjunction with this regulatory action, the Board is also conducting a regulatory action to amend the fees associated with the administration of the VSMP program. These fees are proposed to be established at a level that will provide sufficient funding for localities to carry out their responsibilities under the regulations.
Pamela Faggert (Dominion)	It is recommended that the exemption in 40 CFR Part 122.26 (a)(2)(ii) be included in 4VAC50-60, and perhaps in Part 1 (Definitions, Purpose and Applicability)	While the exemption is believed to be better suited for insertion into a section of the regulations dealing with requirements to obtain a permit and has not been incorporated into the sections currently being amended, the Department does observe the exemption in administering the program.
Pamela Faggert (Dominion)	It would be helpful if DCR would maintain on their website a list of localities, with contacts, that have been delegated the program.	While the helpfulness of the comment is recognized, until the proposed regulations become finalized and effective and the timeframes for program adoption contained in §10.1-603.3 of the Code of Virginia pass, there are no qualifying local programs to list. It is of note that all localities located within

		Tidewater Virginia as defined in §10.1-2101 and all localities designated as MS4s under the Virginia Stormwater Management Act will be required to adopt qualifying local programs, while other localities will be allowed to do so voluntarily.
David Nunnally (Caroline County)	We believe that the best course of action is to focus on establishing and supporting the stormwater management program at the local government level. Given that the Virginia Stormwater Management Law allows an option for these localities [west of I-95] to adopt their own program or allow DCR to administer a program, statewide implementation of the program is likely to be quite challenging.	The proposed regulations do include both amendments to Part II (technical criteria) and Part III (local program requirements). The technical criteria are a common element to all of the actions we are working on and we continue to believe that both elements (technical criteria and program development) are integrated components of a stormwater regulatory product. As such, we believe that without resolution on this important piece it will be difficult to properly develop the other integrated regulatory, guidance, website, and related pieces. The current approach will result in a more cohesive "qualifying local program" that each locality will administer and will have the greatest benefit to water quality. While it is recognized that this will require programs that are accustomed to implementing older technical criteria to amend their programs, it is believed that these updates can be achieved by these programs and the Department intends to remain engaged through technical assistance to these localities. For those localities that have not previously operated local stormwater management programs, adopting the new technical criteria now avoids the need to further amend new programs that are established in response to these regulations. The completion of this integrated regulatory action is important to this Administration. The Secretary of Natural Resource's noted at the first meeting of the technical advisory committee (TAC) that "I believe it is critical that the final regulations address improvements to water quality and quantity criteria associated with construction activities". Additionally, we suspect that approval by the U.S. Environmental Protection Agency (EPA) of moving the administration of the General Permit to localities as a part of the stormwater program revisions ["qualifying local program"] is less likely without the water quality and quantity regulatory improvements that are included in the proposed regulations. The technical criteria are truly a fundamental and necessary element of a "local qualifying program". Without them, those localities that currently do not have a stormwater program would have limited information regarding operational standards. With the proposal of the regulations by the Board on September 24, 2008, the

		Board supported the position that Parts I, II, and III should advance together.
David Nunnally (Caroline County)	Even for the most advanced local stormwater program, the implementation of the program is likely to have numerous challenging issues. Fee collection, permit issuance, coordination of the various existing environmental programs (Erosion and Sediment Control, Chesapeake Bay Preservation Act, etc.) are just a few issues and programs that will have to be coordinated locally.	The proposed regulations are intended to streamline the administration of stormwater management in the Commonwealth and allow for better integration of the stormwater program with the other programs administered by localities across the state. While it is understood that local adoption and implementation of the proposed regulations will represent a new venture for many localities, it is believed that the outcome of this process will be a stormwater management program that functions in a more efficient manner for all parties. In order to help ease program administration, fee collection and permit issuance are intended to be handled by localities through a Stormwater Management Enterprise Website under development by the Department. Use of this website will ease many of the administrative difficulties associated with those tasks.
David Nunnally (Caroline County)	We believe there are significant benefits to be had by coordinating local and state resources. This is especially applicable in the enforcement component of the program. Situations involving land disturbing activities without permits or approved plans, as well as, compliance issues on permitted projects can place a huge burden on a locality's manpower resources. And since these situations only occur occasionally, it is difficult to staff up and maintain sufficient enforcement staff. We would welcome a section of the regulation that clearly provides for timely and effective enforcement assistance from the state government.	As shown in 4VAC50-60-116, qualifying local programs are expected to establish enforcement programs of their own. It is believed that these programs may arise from an expansion of the current enforcement components of a locality's Erosion and Sediment Control program. Even with local enforcement, the Board retains the authority to join in any enforcement actions or to undertake its own enforcement within a locality.
David Nunnally (Caroline County)	Similarly, there are other components of the program that could benefit from DCR's resources. The regulations could establish a mechanism – such as a quarterly report of DCR activities in each locality, or a periodic customer service survey – to facilitate this kind of cooperation. DCR's participation would help to advise developers of VSMP requirements and would support the County's project development efforts.	Continuous interaction between the Department and qualifying local programs is anticipated. The Department intends to dedicate a significant number of its field staff to outreach, oversight and technical assistance for qualifying local programs.
David Nunnally	DCR and the locality should coordinate field	As explained in the previous comment, continued interaction between the

(Caroline County)	resources and avoid duplication and conflicting directives. The regulation should establish basic protocols for site inspections, site selection (for DCR inspection), communication of inspection results, resolution of conflicts (i.e., local vs. state), etc.	Department and a qualifying local program is expected. While the Department will retain oversight responsibilities and the Board will retain over-filing authorities, however, in most cases, it is intended that program administration, including site inspections, will be handled by the qualifying local program.
David Nunnally (Caroline County)	We feel that the proposal to amend and revise the technical criteria should be limited to only those necessary actions in order to facilitate the implementation of the stormwater program at that local government level. There are numerous coordination issues at the local level and these issues are challenging enough without the necessity of implementing new technical criteria at the same time.	The proposed regulations do include both amendments to Part II (technical criteria) and Part III (local program requirements). The technical criteria are a common element to all of the actions we are working on and we continue to believe that both elements (technical criteria and program development) are integrated components of a stormwater regulatory product. As such, we believe that without resolution on this important piece it will be difficult to properly develop the other integrated regulatory, guidance, website, and related pieces. The current approach will result in a more cohesive "qualifying local program" that each locality will administer and will have the greatest benefit to water quality. While it is recognized that this will require programs that are accustomed to implementing older technical criteria to amend their programs, it is believed that these updates can be achieved by these programs and the Department intends to remain engaged through technical assistance to these localities. For those localities that have not previously operated local stormwater management programs, adopting the new technical criteria now avoids the need to further amend new programs that are established in response to these regulations. The completion of this integrated regulatory action is important to this Administration. The Secretary of Natural Resource's noted at the first meeting of the technical advisory committee (TAC) that "I believe it is critical that the final regulations address improvements to water quality and quantity criteria associated with construction activities". Additionally, we suspect that approval by the U.S. Environmental Protection Agency (EPA) of moving the administration of the General Permit to localities as a part of the stormwater program revisions ["qualifying local program"] is less likely without the water quality and quantity regulatory improvements that are included in the proposed regulations. The technical criteria are truly a fundamental and necessary element of a "local qualifying program". Without them, those localities that currently do not have a stormwater program would have limited information regarding operational standards.

		With the proposal of the regulations by the Board on September 24, 2008, the Board supported the position that Parts I, II, and III should advance together.
David Nunnally (Caroline County)	While the draft technical criteria represent state of the art thinking, they are enormously expensive and complex.	The Department contracted with the Center for Watershed Protection for the specific purpose of testing the feasibility of the proposed requirements and providing recommendations to the Department. The Center, in conjunction with the Chesapeake Stormwater Network, developed the Runoff Reduction Method and associated worksheet that is intended to be used in complying with the regulations. Information related to the Method and the work of the Center can be found at: http://www.dcr.virginia.gov/lr2f.shtml. As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within this document. Other parties have additionally conducted economic analyses and presented their results for consideration. It is additionally of note that the proposed regulations were formulated with the assistance of a technical advisory committee composed of local governments, environmental groups, state agencies, federal agencies, consultants, engineers, and planning district commissions. Subcommittees of the TAC were also formed to deal with specific issues. In addition, advisory committees were formed to assist with the development of the BMP Clearinghouse website and with revisions to the Stormwater Management Handbook, and a series of design charrettes was held to gather input on the water quality requirements of the proposed regulations. In all, 44 public meetings have been held that were associated with these regulations. This has allowed the Department to ensure that the proposed regulations have gained extensive exposure and vetting among all interests.
David Nunnally (Caroline County)	The implementation of these criteria appears to have significant costs associated with inspections and maintenance.	As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This

		information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C. As referenced in the previous comment, it is additionally of note that the proposed regulations were formulated with the assistance of a technical advisory committee composed of local governments, environmental groups, state agencies, federal agencies, consultants, engineers, and planning district commissions. This committee commented on all parts of the regulations, including those provisions pertaining to inspection and maintenance.
David Nunnally (Caroline County)	We feel that it would be best to see what gains can be made by implementing the existing criteria (and stormwater management statewide), then determine if this regulation action is necessary.	The proposed regulations do include both amendments to Part II (technical criteria) and Part III (local program requirements). The technical criteria are a common element to all of the actions we are working on and we continue to believe that both elements (technical criteria and program development) are integrated components of a stormwater regulatory product. As such, we believe that without resolution on this important piece it will be difficult to properly develop the other integrated regulatory, guidance, website, and related pieces. The current approach will result in a more cohesive "qualifying local program" that each locality will administer and will have the greatest benefit to water quality. While it is recognized that this will require programs that are accustomed to implementing older technical criteria to amend their programs, it is believed that these updates can be achieved by these programs and the Department intends to remain engaged through technical assistance to these localities. For those localities that have not previously operated local stormwater management programs, adopting the new technical criteria now avoids the need to further amend new programs that are established in response to these regulations. The completion of this integrated regulatory action is important to this Administration. The Secretary of Natural Resource's noted at the first meeting of the technical advisory committee (TAC) that "I believe it is critical that the final regulations address improvements to water quality and quantity criteria associated with construction activities". Additionally, we suspect that approval by the U.S. Environmental Protection Agency (EPA) of moving the administration of the General Permit to localities as a part of the stormwater program revisions ["qualifying local program"] is less likely without the water quality and quantity regulatory improvements that are included in the proposed regulations. The technical criteria are truly a

		fundamental and necessary element of a "local qualifying program". Without them, those localities that currently do not have a stormwater program would have limited information regarding operational standards. With the proposal of the regulations by the Board on September 24, 2008, the Board supported the position that Parts I, II, and III should advance together
David Nunnally (Caroline County)	We recommend a comprehensive approach that targets water quality for all state agencies and their respective activities. There are currently numerous inconsistencies that have come to our attention. Consider the following examples: Instructions for applying 10-10-10 fertilizer directly to ponds and lakes to enhance sport fishing productivity; aerial fertilization of loblolly forests to increase productivity; in-stream release of vast amounts of accumulated sediment by breaching dams to allow fish passage. How is it that state websites and activities, such as the examples noted above, are promoted, yet the stormwater management program requires expensive BMPs and rigorous erosion and sediment inspections?	While it may be the case that other state initiatives may at times appear to have less than desirable water quality impacts, the Virginia Stormwater Management Act (§10.1-603.1 of the Code of Virginia) grants the Board authority over stormwater in the Commonwealth, and the Board's authority within this regulatory action is limited to that subject area. Both the Department and the Board remain watchful of other state government actions which may impact water quality.
Nick Evans (Thomas Jefferson Soil and Water Conservation District)	If localities do not request delegation, Soil and Water Conservation Districts should be offered the opportunity to administer the program on DCR's behalf.	Section 10.1-603.3 of the Code of Virginia specifies that localities are the entities intended to adopt local stormwater management programs, and that in the absence of adoption by a locality, the Department shall administer the program within a jurisdiction. A change to the Code by the General Assembly would be required in order to allow for delegation to a SWCD. Pursuant to §10.1-603.3(G), however, delegated localities may enter into agreements with SWCDs and other to carry out a local stormwater management program.
Nick Evans (Thomas Jefferson Soil and Water Conservation District)	Urges DCR to ensure, that regardless of where the program administration lies, review of Stormwater Pollution Prevention Plans (SWPPPs) prior to the issuance of permits, is a required element of the program.	SWPPPs are not required to be reviewed prior to issuance of permits; in fact, the only time that staff interacts with a SWPPP is during site inspections. What it is believed that the comment is referring to, however, is a stormwater management plan, which is a major component of a SWPPP. These plans are required to be reviewed prior to issuance of permit coverage by 4VAC50-60-108.
Nick Evans (Thomas Jefferson Soil and Water Conservation	Additionally, to avoid confusion and the need to meet multiple requirements intended for the same effect (protection of downstream properties and waterways from increases in volume, velocity and peak flow rate of	A designated Water Quantity Workgroup was formed as a part of the technical advisory committee process to deal especially with water quantity issues. Section 66 of the proposed regulations is the result of that workgroup's efforts. Although it will necessitate a separate regulatory action at a later time, it is anticipated that this group's product will be utilized to

District)	stormwater runoff), a project that complies with the new Stormwater Regulations should be deemed to meet the requirements for Minimum Standard #19 of the Virginia Erosion and Sediment Control Regulations, 4VAC 50-30-40.	amend the Erosion and Sediment Control Regulations, including MS-19. This will be undertaken sometime following this proposed regulation becoming final and effective and will create the consistency sought by the comment.
Nick Evans (Thomas Jefferson Soil and Water Conservation District)	Urges DCR to provide regularly scheduled technical workshops to engineers, review and inspection authorities, the development community, and localities about the administrative and technical requirements of the program.	Continuous interaction between the Department and qualifying local programs is anticipated. The Department intends to dedicate a significant number of its field staff to outreach, oversight and technical assistance for qualifying local programs. This could include workshops such as those referenced by the comment.
Larry Land (Virginia Association of Counties)	The Virginia Association of Counties is very concerned that this could be a regulatory program with serious financial implications for local governments.	The Virginia Stormwater Management Program is intended to be self-funding. Section 10.1-603.4(5)(b) evidences this intent in requiring that permit fees be set at a level sufficient for the Department to carry out its responsibilities under the Virginia Stormwater Management Act. In conjunction with this regulatory action, the Board is also conducting a regulatory action to amend the fees associated with the administration of the VSMP program. These fees are proposed to be established at a level that will provide sufficient funding for localities to carry out their responsibilities under the regulations.
John Carlock (Hampton Roads Planning District Commission)	Based on its review of the NOIRA and the experience over the last two years of moving this regulation to its current state of development, the HRPDC staff believes that there may be merit in dividing the regulatory development process into two separate elements – technical criteria and program administration.	The proposed regulations do include both amendments to Part II (technical criteria) and Part III (local program requirements). The technical criteria are a common element to all of the actions we are working on and we continue to believe that both elements (technical criteria and program development) are integrated components of a stormwater regulatory product. As such, we believe that without resolution on this important piece it will be difficult to properly develop the other integrated regulatory, guidance, website, and related pieces. The current approach will result in a more cohesive "qualifying local program" that each locality will administer and will have the greatest benefit to water quality. While it is recognized that this will require programs that are accustomed to implementing older technical criteria to amend their programs, it is believed that these updates can be achieved by these programs and the Department intends to remain engaged through technical assistance to these localities. For those localities that have not previously operated local stormwater management programs, adopting the new technical criteria now avoids the need to further amend new programs that are established in response to these regulations. The completion of this integrated regulatory action is important to this

		Administration. The Secretary of Natural Resource's noted at the first meeting of the technical advisory committee (TAC) that "I believe it is critical that the final regulations address improvements to water quality and quantity criteria associated with construction activities". Additionally, we suspect that approval by the U.S. Environmental Protection Agency (EPA) of moving the administration of the General Permit to localities as a part of the stormwater program revisions ["qualifying local program"] is less likely without the water quality and quantity regulatory improvements that are included in the proposed regulations. The technical criteria are truly a fundamental and necessary element of a "local qualifying program". Without them, those localities that currently do not have a stormwater program would have limited information regarding operational standards. With the proposal of the regulations by the Board on September 24, 2008, the Board supported the position that Parts I, II, and III should advance together.
John Carlock (Hampton Roads Planning District Commission)	Development of this element of the state program, accompanied by delegation of program administration to localities, as envisioned in the HB1177 development process, should eliminate or reduce program duplication, increase program effectiveness and reduce confusion in the community about who has the lead responsibility for the several programs addressing stormwater management.	Increasing efficiencies and reducing confusion and duplication are some of the major goals of this regulatory action, as it was of House Bill 1177. Implementation of the proposed regulations will allow for a better stormwater management program statewide.
John Carlock (Hampton Roads Planning District Commission)	This effort should also address the sometimes conflicting guidance and regulatory goals of the various divisions and programs within DCR and between DCR and other state agencies, such as VDOT and DEQ.	As mentioned in the comment above, HB1177 was intended to reduce conflicts among various agencies by consolidating stormwater management under the Board's authority. Avoidance of conflict between divisions and agencies is a major goal of the Department. The proposed regulations have been drafted with this in mind, though no regulation can completely speak to all potential intra- and inter-agency issues. Such issues will require awareness of all involved parties and a common approach to practical solutions.
John Carlock (Hampton Roads Planning District Commission)	A more deliberate approach to the technical criteria would allow time for the Handbook and BMP Clearinghouse to be fully developed and provide the appropriate tools for localities and others to use in meeting the technical criteria.	Both the BMP Clearinghouse and Handbook processes are underway and substantively completed products are expected to be available for review at the time of the release of the proposed regulation for public comment. The BMP Clearinghouse TAC has been meeting over nearly the last year and a half. While BMP standards and specifications will continue to be developed over time, the initial offering of the Clearinghouse was made available prior to

		the proposal of these regulations by the Board. To assist in the review of the Stormwater Management Handbook, an advisory committee has been formed and has held one organizational meeting. Additional meetings will be held as handbook chapters are completed and circulated for comment, and a full draft of the Handbook is expected to be substantively completed prior to the beginning of the public comment period.
John Carlock (Hampton Roads Planning District Commission)	This element [technical criteria] should also include consideration of the appropriateness of site-specific stormwater controls in contrast to regional, watershed wide approaches, as presently used in many localities. It is important that the new regulation accommodate both approaches to ensure that localities are able to use the most appropriate vehicle to address specific watershed and locality issues and goals.	Part II of the proposed regulations (technical criteria) does include both on-site and off-site/regional compliance options. Section 65 sets forth the basic on-site compliance requirements (as well as individual off-site compliance where permitted by a local programs). Section 96 establishes options for compliance through comprehensive watershed stormwater management plans and pro-rata fee programs where they are established. [NOTE: Additionally, HB2168 of the 2009 Session, effective July 1, 2009, created a new section numbered 10.1-603.8:1 relating to stormwater nonpoint nutrient offsets that stipulates that a permit issuing authority may allow compliance with stormwater nonpoint nutrient runoff water quality criteria through the use of the permittee's acquisition of nonpoint nutrient offsets in the same tributary.]
Mike Gerel (Chesapeake Bay Foundation)	CBF strongly believes that the Virginia Soil and Water Conservation Board should expeditiously propose VSMP regulations that mandate management of nutrient pollution in stormwater runoff from new development and redevelopment activities in a manner that meets water quality standards, Chesapeake Bay Tributary Strategies, and the Commonwealth's cleanup strategies.	The proposed regulations were developed to further the Commonwealth's Chesapeake Bay goals. The phosphorus removal requirement of .28 lbs/acre/year is based on the removals necessary under Virginia's Tributary Strategies.
Mike Gerel (Chesapeake Bay Foundation)	The tributary strategies prescribe the nutrient and sediment reductions necessary from stormwater runoff and the Chesapeake Bay and Virginia Waters Clean-Up Plan specifies that a revised stormwater management program is the means to achieve the strategy goals and meet water quality standards.	It is recognized that the VSMP program is one aspect of the Commonwealth's overall water quality and Chesapeake Bay goals. The proposed regulations were developed to further the Commonwealth's Chesapeake Bay goals. The phosphorus removal requirement of .28 lbs/acre/year is based on the removals necessary under Virginia's Tributary Strategies.
Mike Gerel (Chesapeake Bay Foundation)	Promulgation of more protective regulations for stormwater quality and quantity will deliver two important benefits for Virginia's citizens: (1)	It is agreed that improved stormwater management in the Commonwealth will benefit water-dependent industries. The VSMP program is also an important component of the Commonwealth's overall water quality and Chesapeake

	protection of the sectors of Virginia's economy that rely upon clean water and (2) lessening of pollution clean up needs with a corresponding cost savings to the Commonwealth.	Bay goals.
Mike Gerel (Chesapeake Bay Foundation)	Evidence was not presented to the TAC that the proposed water quality and quantity criteria are unattainable. On the contrary, developers have the ability to plan for and recover any additional costs.	Achievability of the water quality and quantity standards of the proposed regulations has been a strong goal of the regulatory process. The Department contracted with the Center for Watershed Protection to provide recommendations to the Department and the Board regarding the water quality and quantity criteria portions of the regulations. The Center, utilizing the best stormwater data sets and scientific methodologies available in the nation, put forth technical recommendations to the Department and developed the Virginia Runoff Reduction Method and worksheet. This Method built upon and replaced the earlier draft LID crediting system. These recommendations and processes have been incorporated into the current proposed regulations. Between January 31, 2008 and September 16, 2008, the Department held 7 charrettes across the Commonwealth to test the Virginia Runoff Reduction Method and the achievability of the regulations as well as to familiarize the public with the method. Approximately 300 different people attended these charrettes, with 55-60% of those from consulting firms or construction companies, and about 25-30% from local governments. An additional series of at least four charrettes have been held or are being scheduled for between February and April 2009. Additionally, the James River Association has contracted with Williamsburg Environmental Group to methodically test the regulations and methodology. The study reviewed a range of sites from low to high imperviousness, residential to commercial, as well as testing a redevelopment site. This information is incorporated into the economic analysis portion of the regulatory discussion document.
Mike Gerel (Chesapeake Bay Foundation)	Localities across the Commonwealth, such as Henrico and James City Counties, are already taking advantage of available environmental site design concepts, treatment technologies, and funding mechanisms to achieve aggressive stormwater quality and quantity goals.	It is recognized that various localities and private interests across the Commonwealth are already utilizing innovative measures and technologies in addressing stormwater management. The proposed regulations are intended to recognize these efforts and advance overall approaches to stormwater management across the state.
Mike Gerel (Chesapeake Bay Foundation)	CBF supports clarification and strengthening of stormwater quantity criteria in the proposed regulation.	The proposed regulations contain a revised water quantity section (Section 66). A designated Water Quantity Workgroup was formed as a part of the technical advisory committee process to deal especially with water quantity

		issues. Section 66 of the proposed regulations is the result of that workgroup's efforts.
J. Michael Flagg (Hanover County)	We believe the regulations should utilize existing and successful regulatory models for the administration of local programs to the extent possible without the addition of costly and burdensome administrative procedure and reporting.	Part IIIA of the proposed regulations contains administrative requirements for qualifying local programs, including reporting requirements (4VAC50-60-126). These requirements were developed with the assistance of the TAC and are believed to be the least burdensome necessary.
J. Michael Flagg (Hanover County)	Any modifications to these regulations must show how these changes are consistent with the Clean Water Act and state water quality goals and identify how the existing regulations are not meeting these goals.	To assist in developing compliance methodologies for, and feasibility of, criteria that would support Chesapeake Bay and water quality goals, the Department contracted with the Center for Watershed Protection to provide recommendations to the Department and the Board regarding the water quality and quantity criteria portions of the regulations. The Center, utilizing the best stormwater data sets and scientific methodologies available in the nation, put forth technical recommendations to the Department and developed the Virginia Runoff Reduction Method and worksheet. This Method built upon and replaced the earlier draft LID crediting system. These recommendations and processes have been incorporated into the current proposed regulations.
J. Michael Flagg (Hanover County)	The stormwater program must be coordinated with the other Divisions within DCR to reduce duplicative and costly local program reviews, reporting, construction project inspections and permits.	Avoidance of conflict between divisions is a major goal of the Department. The proposed regulations have been drafted with this in mind. Section 4VAC50-60-157(C) specifies that "To the extent practicable, the department will coordinate the reviews [of qualifying local programs] with other local government program reviews to avoid redundancy." Of course, no regulation can completely speak to all potential issues. Other issues will need to be dealt with by the various program administrators as they are presented.
J. Michael Flagg (Hanover County)	The Department should support local enforcement. Regulations must provide for appropriate penalties, eliminate unnecessary enforcement steps, and provide localities enhanced tools to effectively enforce the stormwater program.	Various sections of the Stormwater Management Act (including §10.1-603.2:1, §10.1-603.11, and §10.1-603.14) grant enforcement authorities to localities operating qualifying local programs. Section 10.1-603.14(A) specifies that civil penalties collected by localities are to be paid into the local treasury for the purpose of minimizing, preventing, managing, or mitigating pollution of the waters of the locality and abating environmental pollution therein in such manner as the court may direct. 4VAC50-60-116 of the proposed regulations references these enabling sections and additionally provides are recommended table which may be utilized in setting civil penalty amounts.
J. Michael Flagg (Hanover County)	Significant modification to the existing technical standards in the regulation should not be made with this action. New standards require further analysis and must be scientifically justified,	The proposed regulations do include both amendments to Part II (technical criteria) and Part III (local program requirements). The technical criteria are a common element to all of the actions we are working on and we continue to believe that both elements (technical criteria and program development) are

	economically feasible, and technically achievable.	integrated components of a stormwater regulatory product. As such, we believe that without resolution on this important piece it will be difficult to properly develop the other integrated regulatory, guidance, website, and related pieces. The current approach will result in a more cohesive "qualifying local program" that each locality will administer and will have the greatest benefit to water quality. While it is recognized that this will require programs that are accustomed to implementing older technical criteria to amend their programs, it is believed that these updates can be achieved by these programs and the Department intends to remain engaged through technical assistance to these localities. For those localities that have not previously operated local stormwater management programs, adopting the new technical criteria now avoids the need to further amend new programs that are established in response to these regulations. The completion of this integrated regulatory action is important to this Administration. The Secretary of Natural Resource's noted at the first meeting of the technical advisory committee (TAC) that "I believe it is critical that the final regulations address improvements to water quality and quantity criteria associated with construction activities". Additionally, we suspect that approval by the U.S. Environmental Protection Agency (EPA) of moving the administration of the General Permit to localities as a part of the stormwater program revisions ["qualifying local program"] is less likely without the water quality and quantity regulatory improvements that are included in the proposed regulations. The technical criteria are truly a fundamental and necessary element of a "local qualifying program". Without them, those localities that currently do not have a stormwater program would have limited information regarding operational standards. With the proposal of the regulations by the Board on September 24, 2008, the Board supported the position that Parts I, II, and III should advance together. Regarding the development of the standards established in Part II (technical criteria), the Department contracted with the Center for Watershed Protection to provide recommendations to the Department and the Board regarding the water quality and quantity criteria portions of the regulations. The Center, utilizing the best stormwater data sets and scientific methodologies available in the nation, put forth technical recommendations to the Department and developed the Virginia Runoff Reduction Method and worksheet. This

		Method built upon and replaced the earlier draft LID crediting system. These recommendations and processes have been incorporated into the current proposed regulations. Between January 31, 2008 and September 16, 2008, the Department held 7 charrettes across the Commonwealth to test the Virginia Runoff Reduction Method and the achievability of the regulations as well as to familiarize the public with the method. Approximately 300 different people attended these charrettes, with 55-60% of those from consulting firms or construction companies, and about 25-30% from local governments. An additional series of at least four charrettes have been held or being scheduled for between February and April 2009. The proposed regulations were formulated with the assistance of a technical advisory committee composed of local governments, environmental groups, state agencies, federal agencies, consultants, engineers, and planning district commissions. Subcommittees of the TAC were also formed to deal with specific issues. In addition, advisory committees were formed to assist with the development of the BMP Clearinghouse website and with revisions to the Stormwater Management Handbook, and a series of design charrettes was held to gather input on the water quality requirements of the proposed regulations. In all, over 50 public meetings have been held that associated with these regulations. The Department will additionally hold a series of public hearings associated with the proposed regulations; dates and locations of those hearings are referenced elsewhere in this document and posted on the Virginia Regulatory TownHall.
J. Michael Flagg (Hanover County)	The Department should work with other state agencies including the Virginia Department of Transportation, the Virginia Department of Health and the Virginia Department of Environmental Quality to enhance state and local implementation.	While other agencies do not have direct responsibility for the VSMP program, the Board and the Department do look for opportunities to partner with other agencies and to streamline the implementation of various programs to the extent possible.
J. Michael Flagg (Hanover County)	Localities must be allowed the oversight and flexibility to design and implement a stormwater management program appropriate to the community. Provisions should be included to facilitate comprehensive plan implementation and prevent sprawl, and to allow pollution trading between sources.	The proposed regulations do establish minimum criteria for locality-operated qualifying local programs. Such criteria are necessary both under state and federal law, as the VSMP program is authorized to administer the federal NPDES program for the Commonwealth. Even so, the proposed regulations do afford flexibility to qualifying local programs to tailor their programs to meet local needs.
J. Michael Flagg	The regulations should promote the	A number of onsite and offsite methodologies are available to meet

(Hanover County)	development and implementation of regional and watershed plans as directed by the enabling legislation. The proposed draft regulations removes many existing beneficial provisions and adds burdensome and unnecessary constraints.	compliance. Permittees will first seek to attain the statewide water quality and quantity technical criteria onsite. If the water quality technical criteria can not be met on-site, off-site controls in part or in whole will be allowed by a qualifying local program in accordance with a Department-approved comprehensive watershed stormwater management plan. If no comprehensive watershed stormwater management plan exists, the criteria may still be allowed to be met off-site if specified terms are met. If allowed by the qualifying local program, reductions required for a site may be achieved by the payment of a pro-rata fee sufficient to fund improvements necessary to adequately achieve those reductions. A local program may also waive the water quality requirements through the granting of an exception in accordance with Part III. [NOTE: Additionally, HB2168 of the 2009 Session, effective July 1, 2009, created a new section numbered 10.1-603.8:1 relating to stormwater nonpoint nutrient offsets that stipulates that a permit issuing authority may allow compliance with stormwater nonpoint nutrient runoff water quality criteria through the use of the permittee's acquisition of nonpoint nutrient offsets in the same tributary.]
J. Michael Flagg (Hanover County)	Regulations should permit on and off-site mitigation approaches to stormwater treatment to encourage cost effective designs and creative solutions.	A number of onsite and offsite methodologies are available to meet compliance. Permittees will first seek to attain the statewide water quality and quantity technical criteria onsite. If the water quality technical criteria can not be met on-site, off-site controls in part or in whole will be allowed by a qualifying local program in accordance with a Department-approved comprehensive watershed stormwater management plan. If no comprehensive watershed stormwater management plan exists, the criteria may still be allowed to be met off-site if specified terms are met. If allowed by the qualifying local program, reductions required for a site may be achieved by the payment of a pro-rata fee sufficient to fund improvements necessary to adequately achieve those reductions.

		A local program may also waive the water quality requirements through the granting of an exception in accordance with Part III. [NOTE: Additionally, HB2168 of the 2009 Session, effective July 1, 2009, created a new section numbered 10.1-603.8:1 relating to stormwater nonpoint nutrient offsets that stipulates that a permit issuing authority may allow compliance with stormwater nonpoint nutrient runoff water quality criteria through the use of the permittee's acquisition of nonpoint nutrient offsets in the same tributary.]
J. Michael Flagg (Hanover County)	Any established load limits must be technologically and economically attainable.	The Department contracted with the Center for Watershed Protection for the specific purpose of testing the feasibility of the proposed requirements and providing recommendations to the Department. The Center, in conjunction with the Chesapeake Stormwater Network, developed the Runoff Reduction Method and associated worksheet that is intended to be used in complying with the regulations. Information related to the Method and the work of the Center can be found at: http://www.dcr.virginia.gov/lr2f.shtml. As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C. It is additionally of note that the proposed regulations were formulated with the assistance of a technical advisory committee composed of local governments, environmental groups, state agencies, federal agencies, consultants, engineers, and planning district commissions. Subcommittees of the TAC were also formed to deal with specific issues. In addition, advisory committees were formed to assist with the development of the BMP Clearinghouse website and with revisions to the Stormwater Management Handbook, and a series of design charrettes was held to gather input on the

		water quality requirements of the proposed regulations. In all, over 50 public meetings have been held associated with these regulations. This has allowed the Department to ensure that the proposed regulations have gained extensive exposure and vetting among all interests.
J. Michael Flagg (Hanover County)	We propose that the regulations should be modified only to make reasonable changes to BMP efficiencies and add new technologies as new information and research indicated.	As even with today's regulatory requirements, water quality continues to decline and water quantity concerns remain, improved water quality and quantity criteria are proposed as a part of this regulatory action. Types and efficiencies of BMPs contained in Table 1 (now located in 4VAC50-60-65) are proposed to be updated as a part of this regulatory action. Additionally, complimenting this regulatory action, the Department is working with the Virginia Water Resources Research Center at Virginia Tech to develop the Virginia Stormwater BMP Clearinghouse, which will make even more BMPs available for use as they are developed and approved.
J. Michael Flagg (Hanover County)	We believe that no changes in performance calculation methods should be made at this time. Efforts to develop new calculation methodologies are at best incomplete and require more time to determine if they are reasonable and achievable.	The proposed regulations do change compliance methodologies from the performance and technology-based methods contained in the current regulations to the Runoff Reduction Method. The Department contracted with the Center for Watershed Protection for the specific purpose of testing the feasibility of the proposed requirements and providing recommendations to the Department. The Center, in conjunction with the Chesapeake Stormwater Network, developed the Runoff Reduction Method and associated worksheet that is intended to be used in complying with the regulations. Information related to the Method and the work of the Center can be found at: http://www.dcr.virginia.gov/lr2f.shtml. Between January 31, 2008 and September 16, 2008, the Department held 7 charrettes across the Commonwealth to test the Virginia Runoff Reduction Method and the achievability of the regulations as well as to familiarize the public with the method. Approximately 300 different people attended these charrettes, with 55-60% of those from consulting firms or construction companies, and about 25-30% from local governments. An additional series of at least four charrettes have been held or are being scheduled for between February and April 2009. In addition to the Runoff Reduction Method, the proposed regulations do allow a qualifying local program to obtain Board approval of an alternative methodology that achieves equivalent results, as well as permitting off-site and regional approaches.
J. Michael Flagg	The proposed regulations must avoid vague	While the civil penalties table contained in 4VAC50-60-116 of the proposed

(Hanover County)	enforcement philosophies in the regulations such as "the board intends that these civil penalties generally be applied after other enforcement remedies have been unsuccessful, in egregious situations, or for repeat offenders."	regulations remains guidance and its use is not required by the regulations, the table has been substantially reworked from an earlier draft of that section and the language cited by the comment has been removed.
J. Michael Flagg (Hanover County)	Adequate scientifically based justification for changes and cost impact studies must be conducted showing the costs and benefits of the proposed changes over the existing requirements.	The Department contracted with the Center for Watershed Protection for the specific purpose of testing the feasibility of the proposed requirements and providing recommendations to the Department. The Center, in conjunction with the Chesapeake Stormwater Network, developed the Runoff Reduction Method and associated worksheet that is intended to be used in complying with the regulations. Information related to the Method and the work of the Center can be found at: http://www.dcr.virginia.gov/lr2f.shtml. As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C. Additionally, the James River Association has contracted with Williamsburg Environmental Group to methodically test the regulations and methodology. The study reviewed a range of sites from low to high imperviousness, residential to commercial, as well as testing a redevelopment site.
J. Michael Flagg (Hanover County)	We believe the cost estimates for the proposed best management practices performance standards in the sample projects which DCR has provided are grossly underestimated in the areas of engineering, land and construction cost. Our estimates range from a 5 to over a 20 fold increase in cost per residential lot over the existing performance standards. An evaluation	The Department contracted with the Center for Watershed Protection for the specific purpose of testing the feasibility of the proposed requirements and providing recommendations to the Department. The Center, in conjunction with the Chesapeake Stormwater Network, developed the Runoff Reduction Method and associated worksheet that is intended to be used in complying with the regulations. Information related to the Method and the work of the Center can be found at: http://www.dcr.virginia.gov/lr2f.shtml.

	of an approximately 10 acre infill subdivision in a suburban area showed that the individual lot cost for stormwater management would increase form $1250 per lot under the proposed FY09 Hanover regional program fee to over $22,000 based on the proposed BMP standard.	As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C. Additionally, the James River Association has contracted with Williamsburg Environmental Group to methodically test the regulations and methodology. The study reviewed a range of sites from low to high imperviousness, residential to commercial, as well as testing a redevelopment site.
J. Michael Flagg (Hanover County)	Corresponding increases in maintenance cost would be expected. We are currently seeing a $400-$500/household cost for maintenance over a 10-15 year period on privately maintained facilities.	The Department contracted with the Center for Watershed Protection for the specific purpose of testing the feasibility of the proposed requirements and providing recommendations to the Department. The Center, in conjunction with the Chesapeake Stormwater Network, developed the Runoff Reduction Method and associated worksheet that is intended to be used in complying with the regulations. Information related to the Method and the work of the Center can be found at: http://www.dcr.virginia.gov/lr2f.shtml. As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and

		has been included in its entirety in Appendix C. Additionally, the James River Association has contracted with Williamsburg Environmental Group to methodically test the regulations and methodology. The study reviewed a range of sites from low to high imperviousness, residential to commercial, as well as testing a redevelopment site.
J. Michael Flagg (Hanover County)	Our experiences also suggest that routine maintenance is similar in cost irrespective of facility size. This suggests that maintenance costs will be directly related to the number of facilities.	The Department contracted with the Center for Watershed Protection for the specific purpose of testing the feasibility of the proposed requirements and providing recommendations to the Department. The Center, in conjunction with the Chesapeake Stormwater Network, developed the Runoff Reduction Method and associated worksheet that is intended to be used in complying with the regulations. Information related to the Method and the work of the Center can be found at: http://www.dcr.virginia.gov/lr2f.shtml. As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C. Additionally, the James River Association has contracted with Williamsburg Environmental Group to methodically test the regulations and methodology. The study reviewed a range of sites from low to high imperviousness, residential to commercial, as well as testing a redevelopment site.
J. Michael Flagg (Hanover County)	We support stormwater regulations that allow localities the flexibility to limit sprawl, and minimize unnecessary transportation infrastructure, fund sewer system upgrades in areas where there may be failing septic systems, and implement BMPs appropriate to the community.	The proposed regulations do establish minimum criteria for locality-operated qualifying local programs. Such criteria are necessary both under state and federal law, as the VSMP program is authorized to administer the federal NPDES program for the Commonwealth. Even so, the proposed regulations do afford flexibility to qualifying local programs to tailor their programs to meet local needs.

J. Michael Flagg (Hanover County)	The regulatory process should consider existing and future local government comprehensive plans and provide for local community flexibility in program development and implementation based on these adopted plans.	The proposed regulations do establish minimum criteria for locality-operated qualifying local programs. Such criteria are necessary both under state and federal law, as the VSMP program is authorized to administer the federal NPDES program for the Commonwealth. Even so, the proposed regulations do afford flexibility to qualifying local programs to tailor their programs to meet local needs.
J. Michael Flagg (Hanover County)	The proposed VSMP regulations developed under the previous NOIRA action would limit or eliminate flexibility for regional planning and require site-specific mandated reductions in lot and building density due to unrealistically high pollution removal standards.	A number of onsite and offsite methodologies are available to meet compliance. Permittees will first seek to attain the statewide water quality and quantity technical criteria onsite. If the water quality technical criteria can not be met on-site, off-site controls in part or in whole will be allowed by a qualifying local program in accordance with a Department-approved comprehensive watershed stormwater management plan. If no comprehensive watershed stormwater management plan exists, the criteria may still be allowed to be met off-site if specified terms are met. If allowed by the qualifying local program, reductions required for a site may be achieved by the payment of a pro-rata fee sufficient to fund improvements necessary to adequately achieve those reductions. A local program may also waive the water quality requirements through the granting of an exception in accordance with Part III. [NOTE: Additionally, HB2168 of the 2009 Session, effective July 1, 2009, created a new section numbered 10.1-603.8:1 relating to stormwater nonpoint nutrient offsets that stipulates that a permit issuing authority may allow compliance with stormwater nonpoint nutrient runoff water quality criteria through the use of the permittee's acquisition of nonpoint nutrient offsets in the same tributary.]
J. Michael Flagg (Hanover County)	While minor changes to this section of the regulations [4VAC50-60-90] may be needed for consistency with other proposed changes, Hanover County supports the retention of current regulatory language that has enabled the County to implement a highly effective regional stormwater management program.	A number of onsite and offsite methodologies are available to meet compliance. Permittees will first seek to attain the statewide water quality and quantity technical criteria onsite. If the water quality technical criteria can not be met on-site, off-site controls in part or in whole will be allowed by a qualifying local program in accordance with a Department-approved comprehensive watershed stormwater management plan.

