Effects of Environmental Regulatory Systems on Housing Affordability

Prepared for:
U.S. Department of Housing and Urban Development
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Prepared by:

John Randolph
Arthur C. Nelson
Joseph M. Schilling
Jonathan Logan
Urban Affairs & Planning – School of Public & International Affairs
The Center for Housing Research
Virginia Polytechnic Institute and State University
Blacksburg, Virginia 24061

Mark Nowak
Newport Partners, LLC
3760 Tanglewood Lane
Davidsonville, MD 21035

James M. McElfish, Jr.
Environmental Law Institute
2000 L Street, NW, Suite 620
Washington, DC 20036

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NOTICE

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Contents

EXECUTIVE SUMMARY

By some projections, the United States will add 100 million people faster than any country on the planet except India. This translates into a net increase of about 40 million homes. This growth will occur largely in areas already challenged by declining supplies of land suitable for efficient development and shifts in demand favoring different – often higher density housing in more mixed-use configurations. The environmental implications of future growth may be significant, and there is a current debate about how to balance meeting housing growth pressures affordably and protecting the environment. Environmental mandates have proliferated and grown more important over the last two decades, but little research has been done to determine what kinds of impacts they have on the provision of affordable housing in communities across the country. Many have argued that environmental regulations have driven up the cost of housing and serve as a critical barrier to affordable housing, but there is little empirical evidence of the impact.

Because so little is known definitively, there is a need to identify promising and needed areas of research, conduct the needed research, and pursue corresponding policy implications of the research findings. The purpose of this study is to clarify research issues in the investigation of environmental regulations and review processes as regulatory barriers to housing affordability and to identify areas for further research that address important relevant policy issues. The study focuses on just four U.S. housing markets, only one in detail, and while it provides some of the first empirical data on the costs of assessments, compliance and delays from environmental regulations, the limited geographic scope makes the study preliminary in nature. It is not intended to provide definitive, broad-based, representative findings that can be broadly generalized. The results are suggestive, or heuristic, and are intended to set the stage for more targeted research to be pursued in more detailed studies.

The Report Roadmap and Chapter Summaries

Chapter 1 reviews the role of environmental regulation as a barrier to the production housing that is affordable to the largest number of households, summarizes research on the relationship of regulatory barriers in general to the production of affordable housing, acquaints the reader with the evolution of the residential subdivision process over the past century – observing that the current era of environmentally-sensitive regulation of residential subdivisions began in the early to middle 1970s, and notes the conundrum of assuring a quality environment while also meeting housing affordability needs. (The term “housing affordability” is used to prevent confusion with HUD’s specific definitions on what constitutes “affordable housing.”)

The chapter also describes a key consideration in the housing development process: How developers decide to proceed with a development proposal. A key step in the development process is “Due Diligence Review” in which a developer assesses the potential for a site to meet market needs, considering improvement costs including environmental costs, the time it will take to secure entitlements, a risk factor, its own overhead and a competitive profit, plus the opportunity cost of money. The more certainty developers have about the costs and process, the better they can negotiate land purchase agreements that internalize those costs. The less certainty, the higher the risk and the higher the profit needed to reward the risk, and also the less

likely a development can include housing that is affordable to a larger number of households in its mix.

The chapter continues with a review of the **research design** guiding work leading to this report. In brief, in addition to extensive literature review, the research is based on a Pilot Study and Focus Groups to inform its policy analysis. The **Pilot Study** is based on in-depth studies of several residential subdivision projects approved in the 2000s throughout the suburbanizing Washington, DC metropolitan area. This Pilot Study area is uniquely suited for the research because it provides an opportunity to examine differences in residential subdivision permitting procedures and environmentally-related regulations among different jurisdictions in the same housing market. The research is also informed by three **Focus Groups** of developers empanelled to represent different environmental conditions, regulatory regimes, planning cultures, and land supply limitations. The focus groups were held in the metropolitan areas of Denver, Dallas and Tucson.

Chapter 1 notes important limitations facing the research team. The research focuses principally on new residential subdivisions in suburbanizing areas and how local governments apply local and state (and to a limited extent, federal) environmental regulations. Because of limited resources and limited access to reliable data on project costs on a national basis, the results are based on four housing markets, thus limiting the extent to which they can be applied nationally.

Chapter 2 includes a **literature review** addressing the nature and complexity of environmental regulation at all levels of government, including, for example, rules for stormwater, flooding, erosion and sediment, wetlands, wildlife habitats, air quality, vegetation, noise, site remediation, and others. The chapter reviews literature on how those regulations interface with residential development permitting processes. In particular, the chapter reviews what is known in the literature about three potential cost impacts of environmental regulations: **1) procedural delays, 2) costs added to development to meet environmental conditions, and 3) the removal of land from development supply**. Some state and local governments have attempted to remove regulatory barriers by streamlining review processes, clarifying requirements to reduce uncertainty, and encouraging affordable housing through incentives, funding, and regulatory exemptions. Some have developed emerging programs which aim to integrate environment and affordability, such as brownfields redevelopment, compact/mixed income development, and community revitalization.

This chapter notes that many questions remain unanswered by the literature including: 1) the extent to which environmental regulations actually pose barriers relative to other regulations (e.g., zoning and subdivision regulations) and market forces; 2) the relative impact of regulatory requirements (standards and measures) versus implementation (review process delays) on housing affordability; and 3) the role of reforms and incentives to balance the objectives of housing affordability and environmental protection.

In order to establish a baseline for the analysis, **Chapter 3** reviews what local environmental regulatory and residential subdivision permitting processes were like at the beginning of the modern environmental epoch of planning – the middle of the 1970s. Two **baseline** continua were developed from previous studies: environmental costs and procedural review timelines.