		If no comprehensive watershed stormwater management plan exists, the criteria may still be allowed to be met off-site if specified terms are met. If allowed by the qualifying local program, reductions required for a site may be achieved by the payment of a pro-rata fee sufficient to fund improvements necessary to adequately achieve those reductions. A local program may also waive the water quality requirements through the granting of an exception in accordance with Part III. [NOTE: Additionally, HB2168 of the 2009 Session, effective July 1, 2009, created a new section numbered 10.1-603.8:1 relating to stormwater nonpoint nutrient offsets that stipulates that a permit issuing authority may allow compliance with stormwater nonpoint nutrient runoff water quality criteria through the use of the permittee's acquisition of nonpoint nutrient offsets in the same tributary.]
J. Michael Flagg (Hanover County)	Regulatory revisions which discourage the implementation of effective regional stormwater management approaches and which require only a site specific stormwater approach result in lost opportunities for water quality improvements and deviate from the intent of the Virginia Code	A number of onsite and offsite methodologies are available to meet compliance. Permittees will first seek to attain the statewide water quality and quantity technical criteria onsite. If the water quality technical criteria can not be met on-site, off-site controls in part or in whole will be allowed by a qualifying local program in accordance with a Department-approved comprehensive watershed stormwater management plan. If no comprehensive watershed stormwater management plan exists, the criteria may still be allowed to be met off-site if specified terms are met. If allowed by the qualifying local program, reductions required for a site may be achieved by the payment of a pro-rata fee sufficient to fund improvements necessary to adequately achieve those reductions. A local program may also waive the water quality requirements through the granting of an exception in accordance with Part III. [NOTE: Additionally, HB2168 of the 2009 Session, effective July 1, 2009, created a new section numbered 10.1-603.8:1 relating to stormwater nonpoint nutrient offsets that stipulates that a permit issuing authority may allow compliance with stormwater nonpoint nutrient runoff water quality criteria through the use of the permittee's acquisition of nonpoint nutrient offsets in

		the same tributary.]
J. Michael Flagg (Hanover County)	The new regulations must allow for regional stormwater management that can demonstrate comparable or better water quality protection for newly developed areas and can also provide water quality improvements from existing developed areas.	A number of onsite and offsite methodologies are available to meet compliance. Permittees will first seek to attain the statewide water quality and quantity technical criteria onsite. If the water quality technical criteria can not be met on-site, off-site controls in part or in whole will be allowed by a qualifying local program in accordance with a Department-approved comprehensive watershed stormwater management plan. If no comprehensive watershed stormwater management plan exists, the criteria may still be allowed to be met off-site if specified terms are met. If allowed by the qualifying local program, reductions required for a site may be achieved by the payment of a pro-rata fee sufficient to fund improvements necessary to adequately achieve those reductions. A local program may also waive the water quality requirements through the granting of an exception in accordance with Part III. [NOTE: Additionally, HB2168 of the 2009 Session, effective July 1, 2009, created a new section numbered 10.1-603.8:1 relating to stormwater nonpoint nutrient offsets that stipulates that a permit issuing authority may allow compliance with stormwater nonpoint nutrient runoff water quality criteria through the use of the permittee's acquisition of nonpoint nutrient offsets in the same tributary.]
J. Michael Flagg (Hanover County)	The regulations should be clear that a site specific or regional stormwater program would include BMPs that may mitigate the effects of the additional impervious area but would not be required to physically intercept all stormwater from each new impervious area.	4VAC50-60-96 of the proposed regulations describes the requirements for regional plans that may be approved by the Board. As proposed, the regulations require that these plans achieve reductions equal to or greater than those that would be achieved by onsite treatment. Pertaining to water quantity objectives, the plan may provide for implementation of a combination of channel improvement, stormwater detention, or other measures which is satisfactory to the local program to prevent downstream erosion and flooding.
J. Michael Flagg (Hanover County)	We have concerns that load reduction requirements for urban lands will use the Chesapeake Bay watershed model output for urban land projected loadings without consideration of feasible economic and technological alternatives to meeting the same water quality objectives from other nutrient	To assist in developing compliance methodologies for, and feasibility of, criteria that would support Chesapeake Bay and water qualify goals, the Department contracted with the Center for Watershed Protection to provide recommendations to the Department and the Board regarding the water quality and quantity criteria portions of the regulations. The Center, utilizing the best stormwater data sets and scientific methodologies available in the nation, put forth technical recommendations to the Department and

	sources and a consideration for what level of implementation activities that can be practically achieved from urban lands.	developed the Virginia Runoff Reduction Method and worksheet. This Method built upon and replaced the earlier draft LID crediting system. These recommendations and processes have been incorporated into the current proposed regulations. Between January 31, 2008 and September 16, 2008, the Department held 7 charrettes across the Commonwealth to test the Virginia Runoff Reduction Method and the achievability of the regulations as well as to familiarize the public with the method. Approximately 300 different people attended these charrettes, with 55-60% of those from consulting firms or construction companies, and about 25-30% from local governments. An additional series of at least four charrettes have been held or are being scheduled for between February and April 2009. As a part of this regulatory process, the Department has additionally conducted an economic analysis of the proposed regulations. That analysis is found within the regulatory discussion document. Other parties have additionally conducted economic analyses and presented their results for consideration. Additionally, the Department contracted with Dr. Kurt Stephenson, an economist at Virginia Tech in their Department of Ag and Applied Economics in June of 2008 to assist in determining the cost of the regulations as well as the general off-setting costs associated with further degradation of Virginia's waters. The report was completed in December of 2008 and posted to the Department's website at http://www.dcr.virginia.gov/lr2c.shtml. This information is referenced throughout the regulatory discussion document and has been included in its entirety in Appendix C. Additionally, the James River Association has contracted with Williamsburg Environmental Group to methodically test the regulations and methodology. The study reviewed a range of sites from low to high imperviousness, residential to commercial, as well as testing a redevelopment site.

Comments received on the initial NOIRA (which has since been withdrawn) during the public comment period from December 26, 2005 through February 24, 2006.

Commenter	Comment	Agency response
Robin Markham (Northumberland County)	Additional costs will be put on property owners for single family residences because an engineered site plan will be required. In the Tidewater area this will mean all those building homes (modular, single or double wides) will be required to have a stormwater plan.	The proposed regulations do currently require stormwater management plans for all regulated land disturbing activities, which include activities disturbing one acre or greater statewide, or 2500 square feet or greater in areas designated as subject to the Chesapeake Bay Preservation Area Designation and Management Regulations (9VAC10-20 et seq.) (unless an exemption otherwise applies).
Robin Markham (Northumberland County)	Stormwater permits/stormwater pollution prevention plans could be required first for the developer (roadway installation) and then for each individual lot owner when they build.	It is possible that one parcel of land could be the subject of multiple stormwater plans over a period of time. Whether an initial plan by a developer will be sufficient to cover all activities that will eventually occur on a site depends upon the scope of work that is covered by the initial plan and what is eventually undertaken on the site; while a developer could include a complete design in an initial submittal, if the initial plan does not account for the development of a lot, then a separate plan will be necessary when activities commence on that lot.
Mike Flagg (Hanover County)	Localities may need to develop regulations in response to these regulatory actions in order to enforce the provisions. I have concern that the "except the adoption and promulgation of regulation" will prevent necessary local government action if implemented as proposed.	The language cited by the comment is found in §10.1-603.2:1(2) of the Code of Virginia. This language operates to allow the Board to delegate all of its authority under the Stormwater Management Law to the Department or an approved locality except for the adoption and promulgation of regulations. This language in fact operates to allow the Board to authorize a locality to operate a qualifying local program.
Mike Flagg (Hanover County)	It is not clear that the legislative action of HB 1177 intended for delegation of collection of state permit fees to localities. There is no documented relationship between the proposed 70 percent allocation of a yet to be determined fee and the necessary administrative and overhead cost to local governments to implement this mandate.	Fees associated with stormwater permits are found in Part XIII of the VSMP regulations and are part of a separate, though related, regulatory process. The proposed permit fees are based upon the actual costs of implementing a qualifying local program and are believed sufficient to both fund a locality's responsibilities and support oversight and technical assistance by the Department.
Mike Flagg (Hanover County)	The proposed regulations will have an impact on small businesses. In particular on single family home builders. This regulation notes that the state intends to establish a fee for any construction activity exceeding 2500 sq. ft. in Chesapeake Bay Preservation Act localities. Issuance of a VSMP permit to land-disturbing projects of less than 1 acre was added as an	Section 10.1-603.4(6) of the Code of Virginia specifies that statewide stormwater management standards adopted by the Board will apply to projects exceeding 2500 square feet in size in areas designated as subject to the Chesapeake Bay Preservation Area Designation and Management Regulations (9VAC10-20 et seq.). Likewise, subdivision (5) of that section directs that a fee, at a reduced level, be established for these projects.

	additional state requirement. This was not required by the federal regulation or the previously existing regulations of DEQ, DCR or CBLAD prior to adoption of HB 1177 and legislative presentation of HB1177 indicated that the bill consolidated regulatory requirements but did not add new requirements. This requirement is inconsistent with those presentations.	
Ingrid Stenbjorn (Town of Ashland)	Localities need to understand how the program will be funded both during the implementation and during start up.	Along with this regulatory action, the Board is undertaking a second action to amend Part XIII of the VSMP regulations, which relates to permit fees. New permit fees levels are proposed which would be set at a level sufficient to fund a qualifying local program, as well as oversight and technical assistance by the Department.
Ingrid Stenbjorn (Town of Ashland); Bill Johnston (City of Virginia Beach)	Localities should receive sufficient guidance to implement the program. Is it DCR's intent to produce guidance or draft ordinances for cities to be able to do the implementation? Will you provide us with the materials we need to make sure we go about this in a uniform and acceptable manner?	Complimenting this regulatory action, revisions are currently underway to the Virginia Stormwater Management Handbook. The Handbook will contain additional guidance for use in operating a qualifying local program. A substantively complete draft of the Handbook is intended to be available at the time that the public comment period begins on the proposed regulations. It is the Department's intent to develop a model ordinance for reference by localities.
Ingrid Stenbjorn (Town of Ashland)	Localities will need to understand State auditing system.	Part IIIC of the proposed regulations sets forth the procedures that will be utilized by the Department and the Board in reviewing a qualifying local program.
Ingrid Stenbjorn (Town of Ashland)	Localities should receive training for program administrators.	The Department is aware of requests to establish training programs associated with the proposed regulations, similar to the certification program currently available under the Erosion and Sediment Control program. Discussions are ongoing regarding the possible future development of such a program. Even aside from any possible formal training program, locality outreach and education is anticipated to be a major role of the Department under the proposed regulations.
Ingrid Stenbjorn (Town of Ashland)	Localities will require support from the State during adoption of program and during program progress. A coordinator should be established.	Locality outreach and education is anticipated to be a major role of the Department under the proposed regulations. The Department expects to assign staff specifically to this task and to specific localities so that there may be continuity in interaction between localities and staff.
James W. Patteson (Fairfax County);	Further definition of the expected programmatic service levels must be defined along with performance expectations. Localities must then	All requirements for qualifying local programs are set forth in the proposed regulations. Locality representatives were present on the technical advisory committee that assisted with the development of the proposed regulations over

Jeff Blackford (Fairfax County)	incorporate those service definitions and expectations into their program development and local code provisions to enable enforcement of this program.	nearly the past three years.
James W. Patteson (Fairfax County) ; Jeff Blackford (Fairfax County)	Further definition of the levels of technical details required to be incorporated into the locality's existing or new Erosion and Sedimentation or construction plans.	4VAC50-60-108 sets forth the required elements of a stormwater management plan. The requirements for an Erosion and Sediment Control plan are contained in the Virginia Erosion and Sediment Control Regulations, 4VAC50-30-10 et seq. Amendments to those regulations, while anticipated in the future, will require a separate regulatory action.
James W. Patteson (Fairfax County) ; Jeff Blackford (Fairfax County)	Further definition of the locality's authority to grant variances or modifications to those criteria and under what circumstances those may be granted.	Section 122 of the proposed regulations allows local program to waive the water quality requirements through the granting of an exception. Specifically, that section relates that a qualifying local program may grant exceptions to the provisions of Part II (4VAC50-60-40 et seq.) through an administrative process. A request for an exception, including the reasons for making the request, shall be submitted, in writing, to the qualifying local program. An exception may be granted, provided that: (i) the exception is the minimum necessary to afford relief, (ii) reasonable and appropriate conditions shall be imposed as necessary upon any exception granted so that the intent of the Act and this chapter are preserved, (iii) granting the exception will not confer on the permittee any special privileges that are denied to other permittees who present similar circumstances, and (iv) exception requests are not based upon conditions or circumstances that are self-imposed or self-created.
James W. Patteson (Fairfax County) ; Jeff Blackford (Fairfax County)	Further definition of the expected frequency and details of the locality's inspections and reporting requirements.	Local program reporting requirements are specified in section 126 of the proposed regulations. Section 114 of the proposed regulations specifically sets forth local program inspection requirements.
James W. Patteson (Fairfax County) ; Jeff Blackford (Fairfax County)	Further definition of what additional training or qualifications will be required of the local Erosion and Sedimentation Control Inspectors.	The proposed regulations do not establish additional training requirements for locality inspectors. The Department is aware of requests for a program similar to the Erosion and Sediment Control certification program to be established for stormwater management, and the creation of such a program is under discussion. Section 114 of the proposed regulations, in relation to locality utilization of owner-conducted inspections, does require that those inspections be required by a person who is licensed as a professional engineer, architect, certified landscape architect or land surveyor pursuant to Article 1 (§54.1-400 et seq.) of Chapter 4 of Title 54.1 or who holds a certificate of competence from the board.

James W. Patteson (Fairfax County) ; Jeff Blackford (Fairfax County)	Further definition of what on-site enforcement actions and steps can or should be taken to gain compliance, if needed.	Section 116 of the proposed regulations sets forth all enforcement tools available for use by a local program, as well as establishing a recommended schedule of civil penalties.
James W. Patteson (Fairfax County) ; Jeff Blackford (Fairfax County)	Further definition of what available enforcement, legal processes and/or court actions the locality can take to resolve non-compliance.	Section 116 of the proposed regulations sets forth all enforcement tools available for use by a local program, as well as establishing a recommended schedule of civil penalties.
James W. Patteson (Fairfax County) ; Jeff Blackford (Fairfax County)	Will the locality have the ability to issue fines for non-compliance?	Section 116 of the proposed regulations sets forth all enforcement tools available for use by a local program, as well as establishing a recommended schedule of civil penalties for violations.
James W. Patteson (Fairfax County) ; Jeff Blackford (Fairfax County)	What monitoring and record keeping requirements by the locality will the state expect?	Local program reporting requirements are specified in section 126 of the proposed regulations. Section 114 of the proposed regulations specifically sets forth local program inspection requirements.
James W. Patteson (Fairfax County) ; Jeff Blackford (Fairfax County)	How will the state track and ensure local compliance?	Part IIIC of the proposed regulations sets out the procedures that will be followed by the Board in conducting reviews of qualifying local programs to ensure compliance with the requirements of the Virginia Stormwater Management Law and regulations. A schedule will be established for Board reviews; however, each qualifying local program will be reviewed at least once every five years (as set forth in §10.1-603.12 of the Code of Virginia). The Department will also be available during the intervening period for technical assistance and to respond to concerns that are raised.
James W. Patteson (Fairfax County) ; Jeff Blackford (Fairfax County)	What are the appeal processes available to the locality if cited for non-compliance by the state?	All qualifying local program reviews will be conducted by the Board and localities will have the opportunity to address the Board with any concerns that they have arising from the review process. In the instance that a locality wishes to further appeal any decision made by the Board, an appeal will be available to court in accordance with the Administrative Process Act (§2.2-4000 et seq.).
James W. Patteson (Fairfax County); Bill Johnston (City of Virginia Beach) ; Jeff Blackford	What impact will non-compliance have on the locality's MS4 permit? Do you anticipate if we fail to comply with what DCR wants in this program it will also be a hit in the MS4 program?	The current small MS4 General Permit (4VAC50-60-1200 et seq.), as well as current drafts of MS4 individual permits, require compliance with the Virginia Stormwater Management Law and its associated regulations. MS4 operators are additionally required to adopt compliant qualifying local programs by §10.1-603.3 of the Code of Virginia.

(Fairfax County)		
James W. Patteson (Fairfax County) ; Jeff Blackford (Fairfax County)	For localities that have existing MS4 permits and are required to implement a stormwater management program, what flexibility will be afforded to them in meeting the planned state's minimum criteria for an acceptable stormwater management program, if components of their existing program do not meet the existing criteria?	Section 10.1-603.3 of the Code of Virginia (as it will be effective following July 1, 2009 as a result of HB1991 of the 2009 General Assembly) provides that localities will have a period of 15 to 21 months to adopt qualifying local programs following the effective date of these regulations (which cannot be prior to July 1, 2010). All qualifying local programs must be compliant with the law and regulations in order to receive authorization to administer a stormwater management program.
James W. Patteson (Fairfax County) ; Jeff Blackford (Fairfax County)	How much time will be given to localities to bring existing stormwater management programs up to acceptable minimum criteria levels or will there be any grandfather provisions?	Section 10.1-603.3 of the Code of Virginia (as it will be effective following July 1, 2009 as a result of HB1991 of the 2009 General Assembly) provides that localities will have a period of 15 to 21 months to adopt qualifying local programs following the effective date of these regulations (which cannot be prior to July 1, 2010). All qualifying local programs must be compliant with the law and regulations in order to receive authorization to administer a stormwater management program.
James W. Patteson (Fairfax County) ; Jeff Blackford (Fairfax County)	There is currently a lack of clarity in the timing expectations by the state for when a VSMP program would need to be established within a locality. Local jurisdictions could require as much as eighteen months or more, after program details are made available and a date for implementation has been established to adopt such ordinances, create or modify IT support systems, and effectively hire and train staff.	Section 10.1-603.3 of the Code of Virginia (as it will be effective following July 1, 2009 as a result of HB1991 of the 2009 General Assembly) provides that localities will have a period of 15 to 21 months to adopt qualifying local programs following the effective date of these regulations (which cannot be prior to July 1, 2010).
William Bullard (Navy/DOD Regional Environmental Coordination)	We feel that the State should retain all Virginia Stormwater Management Program responsibilities over Department of Defense facilities, regardless of any elements delegated to a locality.	The Department will retain responsibility over federal projects. The Department's role with regard to federal projects is alluded to in 4VAC50-60-132(B), which clarifies that the Department will employ the criteria contained in the proposed regulations when reviewing a federal project.
Shelby Hertzler (Rockingham County)	Please strengthen the definition of a 'channel' - research of other governmental regulations, state and federal revealed the following definition as the most common. "Channel - A natural or artificial waterway that periodically or continuously contains moving water. It has a distinct bed and banks that confine the water flowing in the channel."	The definition of "channel" in 4VAC50-60-10 is proposed to be amended to read: "…a natural stream or manmade watercourse with defined bed and banks that conducts continuously or periodically flowing water."
Shelby Hertzler	Please include guidelines for the discharge of	The proposed regulations include greater protection for karst than has

(Rockingham County)	stormwater in Karst Topography - similar to VDOT's Instructional and Informational Memorandum, IIM-LD-228. This can be found at the following link http://www.extranet.vdot.state.va.us/locdes/electronic%20pubs/iim/IIM228 .pdf. Karst Topography and the absence of channels are of great concern in the Shenandoah Valley.	previously been present. 4VAC50-60-85(D) provides that "[c]onstruction of stormwater management impoundment structures or facilities may occur in karst areas only after a geological study of the area has been conducted to determine the presence or absence." Subsection (E) of 4VAC50-60-85 further specifies that "[d]ischarge of stormwater runoff to a karst feature shall meet the water quality criteria set out in 4VAC50-60-63 and the water quantity criteria set out in 4VAC50-60-66. Permanent stormwater management impoundment structures or facilities shall only be constructed in karst features after completion of a geotechnical investigation that identifies any necessary modifications to the BMP to ensure its structural integrity and maintain its water quality and quantity efficiencies. The person responsible for the land disturbing activity is encouraged to screen for known existence of heritage resources in the karst features. Any Class V Underground Injection Control Well registration statements for stormwater discharges to improved sinkholes shall be included in the SWPPP." Finally, 4VAC50-60-108 requires that stormwater management plans show all discharges to karst.
Jack Larson (Lancaster County)	While I have attended several meetings hosted by state officials, no one has been able to explain what will be expected of localities beyond what we already do with the "delegation of administration" to us; lacking knowledge of what will be expected, the natural inclination is to be wary; In summary, without considerably more information as to impact on this locality, I would state that we are opposed to any effort to transfer administration of the state stormwater program to us beyond what we already have.	While localities do currently operate local Erosion and Sediment Control programs, and some localities do operate their own stormwater management programs, the proposed regulations will allow for Board-approved local stormwater management programs to be adopted, and, for the first time, for localities to administer the Board's General Permit for Stormwater Discharges from Construction Activities. In an effort to ensure public input and knowledge of the proposed regulations, the Department has held to date what is believed to be one of the Commonwealth's most extensive public processes resulting in a proposed environmental regulation. The proposed regulations were formulated with the assistance of a technical advisory committee composed of local governments, environmental groups, state agencies, federal agencies, consultants, engineers, and planning district commissions. Subcommittees of the TAC were also formed to deal with specific issues. In addition, advisory committees were formed to assist with the development of the BMP Clearinghouse website and with revisions to the Stormwater Management Handbook, and a series of design charrettes was held to gather input on the water quality requirements of the proposed regulations. In all, over 50 public meetings have been held associated with these regulations. The Department will additionally hold a series of public hearings associated with the proposed regulations; dates and

		locations of those hearings are referenced elsewhere in this document and posted on the Virginia Regulatory TownHall.
Jack Larson (Lancaster County)	What is the rationale for passing this state mandate and previously state managed program down to the localities?	The Virginia Stormwater Management Law requires MS4 localities and those located within Tidewater Virginia as defined by the Chesapeake Bay Preservation Act to adopt local stormwater management programs. Other localities may adopt local stormwater management programs if they choose to do so; otherwise, the Department will administer a local program within those localities. Local administration of a stormwater management program is intended to create one-stop shopping for permittees and increase governmental efficiencies. Today, construction site operators must obtain approval under a locality's Erosion and Sediment Control program and register with the Department for coverage under the General Permit for Discharges of Stormwater from Construction Activities. Site inspections are then conducted by both the locality and the Department, often at different times. The concept of a qualifying local program is to unify responsibilities within the local government in order to avoid confusion and duplicative efforts.
Jack Larson (Lancaster County)	In terms of permitting, where does erosion and sediment control end and stormwater management begin especially for a project that involves very little land disturbance and little or no impervious cover with subsequent development?	While Erosion and Sediment Control and Stormwater Management are closely related, there are distinctions between the programs. For example, in a general sense, stormwater management looks not only at activities that occur during a construction activity but also looks to specific water quality and quantity treatment for post-construction discharges. The close relationship between these two programs is a part of the rationale for the development of qualifying local programs, which will unify their administration within local governments.
James Bishop	Long-term maintenance needs to be addressed. The major problem with stormwater ponds is a failure to maintain once completed. Stormwater ponds are built to control flooding, downstream runoff and maintain clean water in the Chesapeake Bay watershed. The current method by which ponds are being maintained is resulting in little to no benefit for the citizens of the Commonwealth.	The proposed regulations seek to address long term maintenance of BMPs. 4VAC50-60-114 contains requirements for long term inspections of BMPs in accordance with an inspection schedule that is to be included as a part of a long term maintenance agreement (to which the local program will be a party) for each BMP in accordance with 4VAC50-60-124. Other provisions of Part III require retention by the local program (whether locality- or DCR-administered) of record drawings of BMPs, require BMP owners to notify the local program of changes in ownership, and allow for the local program to step in and perform needed maintenance and repairs, and recover costs from the owner, in the event that a BMP is neglected or becomes a public health or safety danger.
James Bishop	Owners of stormwater ponds feel that once built, they have met all requirements with out the need for any follow-up maintenance.	While the proposed regulations leave BMP ownership in the hands of private parties (although local governments may seek to obtain responsibility for them if they so choose), the proposed regulations seek to address long term

	Private owned ponds could be controlled by the jurisdiction, where they located by having them maintained by a contractor and adding the cost to their tax bills, when owners fail to respond to maintenance requests.	maintenance of BMPs. 4VAC50-60-114 contains requirements for long term inspections of BMPs in accordance with an inspection schedule that is to be included as a part of a long term maintenance agreement (to which the local program will be a party) for each BMP in accordance with 4VAC50-60-124. Other provisions of Part III require retention by the local program (whether locality- or DCR-administered) of record drawings of BMPs, require BMP owners to notify the local program of changes in ownership, and allow for the local program to step in and perform needed maintenance and repairs, and recover costs from the owner, in the event that a BMP is neglected or becomes a public health or safety danger.
James Bishop	The Virginia Erosion and Sediment Control Handbook does not have anything in it pertaining to long-term maintenance of Stormwater ponds. The Virginia Stormwater Management Handbook has a single page addressing proper maintenance and inspection. This page is usually completely overlooked by pond owners. (Chapter 3 page 3.01-17)	As noted in the responses to the previous two comments, the proposed regulations do seek to establish greater requirements for long term maintenance. Complimenting this regulatory action, revisions are currently underway to the Virginia Stormwater Management Handbook. Those revisions are intended to include a chapter on long term BMP maintenance, as well as appendices containing maintenance checklists for certain types of BMPs. A draft of the Handbook is intended to be substantively complete at the time that the public comment period begins on the proposed regulations.
James Bishop	Most counties require a three-year inspection and certification. Stormwater ponds, both private and municipal owned, should require an annual inspection by a licensed inspector. A report of needed repairs should be sent to the Department of Conservation and Recreation. The report should include the name of the owner and pond location with GPS coordinates. The Department of Conservation and Recreation should then follow up with correspondence stating the necessary repairs and a date by which required repairs must be completed. This would improve the quality of water released in to our streams.	4VAC50-60-114 sets forth the requirement for local programs to establish procedures for long term inspections of BMPs. In addition to owner inspections, the schedule for which will be set forth in the maintenance agreement for a BMP, local programs must themselves conduct inspections at least once every five years (unless the owner's inspection meets certain criteria contained within that section).
James Bishop	Required Maintenance of stormwater ponds should include: annual mowing to maintain grass at levels no less then 4 inches high and no more then 12 inches; over-seeding once a year to maintain a good growth of ground cover; washouts and/or erosion should be repaired	Complimenting this regulatory action, revisions are currently underway to the Virginia Stormwater Management Handbook. Those revisions are intended to include a chapter on long term BMP maintenance, as well as appendices containing maintenance checklists for certain types of BMPs. A draft of the Handbook is intended to be substantively complete at the time that the public comment period begins on the proposed regulations.

	within thirty days of an inspection report stating needed repairs.	
Joe Lerch (Chesapeake Bay Foundation)	Threshold criteria for distinguishing between general and individual permits for land disturbing activities must be established. Such criteria should take into consideration the total area of land to be disturbed and the quality of the receiving waters (i.e. listed impairments under DEQ's 303d inventory).	The proposed regulations focus upon water quality and quantity criteria and local program elements and do not address scenarios for utilization of individual or general permit coverage. These topics are more directly discussed in other portions of the VSMP regulations. Those portions of the regulations address situations in which the Board may have the ability to require an individual permit, and amendments to them would require a separate regulatory action.
Jay Roberts (Virginia Department of Environmental Quality)	I would ask that you look at site specific, regional specific numbers for that land condition cover. I'm not sure 16% is applicable to many areas and might result in us not incorporating appropriate load reduction requirements.	The proposed regulations remove the reference to the average land cover condition and the water quality criteria no longer utilize the methodology used by the current regulations in computing site loadings and removal requirements. Rather, the Runoff Reduction Method referenced in 4VAC50-60-65 and its associated spreadsheet is to be utilized unless an alternative methodology which achieves equivalent results has been established by a qualifying local program and approved by the Board.
George Simpson (Roanoke County)	Will this regulation affect the county's VPDES permit at the end of the current five-year period? Will this be incorporated into that or is it separate?	Pursuant to the Virginia Stormwater Management Law (§10.1-603.1 et seq.), the Board has two overarching areas of responsibility for stormwater discharges: construction activities and municipal separate storm sewer systems (MS4s). This regulatory action involves only the construction activities portion of the Board's regulations. However, the Board's General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (4VAC50-60-1200 et seq.) does incorporate a requirement for compliance with the Virginia Stormwater Management Law and Regulations in Minimum Control Measure #5. In that way, MS4 permit holders will be responsible for compliance with the proposed regulations when they become effective. Additionally, §10.1-603.3 requires that MS4 localities establish local stormwater management programs in compliance with the law and the Board's regulations.
Kip Foster (Virginia Department of Environmental Quality)	How will TMDL requirements addressed in the MS4 permit or the stormwater general permits?	The implementation of TMDL requirements within stormwater permits is more closely associated with the regulations that directly pertain to permit development. For specific examples, see the Board's General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in 4VAC50-60-1240, or the Board's recent amendments to the General Permit for Discharges of Stormwater from Construction Activities (which amends 4VAC50-60-1170 and other sections). This regulatory action does acknowledge TMDLs and require that WLAs be addressed in accordance with permit requirements in 4VAC50-60-63.
Steve Kayser (Loudoun	How will this affect counties that have approved alternative inspection programs?	Alternative Inspection Programs (AIPs) established and approved under the Erosion and Sediment Control Law and Regulations are not affected by this

County)		regulatory action and remain available for use under that program. 4VAC50-60-114(A) requires that a qualifying local program inspect projects during construction for compliance with the General Permit for Stormwater Discharges from Construction Activities. For long term BMP inspections, 4VAC50-60-114(D) allows a qualifying local program to establish an inspection program based on a system of priorities. Likewise, the Department will establish a similar program when it administers a local program within a locality (see 4VAC50-60-142(A)).
Steve Kayser (Loudoun County)	Frequencies of inspections on jobs are different depending on how the environmental assessment rankings turnout. As you know, some jobs are high, medium, or low, so how are we going to incorporate the stormwater management criteria to apply to those situations?	Specific timelines for inspections during a construction activity are not established in the section affected by this regulatory action; rather, they are established in the Board's General Permit for Discharges of Stormwater from Construction Activities. A separate regulatory action was recently undertaken to amend that permit and inspection frequencies were examined and amendments to those frequencies were included in the new General Permit. For long term BMP inspections, 4VAC50-60-114(D) allows a qualifying local program to establish an inspection program based on a system of priorities. Likewise, the Department will establish a similar program when it administers a local program within a locality (see 4VAC50-60-142(A)).
Steve Kayser (Loudoun County)	Loudoun County also issues agreement plans for single-family homes. Most of these are rural type, single-family dwellings that are currently zoned with three acres or less. We do not charge them fees to build houses; however, they are inspected so we need to figure out how to look at the agreement and the plans as well.	The proposed regulations do not include a provision for agreements in lieu of a plan for single family homes. Such agreements remain available for meeting requirements associated with Erosion and Sediment Control.
Steve Kayser (Loudoun County)	I am also concerned about the inspection frequencies based on rainfall levels. It is not necessarily uniform to apply it to a ½ inch. That needs to be looked at. Is there a realistic way to measure rainfall and apply it to the inspections of stormwater management permits?	Specific timelines for inspections during a construction activity are not established in the section affected by this regulatory action; rather, they are established in the Board's General Permit for Discharges of Stormwater from Construction Activities. A separate regulatory action was recently undertaken to amend that permit and inspection frequencies were examined and amendments to those frequencies were included in the proposed new General Permit.
Joe Battiata (Stormwater 360)	During several public presentations, it was implied that changes brought about by HB1177 to the VSWML served to expand a post-construction water quality mandate state wide. Over the years, several attempts to mandate water quality requirements	In fact, since the Board received approval from EPA to administer Virginia's stormwater management program in January of 2005, water quality requirements have been applicable statewide. This has been further clarified in another of the Board's regulatory actions to amend the Construction General Permit. The regulations proposed by this action likewise have statewide applicability.

	statewide were rejected by the General Assembly. While I firmly support such a mandate (since water does flow downhill!), this should be clarified since there seems to be some confusion regarding this issue.	
Joe Battiata (Stormwater 360)	Will DCR take on the traditional plan review responsibilities that serve as a component of a local program, and require post-construction water quality in a jurisdiction that otherwise does not have a stormwater management program (or in a jurisdiction that has not satisfactorily met the minimum requirements for delegation)? If so, does DCR take on the construction and post-construction BMP inspection responsibilities?	As set out in Part IIIB of the proposed regulations, where a qualifying local program has not been adopted by a locality, the Department will assume all responsibility under the regulations, including items such as plan review, requirements for water quality, and inspections both during and after construction.
Joe Battiata (Stormwater 360)	Again related to local delegation, the "Alternatives" section of the NOIRA states that the substance, format, and procedures of the regulations will depend on EPA approval. Has EPA established any precedent for this action, or provided any criteria by which they will review the proposed delegation procedures? What, if any, will EPA's role be during the amendment process?	Other states have utilized authorization of localities to administer various portions of their stormwater programs; and EPA regulations to permit such authorization of qualifying local programs. EPA is being consulted regarding the procedures set forth in the proposed regulations and must approve any proposal prior to final adoption.
Joe Battiata (Stormwater 360)	Other states have indicated that there is concern among local governments that state delegation is an abdication of federally mandated authority. Are there any legal issues that could serve to delay or otherwise impact delegation?	As noted in the previous comment, EPA is being consulted to ensure that the proposed regulations are in compliance with federal regulations. State law clearly intends that stormwater programs be adopted by localities—see the Stormwater Law, §10.1-603.1 et seq. (especially §10.1-603.3).
Joe Battiata (Stormwater 360)	Current legislative activity placing technical criteria relating to stream channel erosion into the Code of Virginia rather than invoking the regulatory process seemed to be driven in part by the concerns of a lengthy regulatory process. Has the Board considered separating the amendments related to technical criteria from those related to the delegation of permit authority?	The proposed regulations do include both amendments to Part II (technical criteria) and Part III (local program requirements). The technical criteria are a common element to all of the actions we are working on and we continue to believe that both elements (technical criteria and program development) are integrated components of a stormwater regulatory product. As such, we believe that without resolution on this important piece it will be difficult to properly develop the other integrated regulatory, guidance, website, and related pieces. The current approach will result in a more cohesive "qualifying local program" that each locality will administer and will have the greatest benefit to water quality.

		While it is recognized that this will require programs that are accustomed to implementing older technical criteria to amend their programs, it is believed that these updates can be achieved by these programs and the Department intends to remain engaged through technical assistance to these localities. For those localities that have not previously operated local stormwater management programs, adopting the new technical criteria now avoids the need to further amend new programs that are established in response to these regulations. The completion of this integrated regulatory action is important to this Administration. The Secretary of Natural Resource's noted at the first meeting of the technical advisory committee (TAC) that "I believe it is critical that the final regulations address improvements to water quality and quantity criteria associated with construction activities". Additionally, we suspect that approval by the U.S. Environmental Protection Agency (EPA) of moving the administration of the General Permit to localities as a part of the stormwater program revisions ["qualifying local program"] is less likely without the water quality and quantity regulatory improvements that are included in the proposed regulations. The technical criteria are truly a fundamental and necessary element of a "local qualifying program". Without them, those localities that currently do not have a stormwater program would have limited information regarding operational standards. With the proposal of the regulations by the Board on September 24, 2008, the Board supported the position that Parts I, II, and III should advance together.
Joe Battiata (Stormwater 360)	Both the Erosion Control handbook and Stormwater management Handbook have been very successful in providing local governments a consistent technical reference to support local program implementation. Any proposal that depends on regular amendments or updates to these documents should consider both the technical and administrative challenges associated with such action. The ESC Handbook has not been revised in over 14 years, and Technical Bulletins relating to the design and performance of stormwater BMPs have served to high light the need for a strong technical policy to manage	To compliment this regulatory process, updates and amendments to the Virginia Stormwater Management Handbook are underway and a draft is expected to be substantively complete at the time that public comment begins on this regulatory action. Revisions are being conducted with assistance from a stakeholder technical advisory committee.

	any amendments.	
Joe Battiata (Stormwater 360)	Specifically related to the BMP Table, since it represents several elements related to BMPs, what is out of date? Is it list of BMPs, the related total phosphorus removal efficiencies, or both that are out of date? The inclusion of the table in the regulations was based on very specific input from all stakeholders during the 1998 amendments to the stormwater regulations. The table was intended to serve as a tool with which to measure compliance with the Performance-based or Technology-based water quality criteria. Flexibility was afforded by the footnotes that indicate the allowance for additional BMPs and/or designation of alternative pollutants of concern, such as metals, hydrocarbons, sediment, etc. Many consultants and developers have sought utilize the implied flexibility and have been unsuccessful due to lack of a strong and consistent governing policy.	Table 1 has been retained in section 4VAC50-60-65 of the regulations in order to provide a clear set of compliance options within the regulations themselves. BMP types and efficiencies have been updated to match current data associated with the various practices. In order to provide flexibility, in addition to Table 1, BMPs contained on the Virginia BMP Clearinghouse website may be utilized for compliance. The types and efficiencies of BMPs that will be available on the website will continue to expand over time. A Clearinghouse TAC has been assembled to assist with review and approval of new BMP designs as they are submitted.
Joe Battiata (Stormwater 360)	Removing the table from the regulations must be accompanied by a formal regulatory based process for addressing BMP selection, sizing, performance, and compliance. Other states have developed Technical Review Committees (TRC) made up of a variety of stake holders to support the evaluation of BMPs. A TRC can provide a broad range of experts in hydrology, hydraulics, water quality, and represent multiple constituency groups to support policy decisions on what is a very complex science. In all cases, a statutory or regulatory mandate has been established to guide the management of the TRC.	Table 1 has been retained in section 4VAC50-60-65 of the regulations in order to provide a clear set of compliance options within the regulations themselves. BMP types and efficiencies have been updated to match current data associated with the various practices. In addition to Table 1, BMPs contained on the Virginia BMP Clearinghouse website may be utilized for compliance. The types and efficiencies of BMPs that will be available on the website will continue to expand over time. Similar to the comment, a Clearinghouse TAC has been assembled to assist with review and approval of new BMP designs as they are submitted.

Family impact

Please assess the impact of the proposed regulatory action on the institution of the family and family stability including to what extent the regulatory action will: 1) strengthen or erode the authority and rights of parents in the education, nurturing, and supervision of their children; 2) encourage or discourage economic self-sufficiency, self-pride, and the assumption of responsibility for oneself, one's spouse, and one's children and/or elderly parents; 3) strengthen or erode the marital commitment; and 4) increase or decrease disposable family income.

It is not anticipated that this regulation will have a direct impact on the institution of the family or family stability. However, the improvement of water quality and control of water quantity does have public health and safety benefits that have an indirect impact on families.

Detail of changes

Please detail all changes that are being proposed and the consequences of the proposed changes. Detail all new provisions and/or all changes to existing sections.

If the proposed regulation is intended to replace an emergency regulation, please list separately (1) all changes between the pre-emergency regulation and the proposed regulation, and (2) only changes made since the publication of the emergency regulation.

The following chart provides a summarization of the changes to the existing regulations:

Current section number	Proposed new section number, if applicable	Current requirement	Proposed change and rationale
4VAC50-60-10		Section 10 contains definitions that apply throughout the regulations.	Newly defined terms are proposed to be added to this section, including: 1) ”Act”: to be defined as the VA Stormwater Management Act (§10.1-603.1 et seq.). 2) “Comprehensive stormwater management plan”: new term used in section 96; similar to the concept of a “regional (watershed wide) plan” utilized in the current regulations. 3) “Drainage area”: term is utilized in other definitions, and in sections 63, 72, 108, and 114. 4) “Flood fringe”: utilized in other terms that are relevant to section 66. 5) “Floodplain”: utilized in other terms that are relevant to section 66. 6) “Floodway”: utilized in other terms that are relevant to section 66. 7) “Karst features”: used in other terms in section 10, in section 85, section 108, and section 126. 8) “Manmade stormwater conveyance system”: utilized in other terms and section 66. 9) “Natural channel design concepts”: utilized in other terms that are relevant to section 66. 10) “Natural stormwater conveyance system”: utilized in other terms and in section 66. 11) “Natural stream”: utilized in the definition of “channel”.

			12) “Peak flow rate”: utilized in other terms and in section 66. 13) “Point of discharge”: utilized throughout section 66. 14) “Pollutant discharge”: as amended, intended to replace the current term “nonpoint source pollutant runoff load” or “pollutant discharge”. Utilized in various sections of the greater body of VSMP regulations. 15) “Prior developed lands”: utilized in section 63. 16) “Qualifying local stormwater management program” or “qualifying local program”: term used in various places throughout Parts II and III, especially Part IIIA. 17) “Restored stormwater conveyance system”: term used in section 66. 18) “Runoff characteristics”: term used in other definitions and in section 66. 19) “Runoff volume”: defined as the volume of water that runs off the site of a land disturbing activity from a prescribed design storm. 20) “Site hydrology”: term utilized in section 66. 21) “Stable”: term is used in the definition of “unstable” and in section 66. 22) “Stormwater conveyance system”: term is used in other definitions and in section 66. 23) “Stormwater management standards”: term used in sections 20 and 40. 24) “Unstable”: term is used in section 66. 25) “Virginia Stormwater Management Handbook”: term is used in section 66. Amendments are proposed to the definitions of existing terms, including: 1) “Adequate channel”: to add clarity. 2) “Best management practice” or “BMP”: to align the title of the definition with other terms in section 10. 3) “Channel”: to add clarity. 4) “Development”: to add clarity; also does remove the requirement that residential activities result in three or more dwelling units to be considered development. 5) “Environmental Protection Agency” or “EPA”: to align the title of the definition with other terms in section 10. 6) “Facility or activity”: delete the word “program”, as it is already the last word represented by the letter P in “VSMP”. 7) “Flooding”: addition of the word “thereby” for clarity purposes. 8) “Impervious cover”: addition of the word “conventional” in two places to avoid green roofs and pervious pavement being considered as

			impervious, changes to the language concerning gravel to include gravel surfaces that may become compacted within the definition. 9) "Land disturbance": amendment to abbreviate "federal Clean Water Act" as "CWA". 10) "Local stormwater management program" or "local program": added language to specify that the Department may administer a local program in some cases, to add plan review to the list of items included in a local program, and to remove the discussion of ordinance contents, as the Department will not utilize an ordinance and the definition otherwise provides for use of an ordinance by a locality operating a local program. 11) "Major municipal separate storm sewer outfall" or "major outfall": to align the title of the definition with other terms in section 10. 12) "Municipal Separate Storm Sewer System Management Program" or "MS4 Program": deletion of "Virginia Stormwater Management", as the term "Act" is now proposed to be defined. 13) "National Pollutant Discharge Elimination System" or "NPDES": to align the title of the definition with other terms in section 10. 14) "Owner": addition of "or pollutants" to add clarity. 15) "Permit-issuing authority": removal of description of the responsibility of a permit issuing authority, as these responsibilities are described more fully in proposed Parts IIIA and IIIB. Addition of "with a qualifying local program" to clarify which localities may be permit-issuing authorities. 16) "Pre-development": changes the time for determining a pre-development land condition to the time of plan submittal, rather than the current time of plan approval. 17) "Privately owned treatment works" or "PVOTW": to align the title of the definition with other terms in section 10. 18) "Publicly owned treatment works" or "POTW": to align the title of the definition with other terms in section 10. 19) "Site": amendments are proposed for clarification, including additional language regarding lands that have frontage on tidal waters. 20) "Stormwater management plan": proposed amendment simply indicates that a plan could consist of more than one document. 21) "Stormwater Management Program": amendment would delete "Virginia Stormwater Management", as the term "Act" is now proposed to be defined. 22) "Virginia Stormwater Management Program" or "VSMP": to align the title of the definition with other terms in section 10, and to utilize the abbreviated terms for the federal Clean Water Act and the Virginia

			Stormwater Management Act. 23) “Virginia Stormwater Management Program permit” or “VSMP permit”: to align the title of the definition with other terms in section 10. 24) “Water quality standards”: to utilize the abbreviated terms for the federal Clean Water Act and the Virginia Stormwater Management Act. 25) “Watershed”: amendments are proposed to clarify the interaction of this definition in situations involving karst. Terms are proposed to be deleted due to their no longer being used in the regulations, including: 1) “Aquatic bench”: a component of a stormwater pond; term is not useful in the regulations and the concept will be included in the VA Stormwater Management Handbook if necessary. 2) “Average land cover condition”: formerly had relevance to water quality treatment requirements, but is not utilized by the new proposed Runoff Reduction Method. 3) “Bioretention basin”: a type of best management practice. All BMPs are proposed to either be listed in section 65 of the regulations or included on the Virginia Stormwater BMP Clearinghouse. 4) “Bioretention filter”: a type of best management practice. All BMPs are proposed to either be listed in section 65 of the regulations or included on the Virginia Stormwater BMP Clearinghouse. 5) “Grassed swale”: a type of best management practice. All BMPs are proposed to either be listed in section 65 of the regulations or included on the Virginia Stormwater BMP Clearinghouse. 6) “Infiltration facility”: a type of best management practice. All BMPs are proposed to either be listed in section 65 of the regulations or included on the Virginia Stormwater BMP Clearinghouse. 7) “Nonpoint source pollutant runoff load” or “pollutant discharge”: “nonpoint source pollutant runoff load” is no longer utilized; a new definition is proposed to be created for “pollutant discharge”. 8) “Regional (watershed wide) stormwater management facility” or “regional facility”: term is not utilized in the regulations. 9) “Regional (watershed wide) stormwater management plan” or “regional plan”: term has been replaced with “comprehensive stormwater management plan”. 10) “Sand filter”: a type of best management practice. All BMPs are proposed to either be listed in section 65 of the regulations or included on the Virginia Stormwater BMP Clearinghouse.

			11) “Shallow marsh”: a component of an extended detention basin; term is not useful in the regulations and the concept will be included in the VA Stormwater Management Handbook if necessary. 12) “Stormwater detention basin” or “detention basin”: a type of best management practice. All BMPs are proposed to either be listed in section 65 of the regulations or included on the Virginia Stormwater BMP Clearinghouse. 13) “Stormwater extended detention basin” or “extended detention basin”: a type of best management practice. All BMPs are proposed to either be listed in section 65 of the regulations or included on the Virginia Stormwater BMP Clearinghouse. 14) “Stormwater extended detention basin enhanced” or “extended detention basin-enhanced”: a type of best management practice. All BMPs are proposed to either be listed in section 65 of the regulations or included on the Virginia Stormwater BMP Clearinghouse. 15) “Stormwater retention basin” or “retention basin”: a type of best management practice. All BMPs are proposed to either be listed in section 65 of the regulations or included on the Virginia Stormwater BMP Clearinghouse. 16) “Stormwater retention basin I” or “retention basin I”: a type of best management practice. All BMPs are proposed to either be listed in section 65 of the regulations or included on the Virginia Stormwater BMP Clearinghouse. 17) “Stormwater retention basin II” or “retention basin II”: a type of best management practice. All BMPs are proposed to either be listed in section 65 of the regulations or included on the Virginia Stormwater BMP Clearinghouse. 18) “Stormwater retention basin III” or “retention basin III”: a type of best management practice. All BMPs are proposed to either be listed in section 65 of the regulations or included on the Virginia Stormwater BMP Clearinghouse. 19) “Vegetated filter strip”: a type of best management practice. All BMPs are proposed to either be listed in section 65 of the regulations or included on the Virginia Stormwater BMP Clearinghouse. 20) “Water quality volume”: term is no longer used in the regulations.
4VAC50-60-20		This section sets out the overall purposes of the Virginia Stormwater Management Program (VSMP) Permits regulations.	Additional language is proposed to be added to this section describing generally the concept of a “qualifying local program” (which is further defined in Part IIIA) and Board procedures related to stormwater management programs.
4VAC50-60-30		This section lists the entities and projects that	Clarifying language is proposed to be added specifying that the Board’s

		are subject to the Board's regulations pursuant to the Code of Virginia.	regulations apply to the Department in its oversight of locally administered programs or in its own administration of a local program and to an entity that establishes an MS4 program. Language is also proposed to be added to note that some land disturbing activities are specifically exempted from the Board's regulations by the Code of Virginia.
4VAC50-60-40		The current language simply states that Part II specifies the technical criteria for stormwater management programs and land disturbing activities.	Greater explanatory language is proposed to be added to set forth the Board's authority for the requirements of Part II under the Virginia Stormwater Management Act, to relate the applicability of the technical criteria established in Part II, and to specify that this technical criteria shall not take effect until a local program is approved by the Board.
4VAC50-60-50		The current section sets forth general requirements related to Part II of the regulations, including measurement points, design storms, assumptions to be made in computations, requirements for compliance with other applicable regulations, and other requirements.	This section is proposed to be deleted. Most of the provisions of the current section are proposed to be incorporated into other sections of the regulations where similar provisions are located. A new section 53 (explained below) is proposed to describe a general requirement of Part II.
	4VAC50-60-53	The current general requirements of Part II are set forth in section 50 (described above).	This new section sets forth the goals and objectives of Part II, and also specifies that all control measures must be employed in a manner which minimizes impacts on receiving state waters. More specific requirements are set forth in later sections within Part II.
	4VAC50-60-56	The current section 50 (described above) contains a statement that land disturbing activities shall comply with the Virginia Erosion and Sediment Control Law and Regulations.	This new section separately sets out the concept that nothing in these regulations limits the applicability of other laws and regulations (not just the Erosion and Sediment Control Law and Regulations), nor do they limit the ability of other agencies to impose more stringent requirements as allowed by law. Separately setting this information out in its own section is intended to increase clarity concerning the interaction of these regulations and other laws, regulations, and authorities.
4VAC50-60-60		This existing section sets forth the water quality requirements for land disturbing activities. Compliance with those requirements may be met by employing either the technology-based or the performance-based criteria. Both criteria utilize BMPs contained in Table 1 within the section for compliance, although other BMPs may be allowed at the discretion of the local program administrator or the Department. The performance-based criteria is conducted by	This section is proposed to be deleted in its entirety. New water quality criteria and compliance methods are proposed to be established in 4VAC50-60-63 and 4VAC50-60-65 (both discussed below).

		comparing the calculated post-development pollutant (phosphorus) load to the calculated pre-development load based on the average land cover condition or existing site conditions. The average land cover condition equates to 16% impervious cover on the site, or a loading of .45 lbs. per acre per year of phosphorus. Localities do have the ability to establish other values (and thus higher or lower loadings) for the average land cover condition based on an actual calculation of conditions within their jurisdictions. Required reductions are achieved through implementation of BMPs contained in the existing Table 1 associated with this section. Application of the performance-based method involves the evaluation of 4 situations set forth in subsection B and results in a requirement to reduce pollutant loadings. This requirement can be no required reduction for those sites where the post-developed condition will not exceed the average land cover condition. For sites where the pre-developed condition was less than the average land cover condition, and the post-developed condition exceeds that level, it is required that the post-developed pollutant discharge not exceed the pollutant discharge based on the average land cover condition (or .45, if no other level has been established). Thirdly, for sites where both the pre-development and post-development condition exceed the average land cover condition (typically redevelopment scenarios vs. development on greenfields for the first two situations), it is required that the post-development pollutant loading not exceed the pollutant discharge based on existing conditions less 10%, or the pollutant loading based on the average land cover condition, whichever is greater (in summary, the load must be reduced	

		to 10% below the pre-redevelopment loading, but in no case would be required to be less than .45 lbs. per acre per year of phosphorus, unless a locality has established a different land cover value). Finally, for sites that are already treated by BMPs prior to development, it is required that the post-development pollutant loading not exceed the pre-development pollutant loading. The Technology-Based criteria is also available for use. This criteria requires that a BMP be selected from Table 1 utilizing the percent impervious cover of the site, and using it to treat the post-developed stormwater runoff from the impervious cover on the site.	
	4VAC50-60-63	Current water quality requirements for land-disturbing activities are set out in 4VAC50-60-60 (described above).	This new section would revise the water quality criteria required to be met by land-disturbing activities. Rather than the current performance-based and technology-based methods, compliance would be achieved in accordance with the methods set out in new section 65 (discussed below). Under this section, new development projects (those other than projects occurring on prior developed lands, discussed below) must achieve a phosphorus loading of 0.28 lbs. per acre per year. Projects occurring on prior developed lands (as proposed to be defined in 4VAC50-60-10) would be required to reduce phosphorus loads to a level that is at least 20% below the pre-development loading; however, in no case would the load be required to be reduced to less than 0.28 lbs per acre per year unless a more stringent standard is established by a qualifying local program. The 0.28 standard is derived from the reductions deemed necessary to meet Virginia's Chesapeake Bay goals under the Tributary Strategies. The 20% reduction for redevelopment projects is actually a lesser standard than is needed to meet those goals; however, it represents a marked improvement from the existing 10% reduction while having the intent of not discouraging redevelopment or encouraging sprawl. Unless a site drains to more than one hydrologic unit code (HUC) (in which case the requirements are applied independently within each

			HUC), the water quality criteria are applied to the site as a whole, although a local program has the discretion to allow for application of the criteria to each individual drainage area of a site. Finally, the section notes that where a total maximum daily load (TMDL) wasteload allocation (WLA) has been assigned to stormwater discharges from construction activities, the construction site operator must install measures to meet the WLA in compliance with the terms of the General Permit for Discharges of Stormwater from Construction Activities. This note is intended primarily as a reference, as TMDL WLA requirements are put in place pursuant to the Clean Water Act and other VSMP permit regulations (including the General Permit).
	4VAC50-60-65	Current methodologies for complying with water quality criteria (i.e., the performance-based and technology-based criteria) are contained in section 60 of the current regulations (discussed above).	In place of the performance-based and technology-based criteria, this new section provides that compliance with the water quality criteria contained in section 63 is determined by utilizing the Virginia Runoff Reduction Method. Through use of a spreadsheet incorporated by reference into the regulations, the Method seeks to reduce both runoff and pollutants from the site. Similar to the current approach, compliance is ultimately achieved through the implementation of BMPs on the site. The Method and the new regulations, however, allow for an expanded and innovative set of practices. Efficiencies for various types of BMPs have also been updated based on today's science. The list of available BMPs will continue to be augmented through the further development of the Virginia Stormwater BMP Clearinghouse website. The Clearinghouse will be staffed by the Department (and Virginia Tech's Virginia Water Resource Research Center under contract with the Department) and an advisory committee on a continual basis, and will allow for the submission and approval of new designs and efficiencies for stormwater BMPs. Overall, this allows greater flexibility for developers and better site planning and design. If, however, a particular type of BMP is unsuitable for use in a locality due to soil types, etc., subsection D does allow for use limitations to be put in place with justification to the Department. In the event that a qualifying local program desires to do so, section 65 additionally allows compliance to be achieved through the use of another methodology that is demonstrated to achieve equivalent or more stringent results and is approved by the Board. This section provides other compliance methods, as well. In the event

			that a comprehensive watershed stormwater management plan has been adopted pursuant to section 96 for the watershed in which the project is located, off-site controls in accordance with the plan may be utilized for compliance (comprehensive watershed stormwater management plans will be discussed in more detail in the discussion of section 96 below). Even in the case that no comprehensive watershed stormwater management plan exists, off-site controls may be allowed by a local program assuming that certain conditions are met. Finally, an exception to the water quality requirements may be granted in certain cases through the waiver provisions of 4VAC50-60-122 (discussed in more detail below). [NOTE: Additionally, HB2168 of the 2009 Session, effective July 1, 2009, created a new section numbered 10.1-603.8:1 relating to stormwater nonpoint nutrient offsets that stipulates that a permit issuing authority may allow compliance with stormwater nonpoint nutrient runoff water quality criteria through the use of the permittee's acquisition of nonpoint nutrient offsets in the same tributary.] Overall, while the water quality requirements of the regulations have been increased, so have been the compliance options available to construction site operators. Both on-site and off-site compliance tools have been refined and increased over the current regulations.
	4VAC50-60-66	Various water quantity requirements are contained within the existing regulations, primarily within sections 70 (stream channel erosion) and 80 (flooding). Both sections are discussed in more detail below.	This proposed new section contains refined channel protection and flood protection criteria. The overall water quantity requirements are designed to meet the mandate of §10.1-603.4(7), which requires the replication, as nearly as practicable, of the existing predevelopment runoff characteristics and site hydrology, or improvement upon the contributing share of the existing predevelopment runoff characteristics and site hydrology if stream channel erosion or localized flooding is an existing predevelopment condition. The channel protection criteria of this section vary depending upon which type of conveyance system stormwater is being discharged to: manmade, restored, stable natural, or unstable natural. The flood protection requirements likewise vary based on the same list of systems. An exception to these requirements is contained in subsection C, which exempts certain sites based upon area and peak flow rate increase. For discharges that consist of sheet flow (i.e., stormwater discharged

			over a broad surface area rather than to a conveyance system), subsection D requires that those discharges be evaluated and diverted to a detention facility or conveyance system if necessary to protect downstream properties or resources.
4VAC50-60-70		This existing section sets forth requirements for channel protection. A primary requirement of the section is compliance with MS19 of the Virginia Erosion and Sediment Control Regulations. It also requires that properties and receiving waterways downstream of any land disturbing activity be protected from erosion and damage due to changes in runoff rate of flow and hydrologic characteristics, including but not limited to changes in volume, velocity, frequency, duration, and peak flow rate of stormwater runoff in accordance with the minimum design standards set out in the section.	This section is proposed to be deleted in its entirety. New water quantity criteria, including channel protection criteria, are proposed to be established in 4VAC50-60-66 (discussed above). Requirements for compliance with the Virginia Erosion and Sediment Control Law and Regulations are proposed to be relocated to new section 56 (discussed above).
	4VAC50-60-72	Current design storm specifications are contained in section 4VAC50-60-40(B), and are defined as either a 24 hour storm using the rainfall distribution recommended by the U.S. Dept. of Agriculture's Natural Resources Conservation Service (NRCS) when using NRCS methods or as the storm of critical duration that produces the greatest required storage volume at the site when using a design method such as the Modified Rational Method.	This proposed new section places design storm requirements in their own section and provides greater specificity. Prescribed design storms are the 1, 2, and 10 year 24 hour storms using the site-specific rainfall precipitation frequency data recommended by the US National Oceanic and Atmospheric Administration (NOAA) Atlas 14. NRCS synthetic 24 hour rainfall distribution and models, hydrologic and hydraulic methods developed by the US Army Corps of Engineers, or other standard methods shall be used to conduct any analyses. The Rational Method and Modified Rational Method may be utilized with the approval of the local program, however, use of these methods is proposed to be limited to drainage areas of 200 acres or less, as it is believed that this is the maximum drainage area for which these methods can be reliably used.
	4VAC50-60-74	The current regulations contain no information regarding stormwater harvesting.	This section notes the Board's encouragement of (but does not impose requirements for) stormwater harvesting to the extent that such uses of captured stormwater is permitted by other authorities. This is consistent with section 10.1-603.4(9), which was added to the Code of Virginia following the 2008 General Assembly.
	4VAC50-60-76	The current regulations do not specifically address linear development projects.	This proposed new section specifically explains that unless exempt pursuant to section 10.1-603.8(B), linear development projects must address stormwater runoff in accordance with the VSMP regulations.
4VAC50-60-80		The existing section contains provisions related to flood protection. A specific requirement is	This section is proposed to be deleted in its entirety. New water quality criteria for all sites, including flood protection criteria, are proposed to be

		that the 10-year post-developed peak rate of runoff from the development site shall not exceed the 10-year pre-developed peak rate of runoff.	established in 4VAC50-60-66 (discussed above).
	4VAC50-60-85	The current regulations contain several provisions related to construction of stormwater management impoundment structures and facilities. These provisions are located in 4VAC50-60-50(D), (E), and (J).	The proposed new section places two existing requirements into subsections (B) and (C), and adds a statement of the Board's preference that construction of structures or facilities within tidal or nontidal wetlands or perennial streams is not recommended. Additionally, this section addresses the construction of structures or facilities within karst areas and karst features, neither of which are required to be considered under the existing regulations.
4VAC50-60-90		This section describes the requirements for regional (watershed-wide) stormwater management plans, which enable localities and state agencies to treat multiple projects within a watershed through singular, or fewer, best management practices rather than addressing stormwater management on each individual site.	This section is proposed to be deleted in its entirety. A new section describing and establishing requirements for comprehensive watershed stormwater management plans is proposed to be inserted at 4VAC50-60-96 (described below).
	4VAC50-60-93	The current regulations contain a requirement for stormwater management plans to apply the technical criteria to an entire site (such as an entire development) and not simply an individual lot.	This new section would establish a specific section for development of stormwater management plans. In addition to the concept embodied in the existing regulations [which would now be broken out as subsections (A) and (B)], an additional requirement is included that all sources of surface runoff and all sources of subsurface and groundwater flows converted to surface runoff be considered in the plan.
	4VAC50-60-96	The existing regulations contain a description of a regional (watershed-wide) stormwater management plan in 4VAC50-60-90.	This proposed new section would rename a regional (watershed-wide) stormwater management plan, calling it instead a "comprehensive watershed stormwater management plan." Such plans would now require the approval of the Department. The new section also specifically allows for the use of a pro rata fee program as specified in §15.2-2243 of the Code of Virginia.
4VAC50-60-100		This section specified the applicability to the existing Part III.	This section is proposed to be deleted in its entirety. The applicability statements have been incorporated into new sections 4VAC50-60-102, 128, 156, and 158.
	4VAC50-60-102		This proposed new section explains that Part IIIA of the proposed regulations establishes the minimum technical criteria and local government ordinance requirements for a "qualifying local program", which is the proposed name of a locality-operated stormwater management program that has been authorized by the Board to administer its responsibilities under the Virginia Stormwater

			Management Act and federal law and regulations.
	4VAC50-60-104	Existing section 4VAC50-60-110 requires that local programs comply with the various requirements of Part II of the regulations, states that more stringent criteria established by localities may be considered by the Department in its review of state projects within that locality, and explains that nothing in Part III is to be construed as giving regulatory authority over state projects to a locality.	This proposed new section explains that all qualifying local programs must require compliance with the provisions of Part II of the regulations and must comply with 4VAC50-60-460(L), states that more stringent criteria established by localities will be considered by the Department in its review of state projects within that locality, and explains that nothing in Part IIIA is to be construed as giving regulatory authority over state projects to a locality.
	4VAC50-60-106		This proposed new section sets forth the administrative requirements for a qualifying local program. These include identification of various authorities who will be responsible for different portions of the program, program procedures, adoption of an ordinance, and reporting (which is further outlined in 4VAC50-60-126). The section also notes the ability of a qualifying local program to require a performance bond or other surety in accordance with the Stormwater Management Act.
	4VAC50-60-108	Current requirements regarding stormwater management plan review by locality-run stormwater management plans are contained in 4VAC50-60-130 (discussed below).	This proposed new section sets forth specific requirements for review of stormwater management plans by qualifying local programs. This includes not only review procedures to be employed by the qualifying local program, but also the requirements for a complete stormwater management plan, which must be signed and sealed by a professional. The section also permits a qualifying local program to allow for a less extensive initial stormwater management plan to be submitted for initial clearing and grading activities (this is not available under the current regulations). Finally, the section contains procedures for modifying a previously-approved stormwater management plan (the current regulations simply state that no changes may be made to an approved plan without review and written approval by the locality).
4VAC50-60-110		This existing section sets forth the technical criteria for local programs under the current regulations. Requirements include compliance with the existing technical criteria contained in the various sections of Part II.	This section is proposed to be deleted in its entirety. The requirement for compliance with the technical criteria contained in Part II is proposed to be relocated to new section 4VAC50-60-104.
	4VAC50-60-112	Local governments currently do not have the ability to authorize coverage under the VSMP General Permit for Discharges of Stormwater from Construction Activities, which is the permit received by operators of regulated activities.	This proposed new section sets forth the procedures by which a qualifying local program will be permitted to authorize coverage under the Board's General Permit for Discharges of Stormwater from Construction Activities. This will allow for operators of regulated activities to receive both Erosion and Sediment Control and Stormwater Management permits from a single locality, rather than today's practice

			of receiving Erosion and Sediment Control permits from the locality and Stormwater Management permit coverage from the Department. This is intended to enhance user-friendliness and efficiency for the regulated community, and meet the Board's mandate for authorization of local programs under the Virginia Stormwater Management Act.
	4VAC50-60-114	Current requirements for inspections both during and post-construction are contained in section 4VAC50-60-150. These requirements are for stormwater management facilities to be made on a regular basis during construction, and for post-construction inspections to be made on a regular basis or according to an alternative inspection program developed by the local program.	This proposed new section sets forth requirements for site inspections by qualifying local programs to ensure compliance with the Board's regulations and to ensure the long term functionality of stormwater management BMPs. First, the section requires inspections for compliance with the General Permit for Discharges of Stormwater from Construction Activities to be conducted by the qualifying local program during construction. Following construction, the person responsible for the development project or their designated agent shall be responsible for submitting construction record drawings of all permanent stormwater management facilities installed on the site to the qualifying local program for use in long term inspections of the facilities. The qualifying local program or its designee will then use these record drawings in conducting long term inspections in accordance with an approved inspection program that is developed by the qualifying local program. This program will ensure that all facilities are inspected at least once every five years (note that unlike the current regulations, which require inspections annually unless an alternative inspection program is established, the proposed section requires all qualifying local programs to establish an inspection program).
	4VAC50-60-116		Enforcement under the Virginia Stormwater Management Act and these regulations is governed specifically by statute and this section lists all potential remedies available to a qualifying local program under the Act, providing qualifying local programs with one source to find all of the authorities that are scattered in various places in the Act. In addition, this section establishes a recommended schedule of civil penalties for violations, which is required to be established by the Board in accordance with §10.1-603.14(A) of the Code of Virginia.
	4VAC50-60-118	The current regulations do not mention the availability of hearings, although requirements for hearings are established in the Stormwater Management Act.	This proposed new section observes the requirements for hearings contained within the Virginia Stormwater Management Act.
4VAC50-60-120		This section sets forth the requirements for a stormwater management ordinance that could be adopted by a locality and sets out the procedures by which the Department will	This section is proposed to be repealed in its entirety. The requirement for a locality to adopt an ordinance is proposed to be relocated to 4VAC50-60-106(B), and procedures for Department review of a qualifying local program is proposed to be contained in Part IIIC.

		periodically review a locality-operated stormwater management program.	
	4VAC50-60-122	Current section 4VAC50-60-140 (discussed below) allows for exceptions to be granted from the requirements of the VSMP regulations.	This proposed new section would allow for an exception to be administratively granted to the technical criteria contained in Part II (including the water quality and quantity criteria). Exceptions may be granted provided that certain criteria are met (these criteria are refined from those currently included in section 140), and a record of all exceptions granted is to be maintained and reported.
	4VAC50-60-124	Current requirements for ensuring that stormwater management BMPs will be maintained on an ongoing basis are contained in section 4VAC50-60-150 (discussed below).	The requirements for ensuring ongoing maintenance of stormwater management BMPs are proposed to be relocated to this new section. Some refinements are proposed to these requirements, including a requirement that the qualifying local program be made a party to each agreement (which will allow the program to enforce the agreement).
	4VAC50-60-126	Current sections 4VAC50-60-120 and 4VAC50-60-150 contain requirements for the keeping of reviewed plans and stormwater management facility inspection reports by locality-operated stormwater management programs.	This new section would require qualifying local programs to report information pertaining to stormwater management facilities installed in their jurisdictions, inspections made during the fiscal year, number of enforcement actions undertaken, and number of exceptions applied for and the number of exceptions granted. The section would also require permit files to be maintained for three years, inspection reports to be maintained for five years, and maintenance agreements/design standards and surveys/maintenance records for stormwater management facilities to be maintained in perpetuity.
	4VAC50-60-128	Currently, the Department does not administer a local stormwater management program in any locality in the Commonwealth. Rather, the Department only administers the Board's General Permit for Discharges of Stormwater from Construction Activities across the state. The Department's duties include the issuance of coverage under the General Permit, project inspections, and enforcement. As required by §10.1-603.3(C), under the proposed regulations, the Department will administer a local stormwater management program in any locality that does not adopt its own qualifying local program. Part IIIB of the proposed regulations (sections 4VAC50-60-128 through 4VAC50-60-154) establishes the procedures that will be followed by the Department in administering a local program. These procedures are nearly	This proposed section notes that Part IIIB (sections 4VAC50-60-128 through 4VAC50-60-154) sets forth the criteria that will be followed by the Department in administering a local stormwater management program in a locality that is not required to adopt a qualifying local program pursuant to §10.1-603.3(A), or that does not elect to adopt a qualifying local program pursuant to §10.1-603.3(B).

		identical to those that are required of qualifying local programs; distinctions will be noted where they occur.	
4VAC50-60-130		This existing section sets forth the requirements for stormwater management plans and the requirements for stormwater management plan review by localities administering stormwater management plans under the current regulations.	This section is proposed to be deleted in its entirety. Requirements for stormwater management plans and for stormwater management plan reviews are proposed to be relocated and refined in section 4VAC50-60-108 (discussed above).
	4VAC50-60-132	See the note accompanying 4VAC50-60-128	This proposed section notes that a local stormwater management program administered by the Department shall, similar to a qualifying local program, require compliance with the provisions of Part II unless an exception is granted. The section also notes that the Department shall apply the provisions of the VSMP regulations when reviewing a federal project, and it finally states that nothing in the regulations shall be construed as limiting the rights of other federal and state agencies to impose stricter requirements as allowed by law.
	4VAC50-60-134	See the note accompanying 4VAC50-60-128	This proposed section relates that, when the Department administers a local stormwater management program within a locality, the Department will be the permit issuing, plan approving, and enforcement authority; and that the Department or its designee will be the plan reviewing authority and the inspection authority. The Department shall also assess and collect fees. Finally, the Department may require the submission of a reasonable performance bond or surety in accordance with the Virginia Stormwater Management Act.
	4VAC50-60-136	See the note accompanying 4VAC50-60-128	This proposed section relates that the Department will follow the same plan review procedures as required of qualifying local programs by 4VAC50-60-136. The Department shall not, however, accept initial stormwater management plans, which may be accepted by qualifying local programs.
	4VAC50-60-138	See the note accompanying 4VAC50-60-128	This section describes the requirements for and process by which the Department will authorize coverage under the Board's General Permit for Stormwater Discharges from Construction Activities. This process is similar to that required to be utilized by qualifying local programs. The section does additionally note that the Board has the authority to require projects to receive individual permits (permits whose terms are drawn to apply to a singular, particular project rather than a class of similar types of projects) pursuant to 4VAC50-60-410(B)(3).
4VAC50-60-140		This section sets forth the procedures by which a locality-operated stormwater management	This section is proposed to be deleted in its entirety. The exceptions process is proposed to be refined and relocated to section 4VAC50-60-

		program may issue an exception to the requirements of the regulations.	122 (discussed above).
	4VAC50-60-142	See the note accompanying 4VAC50-60-128	This section notes that inspections, enforcement actions, hearings, exceptions, and stormwater management facility maintenance shall be conducted by the Department when it is operating a local stormwater management program in the same manner as those tasks will be performed by a qualifying local program under the applicable sections contained in Part IIIA.
4VAC50-60-150		This existing section describes the requirements for long term maintenance of stormwater management facilities, as well as the requirements for inspections of facilities by a locality-operated stormwater management program both during and post-construction.	This section is proposed to be deleted in its entirety. Requirements for stormwater management facility maintenance are proposed to be refined and relocated to section 4VAC50-60-124 (discussed above). Inspection requirements are proposed to be refined and relocated to section 4VAC50-60-114 (also discussed above).
	4VAC50-60-154	See the note accompanying 4VAC50-60-128	This proposed section explains that the Department shall maintain a current database of permit coverage information for all projects. Department-operated local stormwater management programs shall also report information in the same manner as required by qualifying local programs, and records shall be kept by the Department in the same manner as is required of qualifying local programs.
	4VAC50-60-156	Although the Department does not currently review locally operated stormwater management programs (except for those programs administered to achieve compliance with the requirements of an MS4 permit), criteria for review of a local program by the Department is contained in section 4VAC50-60-120(B). Such review is to consist of a personal interview between Department staff and the local program administrator or his designee, a review of local ordinances and other documents, a review of plans approved by the local program, an inspection of regulated activities within the jurisdiction, and a review of enforcement actions undertaken by the locality.	This proposed section notes that Part IIIC (sections 4VAC50-60-156 through 4VAC50-60-157) specifies the criteria that will be utilized by the Department in reviewing a locality's administration of a qualifying local program.
	4VAC50-60-157	See the note accompanying 4VAC50-60-156	This proposed section notes that all qualifying local programs will be reviewed at least once every five years, as required by the Stormwater Management Act. Evaluations shall be conducted according to the same criteria currently contained in 4VAC50-60-120(B), with an addition of a review of an accounting of the receipt and of the expenditure of fees

			received. The section additionally describes the process by which the Board will allow for corrective action to be taken by any qualifying local program for which deficiencies are noted.
	4VAC50-60-158	The current regulations were adopted prior to the complete adoption of the Stormwater Management Act by the General Assembly, which established the requirement for certain localities to adopt qualifying local programs and for others to have the option to adopt qualifying local programs. The Act likewise requires the Board to establish procedures for authorization of qualifying local programs. As these requirements were not in place in the Code of Virginia at the time of the adoption of the current regulations, the current regulations do not include authorization procedures.	This proposed section notes that Part IIID (sections 4VAC50-60-158 through 4VAC50-60-159) establishes the procedures by which the Board will authorize a locality to administer a qualifying local program.
	4VAC50-60-159	See the note accompanying 4VAC50-60-158	This section describes the procedure by which the Board will authorize a locality to administer a qualifying local program. A locality will first submit an application package, which will be reviewed for completeness within 20 calendar days. The Board will thereafter have 90 calendar days to review the application package for compliance with the Stormwater Management Act and the VSMP regulations. Any decision will be communicated to the locality. This section also notes the timeframes for qualifying local program adoption. Subsections (D) and (E) note the times during which localities should notify the Board. Finally, the section notes that for localities where no qualifying local program is adopted, the Department will administer a local stormwater management program. The Department may phase in these programs over a period of time based on the criteria noted in the section.
Documents Incorporated by Reference		A number of documents useful for compliance with the regulations are currently incorporated by reference into the regulations.	It is proposed that three additional documents be incorporated by reference into the regulations. The first, Technical Bulletin #1—Stream Channel Erosion Control, is referenced in the proposed 4VAC50-60-66. The other two documents (Technical Memorandum—the Runoff Reduction Method and Virginia Runoff Reduction Method Worksheet) are noted in 4VAC50-60-65.

APPENDIX A

Number of Local Programs, Permit Issuance, Effort, Fee Establishment, and Revenue Calculations

Table of Contents

Overview

Since the proposed regulation is statewide, the regulation will impact a wide variety of individuals, businesses, or agencies, particularly Virginia's localities, developers, and the Department of Conservation and Recreation. To estimate the total extent to which this regulation would apply, the Department has estimated the number of local stormwater management programs to be administered by localities or the Department of Conservation and Recreation, the number of Construction General Permit coverages issued and expected to be issued statewide annually, the amount of time and effort associated with administering a stormwater management program and associated permit issuance, the level fees should be established at, and the amount of revenue necessary to meet those staffing needs.

Number of Local and State Stormwater Programs

Virginia has 325 localities comprised of 39 Cities, 95 Counties, and 191 Incorporated Towns. Of these, any locality located within Tidewater Virginia as defined by the Chesapeake Bay Preservation Act (§ 10.1-2100 et seq.) [17 cities, 29 counties, and 38 towns], or any locality that is partially or wholly designated as required to obtain coverage under an MS4 permit under the provisions of the federal Clean Water Act [27 cities, 15 counties, and 7 towns], (there is overlap between the two groups) shall be required to adopt a local stormwater management program for land disturbing activities (§ 10.1-603.3). The following 103 programs [27 cities, 33 counties, and 43 towns] represent those localities required to adopt a stormwater management program:

Cities (27):			
Alexandria **	Falls Church **	Newport News **	Suffolk **
Bristol *	Fredericksburg **	Norfolk **	Virginia Beach **
Charlottesville*	Hampton **	Petersburg **	Williamsburg **
Chesapeake **	Harrisonburg *	Poquoson **	Winchester *
Colonial Heights **	Hopewell **	Portsmouth **	* MS4 only
Danville *	Lynchburg *	Richmond **	** MS4 &CBA
Fairfax **	Manassas *	Roanoke *	
	Manassas Park *	Salem *	

Counties (33):			
Accomack ***	Gloucester ***	Mathews ***	Stafford **
Albemarle *	Hanover **	Middlesex ***	Surry ***
Arlington **	Henrico **	New Kent ***	Westmoreland ***
Botetourt *	Isle of Wight **	Northampton ***	York **
Caroline ***	James City **	Northumberland ***	* MS4 only
Charles City ***	King & Queen ***	Prince George ***	** MS4 &CBA
Chesterfield **	King George ***	Prince William **	*** CBA only
Essex ***	King William ***	Richmond ***	
Fairfax **	Lancaster ***	Roanoke *	
	Loudoun *	Spotsylvania **	

Towns (43):			
Ashland **	Christiansburg *	Herndon **	Onley ***
Belle Haven ***	Claremont ***	Irvington ***	Painter ***
Blacksburg *	Clifton ***	Kilmarnock ***	Parksley ***
Bloxom ***	Colonial Beach ***	Leesburg *	Port Royal ***
Bowling Green ***	Dumfries ***	Melfa ***	Quantico ***
Bridgewater *	Eastville ***	Montross ***	Saxis ***
Cape Charles ***	Exmore ***	Nassawadox ***	Smithfield ***
Cheriton ***	Hallwood ***	Occoquan ***	Surry ***
	Haymarket ***	Onancock ***	Tangier ***

Tappahannock ***	Vinton *	White Stone ***	** MS4 &CBA
Urbanna ***	Warsaw ***	Windsor ***	*** CBA only
Vienna ***	West Point ***	* MS4 only	

The Code also specifies that "[i]n the absence of the delegation of a stormwater management program to a locality, the Department will administer the responsibilities of this article within the given jurisdiction". The Department estimates that there could be as many as 222 localities that do not adopt a program [12 cities, 62 counties, and 148 towns]. The Department would collectively administer these programs as 74 local programs (towns would be handled as part of counties) as outlined below:

Cities (12):	Covington	Galax	Norton	Waynesboro
Bedford	Emporia	Lexington	Radford	
Buena Vista	Franklin	Martinsville	Staunton	

Counties (62):	Carroll	Giles	Montgomery	Russell
Alleghany	Charlotte	Goochland	Nelson	Scott
Amelia	Clarke	Grayson	Nottoway	Shenandoah
Amherst	Craig	Greene	Orange	Smyth
Appomattox	Culpeper	Greensville	Page	Southampton
Augusta	Cumberland	Halifax	Patrick	Sussex
Bath	Dickenson	Henry	Pittsylvania	Tazewell
Bedford	Dinwiddie	Highland	Powhatan	Warren
Bland	Fauquier	Lee	Prince Edward	Washington
Brunswick	Floyd	Louisa	Pulaski	Wise
Buchanan	Fluvanna	Lunenburg	Rappahannock	Wythe
Buckingham	Franklin	Madison	Rockbridge	
Campbell	Frederick	Mecklenburg	Rockingham	

Towns (148):	Charlotte Court House	Duffield	Hurt	Narrows
Abingdon	Chase City	Dungannon	Independence	New Castle
Accomac	Chatham	Edinburg	Iron Gate	New Market
Alberta	Chilhowie	Elkton	Ivor	Newsoms
Altavista	Chincoteague	Farmville	Jarratt	Nickelsville
Amherst	Clarksville	Fincastle	Jonesville	Orange
Appalachia	Cleveland	Floyd	Keller	Pamplin City
Appomattox	Clifton Forge	Fries	Kenbridge	Pearisburg
Berryville	Clinchco	Front Royal	Keysville	Pembroke
Big Stone Gap	Clinchport	Gate City	La Crosse	Pennington Gap
Blackstone	Clintwood	Glade Spring	Lawrenceville	Phenix
Bluefield	Coeburn	Glasgow	Lebanon	Pocahontas
Boones Mill	Columbia	Glen Lyn	Louisa	Pound
Boyce	Courtland	Gordonsville	Lovettsville	Pulaski
Boydton	Craigsville	Goshen	Luray	Purcellville
Boykins	Crewe	Gretna	Madison	Remington
Branchville	Culpeper	Grottoes	Marion	Rich Creek
Broadway	Damascus	Grundy	McKenney	Richlands
Brodnax	Dayton	Halifax	Middleburg	Ridgeway
Brookneal	Dendron	Hamilton	Middletown	Rocky Mount
Buchanan	Dillwyn	Haysi	Mineral	Round Hill
Burkeville	Drakes Branch	Hillsboro	Monterey	Rural Retreat
Capron	Draper	Hillsville	Mount Crawford	Saint Charles
Cedar Bluff	Dublin	Honaker	Mount Jackson	Saint Paul

Saltville	Stanardsville	Tazewell	Victoria	Waverly
Scottsburg	Stanley	The Plains	Virgilina	Weber City
Scottsville	Stephens City	Timberville	Wachapreague	Wise
Shenandoah	Stoney Creek	Toms Brook	Wakefield	Woodstock
South Boston	Strasburg	Troutdale	Warrenton	Wytheville
South Hill	Stuart	Troutville	Washington	

Note: Those 15 localities that are highlighted in grey are geographically located (or partially located) in a locality that is required to adopt a program. It is anticipated that those towns will be administered under the respective county's program through an agreement. Should that not occur, DCR would administer a program in those specific towns. (Scottsville straddles two localities, one of which is a mandatory locality and one not.)

Number of Permits

These local stormwater programs (whether administered by localities or the Department) will be responsible for overseeing the issuance of coverage under the Construction General Permit for an estimated 5000 land disturbing activities per year. This is arrived at through the following computations and assumptions:

Actual DCR Permit Numbers

Data obtained from DCR's existing stormwater permitting database was used as the starting point to estimate the historical extent of the number of general permit coverages issued on a calendar year basis. The history of the program's Construction General Permit coverage issuance and the size distribution of those permits are outlined in Tables A-1 through A-4. Table A-1 outlines those coverages issued that are not VDOT permits while the VDOT permits are tabulated separately in Table A-2.