The first was on the cost of making environmentally-related improvements to residential subdivisions in the middle 1970s. The evidence indicates that stormwater and tree preservation/installation costs ranged about 6-12 percent of total average lot costs. (These were the principal environmentally-related costs locally applied at the time.) With this, the research team constructed an **environmentally-related improvement cost continuum** as follows:

< 6% of Lot Cost	**6-12% of Lot Cost**	**>12% of Lot Cost**
Low	**Normal**	**High**

Information on review times for processing subdivision approvals was also aided by survey research conducted in the middle 1970s. The research team found that a typical residential subdivision required about **15 months to process in the middle 1970s.** About a third of the time, however, developers needed zoning relief in the form or rezoning, variance, and/or special exception that may add two to six months to the process. Using this evidence the research team constructed a **baseline residential subdivision permitting continuum**:

<7 months	**7-12 months**	**13-24 months**	**24+ months**
Expedited	**Accelerated**	**Normal**	**Delayed**

Chapter 3 then examines research completed in 2002 addressing many of the same procedural issues. It found that the incidence of residential subdivisions requiring zoning relief increased from one third to about 45 percent, and on average it appeared that the **typical time to process a residential subdivision between 1975 and 2002 increased from 15 months to 17 months**. Processing time increased, but it has increased only by an order of 2 months or about 13 percent, despite a consensus that regulatory processes have become vastly more complicated since the 1970s. Available research is simply unable to ascribe any part of this relatively small increase in processing time to locally applied environmental regulations.

The cost and process continua are broad, national average benchmarks. These may bear little resemblance to particular regions or unique local conditions. They also apply mostly to new, suburban density single family detached residential subdivisions in "green" fields and not to complex, mixed-use, mixed-housing, urban/suburban in-fill or redevelopment sites. However, they provide a basis for comparison of current research both nationally and in particular markets.

Chapter 4 presents the Greater Washington Metropolitan Pilot Study. It consists of detailed case studies of six residential development projects spread across the case study area provided by regional- and national-scale developers developing new, market-rate housing. The Table ES-1 summarizes the highlights of the case studies.

Three points of interest emerge from the Pilot Study:

1. Almost all cases required zoning relief and the overall average time-to-approval was 24 months. This is at the top end of the "normal" range of the processing continuum identified in Chapter 3. Both the Fairfax County cases were among the fastest to approval although

still well within the "normal" range of the continuum. The one "by-right" case in Loudoun County took nearly as long as the regional average but was still 5 months faster to approve than the rezoning case study in the same county. Development approval in Montgomery took the longest, but developers in Montgomery plan on this period of time since it is based on published processing schedules that more-or-less reflect reality. Long approval time in the Prince William County case took more time than expected because of delays in having staff review the application and decide the appropriate conditions of approval. With one exception, the developers could not assign differences in variation of time-to-approval time to environmental regulations.

2. Second, environmentally-related costs per finished lot, based on an estimate of the market-clearing price of a finished lot to builders, averaged 4.7 percent. The range was from 1.9 percent (for the Loudoun County project requiring zoning relief) to a high of 8.4 percent (for the "by-right" Loudoun County project). These figures are at the low-end of the environmentally-related cost per lot continuum existing in the middle 1970s based on analysis reviewed in Chapter 3.
3. All developers indicated that for the kinds of residential subdivision projects included in the Pilot Study the typical *improvement* cost per lot is about $75,000. This includes all site preparation and infrastructure improvements plus the permit processing time, overhead and cost of money. With an average of $8,600 in environmentally-related costs per finished lot, the share of such improvements to the total cost of making a lot available for development (exclusive of raw land price) is about 11.5 percent. This is higher but not much higher than the 9.2 percent share reported in Chapter 3.

Table ES-1 Pilot Study: Comparing Six Case Studies

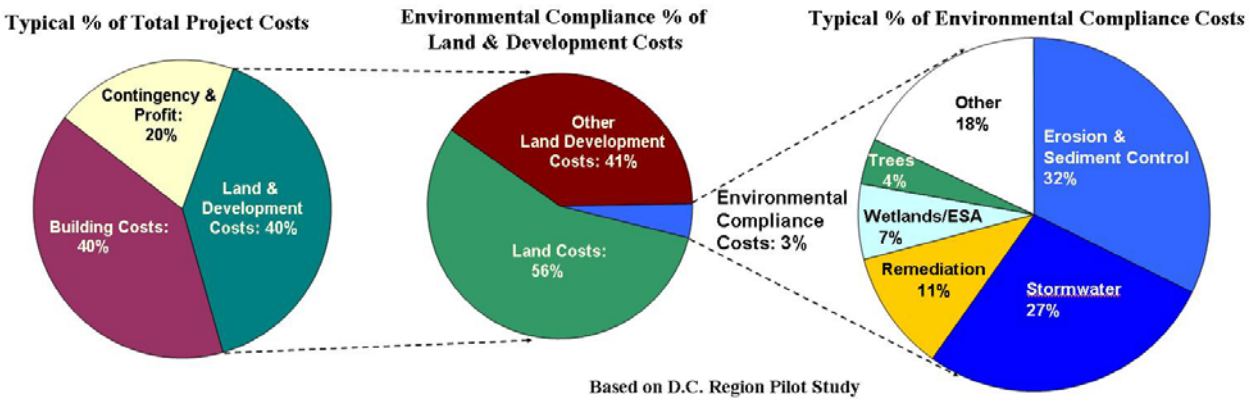
Feature	**Fairfax 1**	**Fairfax 2**	**Montgomery**	**Loudoun 1**	**Loudoun 2**	**Prince William**	**Average**
Land-Use Decision	Rezoning	Rezoning	Rezoning	By-right	Rezoning	Rezoning; plan amendment	
Acres	300	50	100	200	200	100	
Units	700	100	250	200	300	200	
% open space		30%		20%			
Environmental Compliance Cost[a]	$3.96 mil	$1.10 mil	$1.52 mil	$3.16 mil	$1.14 mil	$1.83 mil	
Environmental Cost per unit	$5,650	$11,000	$6,000	$15,800	$3,800	$9,150	$8,600
Environmental Cost Share of Land + Development Cost	1.9%	3.3%	2.3%	5.3%	1.2%	3.6%	2.9%
Imputed Lot Cost[b]	$187,250	$205,500	$167,500	$187,250	$197,500	$156,750	$183,500
Environmental Cost Share of Finished Lot Cost	3.0%	5.0%	3.6%	8.4%	1.9%	5.8%	4.7%
Time to approval	22	18	28	22	27	29	24