Table A-1: Construction General Permit Coverages by Month (Non-VDOT Permits)

CY	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
2005	4	1	230	128	136	193	84	223	165	137	214	199	1714
2006	165	244	278	207	201	247	229	220	225	261	134	158	2569
2007	139	178	243	234	146	319	230	308	164	221	147	135	2464
2008	174	186	222	223	192	228	180	182	183	211	178	107	2266
2009	94												94

It is evident in Table A-1 that the first year of DCR's program administration is not fully reflective of what permit numbers should have been, as this year was a transition period and DCR spent considerable time informing the regulated public of the program changes and the permit requirements. The table also indicates a slowing of permit numbers over 2006 through 2008, although the effort to ensure permit compliance was increasing through this same time period.

Table A-2: Construction General Permit Coverages Issued by Month (VDOT Permits)

CY	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
2005	0	25	0	15	10	16	19	22	53	24	10	14	208
2006	9	12	27	35	6	14	30	22	22	6	20	11	214
2007	9	24	14	17	17	15	20	10	15	22	16	10	189
2008	10	16	13	18	21	12	13	27	18	24	8	3	183
2009	8												8

Table A-3: Total Number of Construction General Permit Coverages Issued by Calendar Year

Calendar Year	Non-VDOT Permits	VDOT Permits	Total
2005	1714	208	1922
2006	2569	214	2783
2007	2464	189	2653
2008	2266	183	2449
	9013	794	9807 (Average = 2,452)

Table A-4: Size Distribution of Construction General Permit Coverages Issued (as of Jan 31, 2009*)

Project Size	Non-VDOT Permits	VDOT Permits	Total	Percentage
< 0.5 acre	878	93	971	9.9
≥ 0.5 acre, < 1acre	692	37	729	7.4
≥1 acre, < 5 acres	3793	454	4247	43.3
≥5 acres, < 10 acres	1430	125	1555	15.9
≥10 acres, < 50 acres	1834	84	1918	19.6
≥50 acres, < 100 acres	251	6	257	2.6
≥100 acres	129	2	131	1.3
Totals			9,808	100.0

* - For all projects where size information was available

Virginia Tech's Computations of Permit Numbers

The Virginia Tech Report (Appendix C, pages 7- 11) suggested, based on discussions with localities, that the state permitting data under-reported the number of land disturbing projects and the amount of disturbed acres recorded under local Erosion and Sediment Control Programs. Accordingly, the number of Construction General Permit coverages issued under-represented the universe of land disturbing projects that should have required permits. Virginia Tech utilized statistical procedures to estimate the extent of the "under-counting" of the number of land disturbing permits. A sampling process was used to identify counties and cities (localities) where more detailed local data would be collected on permit coverage and disturbed acres. To ensure that a representative cross-section of localities was sampled, counties and cities across the state were initially grouped based on a variety of characteristics. Permit and land disturbing data were collected on a sample of localities. Based on observed under-reporting, state permit and disturbed acreage data were adjusted to estimate the potential number of permit coverages for the state.

Cluster analysis was used by Virginia Tech to form the localities into similar groups based on various characteristics. DCR permits were classified as one of four types: residential, commercial/industrial, roads, or other. The number of permits for each category and the number of disturbed acres for each category were used as the primary characteristics describing the localities. Other characteristics used in the cluster analysis included population, land area, and location in the

Chesapeake Bay Preservation Area. Initial clustering indicated a strong tendency to distinguish between localities in the Chesapeake Bay Preservation Area (CBPA) and those that were not. Therefore, to improve the performance of the clustering process, two groups were formed based on this division. K-means cluster analysis was then used to group the 29 counties and 17 cities in the eastern portion of the Bay watershed into 10 clusters, with the remaining counties and cities grouped into 14 clusters.

Individual localities within each cluster group were selected to participate in a spot check survey. Appropriate local officials were contacted to determine the number of permits and disturbed acreage under permit from their local Erosion and Sediment Control programs. At least one locality from each of the 24 clusters was contacted by the researchers, totaling 32 contacts in all. Sixteen contacts provided data for an effective response rate of 50%. The response rate within the CBPA and non-CBPA areas were identical, with five of 10 contacts providing responses within CBPA localities and 11 of 22 contacts responding from localities outside of the CBPA. In addition to these data, preliminary data from an additional seven localities (two within CBPA, five outside) were provided by DCR based on local data collected at regional DCR offices. Thus, sample data of permit numbers were obtained from 23 localities representing the majority of the program clusters (17 of the 24 clusters).

It was understood through this process that comparing state stormwater general permit coverage to local erosion and sediment control permit issuance was not a direct relationship due to a variety of factors, particularly threshold differences (10,000 sq. ft. Erosion and Sediment Control vs. 1-acre Stormwater in non-CBPA localities) but that it was a reasonable approach to exploring the magnitude of potential under-reporting.

Local program data of permits were paired with its corresponding DCR registry data. [Overall, 174 observations were used for the annual disturbed acreage relationship, and 144 observations were used for the number of annual permits relationship. It should be noted that less than 10% of the observations were from within the CBPA.] After considering different methods and models, and the removal of statistical outliers, a simple linear relationship between DCR and local data was found to be the most intuitive and robust estimator.

A linear relationship of the form y = mx + b was calculated for the number of permits. In the equation, y is the reported quantity (of permits) from the locality, x is the corresponding quantity from DCR database, m is the slope of the line, and b is the vertical intercept. Interpretation of the linear model is straightforward. If the data collected from the localities had matched the data from DCR perfectly, the intercept (b) would be zero and the slope of the line (m) would be one.

The actual results of the regression are shown in Figure A-1. The intercept (15.911 for permits) represents an average value of missed data for all DCR observations. The slope (1.4458 for permits) of the estimated line shows the additional change in the quantity from the localities for each additional unit shown in the DCR data.

- This relationship was used to estimate the number of permits ($\hat{y}_i$) in each of the i localities. $\hat{y}_i = f(x_i) = mx_i + b$

- To get the total number of permits for the state, we would need to sum the individual estimations ($\hat{y}_i$).

$$\sum_{i=1}^{n} \hat{y}_i = \sum_{i=1}^{n} f(x_i) = \sum_{i=1}^{n} (mx_i + b)$$

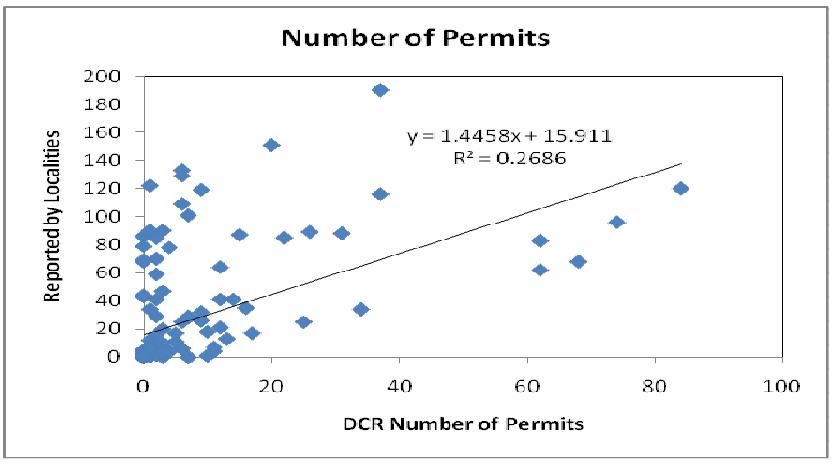


Figure A-1: Linear Regression for Number of Permits

The linear model described above was used to produce state-wide estimates of permit numbers based on the DCR data (as computed by Virginia Tech). Although the correlation coefficient (R^2) was very low, annual totals from DCR data were used to provide a preliminary estimate of the number of permit coverages that might be expected when the permit coverage issuance is administered at a local level. Summary results, compared with the original DCR data are shown in Table A-5. The average percentage of potential land disturbing activities occurring in a locality that the Department had issued general permit coverage for was 42.2%.

Table A-5: Estimates of Permits (Calendar Year)

	Permits			
	2005	2006	2007	Averages
VT Total of DCR Permitting Data	1,904	2,733	2,482	2,373
VT Estimated Permit Total	4,917	6,115	5,752	5,595
Percentage	38.7%	44.7%	43.2%	42.2%

Similar computations were also performed to generate acreage comparisons. Computations run supported the assumption that small developments (less than 5 acres) would be the most under-reported permit group in the state DCR data base. The under-reporting of small projects could have a large impact on permit totals, but a relatively smaller impact on total reported disturbed acres. In areas outside the Chesapeake Bay Preservation Act area, however, local erosion and sediment control permit data might also contain projects that are less than an acre (but greater than 10,000 ft^2). Thus, the local data from these areas may over-estimate the total amount of stormwater permits because projects under one acre would not be required to obtain stormwater permit coverage (only Erosion and Sediment Control). Additionally an over-estimate could occur due to local reporting of individual building permits that may be covered by fewer stormwater permits under a common plan of development. The extent of such potential bias could not be assessed with the available data. It should also be noted that the comparison between the local data and DCR database data in this analysis did not compare individual projects between the two datasets to identify discrepancies.

The analysis only compared the total numbers in each data set for the defined period and assumed that all permits in the smaller set were represented in the larger set. This could lead to an underestimate of the number of permits. It also appears that the permit numbers include VDOT permits for which we do not see any significant under-reporting for and have been handled differently in DCR's computations. This could also lead to an over-estimate of permits.

The permit coverage computations outlined above, although preliminary in nature, suggested an area where DCR should perform additional research to better refine the estimates.

DCR Computations of Permit Numbers

Data is periodically provided to the Department's regional Soil and Water Conservation offices from localities pursuant to § 10.1-566.1 that states that each local erosion and sediment (E&S) control plan-approving authority shall report to the Department a listing of each land-disturbing activity in the locality for which a plan has been approved. Utilizing a subset of those E&S datasets that allowed for a direct comparison to the construction general permit data in DCR's data, the Department performed comparisons. This process was time consuming, but was expected to provide a more refined estimate than that provided in the Virginia Tech analysis.

DCR's analysis involved the use of January – September 2008 data provided by the localities and from DCR's permit coverages database. As DCR's database does not include a locality field for the land disturbing activity, we used zip codes, and where necessary, project addresses to delineate project sites by locality using Microsoft MapPoint. As some localities appeared to be reporting building permits or small E&S projects that did not appear to be part of a common plan of development and that would not be regulated under stormwater, adjustments to the local data was periodically made. Specifically, where a locality reported permits for projects less than an acre, the projects did not appear to be part of a common plan of development, and the locality was not a Bay Act locality, then those reported projects under the one acre and above threshold were removed from the analysis.

Once a list of projects for the given time period were established for both the localities dataset and for DCR's, we compared the projects on both lists by project address, operator name, project name, and project size. As discrepancies in project size commonly occurred between the sets, the acreage recorded in the state database was utilized for computations. Additionally, where projects were present in both the databases with either the same address or name but with very different acreages, we counted them as the same project.

DCR recognizes that using data for a set time period could have lead to an underestimate of the percent comparability between the datasets as there could be a time delay between local project approval and DCR permit coverage issuance. Localities have also suggested that some developers, more so in today's declining economy, are getting plan approvals but not initiating the project until the economy improves. In our Stormwater TAC discussions, it was noted that around 5% of all site plans are never built.

A total of 18 localities were sampled with the results presented in Table A-6. The percentage of potential land disturbing activities occurring in a locality that the Department had issued general permit coverage for ranged from a low of 5% to a high of 89% with an average of 36.4%. This value is similar but slightly lower than the Virginia Tech estimate of 42.2%. However, as noted previously, it is anticipated that a percentage of projects not permitted by DCR were not actually

missed projects, but were projects for which no general permit coverage was sought, as the project did not advance to the construction stage. If we assume that this was 5% of the projects and add this amount back to our estimate of 36.4%, we arrive at an estimated permit coverage issuance value of 41.4%.

Table A-6: Estimate of the Percentage of Reported Applicable Land Disturbing Projects in Each Locality that has been Issued Construction General Permit Coverage as Required

Locality	% of permits	% of acres
Alexandria*	31%	86%
Amherst	23%	32%
Arlington*	21%	16%
Campbell	42%	49%
Charlottesville	89%	57%
Chesterfield*	63%	80%
Colonial Heights*	38%	46%
Fauquier	31%	76%
Dinwiddie	50%	94%
Goochland	21%	43%
Henrico*	49%	75%
James City*	37%	56%
King William*	5%	21%
Loudoun	56%	55%
Lynchburg	22%	44%
Prince William*	60%	64%
Richmond*	6%	32%
Stafford*	12%	65%
Totals	656%	991%
Mean Percent (N=18)	36.4%	55.1%
* - Bay Act locality		

For computational purposes it was also necessary to determine an estimate of the size distribution of the local land disturbing projects (Non-VDOT) for which permits were not being received (Table A-7). These numbers will be utilized later in the computations of the size distribution in Table A-10 below.

Table A-7: Estimated Size Distribution for Local Projects (Non-VDOT) for which DCR did not Issue General Permit Coverage

Project Size	# of Projects	% of Extra Total
$\geq$ 2,500sq ft, < 0.5 acre	451	43.6
$\geq$ 0.5 acre, < 1acre	100	9.7
$\geq$1 acre, < 5 acres	330	31.9
$\geq$5 acres, < 10 acres	77	7.5
$\geq$10 acres, < 50 acres	67	6.5
$\geq$50 acres, < 100 acres	7	0.7
$\geq$100 acres	1	0.1
	1,033	100

Number of Housing Starts

According to the Virginia Tech Report (Appendix C, pages 11- 12), home building comprises a significant portion of the land disturbing activities and may serve as a proxy for the relative level of land disturbing activities. Figure A-2 shows the number of new housing starts from 1980 to 2007. Beyond 2007, the Virginia Home Builders Association projects a decline of 24% in the number of housing starts for 2008 and an increase of only 15% over 2008 in 2009. Given the current turmoil in the credit and housing markets, these numbers may be adjusted downward and the duration of the downturn is uncertain at this time.

Long-term historical trends, however, indicate that private housing starts in Virginia average slightly more than 50,000 units per year. Housing starts also show significant year-to-year variation. During the 1980-82, 1990-91, and 2006-current economic downturns, housing starts dropped significantly (multiple year declines exceeding 20% annually). Average housing starts during the 2005–2007 time period averaged slightly more than 49,000 per year. While housing starts declined over this three-year period, the three-year average is roughly equivalent to the 28-year historical average.

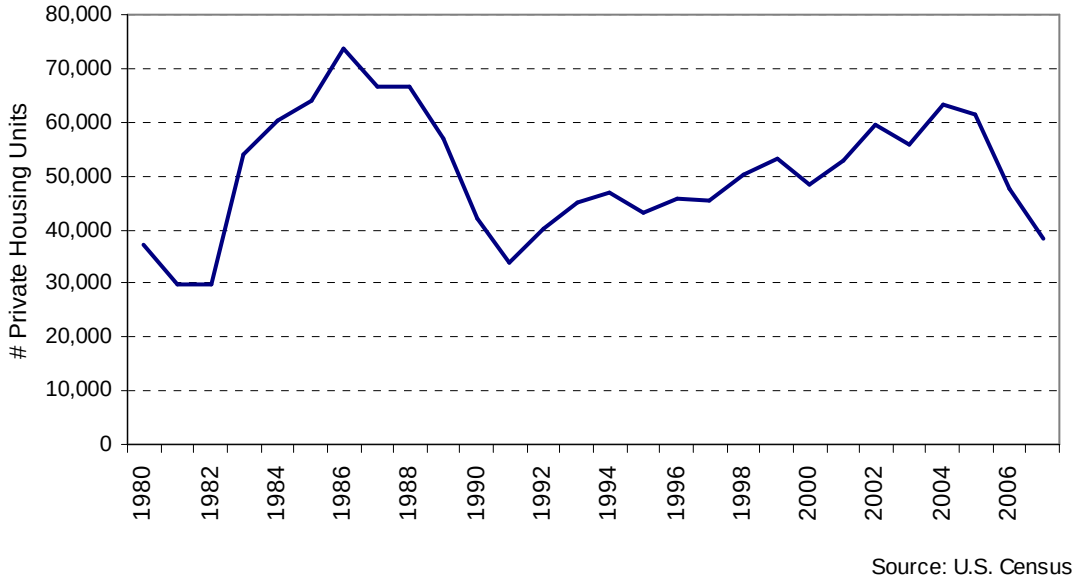


Figure A-2: Total Housing Starts (single and multifamily) in Virginia

Implicitly, one would believe that there should be a significant positive relationship between annual housing starts and the number of construction general permits issued annually (recognizing that not all of DCR's permit coverages are residential related). When this relationship is explored using the data presented in Table A-8 (eliminating 2005 data as an outlier), the linear relationship was of the form $y = 0.01459x + 1884.2$. The R^2 for this relationship was 0.9871. When solving for the number of permit coverages (Non-VDOT) issued associated with the average historical housing units value represented in Figure A-2 (~50,000 per year) the answer was 2,614 permit coverages issued. Taking this number and adding to it the average annual number of VDOT permits for CY05-08 (199) results in an average annual estimate of 2,813 construction general permit coverages.

Table A-8: Number of Housing Units Authorized by Virginia, Valuation of such Construction, and the Number of Non-VDOT Construction General Permit Coverages Issued Annually

	2005	2006	2007	2008
# of Housing Units*	61,518	47,704	38,362	26,788
Valuation	$8.9 B	$7.7 B	$6.3 B	$4.1 B
Mean value per unit	$144,673	$161,412	$164,225	$153,053
# of Non-VDOT Permit Coverages Issued (from Tables A-1 and A-3)	1,714**	2,569	2,464	2,266

*Note: New Privately-Owned Housing Units Authorized by State – U.S. Census Bureau
Housing units - In general, a housing unit is a house, an apartment, a group of rooms or a single room occupied or intended for occupancy as separate living quarters; that is, the occupants live separately from any other individual in the building, and there is direct access from the outside or through a common hall. Transient accommodations, barracks for workers, and institutional-type quarters are not counted as housing units.
** Number not utilized in regression analysis as it was the first year with the program with DCR.

The relationship between the annual housing starts and the number of construction general permits (Non-VDOT) issued annually has a strong correlation and the methodology outlined above might be utilized as a reasonable indicator of the number of permit coverages that may be possible. Additionally, the data in Table A-8 shows the precipitous decline in number of housing units authorized in Virginia annually during this period of a slowing economy as well as it provides an indicator of the value of the homebuilding industry to the Commonwealth of Virginia.

Estimate of Number of Construction General Permit Coverages

Taking the data from each of the sources under consideration (Table A-9) and the significantly slowing economy, and recognizing that an over-estimate of the permits to be expected in the future could lead to severe revenue shortfalls and an inability of both localities and the Department to cover program administration costs (if proposed permit fees were further lowered), the Department selected 5,000 permits as a reasonable estimate of the number of expected permits annually going forward. [Prior to these calculations, 3,000 permits had been utilized and was observed as being too low an estimate by localities.] This calculation is fundamental to both staffing calculations as well as fee calculations both of which shall follow this section.

Table A-9: Comparison of VT and DCR Estimates of Permits (Calendar Year)

	Permits				
	2005	2006	2007	2008	Averages
VT Total of DCR Permitting Data	1,904	2,733	2,482	n/a	2,373
VT Estimated Permit Total (from Table A-5)	4,917	6,115	5,752	n/a	5,595
DCR Non-VDOT Permitting Data (from Tables A-1 and A-3)	1,714	2,569	2,464	2,266	2,253
DCR Estimated Non-VDOT Permit ($E_{1)}$	4,140	6,205	5,952	5,473	5,443
DCR Total Permit Estimate (E_2)	4,348	6,419	6,141	5,656	5,641

Note 1: E_1 = (Actual # of Non-VDOT Coverages / 0.414)
Note 2: E_2 = (E_1 + Actual # of VDOT Coverages)

Taking the DCR Estimated Non-VDOT Permit data (06-08), running a regression of this data [y = (0.03525x + 4,550.7) + 199] with the Virginia housing units data (06-08), and solving for the mean

average house starts (50,000), the 1991 low (33,706), and the 1982 low (29,878) results in the following permit coverage estimates respectively 6,512, 5,938, and 5,803.

Table A-10: Estimated Distribution for the 5,000 Construction General Permit Coverages

Project Size	% of DCR Total (from Table A-4)	Average # of DCR permit coverages in 05-08	% of Extra Total (from Table A-7)	# of Extra permits	Total permits	Percentage
< 0.5 acres	9.9	243	43.6	1,111	1,354	27.1
≥ 0.5 acre, < 1acre	7.4	181	9.7	247	428	8.6
≥1 acre, < 5 acres	43.3	1,061	31.9	813	1,874	37.5
≥5 acres, < 10 acres	15.9	390	7.5	191	581	11.6
≥10 acres, < 50 acres	19.6	481	6.5	166	647	12.9
≥50 acres, < 100 acres	2.6	64	0.7	18	82	1.6
≥100 acres	1.3	32	0.1	2	34	0.7
Total # of Permits	100.0	2,452 (from Table A-3)	100.0	2,548[1]	5,000	100.0

Note 1: 5,000 permits – 2,452 average actual permits = 2,548

Local Program Staffing and Program Oversight Cost Need Computations (for localities and DCR)

Time Estimates for Project Inspections and Re-Inspections

In 2006, DCR surveyed its regional Soil and Water Conservation Office field staff to estimate how long various aspects of stormwater program administration took based on project size. Table A-11 outlines the results of that survey (Variable #1: Site Inspection and SWPPP Review Time). As part of that survey, DCR also estimated the time for various additional administrative activities:

- #2: Travel time per inspection = 1 hr
- #3: Compliance/enforcement per inspection = 1 hr
- #4: Technical assistance per inspection = 1 hr
- #5: Administrative/Permit Issuance = 1 hr

It was determined that typically a project involves one initial inspection and two follow-up inspections per year. Formulas utilized to calculate project Inspection and Re-Inspection times are as follows:

Initial Inspection Time (T) per General Permit
T = (#1 + #2 + #3 + #4 + #5)

Re-Inspection Time (RT) for General Permit
RT = (#1 + #2 + #4)

In addition to these calculations, it was estimated that five BMP inspections per year were necessary for a project 1-acre or greater in size. It was estimated that an inspection took 3 hours. This amounted to 15 hours per year per project 1-acre or greater in size. Lesser times were estimated for projects less than 1-acre in size (Table A-11).

Table A-11: Estimated Annual Total Inspection Time by Project Size

Project Size	Site Inspection (hrs)	SWPPP review (hrs)	Total Inspection and SWPPP review time #1	Initial Inspection Time (T) per General Permit	Re-Inspection Time (RT) per General Permit	Annual Total Inspection Time [T+(2*RT)]	Annual BMP Inspection Time
≥ 2,500sqft, < 0.5 acre	0.25	0.25	0.5	3.5_1	0.0	3.5	0.0
≥ 0.5 acre, < 1acre	1.0	0.6	1.6	5.6	3.6	12.8	3.0
≥1 acre, < 5 acres	1.7	1.3	3.0	7.0	5.0	17.0	15.0
≥5 acres, < 10 acres	2.6	1.6	4.2	8.2	6.2	20.6	15.0
≥10 acres, < 50 acres	3.4	2.1	5.5	9.5	7.5	24.5	15.0
≥50 acres, < 100 acres	4.8	2.6	7.4	11.4	9.4	30.2	15.0
≥100 acres	4.8	2.6	7.4	11.4	9.4	30.2	15.0

Note 1: T = (0.5 + 1 + 0.5 + 0.5 + 1)

This information was shared with localities and they corroborated that the time for the activities in Table A-11 appeared to be reasonable.

Time Estimates for Plan Review and Plan Re-Submittal

Based on DCR's survey information discussed above, Table A-12 contains the results of that survey (Variable #1: Time for Stormwater Management Plan Review). As part of that survey DCR also estimated the time for various additional administrative activities:

- #2: Administrative time associated with plan submission = 1 hr
- #3: Time to determine if a plan is Administratively Complete = 1 hr
- #4 Technical Assistance for plan review = 1 hr

It was determined that typically a project involves one initial inspection and two follow-up inspections per year. Formulas utilized to calculate project Inspection and Re-Inspection times are as follows:

Plan Review Time (PRT) [Unless otherwise noted below]
PRT = (#1 + #2 + #3 + #4)

Re-Submittal Plan Review Time (RPRT) [Unless otherwise noted below]
RPRT = [(½ *#1) + #2 + #4]

Table A-12: Estimated Annual Total Plan Review Time by Project Size

Project Size	Time for Stormwater Management Plan Review (hrs) #1	Plan Review Time (PRT)	Re-Submittal Plan Review Time (RPRT)
≥ 2,500sqft, < 0.5 acre	0	2_1	0.0_2
≥ 0.5 acre, < 1acre	5	7.5_3	4.5
≥1 acre, < 5 acres	10	12.5_3	7.0
≥5 acres, < 10 acres	15	17.75_4	9.5
≥10 acres, < 50 acres	25	28	14.5
≥50 acres, < 100 acres	40	43	22.0
≥100 acres	80	83	42.0

Note 1: PRT = (0 + 1 + 0.5 + 0.5)
Note 2: RPRT = [(½ *0) + 0 + 0]
Note 3: #3: Time to determine if a plan is Administratively Complete = 0.5 hr
Note 4: #3: Time to determine if a plan is Administratively Complete = 0.75 hr

Estimated Costs Per Project

Utilizing the calculations presented above, the Department compiled (Table A-13) and transposed (Table A-14) the estimated time computations into estimated cost figures.

Table A-13: Annual Estimated Total Time by Project Size for General Permit for Construction Activities

Project Size	Plan Review Time (PRT) (from Table A-12)	Re-Submittal Plan Review Time (RPRT) (from Table A-12)	Annual Total Inspection Time [T+(2*RT)] (from Table A-11)	Annual BMP Inspection Time (Q) (from Table A-11)	Total Hours
≥ 2,500 sqft; < 0.5 acre	2.00	0.0	3.5	0.0	5.50
≥ 0.5 Acre; < 1 acre	7.50	4.5	12.8	3.0	27.80
≥ 1 acre; < 5 acres	12.50	7.0	17.0	15.0	51.50
≥ 5 acres; < 10 acres	17.75	9.5	20.6	15.0	62.85
≥ 10 acres; < 50 acres	28.00	14.5	24.5	15.0	82.00
≥ 50 acres; < 100 acres	43.00	22.0	30.2	15.0	110.20
≥ 100 acres	83.00	42.0	30.2	15.0	170.20

For the purposes of calculating annual project costs in Table A-14, staff salary values used for computations are as follows:
$42 per hour: plan review, plan re-submittal
$36 per hour: site inspections, BMP inspections

Table A-14: Annual Estimated Costs ($) by Project Size Associated with General Permit Administration for Construction Activities

Project Size	Plan Review Cost (PRT*$42)	Re-Submittal Plan Review Cost (RPRT*$42)	Annual Total Inspection Cost {[T+(2*RT)]*$36}	Annual BMP Inspection Cost (Q*$36)	Total Fees to Cover Program Administration (without DCR Oversight costs added)
≥ 2,500 sqft; < 0.5 acre	84	0	126	0	$210
≥ 0.5 Acre; < 1 acre	315	189	461	108	$1,073
≥ 1 acre; < 5 acres	525	294	612	540	$1,971
≥ 5 acres; < 10 acres	746	399	742	540	$2,427
≥ 10 acres; < 50 acres	1,176	609	882	540	$3,207
≥ 50 acres; < 100 acres	1,806	924	1,087	540	$4,357
≥ 100 acres	3,486	1,764	1,087	540	$6,877

During the Technical Advisory Committee meetings it was recognized that an additional cost to both the localities and the Department may be the long-term inspections of BMPs after the land disturbing activity has ended. For discussion purposes it was suggested that the fees be increased to partially address these costs. A suggestion was an additional $2,700 (3 hrs x 25 yrs x $36). Although these costs are real, it was determined by the TAC that adding this fee on to the construction general permit coverage fee did not appear fair to the developers. Localities may utilize stormwater utility fees pursuant to § 15.2-2114 of the Code of Virginia to cover a portion or all of these costs as well as localities have the authority for certain proffers that may assist with stormwater. The Department will not have these same fees available to it and may need to seek an additional source of revenue to cover these costs.

The amounts outlined in Table A-14 reflect the revenue per general permit coverage that will be generated per project. From this information, later in these computations, the permit fees are established to cover both local program and DCR program administration costs as well as DCR program oversight costs.

DCR Staffing and Cost Need Computations

This section estimates the number of DCR staff that will be necessary to administer as many as 74 local stormwater management programs and to provide statewide program oversight and the revenue that will be necessary to support these staff from permit fees.

DCR Administered Local Programs – time/staff estimates

All localities where DCR will be administering a program are outside of the Bay Act localities. As such, generally regulated land disturbing activities (excluding common plans of development) in these areas will be 1-acre and above. As such, utilizing Table A-10 as the basis, the percent distribution of projects 1-acre or greater are presented in Table A-15.

Table A-15: Estimated Distribution for Construction General Permit Coverages 1-Acre or Greater

Project Size	Total permits (from Table A-10)	Percentage (from Table A-10)	Total Permits ≥1 acre	Revised Percentage
< 0.5 acres	1,354	27.1		
≥ 0.5 acre, < 1acre	428	8.6		
≥1 acre, < 5 acres	1,874	37.5	1,874	58.2
≥5 acres, < 10 acres	581	11.6	581	18.1
≥10 acres, < 50 acres	647	12.9	647	20.1
≥50 acres, < 100 acres	82	1.6	82	2.5
≥100 acres	34	0.7	34	1.1
Total # of Permits	5,000	100.0	3,218	100.0

The next step in the computation process is to estimate the number of projects that DCR will be annually administering per locality. It has already been discussed previously that it is estimated that DCR may administer 74 local programs (12 cities and 62 counties). Utilizing DCR's general permit coverages database, it was estimated that in these localities an estimated average of 8.83 projects per locality are initiated per year (Table A-16).

Table A-16: Actual Number of General Permit Coverages Issued in Localities that DCR May Administer

Locality	06-08 permits	08 permits		Locality	06-08 permits	08 permits		Locality	06-08 permits	08 permits
Bedford	18	6		Charlotte	7	2		Montgomery	110	26
Buena Vista	4	2		Clarke	28	10		Nelson	23	4
Covington	6	1		Craig	3	1		Nottoway	16	7
Emporia	12	4		Culpeper	50	8		Orange	56	14
Franklin	14	3		Cumberland	4	1		Page	17	7
Galax	14	4		Dickenson	15	4		Patrick	16	7
Lexington	12	1		Dinwiddie	17	7		Pittsylvania	30	12
Martinsville	22	6		Fauquier	100	13		Powhatan	50	12
Norton	10	2		Floyd	4	1		Prince Edward	21	6
Radford	21	4		Fluvanna	24	7		Pulaski	38	7
Staunton	21	10		Franklin	54	11		Rappahannock	1	0
Waynesboro	20	5		Frederick	85	15		Rockbridge	9	1
Alleghany	2	1		Giles	13	1		Rockingham	39	10
Amelia	17	3		Goochland	36	7		Russell	37	10
Amherst	25	12		Grayson	4	1		Scott	9	1
Appomattox	7	3		Greene	45	8		Shenandoah	54	5
Augusta	38	12		Greensville	0	0		Smyth	30	8
Bath	5	2		Halifax	27	8		Southampton	13	5
Bedford	59	15		Henry	21	3		Sussex	4	0
Bland	5	1		Highland	5	3		Tazewell	25	6
Brunswick	12	1		Lee	10	2		Warren	25	4
Buchanan	34	7		Louisa	130	25		Washington	94	23
Buckingham	4	3		Lunenburg	2	2		Wise	42	11
Campbell	31	13		Madison	9	1		Wythe	27	3
Carroll	30	11		Mecklenburg	39	12		**Total**	**1961[1]**	**474[2]**

Note 1: (1961 / 74 localities)/3 years = 8.83 coverages/ locality/year [Using 06-08 data]
Note 2: (474 / 74 localities) = 6.41 coverages/ locality/ year [Using 08 data]

Scaling up by the 06-08 data figure of 8.83 coverages/ locality/ year by the 41.4% permit correction factor provides a working estimate of 21.3 projects per locality per year. Multiplying this by 74

results in an estimate of 1,576 land disturbing activities DCR may be overseeing. Table A-17 takes the number of land disturbing activities per size category and multiplies it by the total plan review and inspection times calculated in Table A-13.

Table A-17: Analysis of Land Disturbing Projects that DCR May Administer

Project Size	% of Total (from Table A-15)	# of permits	Hrs/ project[2] (from Table A-13)	Hours
≥1 acre, < 5 acres	58.2	917	51.50	47,225
≥5 acres, < 10 acres	18.1	285	62.85	17,912
≥10 acres, < 50 acres	20.1	317	82.00	25,994
≥50 acres, < 100 acres	2.5	40	110.20	4,408
≥100 acres	1.1	17	170.20	2,893
		1,576[1]		98,432

Note 1: Expected project load (74 localities * 21.3 projects/locality)
Note 2: From Table A-13 (total plan review and inspection times)

The resulting hours per project category are then summed and the number of staff members and the amount of revenue necessary to support them are calculated (Table A-18).

For computational purposes the number of hours per employee (FTE) was based on a full time employee 2080 hours (52 weeks * 40 hrs/week) reduced by average sick, holiday, and annual leave to arrive at a value of 1,832 hrs/FTE/year.

Table A-18: Staff and Cost Computations for DCR Administered Local Programs

- Staff Estimate for program administration (from Table A-17) = 98,432 hrs / 1,832 hrs per FTE = 53.7; FTE = 54.
- DCR Staffing Costs (based on current average salary and benefits translated to an hourly wage) = 54 FTE * $35.46 per hour * 2,080 hours per year = $3,982,867
- 54 FTE x $8,000 for administrative expenses including rent, utilities, computers, training, travel, printing expenses, etc. = $432,000
- Total cost = $4,414,867

DCR Local Program Oversight – time/staff estimates

The Department of Conservation and Recreation will have substantial management responsibilities associated with implementation of the Commonwealth's new statewide stormwater management program. Although not a comprehensive list, key responsibilities will generally include:

- Review of all local program approval packages submitted to the Virginia Soil and Water Conservation Board for consideration.
- General training and educational outreach.
- Ordinance development and review.
- Local program technical assistance including local plan review, inspection, and BMP questions.
- Response to complaints not resolved at the local level.
- Enforcement responsibilities as deemed necessary.
- Response to issues related to permit issuance and fee accounting.
- BMP Clearinghouse and the enterprise website development and maintenance and maintenance of the stormwater management handbook.

- Statewide program oversight responsibilities for the auditing of all local programs on a periodic cycle to insure compliance.
- Oversight of state stormwater management projects

A detailed explanation of DCR oversight activities for the stormwater management program is outlined below. This list includes both existing positions and those new staff needed to implement new responsibilities under these regulations, as the total funds generated from the fees must be sufficient to cover all positions. The following list includes 7 program functions and outlines the need for 33 staff (Table A-19), a substantial portion of which we already have positions for or filled, to carry out these functions as follows:

1. Program Audits – 4FTE

DCR staff will conduct program audits on all local and DCR administered stormwater management programs. The audits will evaluate compliance with the Stormwater Management Act and attendant regulations. The audit will evaluate the following:

- Local program ordinance and procedures
- Stormwater plan reviews
- Inspections of active projects
- Inspections of completed projects and associated stormwater BMPs
- Compliance and enforcement efforts
- Complaint responses
- General Permit coverage

A 3-year review cycle would utilize two 2-member teams. The review effort will be as follows:

- 3-year cycle – 60 programs reviewed per year [103 local programs + 74 = 177 programs]
- Each team to review 30 programs per year
- Time for one program review – 1 week
- Time for one program Corrective Action plan and Technical Assistance for program development – 0.5 week
- Program Audit Staffing need = 4 FTE

2. Program Technical Assistance – 5FTE

DCR staff will provide technical assistance to local programs regarding plan reviews, inspections, BMPs, and interpretations of the Stormwater Management Act and attendant regulations. DCR staff presently provide this assistance in the Erosion and Sediment Control Program and staff records indicate an average assistance to each program of 6 days per year. DCR field staff or contractors implementing the program locally will need equivalent support.

- 177 programs x 6 days = 1062 days x 8 hrs/day = 8,496 hrs
- Staff estimate for technical assistance = 8,496 hrs / 1,832 hrs/staff = 4.6
- Program Technical Assistance support need = 5 FTE

3. Complaint Resolution by DCR – 3FTE

DCR staff will respond to complaints regarding stormwater management issues that are not resolved satisfactorily by the locally run programs and in support of regional DCR implementing staff. Based on DCR staff records, approximately 212 complaints are received annually. Time estimates for complaint response varies from 1 day to several weeks. The average time for complaint resolution is approximately 3 days.

- 212 complaints x 3 days/complaint = 636 days x 8 hrs/day = 5,088 hrs
- Staff estimate for complaints = 5,088 hrs / 1,832 hrs/staff = 2.8 Staff
- Program Complaint Resolution Assistance support need = 3 FTE

4. DCR Program Coordination and Development by DCR – 12FTE

For DCR run local programs, DCR staff will spend considerable time and effort in coordinating with localities and in ensuring the proper integration of the DCR run stormwater management program with the locality's related permitting programs. Staff will have to meet regularly with local staff to properly integrate project submissions, reviews, approvals, and permitting. Also, there is the initial workload associated with assisting localities in preparation of their program submittals for the Virginia Soil and Water Conservation Board and then on-going to assist with corrective actions following program reviews, etc.

- 74 DCR-run programs x 3 weeks/locality = 222 weeks x 40 hrs/week = 8,880 hrs
- 103 local-run programs x 1.5 weeks/locality = 154.5 weeks x 40 hrs/week = 6,180 hrs
- Staff estimate for program coordination = 15,060 hrs / 1,832 hrs/staff = 8.2 Staff
- Program management, EPA coordination, record oversight, permit tracking, reporting, regulatory coordination, and financial management = 4 Staff
- Total Program Coordination and Development support need = 12 FTE (8+4)

5. DCR Enforcement Actions – 7 FTE

DCR may become involved in enforcement where compliance is not achieved at the local level. The majority of enforcement actions are successful in their initial stages. However, some compliance issues are not resolved locally and require more significant enforcement responses in order to achieve compliance or extract penalties.

- 5,000 permits will be issued annually
- Enforcement actions equate to an average of 2.5 hours per permit
- Enforcement time = 12,500 hrs / 1,832 hrs/staff = 6.8 Staff
- Program Enforcement Action support needs = 7 FTE

6. Enterprise Website – 1FTE

DCR will develop and implement an enterprise website related to the implementation and tracking of the consolidated stormwater management program. The enterprise site will allow for online payment of fees, distribution of the fees paid to localities and DCR, general permit application and issuance, educational outreach and training, and program reporting. After the initial development and testing costs, DCR will have costs associated with the operation and maintenance of the enterprise site. These operation and maintenance costs are expected to total $100,000 per year to cover annual server and network costs.

- Enterprise Website support needs = 1 FTE and annual server and network costs

7. BMP Clearinghouse and Website – 1FTE

DCR will develop and oversee a BMP Clearinghouse and website to provide up-to-date information related to stormwater management practices and program guidance. The clearinghouse will require development and maintenance contracts with the Virginia Water Resources center at Virginia Tech. The anticipated costs associated with the oversight and maintenance of the clearinghouse is approximately $100,000 per year.

- BMP Clearinghouse and Website support needs = 1 FTE plus annual contract costs

Table A-19: Staff and Cost Computations for DCR Program Oversight

- Staff estimate for program oversight = 33 FTE * $35.46 per hour * 2080 hours per year = $2,433,974
- 33 FTE * $8,000 for administrative expenses including rent, utilities, computers, training, travel, printing expenses, etc. = $264,000
- Annual contract costs associated with enterprise website and BMP Clearinghouse = $200,000
- Total cost = $2,897,974

Total Revenue Needs for DCR Staffing and Program Implementation Related to the Municipal Separate Storm Sewer System (MS4) Program

In addition to the construction general permit that has been the focus of the calculations, DCR is also required to provide regulatory oversight of localities determined by the federal Clean water Act to be subject to regulation as a MS4. The MS4 program administration also requires significant effort on the part of DCR and cost estimates associated with the effective administration of the program may be found to Table A-20.

Table A-20: MS4 Individual and General Permit Cost Estimates

Cost Estimates Required to Have an Effective and Responsive MS4 Program	
MS4 Phase I Individual Permits	
Description	Estimates
MS4 Phase I Program Estimated Annual Hours (5 staff x 2080 x 0.22)	2,288
Annual MS4 Program Cost Per Hour	$42.31
Annual MS4 Program Costs	$96,805.28
Total Number of Phase I Individual Permits	11
Amount Per Permit Necessary to Recoup Costs	$8,800.48
Proposed Annual Maintenance Fee	$8,800
MS4 Phase II General Permit	
Description	Estimates
MS4 Phase II General Permit Program Estimated Annual Hours (5 staff x 2080 x 0.78)	8,112
Annual MS4 Program Cost Per Hour	$42.31
Annual MS4 Program Cost	$343,218.72
Total Number of Phase II General Permit Registration Statements	86
Amount Per Registration Statement Necessary to Recoup Costs	$3,990.92
Proposed Annual Maintenance Fee	$4,000
MS4 Phase II Individual Permits	
Description	Estimates
MS4 Phase II Program Estimated Annual Hours	140
Annual MS4 Program Cost Per Hour	$42.31
Annual MS4 Program Cost	$5,923.40
Total Number of Phase II Individual Permits (Estimated cost per permit. No individual Phase II permits have been issued to date.)	1
Amount Per Permit Necessary to Recoup Costs	$5,923.40
Proposed Annual Maintenance Fee	$6,000
Total Revenue Needs for 5 MS4 Staff	$445,947
Total Annual Revenue Generated from Fees	$446,800

Total Revenue Needs for DCR Staffing and Program Implementation related to Construction and MS4 Activities

The combined computations associated with DCR stormwater management program oversight and DCR local program administration are presented in Table A-21 and indicate that DCR will require a total of 92 staff (FTE) and $7.7 million. If the administration of local programs is contracted out as is being considered, the cost may rise to $8.2 million.