a As estimated by developers and their consultants in Pilot Study .

b Estimate of finished lot value based on regional finished lot to house price ratio.

Figure ES-1 provides a summary of the role of environmental compliance costs in overall project development costs. Environmental compliance amounted to only about 3% of Land and development costs, which in turn are only about 40% of overall project costs. For the six projects, these environmental costs were dominated by water, as stormwater management, erosion and sediment control, and wetlands inventories and mitigation amounting to 2/3 of compliance costs.

Figure ES-1 Environmental Compliance Costs in Land Development



Regarding project delays, the Pilot Study indicated that time-to-approval in the middle 2000s is longer than the overall national average for both 1975 and the middle 2000s, but not much higher than the "normal" part of the time-to-approval continuum developed in Chapter 3.

Chapter 5 reports on the Focus Groups of developers assembled in Denver, Dallas and Tucson. Although cost analysis was not made available to the research team in the detailed manner reported in Chapter 4, the Focus Groups did provide sufficient information to allow the researchers to conclude that self-reported environmentally-related costs per lot in the three focus group markets were in the normal to low range based on the continuum developed in Chapter 3, and about in line with those found for the Pilot Study. Costs varied in dollar amounts, certainly, but not in relative magnitudes given different markets.

In addition, the time-to-approval can generally be described as "normal" based on experiences dating back to the 1970s, being roughly between one and two years for the entire approval process including any zoning relief needed. Compared to the Greater Washington Pilot Study, the Focus Group representatives indicated that their local governments on the whole appear to process applications a few months faster.

The Washington, DC region is perceived as one of the more environmentally regulated markets in the United States, owing to issues related to Chesapeake Bay, open space, agricultural preservation, and wetlands. Federal, state, regional, and local environmental regulations are abundant. The views of the developer participants of the other three markets varied from one extreme to the other. In the Tucson market, the participants believe they are highly regulated in a manner that sharply increases housing costs. In Dallas and Denver, the participants believe the environmental regulations they face are not significant barriers to making housing more

affordable. However, the Denver and Dallas participants see trends that point to increasing environmental regulation in the future. In both of these markets, communities are proposing new regulations, especially related to tree preservation.

Although the participants in the three markets shared some frustration over environmental regulations - particularly due to inconsistent interpretations by EPA, the U.S. Army Corp of Engineers, and the Fish and Wildlife Service - the Tucson participants were more adamant that these regulations are a significant barrier to affordable housing. Because only about 15 percent of land in Pima County is privately owned, when a regulation is introduced that includes a land set-aside to protect endangered species or for other reasons, it restricts an already small supply of land available for development. Thus, regions of the western U.S., especially the southwest, that are dominated by public lands, have land markets significantly different from other areas of the country, and the effects of environmental regulations on land costs are likely to be more severe.

Although it was difficult for the research team to fairly compare different environmental concerns and related processes reported by the Focus Groups for the markets they represent, there appear to be some similarities with flood plain and stormwater regulations.

Stormwater management regulations have been around longer than most other environmental regulations. Thus, the approach for addressing these issues has started to take on a degree of consistency in terms of interpretation of the regulations and the practices used for compliance. The participants in each location quickly identified stormwater management as one of the most significant regulations. They were very confident in estimating the costs for compliance because it has become somewhat standard practice. Generally, compliance with Federal, state, and local stormwater requirements was reported to run about 4 percent to 5 percent of the total cost of a finished lot –comparable to the total percentage of finished lot costs represented by all environmental costs in the Pilot Study. But in Dallas this was as low as 1 percent.

Despite the heavy influence of Federal environmental regulations in each market, regional or local regulations also affect development costs. Most of these regulations either are extensions of the Federal regulations or are designed to protect a unique local resource. For example, the Tucson area developers cited protection of the Saguaro Cactus as a significant barrier or cost. In the Dallas-Ft-Worth market, natural gas drilling platforms can place restrictions on development. In Denver and Tucson, protection of ridges and slopes are regulated. Likewise, there are regulations in the Washington market designed to protect the Chesapeake Bay from runoff.

Generally, the research team found it hard to determine if environmental regulations affect the total time required to obtain an approval in the focus group markets. Most of the environmental regulations are evaluated as part of the overall approval process, so isolating the impact of a single regulation was not possible. Only the *FEMA map revision process* under the Federal flood plain regulations clearly adds extensive time to the process – and this is applicable only in low-lying areas where flood-related hazards are more likely to exist.