Table A-21: DCR Total Staffing and Revenue Needs

Category	Staff (FTE)	Total Projected Cost per year
Construction: Program Oversight (From Table A-19)	33	$2,897,974
Construction: Administration of 74 local programs (From Table A-18)	54	$4,414,867
10% increase for contracting		$441,487
MS4: Program Oversight (From Table A-20)	5	$445,947
Totals	92	$8,200,275

Of the 92 stormwater staff identified above, DCR currently has 18 filled positions allocated solely to stormwater paid out of the existing revenue generated by fees and has another 8 stormwater allocated positions vacant. Insufficient fee revenue currently exists until the new fees are implemented to allow for the full filling of the currently authorized 26 positions in total. Once the revenue stream begins, DCR will over several years need to request in the budget additional positions found necessary to fully implement the program as outlined in Appendix A, contract out with other entities to administer the programs, or both. (Contracting may be DCR's preferred alternative in order to better manage the implementation of the program.) DCR will also evaluate staffing in other related portions of the Agency and see where resources may be allocated to stormwater implementation at least in the short-term to allow a reasonable phase-in of program personnel. It should also be noted that should permit loads not meet the estimate, DCR would not require as many individuals to administer the program and would have lower costs (and commensurately less revenue would be generated). Out of the projected $8.2 million, DCR currently generates from fees about $1 million per year of this amount (See Table A-27).

Locality Staffing and Cost Need Computations

If 5,000 permits are issued annually and it is estimated that DCR will be administering 1,576 of these projects, the balance of 3,424 construction general permit coverages will be administered through locality administered local programs. The distribution of these permits by project size is presented in Table A-22. Additionally, Table A-22 takes the number of land disturbing activities per size category and multiplies it by the total plan review and inspection times calculated in Table A-13 to estimate the total number of hours for localities for program administration.

Table A-22: Estimated Distribution for Locality Construction General Permit Coverages and Calculations of Project Time

Project Size	Total permits (from Table A-10)	Percentage (from Table A-10)	Total Permits for localities	Hrs/ project (from Table A-13)	Hours
< 0.5 acres	1,354	27.1	928	5.50	5,104
≥ 0.5 acre, < 1acre	428	8.6	294	27.80	8,173
≥1 acre, < 5 acres	1,874	37.5	1,284	51.50	66,126
≥5 acres, < 10 acres	581	11.6	397	62.85	24,951
≥10 acres, < 50 acres	647	12.9	442	82.00	36,244
≥50 acres, < 100 acres	82	1.6	55	110.20	6,061
≥100 acres	34	0.7	24	170.20	4,085
Total # of Permits	5,000	100.0	3,424		150,744

The resulting hours per project category are then summed and the number of staff members and the amount of revenue necessary to support them are calculated (Table A-23).

For computational purposes the number of hours per employee (FTE) utilized was the same used for DCR. It was based on a full time employee 2080 hours (52 weeks * 40 hrs/ week) reduced by average sick, holiday, and annual leave to arrive at a value of 1,832 hrs/ FTE/ year.

Table A-23: Staff and Cost Computations for Locality Administered Local Programs

- Staff Estimate for program administration (from Table A-22) = 150,744 hrs / 1,832 hrs per FTE = 82 FTE
- Staffing Costs (based on current average salary and benefits translated to an hourly wage) = 82 FTE * $35.46 per hour * 2,080 hours per year = $6,048,058
- 82 FTE x $8,000 for administrative expenses including rent, utilities, computers, training, travel, printing expenses, etc. = $656,000
- Total cost = $6,704,058

Fee Establishment Computations

Table A-21 outlines DCR's need for approximately $7.3 million in revenue to cover expenses associated with the construction general permit (MS4 expenses removed) and similar calculations for localities in Table A-23 indicate a need for $6.7 million to cover expenses. Taken together, this equates to the need to establish sufficient construction permit fees to cover approximately $14 million in administrative services. The responsibilities associated with implementation of the Statewide Stormwater Management Program driving these cost estimates are summarized in Table A-24.

Table A-24: Summary of Locality and DCR Responsibilities Associated with Implementation of a Statewide Stormwater Management Program

Permit Fee Breakdown	Activity	Locally Required or Adopted Program (103 Programs)	DCR Run Program (74 Programs)
72%	site plan review	local	DCR
	site plan approval	local	DCR
	permit issuance	local	DCR
	site inspection	local	DCR
	enforcement	local	DCR
	permanent BMP approval	local	DCR
	permanent BMP monitoring	local	DCR
	permit reporting and accounting	local	DCR
28% (Oversight and assistance to 177 Programs)	program audit	DCR	DCR
	program technical assistance	DCR	DCR
	complaint resolution	DCR	DCR
	program development & mgmt	DCR with localities	DCR
	permit issuance coordination	DCR with localities	DCR
	enforcement	DCR	DCR
	enterprise website	DCR	DCR
	BMP clearing house	DCR	DCR

The Code of Virginia specifies that fees shall be set at a level sufficient to carry out the responsibilities outlined in Table A-24. Additionally, the Stormwater Management Law allows for DCR to retain funding from the construction general permit coverage fees (no more then 30%) to cover the costs of administering and providing oversight of the statewide stormwater management program. It should be noted that the proposed fees utilize a 28/72% split between the Department and the qualifying local programs, less than authorized by the Code of Virginia.

Utilizing the per project plan and inspection costs calculated in Table A-14 and adding to this the estimated oversight costs (28%), the necessary fees were calculated. The resulting numbers were then rounded, as it was recommended by the TAC, as rounded numbers were easier for payment management. The resulting fees are presented in Table A-25. The fees have been established commensurate with the services projected to be rendered and are both justifiable and necessary to properly implement a statewide stormwater management program. However, revenue generated by both the localities and the Department will be periodically assessed to ensure that the fees have been appropriately set and the fees may be adjusted (either up or down) through periodic regulatory actions should significant deviations become apparent (specified in proposed fee regulations). At the request of localities, language was also placed in the proposed fee regulations that should a locality be able to demonstrate to the Board that they can successfully implement a program without full implementation of the fees, the Board may authorize for that locality the establishment of a lower fee provided that such reduction shall not reduce DCR's oversight portion.

It should also be noted that the fees collected by the Agency for program oversight (28%) do not reduce in any manner the amount calculated as necessary for a local government to run a qualifying local program as that portion of the fees has been set to cover 100% of the estimated local program costs per calculations outlined in Table A-14. In other words, the 72% retained by the locality

should be sufficient for a locality (or DCR) to administer a local program. Additionally, there is nothing in the law or regulations that would preclude a locality from establishing additional fees under other authorities granted to localities.

Table A-25: Proposed Construction General Permit Coverage and Individual Permit Fees including Associated Annual Permit Maintenance and Modification/ Transfer Fees

	Local Program Share (72%) (From Table A-14)	Proposed General Permit Coverage Fee[1] (100%)	Permit Maintenance Fee	Modification or Transfer Fee
VSMP General / Stormwater Management – Small Construction Activity/Land Clearing [Sites within designated areas of Chesapeake Bay Act localities with land disturbance acreage equal to or greater than 2,500 square feet and less than 0.5 acre]	$210	$290	$50	$20
VSMP General / Stormwater Management - Small Construction Activity/Land Clearing [Areas within common plans of development or sale with land disturbance acreage less than 1 acre]	$210	$290	$50	$20
VSMP General / Stormwater Management - Small Construction Activity/Land Clearing [Sites within designated areas of Chesapeake Bay Act localities with land disturbance acreage equal to or greater than 0.5 acre and less than 1 acre]	$1,073	$1,500	$200	$100
VSMP General / Stormwater Management - Small Construction Activity/Land Clearing [Sites or areas within common plans of development or sale with land disturbance acreage equal to or greater than 1 acre and less than 5 Acres]	$1,971	$2,700	$400	$200
VSMP General / Stormwater Management – Large Construction Activity/Land Clearing [Sites or areas within common plans of development or sale with land disturbance acreage equal to or greater than 5 acres and less than 10 acres]	$2,427	$3,400	$500	$250
VSMP General / Stormwater Management – Large Construction Activity/Land Clearing [Sites or areas within common plans of development or sale with land disturbance acreage equal to or greater than 10 acres and less than 50 acres]	$3,207	$4,500	$650	$300
VSMP General / Stormwater Management – Large Construction Activity/Land Clearing	$4,357	$6,100	$900	$450

[Sites or areas within common plans of development or sale with land disturbance acreage equal to or greater than 50 acres and less than 100 acres]				
VSMP General / Stormwater Management – Large Construction Activity/Land Clearing [Sites or areas within common plans of development or sale with land disturbance acreage equal to or greater than 100 acres]	$6,877	$9,600	$1,400	$700
VSMP Individual Permit for Discharges of Stormwater From Construction Activities		$15,000	$3,000	$5,000

Note 1: This column was calculated by adding DCR's 28% oversight costs to the permit and plan review calculations in the preceding column.

The annual maintenance fees also presented in Table A-25 are generally about 15% of the initial fee and represent the approximate costs associated with continued inspections and enforcement that may be associated with a project that is not completed and terminated within the first year. The modification or transfer fees are accordingly set lower yet to cover the administrative costs associated with this activity except in the case of individual permits where modification or transfer could have a substantial workload associated with it.

The Municipal Separate Storm Sewer System (MS4) program also required a new fee structure to address the costs presented in Table A-21. Table A-26 presents the MS4 related fees contained in the proposed regulations.

Table A-26: Proposed MS4 General Permit Coverage and Individual Permit Fees including Associated Annual Permit Maintenance and Modification Fees

	New Permit Coverage Fee	Permit Maintenance Fee	Major Modification Fee
VSMP Municipal Stormwater / MS4 Individual (Large and Medium)	$16,000	$8,800	$5,000
VSMP Municipal Stormwater / MS4 Individual (Small)	$8,000	$6,000	$2,500
VSMP Municipal Stormwater / MS4 General Permit (Small)	$4,000	$4,000	na

Today's existing fees associated with issuance of construction general permit coverage are $500 for sites or common plans of development equal to or greater than 5 acres and $300 for those sites or common plans of development equal to or greater than 1 acre and less than 5 acres. No fee is currently assessed for projects between 2,500 square feet and less than an acre. No annual maintenance fees or modification/ transfer fee exists. No fee for construction individual permits or associated maintenance fees exists. Under the MS4 portion of the program, existing fees included $21,300 for an individual large and medium permit, $2,000 for an individual small, and $600 for MS4 general permit coverage. As with construction, no annual permit maintenance fee exists.

The current revenue generated by these existing construction and MS4 fees is presented in Table A-27.

Table A-27: Annual Revenue Generated by Stormwater Management Permit Fees

Fiscal Year	Total Permit Fee Revenue Generated[1]	MS4 Fee Revenue	Construction General Permit Revenue	Penalties
FY2005	$327,393.00	$0.00	$327,393.00	0
FY2006	$1,062,577.93	$41,800.00	$1,020,777.93	0
FY2007	$1,038,014.00	$46,000.00	$992,014.00	0
FY2008	$1,054,558.85	$93,400.00	$961,158.85	0
FY2009 (to date)	$408,784.30	$41,800.00	$366,984.30	$197,739.00
Average Annual Revenue (FY06-08)	$1,051,716.93	$60,400.00	$991,316.93	

Note 1: Total Permit Fee Revenue = MS4 Fee Revenue + Construction General Permit Revenue

As noted, both localities (MS4) and developers (Construction) will pay more under the proposed fees than they pay today under the existing fees. It is estimated that of the annual revenue on average, $60,400 is from MS4 permits and $991,316 from Construction permits.

Comparison of DCR and Locality Revenue Needs Versus Revenue Generation from Proposed Fees

Utilizing the 5,000 permit estimate, the total estimated revenue for construction general permit coverages administered by localities was calculated in Table A-28. The resulting value was $5.8 million from that source that localities would receive (72% of the revenue generated).

Table A-28: Estimated Revenue Generated by Localities Associated with Construction General Permit Coverage Issuance

Project Size	Total permits (from Table A-10)	Percentage (from Table A-10)	Total Permits for localities (from Table A-22)	Cost of permit (from Table A-25)	Revenue Generated
< 0.5 acres	1,354	27.1	928	$290	$269,120
≥ 0.5 acre, < 1acre	428	8.6	294	$1,500	$441,000
≥1 acre, < 5 acres	1,874	37.5	1,284	$2,700	$3,466,800
≥5 acres, < 10 acres	581	11.6	397	$3,400	$1,349,800
≥10 acres, < 50 acres	647	12.9	442	$4,500	$1,989,000
≥50 acres, < 100 acres	82	1.6	55	$6,100	$335,500
≥100 acres	34	0.7	24	$9,600	$230,400
Total # of Permits	5,000	100.0	3,424		$8,081,620
Localities' 72% of Fees to operate 103 programs					$5,818,766

Also using the 5,000 permit estimate, the total estimated revenue for construction general permit coverages administered by DCR was calculated in Table A-29. DCR's data was scaled to only projects greater than 1-acre in size, as that is generally the required size in the non-Bay Act localities. The resulting value was $3.8 million from that source that DCR would receive (72% of the revenue generated).

Table A-29: Estimated Revenue Generated by DCR Associated with Construction General Permit Coverage Issuance

Project Size	% of Total (from Table A-17)	# of permits (from Table A-17)	Permit Cost (from Table A-25)	Revenue Generated
≥1 acre, < 5 acres	58.2	917	$2,700	$2,475,900
≥5 acres, < 10 acres	18.1	285	$3,400	$969,000
≥10 acres, < 50 acres	20.1	317	$4,500	$1,426,500
≥50 acres, < 100 acres	2.5	40	$6,100	$244,000
≥100 acres	1.1	17	$9,600	$163,200
		1,576		$5,278,600
DCR's 72% of Fees to operate 74 programs				$3,800,592

The estimated revenue to DCR for oversight responsibilities was based on 28% of all revenue generated and amounted to $3.3 million (Table A-30).

Table A-30: Estimated Revenue Generated by DCR Associated with Construction General Permit Program Oversight

Project Size	Total permits (from Table A-10)	Cost of permit (from Table A-25)	Revenue Generated
< 0.5 acres	1,354	$290	$392,660
≥ 0.5 acre, < 1acre	428	$1,500	$642,000
≥1 acre, < 5 acres	1,874	$2,700	$5,059,800
≥5 acres, < 10 acres	581	$3,400	$1,975,400
≥10 acres, < 50 acres	647	$4,500	$2,911,500
≥50 acres, < 100 acres	82	$6,100	$500,200
≥100 acres	34	$9,600	$326,400
Total # of Permits	5,000		$11,807,960
DCR's 28% of Fees			$3,306,229

Table A-31 outlines the necessary staff, projected costs to DCR and the revenue expected to be generated by fees for DCR.

Table A-31: DCR Total Costs and Revenue Calculations

Category	Staff (FTE)	Total Projected Cost	Revenue
Construction: Program Oversight	33 (From Table A-19)	$2,897,974 (From Table A-19)	28% = $3,306,229 (From Table A-30)
Construction: Administration of 74 local programs	54 (From Table A-18)	$4,414,867 (From Table A-18)	72% = $3,800,592 (From Table A-29)
10% increase for contracting		$441,487	
Construction: Maintenance Fees Generated	0		$477,768 (From Table A-36)
MS4: Program Oversight (From Table A-20)	5	$445,947	$446,800
Fees generated from the 5% of projects that have plan review but do not seek General Permit coverage (1/2 fee) [1,576 *.05] = 78 * $2,412[1]*.5 = $94,068	0		$94,068
Totals	92	$8,200,275	$8,125,457

Note 1: $3,800,592 (from Table A-29) / 1,576 = $2,412

Table A-32 outlines the necessary staff, projected costs for localities and the revenue expected to be generated by fees for localities.

Table A-32: Locality Total Costs and Revenue Calculations

Category	Staff (FTE)	Total Projected Cost	Revenue
Administration of 103 local programs	82 (From Table A-23)	$6,704,058 (From Table A-23)	72% = $5,818,766 (From Table A-28)
Construction Maintenance Fees Generated	0		$703,792 (From Table A-36)
Fees generated from the 5% of projects that have plan review but do not seek General Permit coverage (3,424*.05) = 171 * $1,699[1] * .5 = $145,265			$145,265
Totals	82	$6,704,058	$6,667,823

Note 1: $5,818,766 (from Table A-28) / 3,424 = $1,699

Table A-33 calculates for all construction projects not completed within a year the percentage distribution of projects by project acreage categories. This information is then utilized in Table A-34 and A-35 to calculate the amount of maintenance fees that localities and DCR would respectively receive. Table A-36 continues this concept and calculates (utilizing an average percentage per year) how much revenue in maintenance fees would be brought in by localities and DCR based on projects continuing for a number of years. The database indicates that almost all projects are routinely expected to be completed within a 10-year period.

Table A-33: Estimation of Projects Not Expected to be Completed Within One-Year that would be Subject to Maintenance Fees

Project Size	Permits > 365 days	All Permits[1]	% of projects > 365 days
< 0.5 acres	100	757	13.2
≥ 0.5 acre, < 1acre	117	622	18.8
≥1 acre, < 5 acres	986	3503	28.1
≥5 acres, < 10 acres	606	1347	45.0
≥10 acres, < 50 acres	996	1724	57.8
≥50 acres, < 100 acres	178	244	73.0
≥100 acres	99	121	81.8
Total # of Permits	3082	8318	37.0

Note 1:Based on all permits in the database where an estimated start and completion date have been provided.

Table A-34: Estimated Revenue Generated by Localities Associated with Construction General Permit Coverage Maintenance Fees > 365 days

Project Size	Total Permits for localities (from Table A-22)	Maintenance Permit Fee (from Table A-25)	Revenue Generated	% of projects > 365 days (from Table A-33)	Maintenance Fee Revenue from projects > 365 days
< 0.5 acres	928	$50	$46,400	13.2	$6,125
≥ 0.5 acre, < 1acre	294	$200	$58,800	18.8	$11,054
≥1 acre, < 5 acres	1,284	$400	$513,600	28.1	$144,322
≥5 acres, < 10 acres	397	$500	$198,500	45.0	$89,325
≥10 acres, < 50 acres	442	$650	$287,300	57.8	$166,059
≥50 acres, < 100 acres	55	$900	$49,500	73.0	$36,135
≥100 acres	24	$1,400	$33,600	81.8	$27,485
Total # of Permits	3,424		$1,187,700		$480,505

Table A-35: Estimated Revenue Generated by DCR Associated with Construction General Permit Coverage Maintenance Fees >365 days

Project Size	# of permits (from Table A-17)	Maintenance Permit Fee (from Table A-25)	Revenue Generated	% of projects > 365 days (from Table A-33)	Maintenance Fee Revenue from projects > 365 days
≥1 acre, < 5 acres	917	$400	$366,800	28.1	$103,071
≥5 acres, < 10 acres	285	$500	$142,500	45.0	$64,125
≥10 acres, < 50 acres	317	$650	$206,050	57.8	$119,097
≥50 acres, < 100 acres	40	$900	$36,000	73.0	$26,280
≥100 acres	17	$1,400	$23,800	81.8	$19,468
	1,576		$775,150		$332,041

Table A-36: Estimated Revenue Generated by DCR Associated with Construction General Permit Coverage Maintenance Fees for Life Expectancy of Projects

# of days Project Estimated to Last	# of Permits in Sample	Average % of Sample Exceeding Date	Locality Revenue	DCR Revenue
	8,348		$1,187,700	$775,150
Portion Subject to Maintenance Fees				
> 365	3,092	37.0	$480,505 (from Table A-22)	$332,041 (from Table A-22)
> 730	960	11.5	$136,586	$89,142
> 1095	325	3.9	$46,320	$30,231
> 1460	137	1.6	$19,003	$12,402
> 1825	56	0.7	$8,314	$5,426
> 1950	33	0.4	$4,751	$3,101
> 2555	18	0.2	$2,375	$1,550
> 2920	14	0.2	$2,375	$1,550
> 3285	13	0.2	$2,375	$1,550
> 3650	7	0.1	$1,188	$775
> 4015	3	0	$0	$0
Sub Total			$703,792	$477,768

Comparison of Revenue Generated from Existing Fees Versus Revenue Generation from Proposed Fees

Computations in Table A-27 indicated DCR currently generates on average $1,051,716 per year although there is expectations that revenue will decline this year with the sagging economy. This revenue is comprised of $60,400 from MS4 permits and $991,316 from construction permits

Table A-31 indicates that DCR's projected revenue from the new fees would be $8,131,457 comprised of $446,800 in fees from MS4s and $7,684,657 in fees from construction. Additionally the revenue to localities is estimated in Table A-32 to be $6,667,823 from construction. The total fee revenue generated will therefore be $14,799,280 per year. This represents an increase in fee revenue of $13,747,564. Of this amount, the increase from MS4s is $386,400 and $13,361,164 from construction.

Additional Expenses Associated with Training and Certification Independent of the Fees

Locality and DCR staff implementing the consolidated stormwater management program will require training on stormwater management principles and practices. A certification program will be required for locality and DCR staff. The development and implementation of the training program is expected to cost approximately $250,000 per year. It should be noted the costs of the training and certification program will be covered by fees for class attendance and exams and is not considered to be included in the 28% program oversight fees, nor are the FTE that would be necessary to administer the training program.

Additional Expenses Associated with Development of the Enterprise Website

In order to facilitate smooth transmittal of permit data, permit coverage issuance, reporting, applying for permits, payment and tracking of fees, BMP tracking, training, and the delivery of

other services, the Department is working on the design of an Enterprise website. The cost of developing the database is unknown at this time but could be in the neighborhood of $1 million. The source of this funding is unknown at this time but may require a special appropriation from the General Assembly.

APPENDIX B

Discussion Document on the Phosphorus Standard Established in the Proposed Regulations
Virginia Department of Conservation and Recreation
September 5, 2008

Overview

This document outlines the background and compiles the rationale supporting the establishment of a 0.28 lbs/acre per year phosphorus standard in the Virginia Soil and Water Conservation Board's draft proposed regulations. Much of the information outlined below was presented to and discussed with a Part II Subcommittee of the first Stormwater Technical Advisory Committee (TAC) on August 16, 2006 and again on September 21, 2006. A technical workgroup was assembled and discussed the issue further on October 12, 2006. It was determined by the members of the subcommittee and the full TAC that the rationale for establishing the 0.28 standard was technically sound.

Background

As part of the Chesapeake Bay 2000 Agreement, Virginia committed to removing water quality impairments in the Chesapeake Bay, including its tidal tributaries, caused by nitrogen, phosphorus and sediment pollution. Additionally, Virginia developed water quality standards (dissolved oxygen, chlorophyll-a, and clarity) for the Chesapeake Bay and its tributaries that incorporated the Chesapeake Bay commitments into the Commonwealth's regulatory framework. Under the Agreement, Virginia received an allocation for the amount of nitrogen, phosphorus and sediment that the Commonwealth could discharge and still meet the Chesapeake Bay water quality standards. Virginia's allocations for annual nitrogen and phosphorus loads are as follows:

	Total for Chesapeake Bay	Virginia Allocation
Nitrogen	175 million pounds	51.4 million pounds
Phosphorus	12.8 million pounds	6.0 million pounds

Subsequently, Virginia developed and adopted plans, called Tributary Strategies, which identify implementation actions necessary to meet the nitrogen and phosphorus load allocations and achieve the Chesapeake Bay water quality standards. These plans address each of the major land uses and discharges contributing to the water quality impairments. Implementation of the Tributary Strategies is tracked on an annual basis and is compiled with data from other Chesapeake Bay jurisdictions to help evaluate progress in achieving the pollution load allocations.

Stormwater is a major source of nitrogen, phosphorus, and sediment to many local streams and rivers statewide. Furthermore, developing lands is the only land use category in Virginia that continues to expand. In the 2007 Chesapeake Bay Progress Assessment, stormwater runoff comprised 21.5% of the nitrogen load and 21% of the phosphorus load delivered from Virginia to the Chesapeake Bay. This represented a marked increase since 1985 when stormwater runoff comprised only 12 and 16 percent, respectively. Over the last twenty years, as development has increased in Virginia, pollution loads from stormwater runoff, per the assumptions of the Bay model, have increased, while pollution loads from other major sources, such as wastewater

discharges and agriculture, have declined. While the Commonwealth has spent considerable time, programmatic focus, and expense addressing nutrients coming from wastewater discharges and agriculture, this regulatory action is one of the first key steps in addressing the increasing impacts from stormwater.

Virginia Stormwater Regulations – Derivation of Standards

In order to fulfill its water quality commitments and to address increasing water quality challenges across the Commonwealth, Virginia is strengthening its stormwater requirements. To do this, Virginia is developing numeric phosphorus criteria both for new development on undeveloped land and for redevelopment of existing developed lands. The goals for each category of development are as follows:

> New development goal – Avoid causing or contributing to water quality impairments by achieving reductions in phosphorus and nitrogen loads for undeveloped land consistent with the loadings identified in Virginia's tributary strategies.
>
> Redevelopment goal – Achieve significant reductions in phosphorus and nitrogen loading without discouraging redevelopment.

Based on discussions with the first TAC and its subcommittees, the standards that were established for new development on undeveloped land were 0.28 lbs/acre per year phosphorus and 2.68 lbs/acre per year nitrogen [NOTE: At the September 10th TAC meeting the members requested a clarification that although there may have been agreement to the approach to arrive at these numbers at that time, there was not consensus around them being an achievable standard until tested]. For redevelopment, a 44% phosphorus load reduction and a 28% nitrogen load reduction from the pre-existing site condition were established. These were based on the following computations:

Virginia Stormwater Regulations
Basis for Water Quality Criteria *

Re-development

	Nitrogen	Phosphorus
2002 Urban Load (lbs)	19,460,534	1,930,567
Trib Strategy (TS) Urban Load (lbs)	14,084,699	1,078,779
Urban Load Reductions (lbs)	5,375,834	851,787
% Urban Load Reduction	28%	44%

Undeveloped Land

TS Non-Urban Land Load (lbs)		
Agriculture	13,394,506	2,237,091
Forest	13,840,691	178,037
Mixed Open	5,461,103	1,002,976
Total	32,696,300	3,418,104
TS Non-Urban Land (acres)		
Agriculture	2,257,957	2,257,957
Forest	8,594,702	8,594,702

Mixed Open	1,356,512	1,356,512
Total	12,209,171	12,209,171
Average TS Non-Urban Load (lbs/ac)	2.68	0.28

* Tables outlining the summary loadings are attached in this Appendix (B).

TP: 3,418,104/ 12,209,171 = 0.28 lbs/acre per year
TN: 32,696,300/ 12,209,171 = 2.68 lbs/ acre per year

Continuing discussions with the current TAC have currently resulted in the selection of 0.28 lbs/acre phosphorus per year for new development and a 20% reduction in phosphorus load from redevelopment as the statewide water quality standards [NOTE: At the September 10th TAC meeting the members requested a clarification that consensus around these standards does not yet exist]. The 44% calculation from the Tributary Strategies was reduced to a 20% standard in order to minimize barriers to redevelopment. The single statewide standard for phosphorus was selected for determining compliance with the stormwater regulations for the following reasons:

- To base the criteria on the reductions needed to achieve the Chesapeake Bay water quality standards.
- To remedy and prevent statewide water quality impairments, both within and outside the Chesapeake Bay Watershed.
- To simplify compliance calculations, thereby facilitating implementation for both permit applicants and local program administrators.
- To provide an equitable approach across Virginia jurisdictions so that no locality had a competitive advantage over another.
- In recognition that nitrogen removals from implementation of stormwater BMPS can still be accounted for, even if they are not subject to compliance criteria.

Virginia
Tributary
Strategies
s56prog02 - 2002 Annual Model Assessment w/o Urban Stream Restoration - FINAL (12/18/2003)
Edge of Stream
Loads

		MAJOR_LAND_USE						
BASIN	Data	AGRICULTURE	ATDEP WATER	FOREST	MIXED OPEN	POINT SOURCE	URBAN	Grand Total
esva	Sum of ACRES	77,605	3,937	80,119	17,648	-	10,594	189,904
	Sum of TP (LBS/YR)	152,860	2,230	2,023	16,742	30,505	12,264	216,625
	Sum of TN (LBS/YR)	1,438,377	38,423	116,652	80,551	164,332	162,653	2,000,988
jame	Sum of ACRES	1,057,990	70,587	3,955,903	655,878	-	767,535	6,507,893
	Sum of TP (LBS/YR)	1,971,128	39,979	115,910	859,599	1,697,886	1,200,316	5,884,818
	Sum of TN (LBS/YR)	11,800,676	742,759	7,997,782	4,064,747	16,346,952	10,056,157	51,009,074
potm	Sum of ACRES	1,082,637	21,350	1,601,925	281,956	-	626,294	3,614,162
	Sum of TP (LBS/YR)	1,446,980	12,092	29,860	166,555	535,532	510,045	2,701,066
	Sum of TN (LBS/YR)	12,192,523	210,983	2,417,706	1,320,587	9,194,242	6,216,433	31,552,475
rapp	Sum of ACRES	485,928	10,783	899,168	199,710	-	114,170	1,709,759
	Sum of TP (LBS/YR)	621,689	6,107	21,712	141,883	64,625	102,666	958,682
	Sum of TN (LBS/YR)	5,359,951	111,543	1,714,969	932,728	610,175	1,452,508	10,181,874
york	Sum of ACRES	309,799	29,376	1,189,538	278,288	-	98,893	1,905,894
	Sum of TP (LBS/YR)	459,632	16,638	29,907	240,389	163,320	105,274	1,015,160
	Sum of TN (LBS/YR)	4,503,807	303,061	2,026,025	1,520,653	1,189,749	1,572,782	11,116,077
Total Sum of ACRES		3,013,960	136,033	7,726,653	1,433,479	-	1,617,486	13,927,612
Total Sum of TP (LBS/YR)		4,652,290	77,047	199,411	1,425,168	2,491,868	1,930,567	10,776,350
Total Sum of TN (LBS/YR)		35,295,334	1,406,770	14,273,134	7,919,268	27,505,450	19,460,534	105,860,489

Virginia Tributary Strategies
s74vats04 - Virginia Tributary Strategies 2004 - FINAL (9/14/2004)
Edge of Stream Loads

		MAJOR_LAND_USE						
STATE_BASIN	Data	AGRICULTURE	ATDEP WATER	FOREST	MIXED OPEN	POINT SOURCE	URBAN	Grand Total
VA_esva	Sum of ACRES	54,906	3,937	101,324	19,691	-	10,046	189,904
	Sum of TP (LBS/YR)	52,573	2,230	1,737	12,265	1,846	7,030	77,681
	Sum of TN (LBS/YR)	513,856	32,572	113,765	57,749	31,126	134,964	884,032
VA_jame	Sum of ACRES	772,337	70,587	4,374,144	552,017	-	738,810	6,507,894
	Sum of TP (LBS/YR)	969,867	39,979	103,176	549,156	1,150,284	653,417	3,465,879
	Sum of TN (LBS/YR)	4,347,480	615,486	7,783,824	2,514,805	12,016,178	7,016,534	34,294,307
VA_potm	Sum of ACRES	791,191	21,350	1,877,296	303,086	-	621,237	3,614,161
	Sum of TP (LBS/YR)	628,192	12,092	28,270	140,995	225,855	297,123	1,332,527
	Sum of TN (LBS/YR)	4,699,582	173,852	2,381,702	1,043,510	4,280,474	4,494,790	17,073,910
VA_rapp	Sum of ACRES	393,909	10,783	956,629	236,668	-	111,769	1,709,758
	Sum of TP (LBS/YR)	316,616	6,107	19,031	140,685	39,544	59,488	581,471
	Sum of TN (LBS/YR)	1,983,807	93,061	1,626,561	857,829	527,255	1,146,141	6,234,654
VA_york	Sum of ACRES	245,615	29,376	1,285,309	245,050	-	100,543	1,905,894
	Sum of TP (LBS/YR)	269,842	16,638	25,823	159,875	89,512	61,721	623,412
	Sum of TN (LBS/YR)	1,849,780	251,330	1,934,839	987,210	1,086,251	1,292,269	7,401,680
Total Sum of ACRES		2,257,957	136,033	8,594,702	1,356,512	-	1,582,406	13,927,610
Total Sum of TP (LBS/YR)		2,237,091	77,047	178,037	1,002,976	1,507,040	1,078,779	6,080,971
Total Sum of TN (LBS/YR)		13,394,506	1,166,302	13,840,691	5,461,103	17,941,283	14,084,699	65,888,583

APPENDIX C

Economic Impact Analysis of Revisions to the Virginia Stormwater Regulation

Final Report[1]

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Economic Impact Analysis of Revisions to the Virginia Stormwater Regulation

Outline

Economic Impact Analysis of Revisions to the Virginia Stormwater Regulation

The Virginia Soil and Water Conservation Board (Board), with the assistance of the Virginia Department of Conservation and Recreation (DCR), proposes a comprehensive revision of Virginia's regulations regarding the control and treatment of stormwater runoff from land development activities. The purpose of this document is to review the possible economic impact of the proposed regulation to the state of Virginia. Part I of this analysis will describe the existing stormwater regulation and proposed revisions. The cost of the proposed changes to the private sector, local governments, and state agencies is analyzed in Part II. The types of benefits citizens of the Commonwealth might receive under the proposed changes are also qualitatively described in Part II.

I. Overview of Existing and Proposed Stormwater Regulations in Virginia

1. Summary of relevant existing regulations

Currently local governments administer local erosion and sediment control (E&S) requirements (runoff from construction activities) under 4VAC50-30-30. The regulations list 19 minimum standards that must be met, including some volume control requirements (4VAC50-30-40.19). To protect existing stream channels, the regulations state that if existing natural channels are not adequate, stream channels shall be improved to contain a 10-year storm and to ensure that a 2-year storm does not erode the channel or banks or to meet the pre-development peak runoff rate from a 2-year storm (discharging into a natural channel).

Virginia also has an existing stormwater management program. Local governments identified in the Chesapeake Bay Preservation Act (see below) and localities permitted under the Board's MS4 program are required to adopt a local stormwater management program (§10.1-603.3). As outlined in the existing stormwater regulations, all local stormwater management programs must meet a set of general criteria (4VAC50-60-50 and 60). The general criteria establish general engineering practices, compliance with erosion and sediment control law, and inspection and maintenance plans for all stormwater management facilities. In addition, all stormwater water management programs must contain provisions to prevent flooding of downstream properties, based primarily on preventing the 10-year post development peak flow from exceeding the 10-year pre-development peak flow (4VAC50-60-80).

Existing state stormwater regulations contain provisions to limit channel erosion (4VAC50-60-70) and improve stormwater runoff quality (4VAC 50-60-60). The regulations identify water quality criteria for any land-disturbing activity. The water quality criteria can be met with "performance-based" criteria or "technology-based" criteria. The performance based criteria (4VAC 50-60-60B) are generally as follows:

- No reduction in the after disturbance pollution is required if existing land cover is less than average land cover condition (assumed to be 16% impervious cover or as established by local stormwater management program).
- Pollutant discharge shall not exceed the existing pollutant discharge (average land cover) in situations where the pre-development percent impervious cover is less than the average land cover condition, but post development impervious cover will exceed average land cover condition.
- Pollutant discharge after disturbance must be 10% less than existing conditions in situations where land disturbing activities occur on land with percent impervious cover exceeding average land condition.
- Pollutant discharge after disturbance cannot exceed existing pollutant discharge for land served by an existing stormwater best management practice (BMP).

Compliance with water quality criteria can also be achieved by applying technology based criteria. The technology-based criteria identify a variety of BMPs that can be used to treat post development stormwater runoff (4VAC 50-60-60C). The BMPs must be designed to meet the pollutant removal efficiencies identified in the regulation.

Under both state law and the federal Clean Water Act, the Department also regulates construction activity of size (land disturbing activities of one acre or greater, except in all areas of the jurisdictions designated as subject to the Chesapeake Bay Preservation Area Designation and Management Regulations, where activities of 2,500 square feet or greater are regulated), statewide through the General Permit for Discharges of Stormwater from Construction Activities. In 2004 the General Assembly assigned state stormwater regulatory responsibility to the Board and DCR and instructed the Board to "protect the water quality and quantity of state waters from potential harm of unmanaged stormwater." (§10.1-603.2:1). Under this legislation, the Board has expanded stormwater water quality and quantity criteria (defined above) and stormwater pollution prevention plan requirements to the rest of the state under the auspices of the general permit coverage (4VAC50-60-1170, Section II.D.2.c.1).[2]

The Chesapeake Bay Preservation Act (§§10.1-2103-2107) and regulations (9 VAC 10-20-10 et seq.) requires local governments to develop plans to protect waters in designated areas (called Chesapeake Bay Preservation Areas) identified as 29 counties, 17 cities, and 38 towns in the eastern portion of the Bay watershed.[3] Stormwater requirements must be consistent with water quality provisions in the stormwater management regulations (described above). The regulations require a no net increase in pollution from predevelopment levels for any new development or redevelopment that has a water quality BMP; or achieve a 10% reduction in NPS pollution from redevelopment lands without an existing BMP (9VAC 10-20-110). The regulation also allows compliance through a "regional stormwater management program" that achieves equivalent water quality results (9 VAC 10-20-120.8(a2)). The regulations also allow localities to designate certain areas as "Intensely Developed Areas".[4] Local government can subject all land within an IDA to the redevelopment stormwater criteria (9 VAC10-20-100). In addition, regulations require riparian buffers in Resource Protection Areas along perennial streams, tidal wetlands/shores, and nontidal wetlands connected to streams. General performance criteria require minimizing land disturbance, preserving indigenous vegetation, and minimizing impervious cover to maximum extent practicable. Land disturbances exceeding 2,500 ft^2 are subject to these requirements.

Some local governments over a certain population size (Phase I) or located in Urbanized Areas as defined by the U.S. Census Bureau(Phase II) that operate a municipal separate storm sewer drainage system (MS4) must also administer a stormwater program under the federal Clean Water Act National Pollutant Discharge Elimination System (NPDES) regulatory program.

Stormwater discharges from Phase I municipal separate storm sewer systems are authorized under individual VSMP permits that require the MS4 owner/operator to implement a collective series of programs to control the discharge of pollutants from its storm sewer system to the maximum extent practicable in a manner that protects the water quality of nearby streams, rivers, wetlands and bays. These programs must include elements to: 1) Operate and maintain structural stormwater controls; 2) Control discharges from areas of new development and significant redevelopment; 3) Operate and maintain public streets, roads, and highways; 4) Identify, monitor and control discharges from municipal waste treatment, storage, or disposal facilities; 5) Control pollutants related to application of pesticides, herbicides, and fertilizers; 6) Implement an inspection program to enforce ordinances, which prohibit illicit connections and illegal dumping into the MS4; 7) Screen the MS4 for illicit connections and illegal dumping; 8) Implement standard investigative procedures to identify and terminate sources of illicit

[2] "(1) The SWPPP shall include a description of, and all necessary calculations supporting, all post-construction stormwater management measures that will be installed during the construction process to control pollutants in stormwater discharges after construction operations have been completed. Structural measures should be placed on upland soils to the degree attainable. Such measures must be designed and installed in accordance with applicable local and/or state requirements."

[3] Counties of Accomack, Arlington, Caroline, Charles City, Chesterfield, Essex, Fairfax, Gloucester, Hanover, Henrico, Isle of Wight, James City, King George, King and Queen, King William, Lancaster, Mathews, Middlesex, New Kent, Northampton, Northumberland, Prince George, Prince William, Richmond, Spotsylvania, Stafford, Surry, Westmoreland, and York. Cities of Alexandria, Chesapeake, Colonial Heights, Fairfax, Falls Church, Fredericksburg, Hampton, Hopewell, Newport News, Norfolk, Petersburg, Poquoson, Portsmouth, Richmond, Suffolk, Virginia Beach, and Williamsburg. Towns within the Tidewater area of the state are also subject to these regulations. Map at:
http://www.dcr.virginia.gov/chesapeake_bay_local_assistance/abtprogram_Tidewater_map.shtml

[4] To be designated IDA, an area one of the following conditions must be met: 1) area is at least 50% impervious, 2) currently served by public water, sewer, or constructed stormwater drainage, or 3) housing density of at least 4 dwelling units per acre.

connections or discharges; 9) Prevent, contain, and respond to spills that may discharge into the MS4; 10) Limit the infiltration of sanitary seepage into the MS4; 11) Identify, monitor and control discharges from municipal landfills; hazardous waste treatment, storage, disposal and recovery facilities; facilities that are subject to EPCRA Title III, Section 313; and any other industrial or commercial discharge the permittee determines are contributing a substantial pollutant loading to the MS4; 12) Control pollutants in construction site runoff; and, 13) Conduct public education regarding stormwater. Phase I covers large and medium size municipalities (populations exceeding 100,000) and includes Arlington County, Chesapeake, Chesterfield County, Fairfax County, Hampton, Henrico County, Newport News, Norfolk, Portsmouth, Prince William County, and Virginia Beach.

The Phase II MS4 regulations require that MS4 programs establish six minimum control measures: 1) public education for stormwater impacts; 2) public involvement/ participation, 3) illicit discharge detection and elimination, 4) construction site stormwater runoff control, 5) post-construction stormwater management in new development and redevelopment, and 6) pollution prevention/good housekeeping for municipal operations. The MS4 program is being implemented in 2 phases. Phase 2 extends permit coverage to smaller jurisdictions with separate storm sewer systems and located in Urbanized Areas (Blacksburg, Bristol, Charlottesville, Danville, Fredericksburg, Harrisonburg, Lynchburg, Richmond, Roanoke, and Winchester areas). The federal program does not establish numeric limits for MS4 permit holders, but rather requires localities to identify actions and practices to reduce discharge of pollutants to the "maximum extent practicable" and to protect water quality. All MS4 programs in Virginia, however, must also ensure that new development and redevelopment projects demonstrate consistency with the technical criteria described in the state stormwater regulations, but are not necessarily required to review site plans for stormwater quality.[5]

2. Summary of proposed regulations

The state proposes modifications to the existing stormwater water quantity and quality requirements that will be applied to every land disturbing activity not exempted by state law (§10.1-603.8B).[6] Land disturbing activity subject to this regulation generally includes disturbances of 2,500 ft^2 or more in the Chesapeake Bay Preservation Act areas and disturbances of an acre or more elsewhere in the state (with some smaller areas included when a part of a larger common plan of development or sale).

The proposed regulations establish statewide water quality design criteria for land disturbing activities. For new land development projects, water quality plans must be designed so that the total phosphorus load shall not exceed 0.28 pounds per acre per year (4VAC50-60-63). The phosphorus load criterion was derived from Chesapeake Bay Tributary Strategies and reductions needed to achieve Bay-wide nutrient reductions derived from the Chesapeake Bay 2000 Agreement. The 0.28/lb/yr phosphorus design criteria represents the average per acre edge of field loading from agriculture, forest and mixed open land uses (estimated from Chesapeake Bay Program watershed model) if the 2005 tributary strategies input deck was fully implemented (DCR 2008). For development that occurs on prior developed land, the designs must allow for the total phosphorus loads to be reduced by 20% below predevelopment levels. While the Chesapeake Bay Tributary Strategies called for phosphorus reductions exceeding 40%, a lower water quality criteria for redevelopment was chosen 1) to achieve additional load reductions from urban areas over existing regulations, and 2) to avoid higher barriers to redevelopment. No explicit sediment or nitrogen water quality design criteria were established because it was determined that the stormwater management practices used to achieve the necessary phosphorus reductions would also result in reductions of nitrogen, sediment, and other potential pollutants.

Compliance is determined by implementing control practices outlined in 4VAC50-60-65. The revisions provide three general ways to reduce phosphorus loads: 1) managing land use conversion (forest, turf, and impervious cover), 2) reducing runoff volumes, and 3) treatment of stormwater runoff. An initial list of best management practices that can be used to achieve the phosphorus criteria are listed in 4VAC50-60-

[5] Personal communication, Doug Fritz, DCR MS4 Program Manager, September 8, 2008.
[6] Exemptions under this regulation include land disturbing activities generally associated with agricultural, forest, and mining activities (§10.1-603.8B). Road projects may also be exempted if certain minimal impacts can be demonstrated.

65B. Other BMPs available to comply with the stormwater requirements are listed on the new Virginia Stormwater BMP Clearinghouse website (http://www.vwrrc.vt.edu/swc). The removal efficiency of each BMP includes phosphorus removal from treating the pollutant concentration in the stormwater as well as the percent removal achieved by preventing runoff from occurring (based upon 1 inch of rainfall, 90% storm). The addition of the runoff reduction potential of individual stormwater control practices reflects a substantive change over the existing regulation. Similar to existing practice, the calculation of phosphorus loads is based primarily on the "simple method" (see Virginia Stormwater Handbook) that relates phosphorus load to total impervious surface. The simple method calculation, however, is modified by adding phosphorus loading coefficients for turf and forest land cover. To assist in determining compliance, DCR has also developed an Excel stormwater compliance spreadsheet.

Water quantity control requirements (4VAC50-60-66) establish minimum standards for downstream flood protection and stream channel protection. The proposed regulation establishes different criteria based on the condition of the existing stormwater conveyance systems. Four general classifications of conveyance systems are identified: 1) man-made conveyance systems, 2) restored streams (designed to restore natural steam channels), 3) stable natural stream channels, and 4) unstable natural stream channels. For stream channel protection, general water quantity criteria are (4VAC50-60-66A):

- Man-made conveyance: stormwater releases following land disturbing activity conveys post-development peak flow from 2-year, 24-hour storm without causing erosion.
- Restored stream channel: runoff following land disturbing activity will not exceed design of the restored stormwater conveyance system or result in instability of that system.
- Stable natural stream channel: will not become unstable as a result of the peak flow from the 1-year, 24-hour storm and provides a developed peak flow rate equal to the pre-developed flow rate times the pre-developed runoff volume divided by the developed runoff volume.
- Unstable natural steam channel: runoff following a land-disturbing activity shall be released into a channel at or below a peak developed flow rate based on the 1-year 24-hour storm where the developed peak flow rate is equal to the peak flow rate from the site in a forested condition times the volume of runoff from the site in a forested condition divided by the developed runoff volume,.

For flood protection, general water quantity criteria are (4VAC50-60-66B):

- Man-made conveyance must confine the post development peak flow rate from the 10-year, 24-hour storm.
- Restored stream channel: Peak flow rate from the 10-year, 24-hour storm following the land disturbance will be confined within the system.
- Natural stream channel that does not currently flood during a 10-year, 24-hour storm: Post development peak flow from the 10-year, 24-hour storm is confined within the system.
- Natural steam channel where localized flooding exists during a 10-year, 24-hour storm: Post development peak flow rate for 10-year, 24-hour storm shall not exceed predevelopment peak flow from the area under forested conditions.

These criteria do not have to be met under certain conditions where the land disturbance is small relative to the size of the drainage area or results in small contributions to overall peak flow (4VAC50-60-66C). It is also possible that runoff volume reduction achieved through the implementation of water quality control practices would be sufficient to reduce or avoid the need for water quantity controls.

The proposed regulation allows, in certain situations, water quality and quantity objectives to be met off-site from the disturbed site. Section 4VAC50-60-65F and G allow land disturbers to meet water quality criteria off-site. Specifically, the proposed regulations provide that off-site controls "shall achieve the required pollutant reductions either completely off-site in accordance with the plan or in a combination of on-site and off-site controls." In localities with an approved comprehensive watershed management plan (4VAC50-60-96), offset activities can occur within the same HUC[7] or any locally designated watershed. Without such a plan, offsite controls may be allowed, but must be located within the same HUC or

[7] "Hydrologic Unit Code" or "HUC" means a watershed unit established in the most recent version of Virginia's 6th Order National Watershed Boundary Dataset. Sixth order HUC range in size from 10,000 to 40,000 acres. See http://www.dcr.virginia.gov/soil_&_water/hu.shtml

adjacent downstream HUC to the land disturbing site (4VAC50-60-65.G.4). In addition, water quantity objectives could also be met offsite if a locality has a Board approved watershed stormwater management plan and equivalent off-site reductions are demonstrated. In areas with approved watershed plans, localities are also permitted to develop a pro rata fee program. Such a program allows land disturbers to pay a per unit fee ($ per pound of P) to meet all or a portion of a regulatory requirement. Fee funds must be used, by Virginia Code requirements (§15.2-2243), to fund actions to achieve equivalent results offsite. Local programs administered by DCR would not have fee system and must confine water quality offset activities within, or adjacent to, the impacted HUC. Additionally, the regulations also provide for a request for an exception that may be granted by a local program in accordance with 4VAC50-60-122.

Linear (road) projects are also subject to the water quality and quantity requirements (VAC 50-60-76). Unless exempt from §10.1-603.8B, linear development projects shall "control post-development stormwater runoff in accordance with a site-specific stormwater management plan or a comprehensive watershed stormwater management plan developed in accordance with these regulations"

The proposed regulations also require a stormwater management plan for land disturbing activities. The plan applies the water quality and quantity technical criteria to the land disturbance (4VAC50-60-93).

*Program Administration and Permitting**:*** The proposed regulation establishes the requirements for local governments that are required to assume the primary authority to administer the provisions of the proposed regulations as well as for those localities that may elect to administer a program (4VAC50-60-104). DCR's aim is to encourage local governments (counties, cities, and towns) that are not required to administer a program to voluntarily assume this responsibility. Local governments developing a qualifying program must administer the stormwater program in accordance with general criteria outlined in Part IIIA. In general, a local qualifying program must provide

- technical criteria to be used in the qualifying local program;
- procedures for the submission and approval of stormwater management plans (4VAC50-60-108)
- assessment and collection of fees;
- inspection and monitoring of land disturbing activities (generally 4VAC50-60-114);
- procedures and policy for long-term inspection and maintenance of stormwater facilities (4VAC 50-60-124);
- reporting and record keeping (4VAC30-60-126); and
- enforcement (4VAC30-60-116).

If the local government elects not to administer a program, DCR is required to assume the basic responsibilities of program implementation and administration described above (Part IIIB).

The regulations also define state oversight responsibilities for the Board and DCR. Section 4VAC50-60-159 describes the general procedure and requirements the Board must use for authorizing a locality to administer a stormwater management program. Once a locality is approved to administer a stormwater management program, section 4VAC50-60-157 describes Board oversight of that program. The Board must review all administered stormwater programs a minimum of once every 5 years (including those administered by DCR). The review will generally consist of reviewing approved site development plans, inspection and enforcement activities, and fee accounting practices. The Board is authorized to pursue corrective actions for noncompliant local programs.

II. Anticipated Economic Impact of the Proposed Regulation

The proposed regulations will generally increase the cost of most land disturbing activities across the entire state. These costs will be incurred by land developers and private landowners for construction and long-term maintenance. Additional costs also will be incurred by local governments and DCR when administering stormwater management programs. Public resources include costs for stormwater plan review and approval, pre and post-construction BMP inspections, tracking/record-keeping, and

enforcement (see Section 4). State administrative and program oversight is also required of locally administered programs (Section 5).

To the extent possible, regulatory impact analysis must evaluate and compare behavioral changes, outcomes, and costs of the proposed regulation to the conditions that would exist without the proposed regulation. Unless otherwise noted, the without (reference) condition is the set of existing Virginia and federal regulations that apply to stormwater management (defined above). Given to the project site-by-site differences related to stormwater control designs, the high degree of variability in costs associated with BMP selection, local program allowances, and off-site alternatives, no comprehensive cost estimate of the proposed regulatory change could be produced. To the extent possible, the analysis compares different stormwater water quality and quantity criteria requirements to the existing regulations in order to illustrate how opportunity costs may change due to the regulatory revisions. Case scenarios are also included that provide examples that illustrate the potential economic scope of the regulations.

1. Description of the individuals, businesses or other entities likely to be affected by the regulation

The proposed regulation revises water quality and quantity control requirements for land disturbing activities. As such, the proposed regulations will primarily impact private land developers, public land developers, businesses, and homeowners. Private land developers across the state may face increased land development costs associated with these new regulations in many situations. A portion of those costs will be passed down to buyers of newly constructed properties, homeowners and businesses. Although maintenance of stormwater control facilities should be conducted under today's regulations, many commercial property owners and some residential property owners across the state may still face higher long-term costs associated with maintenance of stormwater control facilities because of the potential for the installation of a greater number of these facilities to meet the proposed requirements and higher maintenance costs associated with some types of BMPs. Virginia residents will also likely pay for the higher costs associated with local stormwater program requirements (see Section 4).[8]

Public agencies (such as state colleges and universities, state agencies, and municipalities) involved in public works and construction projects will also be required to comply with these requirements. The Virginia Department of Transportation, for example, will be subject to revised runoff control requirements associated with road construction and modification activities.

The direct expenditures (costs) associated with implementing the proposed stormwater requirements may increase upon the current demand for stormwater design and construction services. The comprehensive nature of the regulations and the additional technical requirements will necessitate the greater use of environmental consultants and engineers to design stormwater plans and oversee the implementation of stormwater practices. Businesses providing construction and earthmoving services will also be impacted, although the direction of change is difficult to assess since the type and magnitude of construction and earthmoving activities will change simultaneously.

The general public as a whole also benefits from additional stream channel and flood protection. Additional stream channel protection will provide the public additional assurances that habitat and aquatic diversity will be protected from the impacts of urban land use change. The emphasis on runoff reduction may increase local groundwater recharge and thus protect local stream baseflow during drier parts of the year. The proposed revisions in the water quality criteria will provide reductions in nutrient loads from development activities from what otherwise would have occurred in absence of the revisions.

2. The number of such entities that will be affected

Since the proposed regulation is statewide, the regulation will impact every individual, business, or agency described above. To estimate the total extent to which this regulation would apply, the total historical and projected land disturbance within the state was estimated.

[8] For localities with stormwater utilities, the increase in cost for stormwater control facilities long-term maintenance may be paid for by higher fees. Other localities would have to cover the higher costs through existing local and state revenue sources.

Data obtained from DCR's existing stormwater permitting database was used as the starting point to estimate the historical extent of disturbed acreage and number of general permit coverages issued on a calendar year basis. Preliminary inquiries suggested that the state permitting data under-reported the amount of disturbed acres recorded under local erosion and sediment control programs. Statistical procedures were used to estimate the extent of the "under-counting" of disturbed acreage and number of land disturbing permits. A sampling process was used to identify counties and cities (localities) where more detailed local data would be collected on permit coverage and disturbed acres. To ensure that a representative cross-section of localities was sampled, counties and cities across the state were initially grouped based on a variety of characteristics. Permit and land disturbing data were collected on a sample of localities. Based on observed under-reporting, state permit and disturbed acreage data were adjusted to estimate the total land disturbing activity and number of permits for the state.

Sampling of local programs

Cluster analysis was used to form the localities into similar groups based on various characteristics. DCR permits were classified as one of four types: residential, commercial/industrial, roads, or other. The number of permits for each category and the number of disturbed acres for each category were used as the primary characteristics describing the localities. Other characteristics used in the cluster analysis included population, land area, and location in the Chesapeake Bay Preservation Area. Initial clustering indicated a strong tendency to distinguish between localities in the Chesapeake Bay Preservation Area and those that were not. Therefore, to improve the performance of the clustering process, two groups were formed based on this division. K-means cluster analysis was then used to group the 29 counties and 17 cities in the eastern portion of the Bay watershed into 10 clusters, with the remaining counties and cities grouped into 14 clusters.

Individual localities within each cluster group were selected to participate in a spot check survey. Appropriate local officials were contacted to determine the number of permits and disturbed acreage under permit from their local Erosion and Sediment Control programs. At least one locality from each of the 24 clusters was contacted by the researchers, totaling 32 contacts in all. Sixteen contacts provided data for an effective response rate of 50%. The response rate within the CBPA and non-CBPA areas were identical, with five of 10 contacts providing responses within CBPA localities and 11 of 22 contacts responding from localities outside of the CBPA. In addition to these data, preliminary data from an additional seven localities (two within CBPA, five outside) were provided by DCR based on local data collected at regional DCR offices (DCR is further revising and expanding upon its dataset.). Thus sample data of permit numbers and disturbed acreage were obtained from 23 localities representing the majority of the program clusters (17 of the 24 clusters).

It was understood through this process that comparing state stormwater general permit coverage to local erosion and sediment control permit issuance was not a direct relationship due to a variety of factors but that it was a reasonable approach to exploring the magnitude of potential under-reporting.

Estimation of disturbed acres and permits

Local program data of disturbed acres and permits were paired with its corresponding DCR registry data.[9] After considering different methods and models, and the removal of statistical outliers, a simple linear relationship between DCR and local data was found to be the most intuitive and robust estimator.

A linear relationship of the form $y = mx + b$ was calculated for both disturbed acreage and number of permits. In the equation, y is the reported quantity (of permits or disturbed acres) from the locality, x is the corresponding quantity from DCR database, m is the slope of the line, and b is the vertical intercept. Interpretation of the linear model is straightforward. If the data collected from the localities had matched the data from DCR perfectly, the intercept (b) would be zero and the slope of the line (m) would be one.

[9] Overall, 174 observations were used for the annual disturbed acreage relationship, and 144 observations were used for the number of annual permits relationship. It should be noted that less than 10% of the observations were from within the CBPA.

The actual results of the regression are shown in Figure A-1 and Figure 2.[10] The intercept (15.911 for permits and 28.86 for disturbed acres) represents an average value of missed data for all DCR observations. The slope (1.4458 for permits and 1.06974 for disturbed acres) of the estimated line shows the additional change in the quantity from the localities for each additional unit shown in the DCR data. For example, the slope of 1.06974 for the disturbed acreage suggests that, in addition to the 28 missed acres represented by the intercept there is an additional 0.07 disturbed acres reported by the localities for each acre listed in the DCR data.

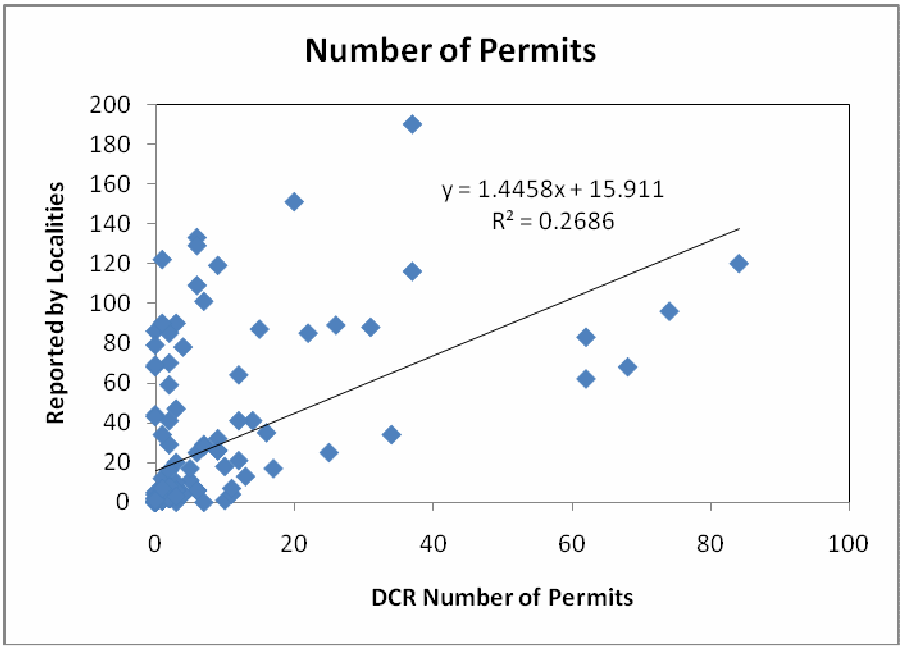


Figure 1: Linear Regression for Number of Permits

[10] Other regressions were considered that included various dummy variables to allow for a difference between the CBPA region and the rest of the state. None of these variables were statistically significant. This could be due, at least in part, to the small representation of the CBPA within the data, as noted in footnote 8 above.

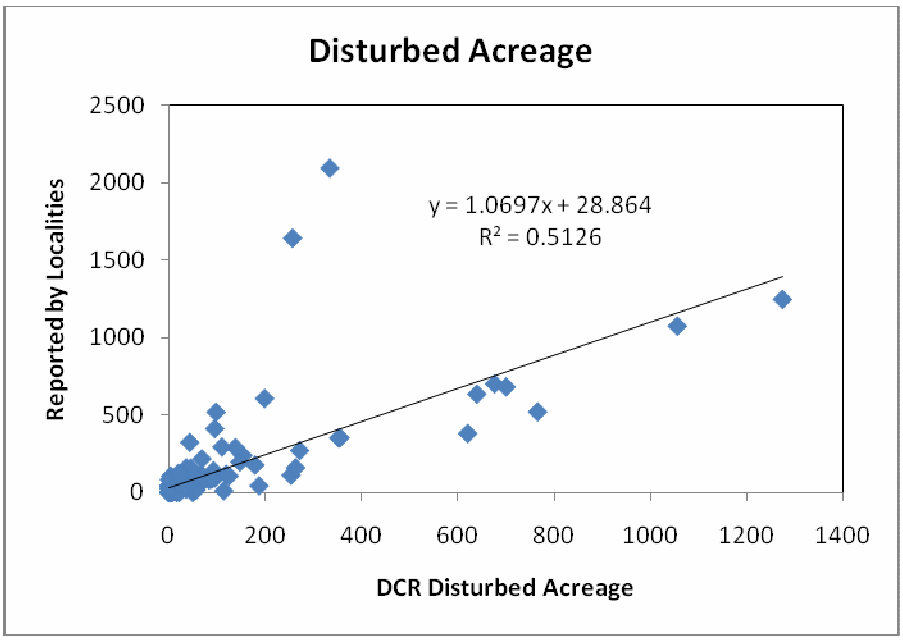


Figure 2: Linear Regression for Disturbed Acreage

Results

The linear models described above were used to produce state-wide estimates of disturbed acres and permit numbers based on the DCR data. Although the correlation coefficients (R^2) were not high, annual totals from DCR data were used to provide an estimate of the number of permits and amount of disturbed acreage for each of the counties and independent cities in Virginia.[11] Summary results, compared with the original DCR data are shown in Table 1.

Table 1: Estimates of Permits and Disturbed Acres (Calendar Year)

	Permits			Disturbed Acres		
	2005	2006	2007	2005	2006	2007
DCR Total for Virginia	1,904	2,733	2,482	24,357	32,331	26,027
Estimated Total for Virginia	4,917	6,115	5,752	31,258	39,713	32,745

The estimated activity at the local level suggests that the undercount permit numbers exceeds the undercount of disturbed acres. These results would be expected under the assumption that small developments (less than 5 acres) would be the most under-reported permit group in the state DCR data base. The under-reporting of small projects could have a large impact on permit totals, but a relatively smaller impact on total reported disturbed acres. In areas outside the Chesapeake Bay Preservation Act area, however, local erosion and sediment control permit data might also contain projects that are less than an acre (but greater than 10,000 ft^2). Thus, the local data from these areas may over-estimate the total amount of stormwater permits because projects under one acre would not be required to obtain stormwater permit coverage (only E&S). Additionally an over-estimate could occur due to local reporting of individual building permits that may be covered by fewer stormwater permits under a common plan of development. The extent of such potential bias could not be assessed with the available data.

[11] A detailed description of the methods used in performing estimates is available in a separate document titled "Discussion of Estimation Issue in DCR Stormwater Project."

However, based on the under-reporting suggested by this analysis, DCR is conducting further analyses to refine the permit estimates that will be included in the Department's regulatory analysis document (see Fee discussion in II.3a).

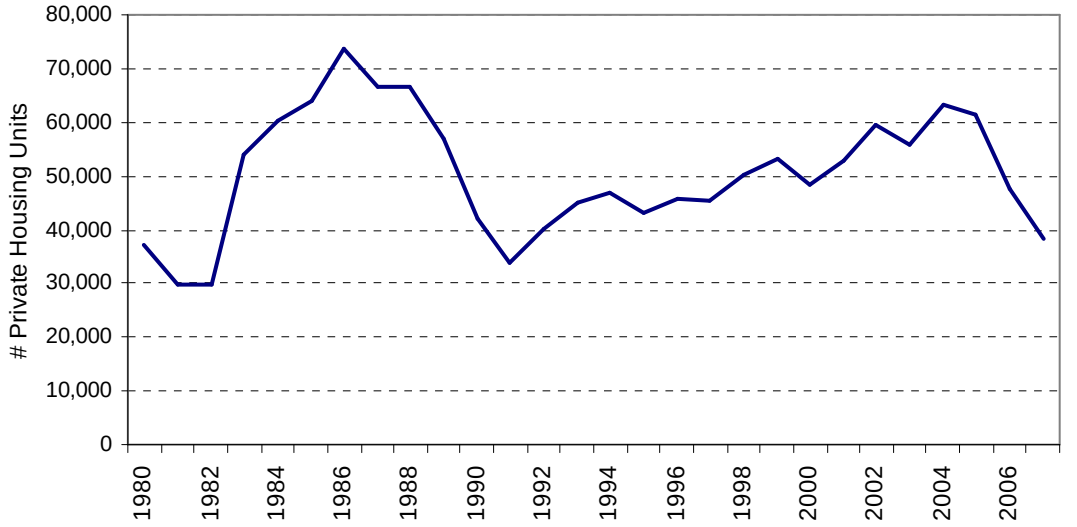
Reliable information about the portion of developed acres that are redevelopment could not be estimated. As part of the survey process, localities were asked about the ratio of new development versus redevelopment within their area. Results are anecdotal; however, in general, areas in the western and southern parts of the state indicate that redevelopment accounts for no more than 10% of their land disturbing activities. On the other hand, more urban areas in the northern and eastern sections report the opposite. One area in northern Virginia estimated approximately 90% of all development is redevelopment.

Future trends

To estimate the entities affected by the regulation, estimates of *future* land disturbing activities is necessary. Making future projections based on historical data and trends on land disturbing activities, however, is difficult due to the limited and incomplete data. To put the land disturbing activity during the 2005-2007 period into perspective, proxy measures or scales of land development activity were sought. Land disturbing activities are generally tied to the overall level of economic activity within the state. Home building comprises a significant portion of the land disturbing activities and may serve as a proxy for the relative level of land disturbing activities. Figure 3 shows the number of new housing starts from 1980 to 2007. Beyond 2007, the Virginia Home Builders Association projects a decline of 24% in the number of housing starts for 2008 and an increase of only 15% over 2008 in 2009. Given the current turmoil in the credit and housing markets, these numbers may be adjusted downward and the duration of the downturn is uncertain at this time.

Long-term historical trends, however, indicate that private housing starts in Virginia average slightly more than 50,000 units per year. Housing starts also show significant year-to-year variation. During the 1980-82, 1990-91, and 2006-current economic downturns, housing starts dropped significantly (multiple year declines exceeding 20% annually). Average housing starts during the 2005–2007 time period averaged slightly more than 49,000 per year. While housing starts declined over this 3 year period, the three year average is roughly equivalent to the 28-year historical average.

Assuming that the 2005-2007 period is, as a whole, roughly representative of the historical level of land disturbing activities in the state, estimates of the level of land disturbing activities during this period might reasonably be assumed to approximate future ranges of land disturbing activity. The average annual estimated disturbed acres in Virginia during the 2005-2007 period was 34,572 acres (27,571 acres using only DCR registry information, see Table 1). The average annual number of permits issued annually during 2005-2007 was 5,595. Once the housing and development market emerges from the current economic downturn, a reasonable estimate of future disturbed acres would be between 30,000 and 40,000 acres per year and the annual number of stormwater permits between 4,000 and 7,000.



Source: U.S. Census

Figure 3: Total Housing Starts (single and multifamily) in Virginia

3. All projected costs of the regulation for affected individuals, businesses, or other entities

3a. On-site stormwater control costs.

Conceptually, the costs of providing stormwater controls are all opportunity costs (EPA, 2000). Opportunity costs are the value of alternatives (next best) given up by society to achieve a particular outcome. Opportunity costs of stormwater control include direct costs necessary to control and treat runoff including construction costs and the present value of annual operation and maintenance costs. Initial installation costs should also include the value of foregone opportunities on the land used for stormwater control, typically measured as land price. Stormwater control costs also include the expertise needed to design stormwater management practices and systems. Private sector costs might include time and administrative cost associated with gaining regulatory approval of stormwater management plans/designs. These costs are exclusive of public costs of administering a stormwater program (see section 4 and 5 below). Opportunity costs also include other values that might be given up as a consequence of stormwater management. For example, the creation of a constructed wetland in a residential area might be opposed because of perceived safety, aesthetic, or nuisance concerns (undesirable insect or animal species). In this case, the diminished satisfaction of nearby property owners is an opportunity cost associated with the constructed wetland. On the other hand, if stormwater controls are considered a neighborhood amenity (e.g., wet pond in a park setting) offsetting benefit would be provided (see discussion below).

The proposed regulation will expand both the scope and intensity of stormwater management activities on land disturbing projects. The proposed regulations would double the phosphorus reductions required for redevelopment and increase phosphorus removal requirements for new development. Additional levels of water quantity control would be required, primarily for discharges to unstable stream channels.

A projection of the incremental private on-site stormwater control costs require 1) estimating the level and type of incremental actions and controls that would occur above what would occur under the existing regulations (assumes existing regulations would apply to future development in absences of proposed regulations), and 2) estimating the unit costs associated with the actions/controls implemented. A total projected cost estimate for the state, however, cannot be reliably projected. The uncertain behavioral responses (both by the land disturber and locality), variation in site specific conditions, and the complexity

of the application of technical requirements make estimation of total state costs unreliable. Rather this analysis will review factors that will likely influence (increase or decrease) compliance costs. To the extent possible, costs for case study examples and applications will be provided.

The proposed regulation places new emphasis on reducing stormwater runoff volume as a means to improving stormwater quality and reflect recent recommendations for improving stormwater management (NRC 2008). Under the existing regulations, stormwater control practices are assigned specific phosphorus removal efficiency (4VAC50-60-60). These efficiencies specify the percentage of phosphorus removed from a total volume of water. The proposed revisions delineate that phosphorus removal can be achieved by both reduction in pollutant concentration and by reduction in runoff volumes. (4VAC50-60-65). For instance, infiltration stormwater practices prevent a percentage of a storm event (of a given size) from ever directly entering a stream system. Reducing runoff volume can reduce P loads simply by reducing the amount of water leaving the site (assuming concentration of P in the runoff remains unchanged).[12] The P reduction achieved through runoff reduction is in addition to any reduction achieved by practices' treatment processes (reducing phosphorus concentration in the remaining runoff).[13] In addition to the runoff volume estimates, the pollutant removal achieved by treatment (lowering P concentration) were also refined and revised for some practices. The net effect of counting runoff reduction and revisions to the pollutant (P) concentration removal efficiencies means that total percent phosphorus removal credited to most stormwater practices (total phosphorus removal efficiencies) is now higher under the proposed regulation.[14]

In addition, the regulations add several new control options available for compliance as well as allowing additional practices to be added through the new BMP Clearinghouse (4VAC 50-60-65B). The additional control options and the acknowledgement of pollutant removal possibilities of runoff reduction increase choice and may reduce the number of structural controls that will be necessary to treat stormwater runoff. Consequently, the addition of control practices and the higher removal efficiencies for most stormwater control practices will tend to reduce the cost of phosphorus control (holding all other cost influencing factors constant).

What type of controls available to land disturbers, however, will depend on which type of stormwater control measures are allowed by a local program (or allowed by DCR in areas without a designated program). Local jurisdictions can limit or specify the type of BMPs available for compliance and there may be a number of valid reasons for doing so. For instance, some infiltration practices may be infeasible or impractical in certain regions of the state, including those areas with karst topography (ex. areas within the Shenandoah Valley) and areas with shallow groundwater tables (ex. areas in the coastal plain). In addition, some local stormwater program managers have voiced concerns about the feasibility and cost of inspection and enforcement of certain types of decentralized practices (see discussion section 4 below). To the extent compliance choices are limited, the cost for land disturbers to comply with the water quality requirements increases.

An important criterion in designing and sizing a stormwater control practice is identifying the volume of water to be treated. The proposed regulations increase the volume of water subject to water quality treatment (§4VAC50-60-65). The existing stormwater regulations require many stormwater control practices to treat of the volume of water associated with the first ½ inch of rain multiplied by the impervious surface of the land development project. Water volume in excess of the design volume would enter water bodies untreated or partially treated. Approximately 70 to 75% of all rain events in Virginia

[12] Under actual field conditions, this assumption may not always hold. For instance, a recent USGS study compared adjacent watersheds with different approaches to controlling runoff. One watershed used a variety of infiltration practices to reduce runoff volume (called low impact development or LID), while the other watershed used mostly conventional practices to capture runoff (ponds). While the runoff volumes in the LID watershed were substantially lower, the total phosphorus loads were higher over a 7 year period in the LID watershed because (presumably) the concentration of P in runoff was higher in some storm events under LID. See Selbig and Bannerman 2008.

[13] In some cases, however, practices that reduce runoff volumes may *increase* the nutrient concentration in runoff. For instance, green roofs are assigned a runoff reduction between 45 and 60 percent in the proposed regulation (4VAC50-60-65C). However, some research finds that nutrient concentrations in the remaining roof runoff will likely increase (see Hunt and Szpir 2006).

[14] There are exceptions. For instance the phosphorus removal percentage of dry extended detention ponds decreases under the proposed regulation

are ½ inch of rain or less. The proposed regulation increases the amount of water that requires treatment from the first ½ inch of runoff from impervious areas to the runoff from the first inch of rain from both impervious and turf areas. Approximately 90% of all rain events in Virginia are 1 inch of rain or less. The additional stormwater treatment volume (from both the larger rain event and the added turf area) will likely increase the size of structural stormwater control practices to treat this additional volume, thus incrementally increasing costs (all other factors held constant).[15]

The proposed regulation also establishes new design criteria and pollutant removal efficiencies for stormwater practices. Design criteria identify the standards used to size and construct stormwater practices. The design criteria can be quite detailed and were revised for all of the stormwater control practices listed in the regulation. It is unclear how the revised design criteria influence costs.

The proposed regulation increases stormwater water quality criteria for new development. Where localities are not already employing more stringent standards, the proposed phosphorus water quality criterion will require the implementation and maintenance of additional stormwater controls. The new water quality criteria establishes a 0.28 lb/ac/yr phosphorus criteria that is more stringent than the current water quality criteria computed under the existing regulation. The reduction requirements under existing regulations are based on preventing an increase in phosphorus load from the pre-development land cover. The existing regulations typically do not face any phosphorus control requirements for development with less than 16% impervious surface (average land cover condition).[16] Finally the existing regulation computes total phosphorus loads based only on total impervious surface. Procedures under the proposed regulation add P contributions from turf and forest areas in order to provide a more comprehensive accounting of phosphorus loads from the developed site.

Figure 4 shows general per acre phosphorus reduction requirements for new development under the proposed and existing regulation. The graph charts total phosphorus reduction requirements for developments with different levels of impervious surface. The total P load reduction required under the existing regulation was computed using the Simple Method as outlined in the *Virginia Stormwater Handbook.*[17] The P reduction requirements under the proposed regulation were calculated using the DCR compliance spreadsheet. Total P load reductions were calculated using different assumptions for nonimpervious (pervious) land cover. One scenario assumes all pervious (nonimpervious) area is turf/lawn and represents the upper bound total P reduction required. Another scenario assumes that 80% of pervious areas remain, or are converted to, a forested cover condition. This scenario approximates a lower bound estimate of total P reduction required under the proposed regulation.

The proposed revised regulation increases the total phosphorus reduction requirement between 0.14 and 0.45 lbs/ac, depending on assumptions about composition of impervious and pervious surfaces (the difference between proposed and existing reduction curves in Figure 4). The increase is due to a number of factors. First and most obvious, the effective load standard has been lowered to .28 lbs of P per acre. Second, the proposed regulation also calculates P load from two types of pervious areas, managed turf and forest. The existing regulation calculates P load from impervious surfaces only. The effect of including pervious surface will have larger relative impacts for low density developments with significant turf cover (see Figure 4). As an illustration, a new development with 20% impervious cover would be required to remove 0.07 pounds per acre under the existing regulation. If the 80% remaining land was turf, the total P load reduction requirement would 0.52 pounds per acre under the proposed regulation (top line in Figure 4). The load reduction requirement can be reduced considerably, however, by preserving more forest cover on the remaining pervious areas (e.g. middle line in Figure 4). Finally, the proposed regulation tightens the threshold under which new developments must reduce phosphorus

[15] It should be noted that the costs of controlling this additional treatment volume.may be partially offset by the new BMP performance criteria that gives more pollution removal credit for practices that reduce runoff volume.
[16] Recall that the default existing land use condition is assumed to be 16% impervious, although localities are granted discretion to provide a more refined delineation of existing land use condition.
[17] Calculated assuming the default existing land use condition of 16% impervious.

loads. For example, new development with 10% impervious surface and significant turf area would likely face some phosphorus reduction requirement under the proposed regulation.[18]

Figure 4 also illustrates that for both the proposed and existing regulation, the computed P reduction requirement increases with total impervious surface cover. Under the proposed regulation, the P reduction requirement for a development with 10% impervious surface and 90% turf is 0.35 lbs/ac, while the P reduction requirement as a development with 90% impervious surface and 10% turf is 1.72 lbs/ac (a nearly 5 fold increase). Moving from a site-by-site perspective to a watershed perspective, however, may produce different conclusions. Based on this site-by-site method, low density developments would produce less estimated phosphorus runoff than medium or high density areas. Very low density developments (1 dwelling unit per 3 to 5 acres) would unlikely face any water quality control requirements (Figure 4 and Table 2). Yet, on a watershed basis, low density ("sprawl") development increases the overall rate of land conversion to urban uses, creates more impervious area per capita, and increases dependence on auto transport (thus increasing emissions and roadway impervious surfaces). Highly impervious areas accompanied by dense population settlement can produce net water quality improvements, independent of whether stormwater controls are implemented (Bosch et al. 2003; EPA 2006). For example, if high levels of impervious cover are accompanied by higher population densities, the overall watershed effect may be to decrease the rate of urban land conversion, decrease impervious surface per capita, and lower overall urban pollutant loads. As currently conceived, the nutrient load reductions from foregone land conversion are not counted against the calculated on-site loads. Although empirical evidence is limited, on-site effluent treatment costs (expressed on a per pound basis) are expected to be higher for highly impervious areas relative to low impervious areas. Higher phosphorus control costs in high density developments create financial disincentives that may work at cross purposes with larger watershed objectives.[19]

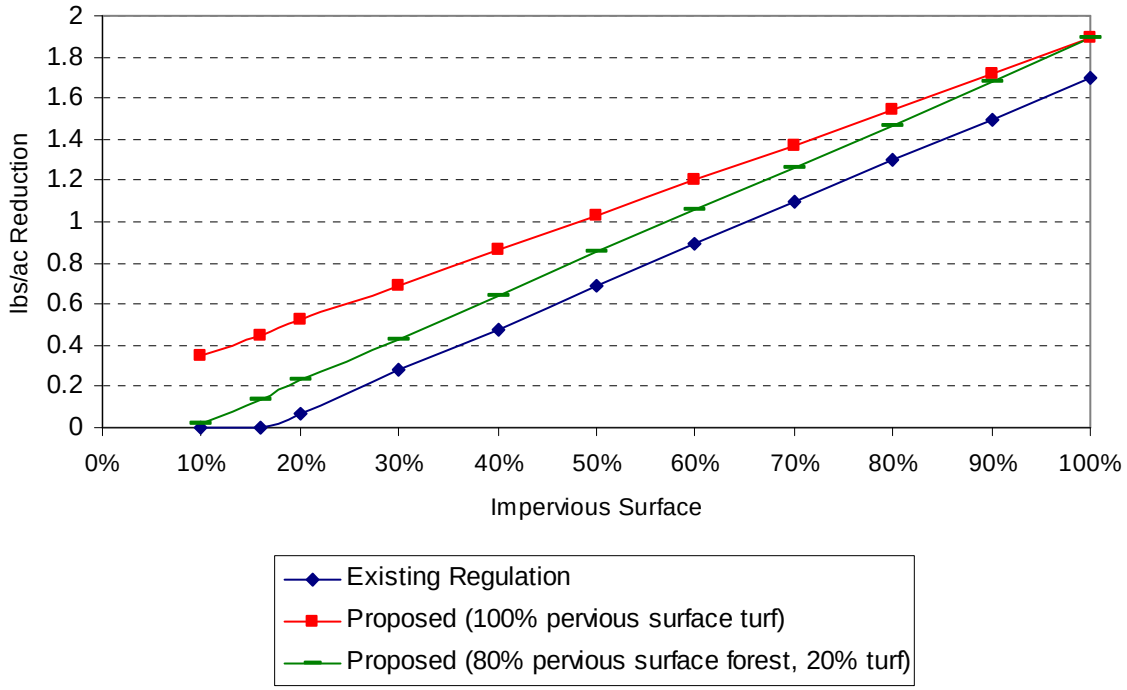


Figure 4: Per Acre Phosphorous Reduction Requirement (New Development)

The proposed regulation doubles the phosphorus requirement for redevelopment from 10% P reduction from predevelopment levels to a 20% reduction. Stormwater control costs (measured on per pound of P reduction) are expected to be higher in redevelopment areas (without stormwater controls) than for new

[18] As a reference, housing developments with 1, 4 or 8 houses per acre might have 20%, 38%, and 65% impervious surface respectively (EPA 2006).
[19] The addition of turf areas to the computation of P load (as described above), however, would somewhat offset this disincentive.

development.[20] However, since the criterion is expressed as a percentage reduction from predevelopment levels, the redevelopment will not usually be as stringent as the 0.28 load standard for new development. For redevelopment with impervious cover ranging from 50 to 100%, the additional 10% reduction would translate into an additional phosphorus reduction ranging from 0.13 and 0.22 lbs/ac.