Chapter 6 examines the results of this new research in the context of what is already known in the literature. This Executive Summary reviews the research findings and provides lessons and recommendations from this project. They are summarized below.

Table ES-2 Environmental regulations with potential impact on residential development costs[1]				
	Denver	**Dallas**	**Tucson**	**Washington**
Stormwater (includ. Erosion & Sediment control)	X	X	X	X
Remediation				X
Wetlands	X		X	X
Endangered species	X		X	X
Tree/Forestry		X		X
Noise				X
Flood plain		X	X	X
Riparian areas			X	
Hillside/ridge preservation			X	
Average new home cost	$329,967	$179,000[2]	$245,804	$734,000
Typical time to approval (including zoning decision)	12 to 28 months	18 to 24 months	12 to 24 months	~24 months

[1] An "X" in the box indicates that the participants identified this as a significant environmental regulation. Other environmental regulations are present in each market, but were not identified as having a significant impact on costs.

[2] The average new home cost for Dallas was not available. This number represents the median price. See text for more details on housing costs in each area.

Summary of Findings, Lessons, and Recommendations

Some of the key findings from the overall study are summarized in Table ES-3. Through project case studies, interviews and focus groups, the research team found little evidence that either environmental compliance costs and costs of delay exceeded historic norms for time-to-approval or added significantly to overall project costs. There was some variation within these studies results, however, and because of data limitations it is difficult to generalize too far.

Table ES-3 Summary of Key Findings

- Environmental regulatory compliance and delay costs are real and significant, but they are not a major factor in the increasing cost of housing compared to other land and development costs.
- Costs of compliance are about $5,000-15,000 per lot or unit in the DC market, comparable in Tucson, but apparently less in Denver and considerably less in Dallas.
- Stormwater management, erosion & sediment control, site remediation, tree preservation, wetland mitigation, and habitat preservation are important cost categories, and water issues dominate mitigation costs.
- Developers could do a much better job tracking environmental costs. If they had more concrete data on environmental costs it would greatly assist the home building industry in understanding where improvements in the process are needed to help reduce expenditures.
- Project delays for environmental approvals were apparent in the projects and markets studied. But the 12-24 months approval period was not atypical compared to historical

norms for rezoning decisions, which are increasingly required for major developments. Concurrent permit reviews were important to minimize delays.

- Environmental compliance and expedited approval can be facilitated by use of knowledgeable and trusted environmental consultants who can develop innovative compliance measures and communicate them to permitting agencies and the public.
- In certain markets with already limited land (e.g., Tucson), Endangered Species Act habitat conservation may limit land availability and raise land prices. There is no evidence from the study that wetlands permitting and mitigation affect land availability.
- Some state and federal mandates, such as FEMA map revisions and U.S. Army Corps of Engineers wetland review, caused delays that some developers thought were excessive. But other projects showed that concurrent review by different jurisdictions and for different permitting decisions helped shorten overall review times.
- There are opportunities in many markets to reduce uncertainty for developers, to streamline the approval process, and to reduce costs while still protecting environmental resources.

Regulatory processes and costs vary widely across the nation because of differences in growth pressures and landscape conditions. Where there are few physical and environmental barriers to development, time-to-approval periods and environmentally-related improvement costs are low relative to areas where there are physical or legal barriers (such as limited private land ownership) or important environmental limitations (such as wetland sensitivity, endangered species habitats, fragile/polluted waterways, etc.).

Yet, the study's results on time-to-approval and environmentally-related improvement cost to total improvement cost ratios were mostly within the "normal" range on the process and cost continua (although the Washington market was at the high end of this range). Indeed the research team was impressed that, despite 30 years of what would seem ever-escalating environmental conditions and associated costs, *there is such little difference in time-to-approval periods and environmentally-related costs as a share of total improvement costs between the middle 1970s and the middle 2000s.*

There may be important reasons for this. While greater experience, environmentally-related regulations may be more clear and objective now than in the past, and may have become part of the routine checklist of things to do as part of development preparation and review. In addition, technology may have improved to the point where many functions that once were very costly are now inexpensive in comparison. Also, decision-makers and to some extent the public may be giving deference to experts to assure concerns are addressed adequately – and in large part developers are turning to experts to interface between them and review processes. Experts, in turn, seek solutions and build trust over time. Finally, administrative systems are probably much more efficient today than in the past in processing environmentally-related conditions.

This does not mean there is little room for improvement. Appendix B cites numerous specific examples of duplication of administrative review of environmental decision-making even within the same jurisdiction (Montgomery County, MD, for example), unclear requirements, and confusing inter-jurisdictional responsibilities (for example, in the case of the Pilot Study, how development is reviewed for its impact on the Chesapeake Bay).

The lessons and recommendations from this research project include a call for *streamlining administrative review and implementation* processes for environmental regulations in a variety of ways drawn from recommendations in the existing literature. To this list the research team adds a recommendation for: ***Clear and objective standards with expert review***. *Clear* standards are those that enable experts in the field to know what is meant by the standard – such as stormwater retention based on a 1-year storm event extending 1 hour. *Objective* standards would show how the stormwater retention may be achieved through design and choice of materials. Ideally, if the clear and objective standard is met there may be no discretion by local decision-makers to add further requirements that address the issue. *Expert review* provided by both the applicant and the local government would also be available to ensure application of the standard. A *checklist* of standards including a clear statement, means of compliance, and methods of analysis would help clarify standards and their technical basis for both developers and citizens. The use of clear and objective standards with expert review can assure that public policy is achieved by addressing the environmental concern, reduce discretion (and related uncertainty) and the time to approval, and streamline the process for both developers and decision makers.