Stormwater Control Costs

In general, the cost to control and treat stormwater runoff is incompletely understood and gaps exist in the literature. Extrapolating existing empirical cost analysis to field conditions is challenging given that stormwater treatment exhibits considerable site-specific variation resulting from different soil, topography, climatic conditions, development forms, local economic conditions, and regulatory requirements (Lambe et al., 2005).

The literature on stormwater costs tend to be oriented around construction costs of more conventional types of stormwater control practices such as ponds, constructed wetlands, detention basins, sand filters and bioretention areas (Wiegand et al., 1986; SWRPC, 1991; Brown and Schueler, 1997; Wossink and Hunt, 2003; Lambe et al. 2005). These studies generally find that construction costs decrease on a per unit basis as the overall size (expressed in volume or drainage area) of the stormwater BMP increases (Lambe et al., 2005). These within-practice economies of scale are generally found across conventional stormwater controls including wet ponds, detention ponds, and constructed wetlands (Brown and Schueler 1997; EPA 1999; Wossink and Hunt, 2003).

Increasing attention has been paid to small-scale practices (serving small parcels and lots) including efforts to increase infiltration and retain water through such means as green roofs, permeable pavements, rain barrels, and rain gardens. The costs of these practices, in general, are less well understood compared to the other stormwater practices. In general, per unit construction and design costs exceed larger scale conventional stormwater practices. Others have suggested that per unit costs to reduce runoff may be less for these small-scale distributed practices after considering higher infiltration rates and retention rates (MacMullan and Reich 2007). Furthermore, reducing the volume of runoff through the use of such practices may result in lowering the cost of the overall drainage infrastructure, since less water will have to be conveyed. Other classes of small, on-site practices, such as grass swales and filter strips, may also be implemented for relatively low cost.

Almost all stormwater control measures require active long-term maintenance in order to continue to provide volume and water quality benefits (Hoyt and Brown, 2005; Hunt and Lord, 2006). Compared to construction costs, less is known about long-term operation and maintenance costs (Wossink and Hunt 2003; Lambe et al. 2005; MacMullan and Reich 2007). A recent Water Environment Research Federation study (2004, p.5-5) concluded that "there is an urgent need to appraise the frequency and cost (level of activity) of maintenance required to achieve appropriate performance levels of BMP/SUDs in different climates."

Stormwater control maintenance often consists of routine maintenance activities as well as periodic retrofits. The type, frequency, and extent of maintenance requirements differ between stormwater control practices (EPA 1999). The most common stormwater practices implemented in Virginia, extended detention ponds and wetponds, require annual or as-needed maintenance for vegetation control (mowing), clearing debris, and embankment and slope repair. More extensive maintenance (retrofits), such as the removal of accumulated sediment from the pond itself may be needed every 20 years (or when pond loses half of its original storage volume). In areas without adequate upstream stream channel protections, the sedimentation rate can be significantly accelerated, increasing the frequency and cost of maintaining functions of downstream ponds. The dredged material must typically be land-filled because the sediments will contain contaminants. Larger pond structures also carry costs associated with a nonzero probability of structural dam failure, which causes environmental, property, and human health damages downstream.

[20] There may be instances where the costs of providing for the additional 10% removal will not increase because the new BMP performance criteria generally assigns more higher pollution removal credit for each BMP.

Local stormwater programs in Virginia have less experience with filtration and infiltration practices. Bioretention, infiltration, and filtration practices, however, all generally require more frequent maintenance than ponds to maintain performance (EPA 1999). All require annual or regular maintenance. For instance, bioretention areas require regular mulching, trash removal, plant maintenance and replacement, and minor erosion related repairs (Hunt and Lord 2005). More extensive periodic maintenance, however, is required to maintain filtering and infiltration functions. In general, activities to remove excess sediments, remove biofilms, or replace (often partial) filter media must be accomplished on a 3 to 5-year cycle. More extensive excavation may be required in case of severe clogging. Costs may also be incurred to discard soil and filter media.

Based on the limited information available, however, long-term maintenance costs represent a substantial share of stormwater control costs. Based on annual maintenance costs from EPA (1999), the present value of annual maintenance costs is estimated to be between 40 and 85% of construction costs for wet ponds and constructed wetlands and between 70 and 100% for swales and bioretention areas. The total present value of annual maintenance costs for infiltration trenches and sand filters can range from 70 to 280% of total construction costs. Other studies confirm that over the life of many stormwater control practices, maintenance costs may equal or exceed construction costs (Center for Watershed Protection 2000). The very limited evidence above suggests that maintenance of conventional ponds costs less than for other types of stormwater control practices. During interviews with local stormwater managers in Virginia, one local government reported that the annual cost to maintain publicly managed bioretention areas (over $8,000/yr per bioretention facility) was more than five times more expensive than the annual cost to maintain publicly managed ponds.[21]

As outlined in the regulation, these costs will be incurred primarily by commercial, industrial, residential property owners or local governments who manage regional facilities. The evidence on the long-term performance of stormwater BMPs under actual conditions is also limited. Assuring long-term performance, however, will also require expenditure of resources. Private landowners have limited financial incentives to incur the annual and periodic retrofit costs to maintain stormwater practices. Thus, local governments will be required to devote sufficient resources to post-construction inspection and enforcement to ensure that practice performance is maintained over time (see Section II.4).

The proposed regulation offers opportunities to reduce phosphorus by altering the design of any development, independent of the specific control practices imposed. New P calculation procedures assign lower P loads to forest and turf areas. Low to medium density developments can lower phosphorus control requirements by reducing effective impervious cover through cluster development patterns, preserving forest cover, reducing street widths, reducing curb and gutter, and reducing in the number of cul-de-sacs (Center for Watershed Protection 2000).[22] Quantifying the cost of many of these design features is more challenging, and the literature is much less developed or conclusive than the literature on conventional control practices. Many development design features (clustering, reduced setbacks, narrower streets, less curb and gutter, etc.) can lower construction and infrastructure costs. Such features may reduce the capital cost of subdivision development from 10 to 80% (Center for Watershed Protection 2000; EPA 2007b). On the other hand, the evidence is unclear how property owners value these design features. If consumers prefer characteristics associated with conventional developments (large suburban lot, cul-de-sacs, curb and gutter) then removal of these features impose an opportunity cost in the form of reduced amenity value (measured as reduced housing price). For example, most statistical studies in the U.S. housing market find that consumers prefer homes with larger lots and are willing to pay premiums for homes located on cul-de-sacs, presumably for privacy and safety reasons (Fina and Shabman 1999; Song and Knapp 2003; Kopits, McConnell and Walls 2007). These effects, however, might be partly offset by the higher value consumers might place on the proximity of

[21] The fact that construction and long-term maintenance costs may be different may present barriers and disincentives to installing cost effective combinations of stormwater controls. Land developers, for instance, have incentives to minimize the cost of meeting a regulatory obligation. Since the land developer typically does not pay long-term maintenance costs, financial incentives exist to minimize upfront (construction) costs, even if the total life cycle costs are high.

[22] The ability achieve these reductions in effective impervious surface, however, will be limited and constrained to varying degrees by local zoning and subdivision ordinances and state road construction requirements (example those for fire safety).

open space to their homes (Cheshire and Sheppard, 1995; Stephenson et al. 2001; Qiu et al., 2006; Mohamed 2006). Whether the value of open space is sufficient to offset the diminished value of smaller lots in cluster developments remains largely an unresolved issue and one that is probably determined by local market conditions.

Most stormwater control practices listed in the proposed regulation require land to be designated for water treatment, storage, filtration or infiltration. Land for stormwater control represents a significant opportunity cost. Land devoted to stormwater control results in lower development densities and/or loss of other land uses (e.g. loss of recreational or landscaping space to stormwater facilities). While land costs are site specific and exhibit spatial variation, land costs may be the single biggest cost outlay of land-intensive stormwater control practices in highly urban settings (Wossink and Hunt 2003).

Other costs include design and permitting costs. Brown and Schueler (1997) provide general "rule of thumb" estimates that design and permitting cost can range between 25 and 37% of construction costs. Another cost is the time delays in securing the necessary approval to begin development. Time delays are frequently cited as a major cost by the developer community (Randolph et al. 2007). Experience and good plan design would be a critical element in reducing these time costs.

Little systematic research has been conducted on the relationship between stormwater control costs and high-density development/redevelopment. Most stormwater control practices require space. In highly dense development, land costs tend to be high and the space available for storage, treatment, and infiltration of runoff diminishes (Wossink and Hunt 2003). Limited space also reduces available treatment options. Space constraints often require filtration and storage devices to be built underground. In redevelopment areas, construction costs increase as existing infrastructure must be modified, moved, or built around. While little empirical evidence exists, there appears to be a reasonable expectation that the cost of treating a given volume of water increases as the percentage of impervious cover increases (holding the size of the development constant). This relationship between cost and impervious area also highlights the economic importance of being able to spatially target phosphorus and water quantity controls in areas with more cost effective treatment options (see off-site and pro-rata share discussion below).

Randolph et al. (2007) report on the cost of complying with environmental regulations for five residential developments in the northern Virginia (across 3 counties within Chesapeake Bay Preservation Area). The developments represented a mix of greenfield and infill development with densities of 1 to 3.5 dwelling units per acre (approximately 20 to 40 % estimated impervious area). Stormwater control costs included only construction costs for wet ponds. Stormwater costs, however, were separate from erosion and sediment control costs. The findings from these case studies indicate that stormwater costs range from $350 to $7,000 ($1,900 average) per dwelling unit and $500 to $7,000 per acre ($3,900/ac average). These costs reflected in the case studies would likely more than double if land and maintenance costs were included (see discussion above).

As a nutrient management strategy, urban stormwater control tends to be the most costly means for reducing nutrient loads. Considering maintenance, capital construction, and land costs, recent estimates for North Carolina indicate that annual cost for wet ponds and constructed wetlands range between $100 to $3,000 per treated acre (typically less than $1,000).[23] Per acre annual costs for bioretention and sand filters typically ranged between $300–$3,500 and $4,500–$8,500 respectively (Wossink and Hunt, 2003).

The cost of reducing nutrients *on a per pound* basis will typically be hundreds and sometimes thousands of dollars per pound (Aultman 2007; Brown and Schueler 1997). For example, based on removal effectiveness and costs estimates from Brown and Schueler (1997), the annual cost to reduce a pound of phosphorus with wet ponds or bioretention areas ranged from $560 to $1,500/lb/yr.[24] These estimates include construction, land, and operation and maintenance costs for a hypothetical five acre commercial

[23] These costs would then need to be allocated between water quality and water quantity treatment.
[24] Assumes all water quality control costs are allocated to phosphorus removal only.

site and a 25 acre residential site.[25] As an illustration of the unit costs of meeting the current redevelopment criteria, the total capital cost for a small commercial development was $4,500/lb/yr.[26] These estimates are based on the costs for water quality treatment only (water quantity controls represent additional costs), but assume all water quality costs are assigned to phosphorus removal.

These control costs are significantly higher than nutrient control costs from point sources or agricultural nonpoint sources (Chesapeake Bay Commission 2004; Shulyer 1995).[27] A recent Chesapeake Bay Commission (2004) report estimated annual point source phosphorus control costs to be $74/lb. Enhanced nutrient management (currently considered beyond a Tributary Strategy baseline practice) cost an estimated $96 per pound of phosphorus.

Incremental costs: Illustrations applying proposed water quality criteria.

The proposed criteria was tested on a limited number of existing and planned developments to gain a better understanding of what type of incremental actions and costs would be required to meet the new water quality and quantity criteria. The information provided in this section came from three general sources. First, DCR conducted design "charettes" in the fall of 2008. Stormwater design teams proposed plans to meet the revised water quality and quantity test for a small commercial site and a medium density residential development. Second, land developers (permittees) and consulting firms voluntarily supplied alternative stormwater designs for 5 recently completed or planned developments. Finally, one environmental group commissioned stormwater plan designs for 6 developments. These developments do not represent a random sample although they do characterize many types of developments occurring across the Commonwealth. The examples used are drawn mainly from the eastern portion of the state and are provided by the volunteer efforts of a variety of groups. In each case, efforts were made to identify the activities and costs required to meet both the existing and proposed regulation.

With these caveats, the developments evaluated are summarized in Table 2. The developments do represent a broad cross section of different development types. The developments were almost evenly split between residential and commercial development types. Two of the six commercial developments were redevelopment projects (see Comm5 and Comm6, Table 2). All remaining projects were new developments. The residential developments tended to be low to medium density development with only one site above 4 dwelling units per acre. None of the developments occurred in ultra-urban areas (over 75% impervious surface).

All development cases in Table 2 were able to meet stormwater quality and quantity requirements on-site. The two low density residential developments met the revised water quality standard in their existing form (Resid3 and Resid7 in Table 2). Both developments had less than 10% impervious cover and significant forest cover on remaining (pervious) land. This result is consistent with the general result shown in Figure 4. The proposed revisions to the water quantity requirements were the binding regulatory constraint for two of the 13 development projects (Resid 3 and Comm6). For water quality controls, the stormwater development designs reflect a mix of conventional treatment and runoff volume reduction practices. The use of bioretention areas, ponds, and swales were commonly used control practices. The residential development with the highest development density (dwelling unit/ac) was able to meet water quality criteria by upgrading the treatment level of a large stormwater pond (Table 2, Resid2). For this development, compliance was achieved without any reductions in runoff volume and reflected the impact

[25] Construction cost estimates were converted to current 2007 dollars. Operation and maintenance costs were derived from EPA (1999) and assuming land costs of $50,000 per acre. Total costs were annualized using discount rate of 5%. The wetpond cost estimates assume that only a third of the cost of the wetpond is assigned to water quality (the remainder of the cost assigned to water quantity control).

[26] The project was a one acre development, mostly impervious. Two proprietary filtration devices installed at a total cost of $19,370 to achieve the required remove 0.22lbs/P/yr from the site. Maintenance and land costs were assumed to be zero, thus represents a lower bound estimate.

[27] The Chesapeake Bay Commission 2004 succinctly summarized the challenge of managing urban loads: while urban sources are the fastest growing source of nutrient load to the Bay, "the job to reduce stormwater impacts from developed land will be expensive, difficult to measure and effective only over the long-term." (p. 10). In Virginia's tributary strategy document, urban runoff contributes 18% of Virginia's phosphorus load to the Bay, but crude cost analysis estimates that urban runoff controls will make up 75% of the cost to meet Virginia's reduction commitment (Virginia Secretary of Natural Resources 2005).

of revisions to the phosphorus removal efficiencies (75% P concentration reduction for level 2 wetpond). The two redevelopment sites were also able achieve the new water quality and quantity criteria.

Table 2: Descriptions of Developments Used to Evaluate Revised Regulatory Requirements

NAME	Dev Type	Dev Size (ac)	% Land Cover (Imperv/Turf/Forest)	Density DU/ac	Additional Actions Required to Meet Proposed Regulatory Requirements
Comm1	New	0.75	47%/53%/0%	N/A	Reduction in parking spaces, bioretention areas, dry swale, detention facility.
Comm2	New	15.2	43%/57%/0%	N/A	Eight additional biofilters; some substitution of impervious with permeable pavement
Comm3	New	15.6	67%/33%/0%	N/A	New criteria can be met with current underground detention/stormwater filtration and upgrading large wet pond from type 1 to type 2 treatment level.
Comm4	New	11.1	66%/32%/2%	N/A	The current stormwater design utilizes an LID approach with 25,000 ft^2 of bioretention facilities and soil amendments. New requirements could be met with a type 2 wet pond. Meeting new criteria with LID approach would require upgrading the bioretention to meet new design standards but with a similar area.
Comm5	Re Dev	1.65	Imp Predev,65% Imp Postdev,75%	N/A	Existing detention basin is converted to extended detention basin, 1/6^{th} of the new pavement is permeable and 2,000 gallon cistern.
Comm6	Re Dev	54	Imp Predev,58% Imp Postdev,69%	N/A	Water quality redevelopment criteria met with no additional controls (existing 2.4 acre retention pond), but new water quantity criteria requires reconfiguration of piping and addition of rain tank and pump system.
Resid1	New	8.8	25%/42%/33%	3.3	Grass swales, expanded bioretention areas, forest cover preservation
Resid2	New	26.5	50%/50%/0%	7	Upgrade large wet pond from type 1 to type 2 treatment level.
Resid3	New	42.6	9.1%/35%/56%	0.66	Existing cluster development (19 ac disturbed) meets WQual criteria with no additional treatment. Activities to meet WQuant requirement: roof disconnect, grass swales, porous pavement.
Resid4	New	43.3	21%/49%/30%	1.82	Roof top disconnect, porous pavement, added size for infiltration basin. One pond to meet WQuantity requirements.
Resid5	New	55	40%/53%/7%	3.73	Upgrade and expand dry detention basin to type 2 wet pond, in addition to the other planned stormwater facilities.
Resid6	New	14.9	Traditional: 25%/58%/17% Cluster: 20%/63%/17%	1.68	Change from 9.583 s.f. of bioretention and swales to 9,500 s.f. of level 1 dry swale, 700 l.f. of grassed swale, 5,000 s.f. of soil amendments and 50 rain barrels.
Resid7	New	270	5%/16%/79%	0.13	None. No stormwater controls required.

The incremental phosphorus removed from revisions to the water quality criteria, and the added cost to achieve these reductions, are shown in Table 3. Incremental phosphorus reductions achieved is an estimate of the additional annual reductions in phosphorus loads achieved above existing (current) water quality requirements. Incremental upfront costs are construction, material, land and design costs associated with the additional controls needed to comply with the proposed regulations. Incremental annual costs are the annualized cost of incremental upfront costs plus an estimate of the annual operation and maintenance costs. Finally, the incremental (marginal) cost to achieve the additional phosphorus reductions achieved by the revised water quality criterion is reported in the last column of Table 3. In two cases, additional costs were necessary to comply with water quantity criteria, but not the water quality criteria. In these cases, the cost per pound of phosphorus removal measure is not applicable (incremental costs were attributed to water quantity requirements). Data for three developments (Comm1, Resid1, and Resid2) are not reported in Table 3 due to inadequate baseline information or lack of cost data.

The incremental upfront costs to maintain compliance with the proposed revisions ranged from $0 to $750,000 per development project. For residential projects, stormwater BMP upfront costs (construction and land costs) were between $0 and $6,000 per dwelling unit depending on the scenario). For projects requiring additional phosphorus control, the addition reduction in P loads achieved per development site range from 0.23 to 19.2lbs/yr (between 0.14 to 0.41 pounds/ac). The incremental (marginal) phosphorus control costs (including upfront costs and operation & maintenance costs) range from $825 to $15,300 per pound per year (assuming all costs are assigned to P removal and no cost assigned to reductions in other constituents such as nitrogen, sediment, etc). Expressed on a cost per pound basis, phosphorus control costs appear to loosely increase with impervious area. The projects with the highest estimated per unit costs were a commercial development (Comm2) and a redevelopment site (Comm5).

Table 3: Incremental Phosphorus Reductions and Costs of Selected Developments

NAME	Dev Size (ac)	Incremental P Reduction for Site‡	Increase in Incremental Upfront Costs	Incremental Annualized Cost*	Incremental Cost per Pound per Year
Comm2	15.2	3.9	$551,570	$59,657	$15,296
Comm3	15.6	4.4	$40,000 to $70,000	$3,638 (low) $9,867 (high)	$825 $2,237
Comm4	11.1	3	$60,000 to $120,000	$5,457 (low) $16,914 (high)	$1,819 $5,638
Comm5	1.65	0.23	$17,500	$1,592 (low) $2,467 (high)	$6,920 $10,725
Comm6	54	None Needed	$100,000◊	$7,095Δ	Not Applicable
Resid3	42.6	None Needed	$99,600◊	$8,490	Not Applicable
Resid4	43.3	8.3	$206,279	$21,922	$2,641
Resid5	55	19.2	$350,000 to $750,000	$31,833 (low) $105,714 (high)	$1,658 $5,506
Resid6	14.9	5.7 to 6.05	$54,500 to $154,500	$4,956 (low) $21,777 (high)	$868 $3,600
Resid7	270	0	0	0	Not applicable

‡Represents estimated or an approximate additional P reduction. Comparing changes in load from existing and proposed regulations is complicated by the fact that load estimation methods and BMP sizing/design criteria differ between existing and proposed regulations.

*Unless otherwise noted, includes estimates of capital, land, and maintenance costs. Costs annualized over 25 years at 5% discount rate. High and low estimates based on assumptions that annual maintenance costs range from 2% to 7% of incremental upfront costs.

◊ Cost to meet revised water quantity criteria only.

Δ Does not include maintenance costs.

Fees

The regulatory revisions also propose a new stormwater permit fee structure (4 VAC 50-60-800 through 830). The number and size of permits that are expected to be managed under the proposed regulations is important for a number of reasons. The fees will be used by DCR and local stormwater programs to help finance the costs of implementing the stormwater program (as outlined in Section II.4 of this report). As currently calculated based on the original DCR estimate of 3,000 permits issued per year, local governments with an approved stormwater program receive 72% of collected fees, with the remainder (28%) going to DCR through the Virginia Stormwater Management Fund (4 VAC50-60-780). The number of permits will be important for estimating the management workload at both the local and state levels. Furthermore, the distribution of the permits by size determines the stormwater revenue generated under the proposed fee structure. It should be noted, however, that these fees do not represent (and should not be interpreted as) a societal cost from the revised regulations, but rather the fees determine who bears the burden of paying for program implementation costs. To the degree that fees will increase, the higher fees shift responsibility for paying for program implementation from the local/state governments to land disturbers (permit applicants).

The estimation of the total amount of fees that would be collected under the proposed regulation requires not only an estimate of the number of permits that are expected to be issued, but the distribution of those permits by the size of the land disturbance. The estimated total permits issued annually are shown in Table 1 (Section II.2). Information on the distribution of these permits according to size of land disturbing activities, however, was more limited. Specifically, the data supplied by the local governments did not typically contain information on the number of permits and land disturbance size.

Several approaches were used to estimate the distribution of permits according to the size of land disturbance. First, DCR provided an initial estimate of permit distribution and fee revenue in a discussion document dated September 8, 2008 (see Table 4). DCR's estimate of the distribution of permits was based on the DCR state permit registry. DCR also assumed 3,000 annual permits.

Table 4: Initial DCR estimates of revenue from fees

Project Size	% of Permits	# of permits	Fee per permit	Revenue Generated
≥ 2,500sqft, < 0.5 acre	7%	210	$290	$60,900
≥ 0.5 acre, < 1acre	8%	240	$1,500	$360,000
≥1 acre, < 5 acres	40%	1,200	$2,700	$3,240,000
≥5 acres, < 10 acres	17%	510	$3,400	$1,734,000
≥10 acres, < 50 acres	23%	690	$4,500	$3,105,000
≥50 acres, < 100 acres	3%	90	$6,100	$549,000
≥100 acres	2%	60	$9,600	$576,000
				$9,624,900
DCR's 28% of Fees				$2,694,972

Source: "Discussion Document on Department Fees" Virginia Department of Conservation and Recreation, September 8, 2008

The distribution reported in Table 4 can be generalized as a gamma distribution. Gamma distributions are best for data where there are many observations near zero, but progressively fewer as the values increase. Fitting a gamma distribution to the disturbed acreage data resulted in parameters of shape 0.5702 and scale 18.59 (standardized gamma distribution $\Gamma(0.5702, 18.59)$. Defining the distribution in this manner is comparable to fitting a regression line to a set of data: it provides a smooth, standardized description of the data of interest.

Yet, the distributions above are drawn from the state registry database that is thought to under report annual permits (Table 1). Furthermore, based on the discussion in Section II.2, there is reason to suspect that the number of smaller development projects are disproportionately under represented, thus also likely altering the distribution of permits.

To address the issue of permit undercount, DCR is currently conducting a systematic comparison of the state permit registry data with local permit data supplied to their regional offices. DCR compared state permit data with permit data for a select number of local government programs. The comparison was for data available for fiscal year 2008. The local data are sufficiently detailed for some localities to allow for a permit-by-permit comparison of the DCR database with data provided by local programs. The preliminary results suggest a state undercount of permit data with permits less than 5 acres disproportionately under represented. From this preliminary analysis, DCR concurs that their database does indeed reflect fewer permits than have been issued on the local level. Extrapolating DCR's preliminary data over the entire state and for an entire year (estimates may be subject to change). DCR suggests that the total permits could approach 7,000 annually. Upon the completion of their analysis, DCR will incorporate the final refined estimates they are generating into the regulatory discussion form.

Revenue estimates generated by the proposed fee structure are shown in Table 6. The estimates were based on two different distributions of permits: the permit distribution based on the state registry data and a gamma distribution of that data (see Table 5 for a summary). The distributions are then applied to three different assumptions about the number of permits that would be issued annually: 3,000 permits based on the state level DCR historical data, 5,600 permits based on the average annual number of permits projected in Table 1, and 7,000 permits based on upper bound permit estimate (see page 11). Combining the different estimates of number of permits with the different estimates of their distribution provides a matrix of possible revenues under the different assumptions (Table 6). An additional scenario will be developed by DCR upon completion of their data analysis.

Table 5: Comparison of permit size distributions under different assumptions

Permit Size	Original DCR	Gamma Distribution
> 2,500sqft, < 0.5 acre	7%	10.7%
> 0.5 acre, < 1acre	8%	6.9%
>1 acre, < 5 acres	40%	28.6%
>5 acres, < 10 acres	17%	18.1%
>10 acres, < 50 acres	23%	33.1%
>50 acres, < 100 acres	3%	2.5%
>100 acres	2%	0.1%

Table 6: Fee Revenues under Different Assumptions of Number and Distribution of Permits

No. of Permits / Distribution by size	3,000 (Original DCR)	5,600 (Table 1)	7,000 (Upper Bound)
Original DCR	$9,624,900	$17,966,480	$22,458,100
28% to DCR	*$2,694,972*	*$5,030,614*	*$6,288,286*
Gamma Distribution	$9,523,284	$17,772,888	$22,216,110
28% to DCR	*$2,666,520*	*$4,976,409*	*$6,220,511*

Given the compelling evidence of undercounting of permits in the registry database, an annual estimate of 3,000 permits is probably low for a typical year. The future number of permits during normal economic conditions would more likely be in the 4,000 to 7,000 range. The total annual permit fees collected assuming 3,000, 5,600 and 7,000 permits would be approximately $9, $18 million, and $22 respectively. Of total fees collected, DCR would collect 28% for overall program administration (assuming percentages remain the same as currently specified under 4VAC50-60-780). According to Table 6, fee revenue for DCR program oversight would be between $2.7 and $6.3 million per year (assuming 3,000 and 7,000

permits respectively).[28] Given the uncertainty of the current economic environment, however, the impact on program revenue from fluctuations in the number of permits issued is also worth noting.

According to DCR, it also should be noted that should DCR's final permit computations substantiate a significant under-reporting of permits, then the Department will need to reassess needed staff to support an increased permit load as well as revisit the fee amounts and DCR's percentage of the fees.

3b. Off-site options and pro rata programs

The offsite provisions and the pro rata system is an important and critical feature of the regulation. In highly urban settings (particularly redevelopment),some local programs report that on-site compliance is difficult and costly under the existing regulations. The more stringent water quality and quantity criteria and their focus on onsite runoff volume management will likely mean additional projects will face compliance challenges and increased costs for on-site control. Other land disturbances may face other types of site constraints (topography, soils, high groundwater tables, etc).

The off-site provisions in the proposed revisions offer needed compliance options and may allow greater opportunity to get more water quality protection for every dollar spent. Allowing land disturbers and local program administrator's flexibility to determine how and where water quality can be addressed may improve compliance opportunities and significantly reduce overall costs. Land disturbers would treat on-site up to the point that it is cost effective to do so (or as required by the local program) and then either pay a fee or achieve regulatory obligations off-site. The lower off-site control costs, the greater the cost-savings would be from a pro rata program or the off-site compliance option. An effective off-site/pro-rata program may be a necessity for highly impervious areas.

The magnitude of the cost savings, however, is uncertain at this point. Part of the uncertainty arises on the degree of flexibility localities will have in designing and implementing these programs. It is also uncertain how many localities will offer off-site compliance options.

A number of factors influence the cost reducing potential of the off-site/pro rata fee option. Three factors, in particular, will influence total stormwater control costs: sequencing preferences, allowable geographic area of off-site controls, and allowable off-site control options.

Sequencing refers to whether the local stormwater program would require land disturbers to undergo a process that gives preferential treatment to on-site controls before being allowed to consider off-site options (including payment of in lieu fees). Strict preferences for on-site control typically require the regulated party to demonstrate that on-site controls are either technically infeasible or prohibitively expensive. Strict sequencing rules will limit opportunities for lower cost and perhaps (in some circumstances) more environmentally effective off-site options (see discussion below). The proposed regulations are silent on regulatory preference for on-site controls.

The geographic area where off-site controls can be applied also influences the degree to which cost effective controls can be implemented. Greater flexibility on where off-site controls can be located will reduce costs and possibly improve environmental outcomes (other factors constant). For localities without a comprehensive watershed management plan, the regulation allows limited offset options for water quality criteria only. With a Board-approved watershed management plan, a local program can secure off-site reductions for either water quality or quantity within or adjacent to the impacted HUC or within "designated watersheds".[29] The watershed management plan requires consideration of the existing conditions and creates a plan to target and plan for future economic growth and environmental improvement. The cost effectiveness of off-site controls applies only if outcomes are achieved offsite that

[28] In addition, DCR would also receive 72% of all fees collected in areas without a delegated stormwater program. Roughly one quarter of all stormwater permits are estimated to be these nondelegated areas (assuming current estimates of 62 counties and 12 independent cities hold). Based on these assumptions, DCR could collect an additional $1.7 to $4.0 million in fees for local program administration (based on a range of 3,000 to 7,000 permits respectively). The remainder of all fee revenue ($5.2 to $12.1 million) would go to local delegated stormwater programs (assuming percentages specified in 4VAC50-60-780 do not change).

[29] In the event that a local water body is impaired by phosphorus, local programs can limit off-site options.

would be equivalent to those required on-site. Stormwater control programs, in general, provide three general sets of services; flood protection, channel/habitat protection, and water quality services. Each may be somewhat separable and each may have different spatial impacts and a watershed management plan can allow flexibility in how these impacts are offset. For example, flood protection is typically provided in close proximity to the impact in order to protect properties immediately downstream. Yet, flood protection can be provided without significant reductions in pollutant loads. Nutrient management to improve water quality offers more opportunity to move controls further off-site.[30] The flexibility and cost-saving potential of the off-site and pro rata provisions will depend partly on how broadly or narrowly "designated watershed" is interpreted by DCR in allowing off-site controls.

Finally, the way in which the water quality and quantity impacts can be offset off-site will also determine cost effectiveness. Existing pro rata programs in the Chesapeake Bay Preservation Area have been allowed to construct regional stormwater ponds, undergo stream restoration projects, and preserve open space as a way to offset phosphorus loads from land development activity. Such fees typically range from $5,000 to $8,000 per pound (or if expressed as an equivalent annual cost, $250 to $400/lb/yr). In localities where such programs exist, land disturbers are frequently willing to pay these fees rather than build additional onsite phosphorus control, suggesting that on-site phosphorus control costs are higher than these fees (this is consistent with empirical research on costs, see discussion above). The cost savings achieved by these programs support cost research that finds significant economies of scale for regional or larger scale projects. Several local officials interviewed during this analysis, however, indicated that these fees are likely to increase over time. Reasons for this increase include a decrease in the number of favorable and low cost offset sites, an increase in administrative and permitting costs of working in and around perennial streams (particularly for regional pond construction), and less willingness of state and federal regulatory officials to allow construction of regional stormwater facilities on perennial streams.

Conceptually, cost effectiveness will be enhanced if programs focus on achieving and maintaining a desired outcome (e.g., pound of P removed for example), rather than proscribing the means to achieve the outcome. The differences in per unit control costs across sources suggest that there are numerous options to lower compliance costs. Creating opportunities to secure phosphorus reductions (above and beyond reductions outlined in the state Tributary Strategies) from sources other than the construction of stormwater BMPs could lower costs. The following list of actions is only illustrative of the types of ways that could conceivably be available to reduce the cost of complying with the phosphorus control requirement.

- Biomass Harvest. The harvest of algal biomass could also be used to remove nutrients from ambient waters. One such system, Algal Turf Scrubber, grows filament algae using ambient water pumped over a flat prepared growing area. Water is then discharged back into receiving water and total nutrients removed from water can be measured as biomass weight and nutrient concentration. This technology is currently used in Florida to remove phosphorus from ambient waters and studies estimate the cost of phosphorus removal at $16 and $50/lb/yr (Hydromentia 2005). Advocates claim such a facility can remove over a thousand pounds of P per acre per year. Operated in conjunction with a municipal wastewater treatment plant, such a system could serve as a nutrient compliance offset for both municipal point and nonpoint nutrient control requirements. Currently, a biomass harvesting project is being piloted on the Susquehanna River in Pennsylvania (Crable 2008).

- Density Credits: From a watershed perspective, land settlement patterns may have the largest overall potential to reduce the impact of urban runoff on water quality (see discussion above). Localities in other states waive stormwater water quality criteria (grant exemptions) for high density developments or for brownfield redevelopment based on the premise that such

[30] Not all pollutant discharge will necessarily adversely impact local water quality. For instance, nutrient loads may not necessarily be a water quality concern in the immediate vicinity of the development impact, but rather may have adverse water quality consequences further downstream (in a reservoir or estuary). In the Chesapeake Bay watershed, tributary strategies focus on achieving nitrogen and phosphorus goals within entire river basins. Municipal waste water treatment plants and industrial point sources operating under the Virginia trading program may reallocate phosphorus and nitrogen within tributaries.

development has lower overall watershed impacts than low density development (NRC 2008; Lemoine 2007).[31] Such designations may offer localities additional flexibility in lowering compliance costs while at the same time providing watershed-wide water quality benefits. The logic is that total water quality can be improved on a watershed basis by settling more people on less land, even if the onsite runoff (or load) from the relatively small impacted area may be high.

- Under Virginia's Chesapeake Bay Watershed Nutrient Credit Exchange (§62.1-44.19:12-19) point source discharges (municipal wastewater treatment plants and industrial dischargers) must meet stringent nitrogen and phosphorus annual load limits, called wasteload allocation (WLA). Existing point sources that exceed their annual wasteload allocation have a number of options to remain in compliance. One option offered by the state includes securing nonpoint source reduction credits from Virginia's Water Quality Improvement Fund. Credits are documented reductions in nonpoint source loads that exceed reductions required by any regulatory requirements or by the Virginia Chesapeake Bay tributary strategies. Currently Virginia charges $11.06/lb for nitrogen credits and $5.04/lb for phosphorus credits (9VAC 25-820-70j3). These fees were based on state estimates of the annual cost of nutrient removal from agricultural BMPs. A similar type of program could be offered to land disturbers to offset stormwater impacts. Conceptually, land disturber could make a lump sum payment of $168 into a financial trust or foundation that would generate a stream of annual $5 payments in perpetuity (assuming a modest 3% growth). Even if the cost of these offset fees increased 10 fold (to account for uncertainty, rising control costs, etc) the cost would still be significantly lower than existing pro rata fees or on-site stormwater control costs.

- Chemical treatment. Several localities in the U.S. use chemical treatment processes (e.g. alum) to remove phosphorus and nitrogen from urban stormwater. For example, one regional stormwater treatment facility serving a 1,160 acre urban drainage was designed to remove 14,000 pounds of phosphorus per year in Florida (Herr and Harper 2000). Costs using such processes are reported to be only 30% of the cost of a wet detention system (Herr and Harper 2000).

- Wetlands are often noted for their nutrient cycling services. The regulation identifies constructed stormwater wetland as an acceptable stormwater practice, but constructing small scale treatment wetlands in urban environments is expensive (similar in cost to stormwater ponds). In comparison, large scale restoration of degraded or former floodplain wetlands may be a less expensive way secure phosphorus reductions. [32] Restoring former flood plain wetlands may involve simply restoring hydrologic function and wetland vegetation to drained flood plain agricultural land (which were often wetlands themselves before being converted). Restored floodplain wetlands can increase the capacity of aquatic ecosystem to remove nutrients because the represent new nutrient removal capacity to the system.

It is unclear at this time the extent to which localities administering their own stormwater program can pursue different (nonstormwater) types of phosphorus offsets.

One challenge to pro-rata programs, however, is that state law only allows localities to use such pro-rata fees to pay for design and construction costs (§15.2-2243). Since long-term maintenance costs may not be paid with pro-rata fees, the fees do not reflect the total cost of the offset. As noted above, long-term maintenance costs are a significant cost of stormwater management. Long-term maintenance costs may be paid by private owners of stormwater controls, shared between private landowners and the local stormwater management program, or incurred by the local stormwater management program (in the case of publically owned regional stormwater treatment facilities). These legislative restrictions place incentives for localities to narrow the range of possible offset activities to those that are more capital

[31] The comprehensive watershed management provision of the regulation (4VAC 50-60-96) does not grant authority to alter water quality criteria in specifically designated areas.
[32] The Wetlands Initiative. Undated fact sheet. "Can Wetlands Cost Effectively Manage Nutrients"

intensive. However, under the provisions of law, a locality may establish stormwater utility service fees to address, among other things, maintenance and inspection of BMPs in accordance with §15.2-2114.

Development projects located in state-managed areas or local areas without a pro rata program have much more limited opportunities to reduce costs off-site. For example, land disturbers in areas with a DCR administered programs will not have the advantages of a pro-rata program. One option the state may wish to consider in the future is the development of a state-wide urban offset program. North Carolina, for example, administers a state-wide in lieu fee program called the Ecosystem Enhancement Program (NCEEP). A regional state administered offset program option is also offered under Virginia's point source program (see above). A state-wide or regional program may be able have more opportunities to target fee resources to areas and sites where water quality improvements can achieve more reductions with higher probabilities of success. A state-wide program could serve a significant portion of the state where pro-rata systems are not available and also achieve administrative economies of scale by being able to more effectively consolidate management activities across more disturbed acres. Finally, such a program may be able to expand the cost reducing offsite options to a greater number of regulated parties.

3c. Benefits

The benefits of the proposed regulation are the additional improvements to the state's water bodies that would be achieved in the future with the proposed regulation as compared to what would be achieved with the existing regulation. Given the complexity of stormwater impacts and the comprehensive nature of the regulation, quantitative estimates are not possible. However, the range of possible benefits and indicators of the relative magnitude of possible benefits from the proposed regulation are summarized.

Conceptually, stormwater benefits are represented in Figure 5. As outlined in the proposed regulation, stormwater control practices alter flow and runoff quality stemming from land use change. These changes could then change a number of man-made and water-related services that are of value to people. These services include reductions in flood risk, avoided infrastructure costs, aquatic life support, recreation, and aesthetics (Braden and Johnston 2004). Commercial fisheries may also benefit from additional stormwater controls. Economic benefits are the value of these service changes to people.

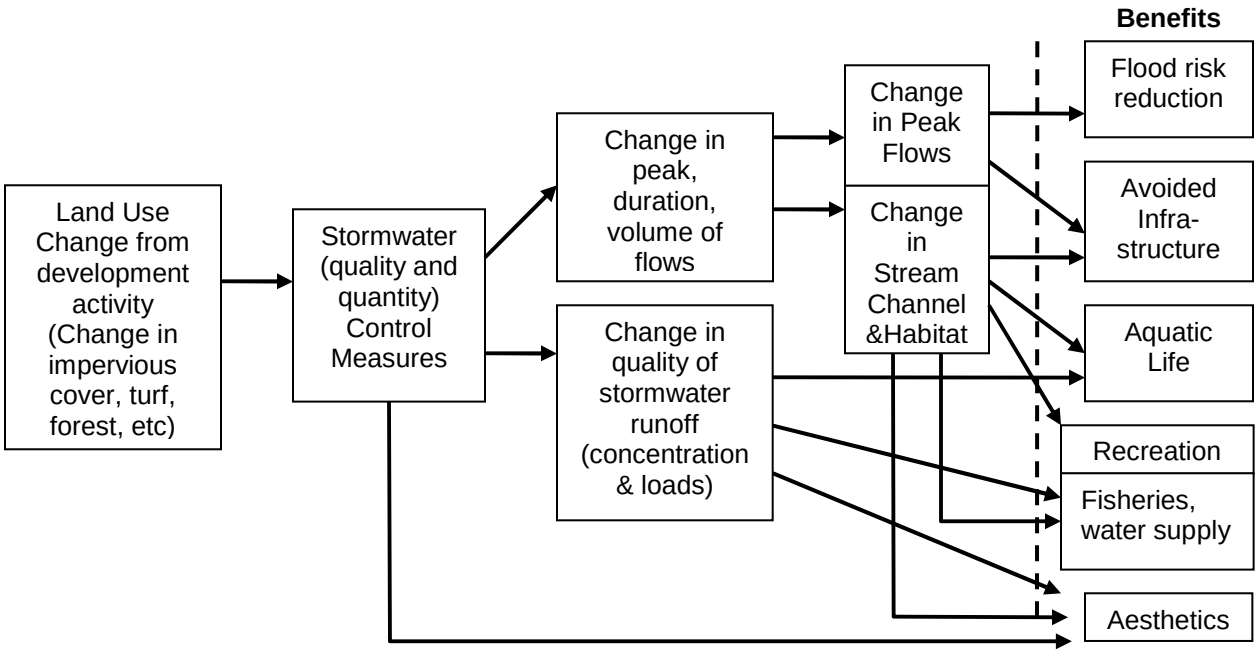


Figure 5: Benefits of Stormwater Control

Stormwater management also reduces the peak, duration and volume of stormwater runoff. The control of flows have significant consequences on stream habitat, flood related property damages, downstream infrastructure, and aesthetics (Streiner and Loomis 1995; Johnston, Braden and Price 2006). Virginia's current erosion and sediment and existing stormwater control programs provide some level of runoff control, primarily associated with control of peak flows. Johnston, Braden, and Price estimate differences in flood damage and infrastructure costs (primarily culverts) from conventional residential stormwater designs (stressing stormwater detention) versus conservation design (greater emphasis on infiltration and disturbed practices). The additional volume control achieved under conservation design was estimated to provide additional flood risk reduction benefits (between 0.4% and 2.5% of the value of downstream properties) and a reduction in infrastructure (culvert) costs for the developed area. In other cases, some elements of conservation design may directly improve the aesthetic environment for surrounding property owners (see Figure 5). For instance, the property owners are willing to pay more for properties adjacent to riparian areas and to open space (Qiu, Prato, and Boehm 2006).

Numerous studies have established a statistical correlation between urban land cover (as measured by impervious cover, effective impervious cover, road density, etc) and different measures of in-stream biotic diversity (ex. indices of biological integrity, measures of diversity of benthic macroinvertebrate life, etc). Studies overwhelmingly report an inverse relationship between measures of urban land cover (measured as impervious surface, road density, etc) and downstream biotic measures/indices (Davies and Jackson 2006; Center for Watershed Protection 2003; Wang et al. 2001; NRC 2008). Many studies report measures of biotic diversity begin to be reduced for relatively small amounts of impervious cover (~10%).

Empirical research of the extent to which these impacts might be reduced or avoided by various stormwater control practices is still emerging. Some existing studies suggest that control of peak flow alone has minimal impact on improving aquatic conditions (Maxted, J. R., and E. Shaver 1997; Roesner, Bledsoe and Brashear 2001). The proposed regulation, however, provides incentives to reduce runoff volume and imposes new water quantity criteria on controlling energy input to the stream. The proposed regulations requires more stringent requirements for unstable streams to energy inputs approximating forested conditions (§4VAC 50-60-66.A.3). The incentives to implement runoff reduction practices can also assist in efforts to more closely approximate the hydrology of predevelopment conditions. Reducing the volume, duration, and magnitude of flows will increase the probability of maintaining and improving biotic diversity in streams (NRC 2008). However, as the percentage of impervious cover increases in a watershed; the possibility that management efforts can restore biological conditions to pre-urban conditions in these watersheds is likely to diminish (Booth and Jackson 1997). Thus, the achievable stream restoration benefits (specifically aquatic diversity) may be small for new development or redevelopment in sub-watersheds with high percentages of impervious surfaces. The pro rata share provision of the regulation, however, offers some opportunities to redirect and target financial resources to other areas that have a higher probability to improve and maintain overall stream conditions.

It should be noted that many of the aquatic benefits from management of the runoff volumes generally accrue in relatively close geographic proximity to the stormwater control measures. Thus, the local citizens and governments incurring the higher stormwater control costs are also likely to be the same group of citizens that benefits most from these efforts.

Water quality benefits

While the proposed regulation focuses on nutrients (specifically phosphorus), many of the practices and strategies to control phosphorus will also lower the discharge of other pollutants associated with urban stormwater discharge. A number of chemical constituents are commonly found in stormwater runoff including a variety of heavy metals (zinc, copper, lead, chromium, etc), pathogens, suspended solids, oil/grease, and organics (BOD) that are commonly found in stormwater (Burton and Pitt 2002; Center for Watershed Protection 2003; Lee and Jones-Lee 2004; NRC 2008). It is reasonable to expect that the concentration of many of these contaminants increases with the level of urban activity (measured by population density, economic activity, or impervious surface). In sufficient quantities, these constituents can adversely impact aquatic life, human health, and possibly recreational activities. The proposed

regulations place new emphasis on runoff reduction and infiltration practices and can reasonably be expected to provide ancillary reductions of these other pollutants.

A significant analytical challenge in estimating the benefits of stormwater management is identifying the incremental improvement that can be achieved through the variety of stormwater controls. Tracing out this incremental impact requires identifying stormwater control practices used to control stormwater runoff, establishing the relationship between practices and pollutant removal, linking changes in pollutant loads to changes in water quality/quantity conditions, and then relating water quality and quantity conditions to physical and instream biological conditions of concern to people. For example a variety of studies have noted that people place a higher value on properties located along water bodies with improved water quality (Leggett et al 2000; Poor et al. 2001). However, these studies typically do not establish causal linkages between water quality and urban stormwater runoff. Conceptually, the value of stormwater management to water quality would require assessing the contribution of stormwater control practices to water quality improvements.

Water quality benefits from nutrient reductions

The proposed water quality criteria were established based on meeting Virginia's nutrient reduction requirements under the Chesapeake Bay Agreement. In 2000, Virginia along with the federal government and other Bay states signed the *Chesapeake 2000* Agreement. The agreement renewed commitments to lower nutrient and sediment loads to improve Bay water quality. Water quality standards were then established for different segments of the Chesapeake Bay and tributaries. The standards established criteria for dissolved oxygen and water clarity. Modeling conducted by Chesapeake Bay Program then analyzed the relationship between total nitrogen and phosphorus loads delivered to the Bay and the probability and frequency of attainment with water quality standards. The final annual load target agreed upon was 175 million pounds of nitrogen and 12.8 million pounds of phosphorus. At these load levels, the model estimated attainment with the dissolved oxygen criteria in most areas, but with some probability of occasional nonattainment (EPA 2003). As with any modeling of natural systems, uncertainty surrounds these estimated effects. Published estimates of the response to dissolved oxygen levels for incremental changes to the 175 and 12.8 million pound nitrogen and phosphorus load target could not be located.

Virginia's portion of this overall load target is 51.4 million pounds of nitrogen and 6 million pounds of phosphorus (delivered load to the Chesapeake Bay from all tributaries) (Chesapeake Bay Program Office 2008). Through the Virginia's Tributary Strategy planning process, plans were devised to achieve nutrient load targets. The plans (not part of a regulatory process) allocated nutrient load reduction targets to specific types of discharge sources (Virginia Secretary of Natural Resources 2005). Urban phosphorus loads from all urban land was estimated to be 1.86 million pounds in 2007. Of these pounds, the Chesapeake Bay Watershed Model estimates that 87% of the urban phosphorus load originates from pervious urban surfaces, with the remaining share of urban load from impervious surfaces. The state Tributary strategies aim to reduce urban loads to 1.04 million pounds (817,000 pound reduction from 2007).[33] While urban stormwater loads are not the largest source of nutrients to the Bay, as a group they are the only major class of sources where loads have increased over time (EPA 2007; Chesapeake Bay Program Office 2008).

The achievement of the Chesapeake Bay goals has been an important water quality goal for the state for over 20 years. The Chesapeake Bay makes numerous and fundamental contributions to the economy and the citizens of the Commonwealth. The Bay supports a variety of commercial and recreational fisheries. The benefits (measured primarily as the increased recreational benefits) from state and federal policy efforts through 1996 was estimated to be between $360 million to $1.8 billion (Morgan and Owen 2001). These benefits were confined only to recreational benefits and to those currently living within the Bay watershed.

[33] Chesapeake Bay Program Office. "Loads and Land Use Acreage" Excel Spreadsheet. Accessed on-line at http://www.chesapeakebay.net/tribtools.htm#allocations.

The contribution to those benefits from this proposed regulation could not be estimated. However, a crude estimate of the additional reductions that might be obtained beyond what is achieved under the existing regulations is possible. Beginning with the Chesapeake Bay Preservation Act areas, the new proposed stormwater water quality criteria would achieve additional (modeled) phosphorus reductions ranging from 0.15 to 0.45 lbs/ac/yr (see Figure 2 and Table 3). Land disturbance on new development would achieve reductions of 0.13 to 0.22 lbs/ac/yr.[34] Based on available evidence, slightly more than half of all disturbed acres in the state occur within the Chesapeake Bay Preservation Area. Assuming that 17,500 acres will be disturbed each year in the Chesapeake Bay watershed (estimated average land disturbance in CBPA area between 2005-2007) total phosphorus reductions achieved beyond the existing regulations would be 2,480 and 7,470 lbs/yr in the Chesapeake Bay Preservation Act areas. These estimates assume redevelopment acres range for 10 to 40% of total disturbed acres. The total site reductions achieved over the course of a decade would be between 27,300 and 411,000 lbs over what would be achieved under the existing regulation. These figures are changes in estimated loads leaving the development site but not delivered to the Chesapeake Bay. Phosphorus load reaching the Chesapeake Bay would need to be adjusted for fate and transport using attenuation ratios. Furthermore, it should be stressed that these estimates are *not* changes in phosphorus loads that stem from a change in land cover/use, but rather the additional reductions that could occur from more stringent water quality criteria.[35]

While the water quality criteria in the proposed regulation were derived to meet Chesapeake Bay Tributary strategies, the same phosphorus criteria are proposed for the entire state. Watersheds outside the Bay include Chowan, Roanoke, New River, Holston, Clinch and Big Sandy. In general, these areas are less densely populated than the eastern portions of the Chesapeake Bay watershed and nutrient related contributions from urban runoff would be expected to be much smaller. Furthermore, many of these areas of Virginia do not yet face the same regional water quality issues related to nutrient enrichment as those found in the Chesapeake Bay. Establishing differential stormwater water quality criteria based on the differential local and regional benefits that could be achieved from additional nutrient reductions can improve the economic efficiency of the proposed regulation.[36]

Watersheds beyond the Chesapeake Bay have yet to apply the same level of nutrient control requirements across a wide range of nutrient sources. If localized nutrient issues occur or are a possible water quality concern in these non-Bay watersheds, more cost effective and larger nutrient reductions could be achieved by securing reductions from sources other than incremental reductions from urban stormwater. Achieving additional phosphorus removal through the application of more stringent water quality criteria (effectively lowered from 0.45 lbs/ac to 0.28 lbs/ac) are achieved at estimated costs of $900 to $15,000 per pound of phosphorus (see Table 3). Agricultural and regulated point sources can achieve nutrient reductions at significantly lower unit costs. Given the relatively small scale of urban development in most parts of the non-Chesapeake Bay region, the more stringent phosphorus criteria would likely achieve modest phosphorus reductions relative to other sources. In areas where nutrient impairments may occur and are substantively related to urban development, a number of policy options already exist. For instance, urbanized areas regulated under the MS4 program may face different water quality concerns and apply different standards. In rural areas, local governments always have the option (and some incentive) to adopt programs and land use controls to protect any local water deemed to have special importance to the local economy (trout waters for instance).

The Virginia General Assembly has acted in ways that acknowledge the efficacy and fairness of differential nutrient control requirements across to the Commonwealth. Through the Chesapeake Bay

[34] Load changes based on procedures in DCR's compliance spreadsheet.
[35] The distinction is not trivial. The 0.28 standard for new development achieves additional reductions from what would be achieved under the existing regulation, but if the new development was built on land previously forest (P load rate 0.03lb/ac), the development would increase loadings to the Bay *regardless* of what water quality criteria is adopted (the issue the regulation addresses is how large the increase will be). Conversely, if the new development occurred on former agricultural cropland, the conversion to an urban use would likely lower total P loads from that area (the issue addressed by the proposed regulation is how large the decrease will be).
[36] This discussion mainly applies to the application of stormwater water *quality* criteria. The local benefits from the application of water *quantity* criteria would be unaffected by this discussion.

Preservation Act, the General Assembly required restrictions on land use (e.g. buffers) for only landowners in the 29 Tidewater counties. The Virginia General Assembly has imposed more stringent nitrogen and phosphorus requirements on municipal and industrial point sources located within the Bay watershed through the 2005 Chesapeake Bay Watershed Nutrient Credit Exchange Act §62.1-44.19). Through these actions the General Assembly has authorized and legitimized the appropriateness of more stringent nutrient controls for areas within the Chesapeake Bay watershed. Furthermore, the General Assembly has not stipulated that phosphorus water quality criteria established by the Board must be uniform across the state.

Implementing different stormwater water quality criteria across different watersheds would represent a minimal change in administrative costs. The stormwater design, evaluation, and permitting process would remain unchanged. The DCR stormwater compliance spreadsheet would require only minor changes. The type of stormwater practices offered and the design criteria of those practices would not need to be modified.

4. Projected cost of the regulation on local governments

The proposed regulation will require local governments to spend additional resources on administering stormwater control. The proposed regulation aims to extend federal authorization for administering the Virginia Stormwater Management Program General Permit for Discharges of Stormwater from construction activities (4VAC40-6-102) to local governments. The proposed regulation establishes standards and procedures of a locally administered stormwater management program. In delegated program areas, this proposed change will consolidate permitting of land disturbing activities into a single permitting process with the potential of streamlining the permitting process for regulated entities.

In general, local administration of a stormwater program involves a number of activities including:

- Stormwater BMP plan review and approval
- Stormwater BMP construction inspection
- Stormwater BMP record keeping/tracking
- General Permit coverage issuance
- General Permit enforcement
- Stormwater BMP long-term post-construction compliance monitoring & enforcement
- Receipt of permitting and program administration fees

This analysis below draws upon two data sources. First, DCR conducted a survey of local stormwater and erosion and sediment control programs in the summer of 2007. Thirty-three counties (more than a third of all counties) and 9 cities completed or partially completed the survey. Second, during the fall 2008, interviews were conducted with staff for 7 large stormwater programs within the Chesapeake Bay Preservation Act area (jurisdictions representing about a third of Virginia's total population).

The analysis identifies possible ways the proposed changes will impact program administration costs to state and local government. The expenditure of additional resources to implement the proposed changes represents a societal cost that is in addition to practices and actions associated with constructing and maintaining stormwater control practices. Any changes in program administration cost, however, must be distinguished conceptually from those who will pay the cost. Although program costs are expected to increase for state and local governments in ways described below, the proposed fee structure will mean that a portion of those costs will be paid by the regulated community.

Based on available information, most localities with stormwater management programs rely primarily on conventional stormwater control practices (e.g. extended detention basins and wetponds) to meet existing water quality and quantity criteria. These conventional practices can also be used to capture and treat runoff from a larger land area. Some local governments have expressed concern that the emphasis on runoff reduction and the more stringent water quality criteria will increase the use or need of less conventional and smaller scale stormwater control practices. The expected change in the number and

composition of stormwater BMPs is expected to increase local government administration costs in several ways. During interviews, some local stormwater managers estimated that five to ten smaller scale stormwater BMPs may be needed to treat a given land disturbance that would have been treated with a single conventional best management practice under the existing regulations. The increase in the number and type of BMPs needed to treat any given acre of disturbed land may increase local stormwater program administration costs.

Stormwater plan review costs are expected to increase. Plan review will require more hours and perhaps the acquisition of additional expertise or training of existing personnel as the complexity of stormwater designs increase. Depending on the complexity of the smaller scale distributed infiltration and filtration BMPs, construction inspection costs may increase. First, localities may not have expertise to inspect for the proper installation of practices such as green roofs, porous pavement, and practices that require subsurface infiltration and drainage structures. Some local programs have suggested that they may need to either hire additional expertise or contract out for inspections for certain types of practices. DCR also plans to offer certification and training programs designed to provide training necessary to appropriately assess these practices. Similar to some conventional stormwater controls, additional inspections may be required during construction for some practices – for example infiltration and filtration practices currently available for use that require subsurface drains and specific soil mixes that should be inspected during construction. Finally, use or reliance on smaller scale BMPs (often collectively referred to as LID) increases the number of facilities needed to treat a given land development, thus increasing the number of inspections and the related costs.

An effective stormwater program also requires a system to inventory and track BMPs, long-term compliance monitoring (inspection), and enforcement against noncompliance. Such a system is essential to ensure that practices continue to provide water quality and quantity control services over time. A long-term compliance system requires developing a BMP tracking system, system of inspection, administration and follow-up for violations, and initiation of enforcement actions if deficiencies and violations are not corrected. Recent reports conclude that a major challenge confronting stormwater programs across the United States is inadequate plans and resources to ensure the long-term maintenance of stormwater infrastructure (GAO 2007; NRC 2008).

A long-term inspection and compliance program is typically the last programmatic phase to be developed in most stormwater management programs. In fact, many localities interviewed indicated that many long-term inspection/compliance programs have just recently been actively implemented. The inspection programs include efforts to identify and cooperatively correct any observed deficiencies or violations of maintenance agreements. Active enforcement in terms of pursuing legal remedies against persistent instances of noncompliance has not been confronted for many active stormwater programs. Some general estimates of stormwater annual inspection and enforcement costs provided by local program administrators range from $100 to $500 per stormwater practice. Based on limited evidence from stormwater programs, approximately 1 full time staff equivalent is required for long-term inspection/compliance for every 400 to 450 stormwater practices in the local stormwater inventory (assuming inspections occur every 1 to 2 years).[37] Given that the number of practices needed to treat any given area may increase significantly, long-term compliance and enforcement costs will be expected to increase as the rate of new stormwater BMPs added to the existing stormwater inventory increases. The stormwater infrastructure inventory represents a long-term regulatory responsibility and growing cost obligation to local stormwater programs. The new emphasis on run-off reduction, however, may offset some of these costs because of avoided future administration and remediation costs from local drainage problems.

Proposed regulations, however, offer opportunities to manage these additional costs of a long-term inspection and maintenance program. The proposed regulation requires local stormwater programs to develop an inspection program. The inspection program, however, includes a priority system that would allow a locality to target inspections (frequency, type, etc.) based on a number of factors including the

[37] Based on limited evidence, local stormater programs in Virginia average about 400 to 450 stormwater BMPs per 100,000 people under the existing regulation.

type of stormwater practice, contributing drainage area, and downstream conditions (4VAC50-60-114D). In concept such a priority system could target inspection in relation to the relative contribution of any given practice to water quality improvement or the probability of failure. DCR is also considering developing a stormwater practice tracking and reporting system that could help reduce inspection administration costs.

Local stormwater programs can also rely on the private sector to carry out some of the inspection activities. Private inspections are allowed if conducted by a licensed professional and paid for by the owner of the stormwater facility (4VAC 50-60-114C and 114.D4) and in accordance with the inspection schedule outlined in the stormwater facility maintenance agreement (4VAC50-60-124). Although such provisions do not avoid the social cost of inspections, it does allow the local stormwater program to shift some inspection costs to the private sector.[38]

Local government programs might face higher long-term costs associated with maintaining BMPs. The proposed regulations encourage the assignment of long-term maintenance costs to private landowners. The regulation states that the responsibility for long-term operation and maintenance of stormwater facilities shall remain with property owner or other legally established entity, unless assumed by a government agency (4VAC50-60-124). In many local programs, however, the responsibility of long-term maintenance is frequently assumed or partially assumed, particularly in residential areas, by the local government. Often the landowner or homeowner association will assume responsibility for routine maintenance while the local program will assume responsibility for major retrofits and repairs. Local programs will elect to assume partial responsibility for some types of stormwater practices in some situations because of a perceived inability of the private landowner to effectively carry out the long-term maintenance requirements (Ruppert and Clark).[39] Furthermore, as the number of stormwater BMPs proliferate, particularly in residential developments, the probability that some responsible parties will not have the financial means to maintain the BMPs increases. In cases where the legally responsible party does not have the financial ability to pay for maintenance or BMP repair, the local government may face the choice of whether to let the practice fail or assume the long-term cost obligation itself. The precise magnitude of the increase, however, is uncertain since most local programs have limited long-term experience with the maintenance and performance of nonconventional best management practices (the relatively few number of nontraditional practices implemented have been done so only recently) and it is unclear how prevalent the sharing of maintenance responsibility will be.

Some of the proposed stormwater management practices may also present unique monitoring and enforcement challenges. For example, rain gardens, porous driveways, cisterns, green roofs, grass swales, and some types of land use easements (to preserve forest cover for example) are distributed small scale stormwater treatment options that may be located on individual residential properties. The proposed regulations require local stormwater programs to require right-of-entry agreements or easements from the property owner for purposes of inspection and maintenance (4VAC50-60-124C). Placing BMPs on individual parcels, however, can result in management challenges because residents are often unaware of the maintenance requirements or obligations for practices on their property (Ruppert and Clark 2008). Furthermore, local governments may be reluctant to require small scale practices due to privacy and political expediency concerns, particularly in residential situations (Ruppert and Clark 2008). Consequently, local stormwater management programs in Virginia often prohibit or restrict the use of stormwater practices on individual residential lots.

In addition, verifying compliance may be difficult for some nonconventional stormwater control practices listed in the regulation. Most compliance inspections are done through visual inspection. Maintenance of conventional systems, such as ponds, can be done through checks of trash/sediment and, periodically,

[38] The use of private third party contractors, however, would also require a separate set of oversight costs. The use of private inspectors to verify performance create incentive compatibility issues because neither the private inspector or the regulated party have an inherent interest in the public's interest in maintaining BMP performance (Ruppert and Clark 2008). The private inspector has a primary interest in paying clients and the client has an interest in a quick and favorable inspection. Thus, private inspections still require cost to certify and spot check private inspectors.

[39] The proposed stormwater revisions also allow local governments to conduct necessary repairs or maintenance on negligent stormwater facility owners and then recover the costs from the owner (4VAC50-60-124A).

dam structure. The performance of many nonconventional practices (some practices referred collectively as LID) can be more difficult to verify (Ruppert and Clark 2008). For example porous pavement requires scheduled vacuuming/sweeping to prevent fine particles from decreasing water infiltration. Cisterns require active draw-downs after storm events in order to maintain runoff reduction capacity. Such behavioral actions necessary for maintenance are more challenging to verify. The proper functioning of infiltration or filtering practices may be more difficult to verify except during storm events.

Given the implementation costs and challenges noted above, local stormwater programs may have legitimate reasons for limiting the use of some types of stormwater treatment practices in their jurisdiction. For example, small scale distributed practices may be discouraged by local governments out of legitimate concerns about the public acceptability, long-term cost obligations, or out of concerns of documenting/maintaining performance over time. Restricting BMP options available for land disturbers, however, may make compliance more difficult and costly. Given the stringency of the proposed stormwater quality criteria, it is unclear whether conventional treatment options alone can achieve compliance in some circumstances. Thus, local stormwater programs may face a trade-off between private compliance costs and local government implementation cost. Limiting the number of stormwater practices that can be used to achieve compliance may reduce local government implementation costs but increase private stormwater compliance costs because some lower-cost stormwater control options have been eliminated. If the local program fails to offer enough control options, land developers may find it more difficult to achieve compliance on-site.

4a. Existing Local Stormwater Programs: Program Administration Costs

All counties and cities covered by the Chesapeake Bay Preservation Act (29 counties, 17 cities, and 38 towns) and counties and cities covered by MS4 permits are required by statute to administer a local stormwater management program. Non-CBPA localities required to operate delegated stormwater programs include the cities of Bristol, Charlottesville, Danville, Harrisonburg, Lynchburg, Roanoke, Salem, Winchester, and Christiansburg/Blacksburg area and the counties (partial or total) of Albemarle, Botetourt, Roanoke and Loudoun. These areas represent approximately three quarters of the state population and cover roughly the same percentage of all disturbed acres (2005 to 2007).

The cost to these jurisdictions to implement the new regulations is subject to considerable uncertainty for reasons highlighted above. Most local governments interviewed were reluctant or unable to provide an estimate of the amount of new resources needed for implementation. All agreed that additional staffing and budgetary resources would be necessary.[40] The challenge of estimating future costs are compounded by the fact that many localities felt that additional resources were needed to adequately implement *existing* stormwater and erosion and sediment control programs. For example, the 2007 DCR survey found that less than half of local stormwater programs had adequate staffing to implement *existing* stormwater requirements. In addition, staff and budgetary resources for erosion and sediment control, zoning, and public work functions are often shared with stormwater management programs, thus making it challenging to isolate costs attributable to just stormwater management. The overlapping responsibilities of program implementation (E&S, stormwater, public works) and the challenge of separating costs across existing and new proposed activities further complicate estimating the increase in costs associated with proposed regulation.

Either through the interview process or the DCR survey, eleven local stormwater programs provided an estimate of the increase in costs or staff needed to comply with the proposed regulations. These programs represented almost one fourth of all disturbed acres in the set of localities identified above. These localities estimated 31 to 41 additional staff in total would be needed to administer the proposed regulation. Three localities provided a minimum estimate of additional staffing needs (e.g. “need at least 2 additional staff”). A rough estimate of the incremental staffing costs for these 11 localities would be between $2.6 and $3.4 million per year.[41] Assuming the remaining localities with existing stormwater programs would have to increase in the roughly the same proportion as this sample, total estimated local

[40] These additional costs would be fully or partially covered by new stormwater fees.
[41] Assumes full time equivalent staff paid at $36/hour (wage + fringe) plus 10% overhead costs.

government staffing costs may be between $10.6 and $14.2 million per year.[42] These totals exclude increases in long-term maintenance and repair costs that may be assumed by the local programs as a result of the implementation of the proposed regulation. These cost estimates do not include additional educational and technical materials that must be developed to successfully implement the new program (discussed below). Finally, these costs also exclude the annual increase in inspection, tracking, and enforcement costs that will occur as the stormwater infrastructure inventory grows.

4b. Administration of Local Stormwater Programs in Areas without Existing Stormwater Program

The proposed regulation would also require all areas outside the Chesapeake Bay Preservation Act and MS4 programs to comply with the proposed revisions to the regulation. These localities have the option for DCR to administer the stormwater program or applying to assume responsibility for local program administration. These localities include the remaining 62 counties as well as 12 independent cities.[43] Towns in these counties also have the option to develop their own program. While representing almost two-thirds of the land area in the state, less than one quarter of the citizens live in these areas. An estimated one quarter of all land disturbed acres in the state between 2005 and 2007 were located here.

It is uncertain what percentage of these local governments will elect to administer a stormwater program. Most of these local governments currently only administer erosion and sediment control programs. Furthermore, state and local programs are struggling to adequately implement the existing E&S program. Of the twenty counties and independent cities responding to DCR's 2007 stormwater survey, only 15% indicated they had sufficient staff resources to administer the existing erosion and sediment control programs. Given the limited existing resources for E&S implementation and almost no experience with stormwater programming, the expectation is that DCR will initially administer the majority of these programs. Regardless of administrative agency, the stormwater programs in these areas will need to be built up from a minimal programmatic foundation.

For purposes of this analysis, it will be assumed that the cost to implement local stormwater management programs in these areas will be incurred (at least initially) by DCR (see next section). To the extent local governments in these areas assume responsibility for program administration, estimates of local government costs can derived from the discussion in Section II.5a.

5. Projected cost to the state to implement and enforce the proposed regulation

5a. DCR Administration of Local Stormwater Programs in Nondelegated Areas

For purposes of this analysis, it is assumed that DCR will administer local stormwater programs in 62 counties (and towns within) and 12 independent cities. These local governments do not currently administer a local stormwater program and are not required to assume this responsibility. The activities DCR must implement in the administration of these programs are the same as described in section 4.

Estimates of the cost to administer these local stormwater programs are derived using two data sources. First, DCR provided an estimate of the staffing requirements and administrative costs. Second, program staffing in the nondelegated areas was estimated based on the current staffing requirements from operating local stormwater programs in Virginia. Staffing requirements for a sample of existing local stormwater programs was obtained from the 2007 DCR survey of local stormwater programs. Coupled within information on disturbed acres, these staffing estimates could be expressed as stormwater staff requirements per unit of disturbed acres and applied to the nondelegated area.

[42] These represent estimates of the increase in social cost. How these costs are shared between local government programs and the private sector (who pays) depends on the amount of stormwater fees collected. See the discussion of fees (pages 22-24) for estimates of total fee revenue.

[43] Includes all counties outside the CBPA and without a MS4 program and the cities of Bedford, Buena Vista, Covington, Emporia, Franklin, Galax, Lexington, Martinsville, Norton, Radford, Staunton, and Waynesboro.

DCR originally estimated that 24 full time staff would be required to administer the local stormwater program in nondelegated areas (it should be noted that this estimate was based on the issuance of 3,000 permits per year and DCR plans to revise their staffing needs and costs upon finalization of their revised permit computations). Including administrative expenses and staffing costs, DCR initially estimated the total cost to pay and support this staff would be $1.962 million.[44] It should be stressed that this cost estimate does not represent the incremental cost of the proposed regulation. Some of these staff resources are also required to administer the existing regulations. Thus, the incremental cost to administer the proposed regulatory revisions is some portion of these costs.

Another estimate of local stormwater staffing requirements for these nondelegated areas was made based on the staffing requirements of existing local stormwater programs. Stormwater program staff estimates for 12 local stormwater programs were obtained primarily from the 2007 DCR survey. Based on DCR estimates of disturbed acres, these 12 stormwater programs administer approximately the same number disturbed acres as the total area DCR is expected to administer (62 counties, 12 independent cities). The 12 local programs estimated that approximately 27 full time staff are devoted to stormwater management activities, but need an additional 13.5 staff to fully implement the existing regulation. Using these estimates of the staffing needs from existing local stormwater programs, then DCR may need between 27 and 40.5 full time staff to implement stormwater programs in nondelegated areas at a cost ranging from $2.2 to $3.3 million. The lower estimate is similar to the initial staff estimate calculated by DCR. Such calculations will be revised by DCR.

Several caveats are necessary. The staff estimate based on the staff of existing stormwater programs might be viewed as an underestimate because local programs also indicate the need for additional resources to implement the proposed regulations (see Section 4a above). DCR, however, may be able to achieve some administrative economies of scale by consolidating administrative activities across larger geographic regions in their regional offices.

5b. DCR oversight costs[45]

Under program oversight, DCR will be responsible for the auditing of all local programs on a periodic cycle to insure compliance. A large initial workload will exist in program development including DCR support of the development and review of local program submittals to the Virginia Soil and Water Conservation Board. Associated program development issues will shift through time, but remain indefinitely. Other technical assistance will include supporting local plan review, oversight inspections, and BMP questions. Further, DCR will be required to respond to complaints not resolved at the local level and will need to address issues related to permit issuance and fee accounting. In addition, DCR will develop and maintain the BMP Clearinghouse and the enterprise website and maintain the stormwater management handbook. DCR's initial estimates of staffing needs and computations are based on the issuance of 3,000 permits per year and are subject to revision upon finalization of the permit computations. Initial calculations were as follows:

- 30 FTE x current average salary and benefits of $35.46/hr x 2080 hrs/yr = $2,212,704
- 30 FTE x $8,000 for administrative expenses including rent, utilities, computers, training, travel, printing expenses, etc. = $240,000
- Annual contract costs associated with enterprise website and BMP Clearinghouse = $200,000
- Training costs, $250,000/yr
- Minimum total annual cost = $2,902,704

It should be recognized that the estimated program oversight cost of $2.903 million is not an estimate of the new costs required to meet the proposed revisions to the stormwater regulation. A number of the

[44] Assumes hourly salary and benefit rate of $35.46/hr and $8,000 in administrative expenses (overhead, travel, etc) per staff position.

[45] This section draws text and estimates directly from "Discussion Document on Department Fees" (pp. 3-6), Virginia Department of Conservation and Recreation (September 8, 2008).

staff included in the estimate above (including those needed for oversight and program administration collectively) are already on staff at DCR and do not represent new positions. A detailed explanation of DCR oversight activities for the stormwater management program is as follows:

Program Audits – 4FTE

DCR staff will conduct program audits on all local and DCR administered stormwater management programs. The audits will evaluate compliance with the Stormwater Management Act and attendant regulations. The audit will evaluate the following:

- Local program ordinance and procedures
- Stormwater plan reviews
- Inspections of active projects
- Inspections of completed projects and associated stormwater BMPs
- Compliance and enforcement efforts
- Complaint responses
- General Permit coverage

A 3-year review cycle would utilize two 2-member teams. The review effort will be as follows:

- 3-year cycle – 60 programs reviewed per year
- Each team to review 30 programs per year
- Time for one program review – 1 week
- Time for one program Corrective Action plan and Technical Assistance for program development – 0.5 week

Program Audit Staffing need = 4 FTE

Program Technical Assistance – 5FTE

DCR staff will provide technical assistance to local programs regarding plan reviews, inspections, BMPs, and interpretations of the Stormwater Management Act and attendant regulations. DCR staff presently provide this assistance in the ESC Program and staff records indicate an average assistance to each program of 6 days per year. DCR field staff or contractors implementing the program locally will need equivalent support.

179 programs x 6 days = 1074 days x 8 hrs/day = 8,592 hrs

Staff estimate for technical assistance = 8,592 hrs / 1,832 hrs/staff = 4.7
Program Technical Assistance support need = 5 FTE

Complaint Resolution by DCR – 3FTE

DCR staff will respond to complaints regarding stormwater management issues that are not resolved satisfactorily by the locally run programs and in support of regional DCR implementing staff. Based on DCR staff records, approximately 212 complaints are received annually. Time estimates for complaint response varies from 1 day to several weeks. The average time for complaint resolution is approximately 3 days.

Complaint Response – time/staff estimates:

212 complaints x 3 days/complaint = 636 days x 8 hrs/day = 5,088 hrs

Staff estimate for complaints = 5,088 hrs / 1,832 hrs/staff = 2.8 Staff
Program Complaint Resolution Assistance support need = 3 FTE

DCR Program Coordination and Development by DCR – 12FTE

For DCR run local programs, DCR staff will spend considerable time and effort in coordinating with localities and in ensuring the proper integration of the DCR run stormwater management program with the locality's related permitting programs. Staff will have to meet regularly with local staff to properly integrate project submissions, reviews, approvals, and permitting. Also, there is the initial workload associated with assisting localities in preparation of their program submittals for the Virginia Soil and Water Conservation Board and then on-going to assist with corrective actions following program reviews, etc.

73 DCR-run programs x 3 weeks/locality = 219 weeks x 40 hrs/week = 8,760 hrs
106 local-run programs x 1.5 weeks/locality = 159 weeks x 40 hrs/week = 6,360 hrs

Staff estimate for program coordination = 15,120 hrs / 1,832 hrs/staff = 8.3 Staff

Program management, EPA coordination, record oversight, permit tracking, reporting, regulatory coordination, and financial management = 4 Staff

Program Coordination and Development support need = 12 FTE

DCR Enforcement Actions – 4FTE

DCR may become involved in enforcement where compliance is not achieved at the local level. The majority of enforcement actions are successful in their initial stages. However, some compliance issues are not resolved locally and require more significant enforcement responses in order to achieve compliance or extract penalties.

If we assume that 3,000 permits will be issued annually and that the occasional significant enforcement actions equate to an average of 2.5 hours per permit issued, then enforcement time will require 7,500 staff hours per year or 4.1 staff.
Program Enforcement Action support needs = 4 FTE

Enterprise Website – 1FTE

DCR will develop and implement an enterprise website related to the implementation and tracking of the consolidated stormwater management program. The enterprise site will allow for online payment of fees, distribution of the fees paid to localities and DCR, general permit issuance and program reporting. After the initial development and testing costs, DCR will have costs associated with the operation and maintenance of the enterprise site. These operation and maintenance costs are expected to total $100,000 per year to cover annual server and network costs.
Enterprise Website support needs = 1 FTE plus annual server and network costs

BMP Clearinghouse and Website – 1FTE

DCR will develop and oversee a BMP Clearinghouse and website to provide up-to-date information related to stormwater management practices and program guidance. The clearinghouse will require development and maintenance contracts with the Virginia Water Resources center at Virginia Tech. The anticipated costs associated with the oversight and maintenance of the clearinghouse is approximately $100,000 per year.
BMP Clearinghouse and Website support needs = 1 FTE plus annual contract costs

Training and Certification Costs

DCR will face significant transition costs in implementing these regulations. More than half of all local governments and local developers across the Commonwealth have little or no experience or expertise in stormwater management. For local programs with stormwater programs, the state is also introducing new

compliance tools and the regulations encourage a variety of stormwater practices which many local programs have not yet (to date) promoted or have little experience with reviewing design specifications or inspecting. This transition will require investments by DCR in stormwater program education and dissemination of technical information. A certification program will be required for locality and DCR staff. DCR expects that the development and implementation of the training program will cost approximately $250,000 per year.

5c. Local Program Costs and Fee Revenues

DCR expects to pay for the majority of state stormwater program operating costs (oversight as well as operating local programs) with permit fee revenue (Table 6). These fees are based on the number permits managed each year by DCR or by the designated local stormwater programs. Fee revenue would appear sufficient to pay for the majority or all of the incremental program administration costs in an "average" or typical year. Yet, program revenue will be largely dependent on the level of economic activity in the construction industry. Furthermore, fee revenue would be expected to show more variation over the business cycle than other revenue sources (e.g. general tax revenues or general stormwater utility fees). For example, consider housing starts as one proxy measure for the possible variation in fee revenue (see Figure 1). The historical record shows that housing starts can change dramatically around the business cycle. For instance, 2 to 3 years during an economic recovery, housing starts can more than double in number. The downside risk is similar in magnitude. Between 1989 and 1992 housing starts fell by half. Similar or greater drops were experienced in the early 1980s. The extent to which housing starts and construction activity will drop in the current recession is yet to be seen. Assuming building permits track closely with stormwater permit applications in terms of relative volatility, such data give a sense of the relative magnitude of revenue variability that could be faced by the state stormwater program.

Some program costs (program oversight costs, long-term inspection/enforcement, maintenance costs) must be incurred annually, and are mostly independent of the level of current development activity. Given that DCR and local program activities under this proposed rule face a highly variable revenue source, DCR and local governments should develop clear plans to manage its variable revenue stream in a way that does not disrupt monitoring and enforcement of these regulations.

5d. VDOT compliance activities and costs

The cost of road construction will increase as a result of the proposed regulation. While costs will increase, a total annual estimate of the increased cost to comply with the proposed standards, however, could not be estimated at this time. Between 2005 and 2007, Virginia Department of Transportation road construction projects obtained permits to cover slightly more than 1,000 disturbed acres per year for the state.

The proposed regulation will increase both road construction and post construction maintenance costs. The redevelopment water quality criteria would apply for road construction and improvement projects to existing roads. New road or major expansions of existing roads will likely be subject to the proposed 0.28lb/ac phosphorus water quality standard. Under current regulations, the vast majority of stormwater control structures constructed for road projects are extended dry detention basins. To achieve compliance with the new water quality criteria will require greater reliance on filtration and infiltration types of BMPs. As noted in the cost discussion above, such practices are often more costly to both construct and maintain. Furthermore, new road construction will likely require wider right-of-ways in order to install stormwater control practices, thus increasing land acquisition costs.

VDOT expects achieving the redevelopment water quality criteria for projects located in urban areas and rural secondary roads will be more technically challenging and costly than for new road projects. Urban areas and rural secondary roads typically have narrow right-of-ways. Urban streets may face additional challenges to treating water in high percentages of impervious surface and curb-and-guttered streets. All limit the suitable land areas for treating stormwater runoff. In many cases, VDOT expects to rely on some off-site controls to achieve compliance.

6. Summary

The proposed revisions to Virginia stormwater regulations will likely produce improvements in the condition of receiving waters. The new emphasis on reducing runoff volumes can produce important benefits related to the condition of aquatic habitat by reducing the energy pulses produced during storm events. New water quantity control requirements also provide benefits in terms of additional flood protection and instream aquatic protection. Acknowledging and accounting for the runoff reduction potential of many types of stormwater control practices will increase compliance options and increase the effectiveness of state stormwater regulations.

The proposed regulatory revisions also impose more stringent stormwater water quality criteria. The proposed stormwater regulatory revisions will produce additional reductions in phosphorus and other effluent loads produced from urban land conversion (land use change to impervious cover and turf). Achieving additional improvements in the quality of stormwater will impose new costs on land development activities. In development case examples, the new water quality and quantity standards could be achieved on the development site. The cost of incremental reductions in nutrient loads from the application of stormwater controls, however, is high relative to other nutrient removal options. Uncertainties exist over the long-term cost and effectiveness of many stormwater control practices. The cost of achieving additional nutrient reductions in highly urban settings and other areas with site specific constraints is still uncertain but potentially high. The off-site and pro-rata provisions in the regulation offer opportunities to lower costs and enhance benefits to affected watersheds if properly implemented. The total incremental costs to the state of implementing additional stormwater control practices to meet the proposed regulatory changes could not be estimated at this time.

The proposed revisions apply the same water quality and quantity criteria across the entire state. New proposed stormwater water quality criteria was based on estimates of the nutrient reductions needed to achieve reductions called for in the Chesapeake Bay Tributary Strategies. Economic efficiency of the proposed regulation could be improved by applying differential water quality criteria in watersheds across the state based on the relative water quality benefits that can be achieved.

The proposed regulation will produce improvements in the stormwater permitting structure and will strengthen the administrative tools localities need to implement stormwater programs. While the proposed changes will increase the number and type of control practices that can be used, these changes will also increase the sophistication and resources needed for stormwater design and program administration. The greater expected use of smaller scale distributed practices could increase the costs of local stormwater management, particularly in terms of ensuring the long-term maintenance and performance of stormwater control practices over time. The local and state government cost to administer local stormwater programs will increase (rough estimates range between $13 and $17.5 million, but estimates are not final). State agency cost (DCR) for overall program administration will be a minimum of $3 million per year (estimates are not yet final). These costs are expected to be partially to fully covered by additional fees imposed on land disturbing permit applicants.

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