Further streamlining could possibly be achieved by stronger federal oversight, such an incentives for states and localities to meet federal guidelines of approval time-limits. This approach would elevate the discourse and response for process streamlining, but it is not feasible because of practical and political limitations.

Another option that may be more effective in the near-term for all interested parties is the concept of the ***regulatory cost inventory or audit***. Audits are used in many contexts but perhaps the best known is in accounting based on generally accepted accounting practices. The idea of a regulatory cost inventory would be a new application of the concept. It would be devised by a panel whose members would include those knowledgeable of comparative regulatory processes, housing and/or urban economics and finance, environmental and land use law, environmental engineering, landscape architecture, ecology/environmental analysis, and others who can inform the process to be described. The outcome of the process would be a set of ***best practices and standards*** addressing each area of environmental concern along four dimensions:

1. Cataloging the nature of particular environmental concerns such as stormwater drainage, habitat preservation, tree preservation and enhancement, soil erosion and sedimentation, and so forth that would be applicable to a wide range of residential developments and mixed-use developments that have housing components.
2. Identifying and specifying through descriptions, drawings/diagrams and other means the appropriate range of development responses to each of the environmental concerns.
3. Framing the regulatory review process needed to address each concern, the extent to which discretion in addressing each area of concern may be needed even if the design solution posed in the second step is posed by the developer, and noting the reasonable time needed to provide reasonable public review.
4. Determining where multiple environmental concerns may be addressed by the same review function, discipline, and group of design solutions.

5. Characterizing an over-arching administrative process that implements the above four elements in a reasonably efficient manner that nonetheless accords discretion to unusual or complex cases.

The work outlined above would lead to a publication on standards and guidelines not too dissimilar from the *Time-Saver Standard* series of technical reference books for architecture, urban design and planning published by John Wiley and Sons. The publication, however, would include important auditing features that would allow local governments – or others – to assess current environmental regulatory processes and conditions in relation to the standards and thus identify area for improvement.

The standards and guidelines would serve another important function and that is ***benchmarking***. Local governments and others could use the standards and guidelines to compare their procedures and requirements against them. This may result in changes that move current practices towards more efficient and efficacious outcomes – and create the potential for some to advertise that their processes are better than the standards.

This approach need not wait for research to fully inform refinements or reforms needed to reduce potentially adverse effects of environmental regulations, processes and conditions on housing affordability. It could result in a kind of LEED-based rating system from platinum to lower grades of metal that may induce some local governments to aspire to higher ratings. The ratings themselves may over time be used by government agencies to allocate scarce resources on the basis of audit performance. HUD may wish to explore how such a system of standards and practices may be assembled, who should be involved, and how it may be used to inform local governments, states, and Federal agencies.

Limitations of Study and Recommendations for Further Research

Although this study provides useful empirical data on the cost of environmental regulation compliance and the effect on housing cost, it is not a definitive study. Initial research designs that aimed to assess development projects throughout the country were stymied by limited access to real project data. The final research design was able to access detailed data in one market and extend those results to other markets with the assistance of builder associations. Still, more research is needed to address the important questions about the effect on environmental regulations on the cost of housing.

There remain important gaps in understanding how environmental and other regulations influence the time-to-approval process and especially the cost of housing. There are also important limitations in linking regulation per se and the effect of environmental regulations on housing prices, including especially housing affordability. Most studies to date rely heavily on what developers report as their concerns and this creates bias in the survey outcomes. Estimates of the costs associated with regulatory burdens are imprecise, and given their source (developers), perhaps self-serving. Some estimates appear to lump together costs of administrative burdens with legitimate regulatory conditions which make it difficult to fairly assign regulatory inefficiencies.

It is difficult to generalize findings to broader, national impacts on housing supply and affordability. HUD and other Federal agencies should sponsor new research in this area. Four avenues of research can help close these important gaps in understanding and lead to more informed regulatory processes, including:

1. Understanding the true costs of regulatory process barriers to the availability and affordability of housing.
2. Understanding the effects of regulatory practices for areas other than regulation of building safety.
3. Understanding lesser-studied aspects of regulatory processes, such as estimating the effects of citizen opposition to housing or of the effects of fragmented regulatory structures.
4. Understanding the balance between the economic, social and environmental benefits of environmental regulations and the cost impacts on housing. Do the costs of regulations exceed the benefits they provide?

Research in each area would close important gaps in research and especially create a credible – versus biased and anecdotally-based – body of knowledge on the relationship between regulation per se and especially environmental regulation and housing affordability. However, the team found that this type of research is difficult. It requires valid data from builders and access is difficult. While this study provides some of the first data in these areas, much more is needed to quantify the effects, understand the process, and foster greater effectiveness for both housing affordability and environmental protection.

Chapter 1
INTRODUCTION

The U.S. Department of Housing and Urban Development describes a regulatory barrier to the development of affordable housing as a regulatory requirement or process that significantly impedes the development or availability of affordable housing without providing commensurate public benefit. While often motivated by good intentions, some local, state and federal government rules and regulations can exacerbate problems of high housing costs experienced by residents of certain communities. These are the requirements that frequently, without intending to do so, prolong the completion and raise the cost of new construction and rehabilitation. This introduction reviews the Federal concern about the relationship between environmental regulations and housing affordability, the conflict inherent in separating the costs of environmental regulations and the benefits they confer on society as a whole and internalized in the market for housing, and how the report is organized. Environmental regulations are those intended to protect water, air, land, and/or biodiversity resources and human environmental health. This introduction starts with a review of the Federal concern about the relationship between environmental regulations and housing affordability, a more detailed assessment of the concern based on literature, an overview of the residential subdivision process, a review of the conundrum that while environmental regulations may impose costs they may also create benefits with the result that higher housing costs may reflect both burdens and benefits, the role of "due diligence" in the developer decision-making process especially in negotiating land purchase prices reflecting environmental costs, and a discussion of the research design. The introduction ends with a perspective on America's looming housing needs.

The Federal Concern[1]

The issue of regulatory barriers is not new. In 1991, the President's Advisory Commission on Regulatory Barriers to Affordable Housing, popularly known as the Kemp Commission, published its report, *Not in My Backyard, Removing Barriers to Affordable Housing*. Yet its basic finding – that exclusionary, discriminatory and unnecessary regulations constitute formidable barriers to affordable housing – remains as true today as it did more than a decade ago. HUD's update of that report, *From Not in My Backyard to Why Not in Our Community*, finds that many regulatory barriers still persist.

One broad area of regulation addresses environmental protection, which is seen as essential to building healthy, sustainable communities, and represents an integral part of land development decisions. Both HUD reports note that federal, state and local environmental regulations now constitute a significant investment of resources and time by the applicant in responding to these environmental regulations and, correspondingly, by the public agencies carrying out the reviews.

[1] Much of this section is from the U.S. Department of Housing and Urban Development, Administrative Service Center 1, Solicitation Number R-2004-R-00126, "Study of Impact of Environmental Regulatory Processes on Affordable Housing."

The Kemp Commission report identified environmental regulation processes as serious barriers to the development of affordable housing (see its Chapter 4). The report stated that, as a result of inefficient implementation, environmental protection regulation processes serve as significant barriers to the availability of affordable housing. These inefficiencies include 1) conflicting environmental regulations, 2) prolonged review processes, 3) lack of a clear rationale or justification for environmental decisions, and 4) regulations that extend beyond the scope of goals they seek to achieve. These uncertainties result in increased unpredictability, delays, reduced land availability, and increased construction costs. In April 2004, HUD sponsored a Research Conference on Regulatory Barriers to Affordable Housing (the proceedings of which were published in *Cityscape* vol. 8, no. 1) reaffirmed these barriers as major issues requiring systematic research.

The major Federal mandates that affect housing development include environmental impact statements, water quality management and especially stormwater management, air quality management, wetlands protection, floodplain management, coastal zone protection, endangered species protection, and site contamination. Many states in turn have added their own requirements that increase the layers of regulatory review and even conflicts with Federal efforts exacerbating further the development of affordable housing.

Survey of Research on Regulatory Barriers[2]

May (2005) observes that the relationship between regulatory barriers and effects on affordable housing has not been broadly studied. Two regulatory processes are especially interesting: 1) delays in housing construction due to cumbersome decision-making processes and 2) the effect of the regulatory burdens on housing costs. Of course many types of regulation impact differently on the cost and availability of housing including land use and zoning provisions, subdivision processes, building codes, and so forth. In recent years the list has grown to include environmental and related impact assessment conditions.

The housing developers as well as affordable housing advocates have raised numerous concerns about the impact of regulation on housing production and especially on producing affordable housing. A survey in 1998 by the National Association of Home Builders (NAHB) of its members found that about 10 percent of the cost of building a typical new home is attributable to what respondents self-describe as unnecessary regulation, regulatory delays, and fees (U.S. House of Representatives, Committee on Small Business (2000: 42)). Luger and Temkin (2000) used a more refined research approach to find that development costs associated with their definition of the "direct cost of excessive regulation" – including delays plus financing costs – added $10,000 to $20,000 per new housing unit (in 2000 dollars) to residential subdivisions in New Jersey – roughly 2 to 4 percent of the sales price of new homes.

To assess trends over time, Eran Ben-Joseph (2003) replicated a survey undertaken in 1976 by Stephen Seidel (1978). In both 1976 and 2002, nearly three-fourths of the development community respondents cited "government-imposed regulations" as one of the three most significant housing problems. One area of concern is the time it takes to process residential

[2] Much of the discussion in this section is based on Peter J. May, "Regulatory Implementation: Examining Barriers from Regulatory Processes," *Cityscape* vol. 8, no. 1, pp. 209-232.

subdivision approvals. Ben-Joseph's data indicate that between 1976 and 2002 the national average time to process approvals increased from 15 to 17 months with much of the increase appearing to be attributable to securing various forms of zoning relief (rezoning, variance, special exceptions, etc.). One-fifth of the respondents to his 2002 survey noted waiting more than two years for approval. Luger and Temkin (2000) add further insights about the sources of delay for residential subdivisions in their surveys of New Jersey and North Carolina planning officials, noting:

> *"Organized citizen opposition" to subdivisions was cited by the greatest percentages of respondents, respectively followed by contractor or development error, inadequate staffing, and unspecified sources of delay in negotiations (2000: 57). In response to other questioning, from one-third to over one-half of the respondents cited complexity in regulations or regulatory processes as a major factor in delays in regulatory approvals (2000: 61).*

May lists several stages developers go through to secure approvals for new residential developments such as:

> A series of pre-approval meetings to discuss the outlines of the proposed development, the process to be followed for approval, and preliminary negotiations over the development itself.
>
> Submission of application materials that detail plans, alternatives, and adherence to the variety of relevant regulations concerning land use and location of the property; environmental considerations and remediation of potential harms; adherence to local codes concerning visual appearance, utilities, and roads; adherence to building regulations; and, in the case of housing rehabilitation, consideration of potential environmental considerations, such as asbestos removal.
>
> A variety of special studies to support the application materials that may include separate environmental reviews, engineering assessments, traffic studies, and other technical back up.
>
> Community or other hearings by approval boards to register concerns about the proposed development.
>
> Approval decisions that contain conditions placed on the development that must be met prior to receiving necessary permits or other approvals; these may be appealed to hearing examiners or other quasi-judicial bodies.

May also observes that there rarely is a single approval process and developers instead must work with multiple agencies, each with different approval processes. Yet, May also notes that solid research about delays is hard to come by with most allegations about delays being more anecdotal than documented empirically – and the research team learned from local officials that the biggest source of delay is untimely submission of complete information.

Delays also vary by the complexity of processes. Regarding the high costs of new housing construction in New York City, Salama, Schill, and Stark (1999) note:

> *Because the Buildings Department is the single most important agency in the development process, its management and operations need to be as efficient as possible. In fact, the New York City permitting process is not—the process is arcane, cumbersome, confusing, complicated and paper-intensive (1999: 108).*

Euchner and Frieze (2003) and Field (1997) note that groups that do not want multifamily housing or other forms of affordable housing in or near their neighborhoods often use public hearings and review processes to create roadblocks to those developments. At the other end of the spectrum, however, are examples where affordable housing is given fast-track status (such as in Florida) and one case (Oregon) where land-use approvals are required to be given within 120 days of filing a completed application (Nelson and Duncan 1995).

May further notes there are numerous anecdotes about how duplication of administrative structures and gaps in regulatory decision-making processes complicates regulatory implementation often leading to delay. Euchner and Frieze (2003) review the effects of regulatory fragmentation in the Boston area as an example of housing barriers:

> *The lack of integration [of regulations] at the state level [then] can lead to confusion among local enforcement authorities such as building inspectors, fire chiefs, and boards of health and increase the number of appeals boards in front of which a builder has to appear. The process is especially complex (and confusing) in the case of environmental and handicap access regulations.*
>
> *Public officials also regularly defer to "community process" when controversial projects are proposed. Many cities and towns specifically require that projects undergo community scrutiny, even when the projects fit into the existing look and feel of the neighborhood. Community process can be especially problematic in small communities with volunteer governance structures like town meeting and little professional staff in town hall. (2003: 7)*

This is not a new insight. Pressman's and Wildavsky's 1972 work concluded that decision structures that include multiple decision points between and across levels of government introduce delays as decisions are made and remade. More often, this introduces multiple opportunities for any given decision-maker to veto decisions of others.

As May laments, however, without specific knowledge of actual situations, it is difficult to evaluate the extent to which regulatory processes actually increase approval periods.

Overview of the Residential Subdivision Process

America has built or rebuilt more than two million homes annually during most of the first decade of the 21st century. This does not include residential units converted from existing nonresidential structures such as warehouse "loft" conversions, recycling of office buildings and schools into residential units, and similar conversions. Yet, according to Census building permit statistics, more than two-thirds of all new residential units are single family detached or attached townhouse units on individual lots. The production of these lots almost always requires subdividing land.

The process of subdividing for residential development has evolved greatly over the past century.[3] Before the middle 1920s it was common for individual property owners to merely file a plat with the local county recorder or clerk showing numbered lots and blocks, streets dedicated to the public (not necessarily to any governmental unit, however), and occasionally land dedicated for public uses. The subdivision of land was seen merely as a way to sell lots more efficiently, by-passing the need to engage a surveyor to document each individual lot and to have a title company accept it for title insurance purposes. For local governments, real property taxes became easier to assess and collect.

The Standard Planning Enabling Act (SPEA), drafted in 1928 by the U.S. Department of Commerce as a model for states, saw the regulation of residential subdivisions as a way to plan for or guide community growth – and included giving local governments the authority to approve, deny, or approve with conditions proposed residential subdivisions. The SPEA provided local governments with a list of design features to consider in reviewing and approving residential subdivisions such as street design (length, width, intersections, curves), utility placement, lot and block design and dimensions, and open spaces. Underlying the standard act was empowering local government to manage its density by setting minimum lot sizes as part of approval conditions. Although the standard act was not adopted uniformly among the states it was adopted in most of the faster-growing ones. This second epoch of subdivision control extended through the Great Depression, the Second World War, and into the first generation of automobile-dependent post-War suburbanization.

All too often, subdividers did not themselves install roads or utilities to lots, leaving those costs to the buyers of lots or, more frequently, having buyers of lots put pressure on local government to do so.[4] Moreover, local governments saw the residential subdivisions triggered demand for new parks and schools they were often unable to meet. Many states crafted subdivision statutes that enabled local government to require subdividers to install on-site infrastructure at their expense and also to dedicate land for schools, parks, and other purposes, or provide funds in lieu that local government could use to acquire the necessary land outside the subdivision. Environmental or social impacts of new subdivisions were not usually addressed, except indirectly as related to infrastructure.

[3] Much of the historical discussion is adapted from Robert H. Freilich and Michael M. Schultz, *Model Subdivision Regulations*, 2nd Edition, American Planning Association (Chicago, IL), 1995.
[4] This attitude prevailed into the 1990s in some communities.

Beginning in the 1970s other issues surrounding residential subdivisions began to emerge, many relating to their environmental and social impacts on the community. Water pollution from stormwater runoff, denuding subdivisions of trees during the land-clearing and residential home construction process, altering waterways with adverse down-stream impacts, and relying on septic systems instead of sanitary sewers emerged as chief environmental impact concerns. States often amended their subdivision enabling statutes to account for these additional concerns but in some cases where states did not local governments found ways in which address them nonetheless. The 1970s was also when the Federal government began to exert its interest in protecting the environment, and later, habitat.

The process for creating and developing residential subdivisions has changed considerably over the past century as a result of this evolution. Whereas a century ago – and often well into the middle part of the 20th century – a person could buy and subdivide a tract of land within the same year without being subject to planning review or required to install infrastructure. Nowadays the residential subdivision and development process has become extended. Buyers and speculators of raw land will acquire land intending to hold it for several years. Prospective land developers often secure an option to buy the land and will proceed with purchase only after a due diligence period and then only if entitlements from local governments are secured – a process that can take 2 to 5 years. Land developers will often face a year of land improvement before selling finished lots to home builders – and if the market softens unexpectedly the period of time to sell-off all the lots can take months or years longer than projected. This is illustrated in Figure 1.1.

For its part, the residential subdivision process is composed of several steps. Generally speaking, local government makes two important decisions about residential subdivisions: whether to approve the "preliminary" or "tentative" plat including the conditions of approval, and then approve the final plat when those conditions are met. The procedural flow-chart for each is illustrated in Figure 1.2 (for the preliminary/tentative plat) and 1.3 (for the final plat). According to a national survey preliminary/tentative approval is required of 92 percent of jurisdictions and 99 percent required final plat approval.[5]

Combined, the residential subdivision approval process entails probably at least 20 review steps and decisions, any one of which can be delayed for reasons ranging from back-log of applications, vacation or sick-leave of key staff, community opposition, and requests by staff for more information. Adding considerations imposed by state and/or Federal agencies will likely extend the review period. If zoning relief is required – such as variances, special exceptions and/or zone changes – the process can be extended as well.

[5] Eran Ben-Joseph, *Subdivision Regulations: Practices & Attitudes*, Lincoln Institute of Land Policy (Cambridge, MA), 2003, p. 18.

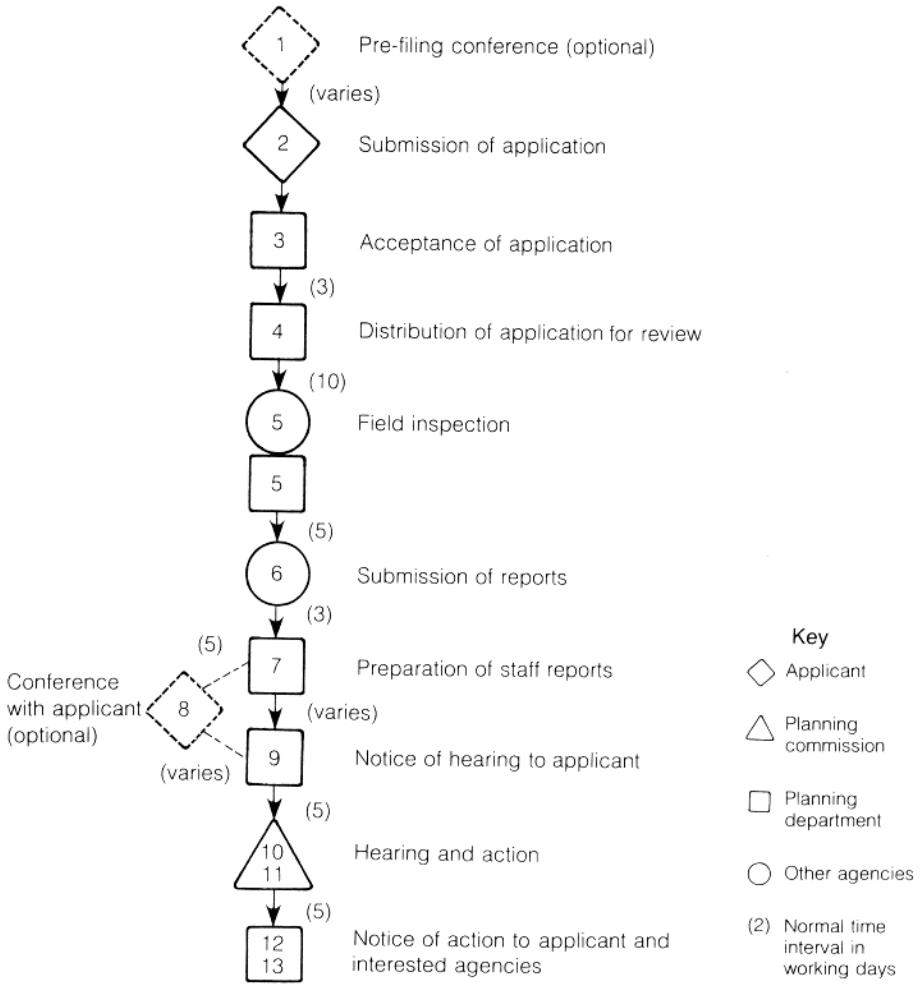
Figure 1.1

The Structure of the Land Conversion Industry and the Activity of Predevelopment

	Types of Land Investors				
	Buyer of Raw Land	**Land Speculator**	**Predeveloper**	**Land Developer**	**Builder/End User**
Major Function	Begins conversion	Holds the property waiting for growth to approach	Analyzes market and plans development; clears all regulatory hurdles	Installs utilities; completes subdividing program	Builds structures for sale, rent, or own use; may employ general contractor
Typical Financing	Noninstitutional		May attract institutional investment on selective basis	May be able to obtain construction loans and long-term real estate investors	
Typically Sells To	Land speculator	Other speculators. Last in line to sell to some type of developer	Land developer or end user	Other (smaller) builders or end users	
Typical Length of Tenure	10+ years	8–10 years	2–5 years	1+ years	Indeterminate

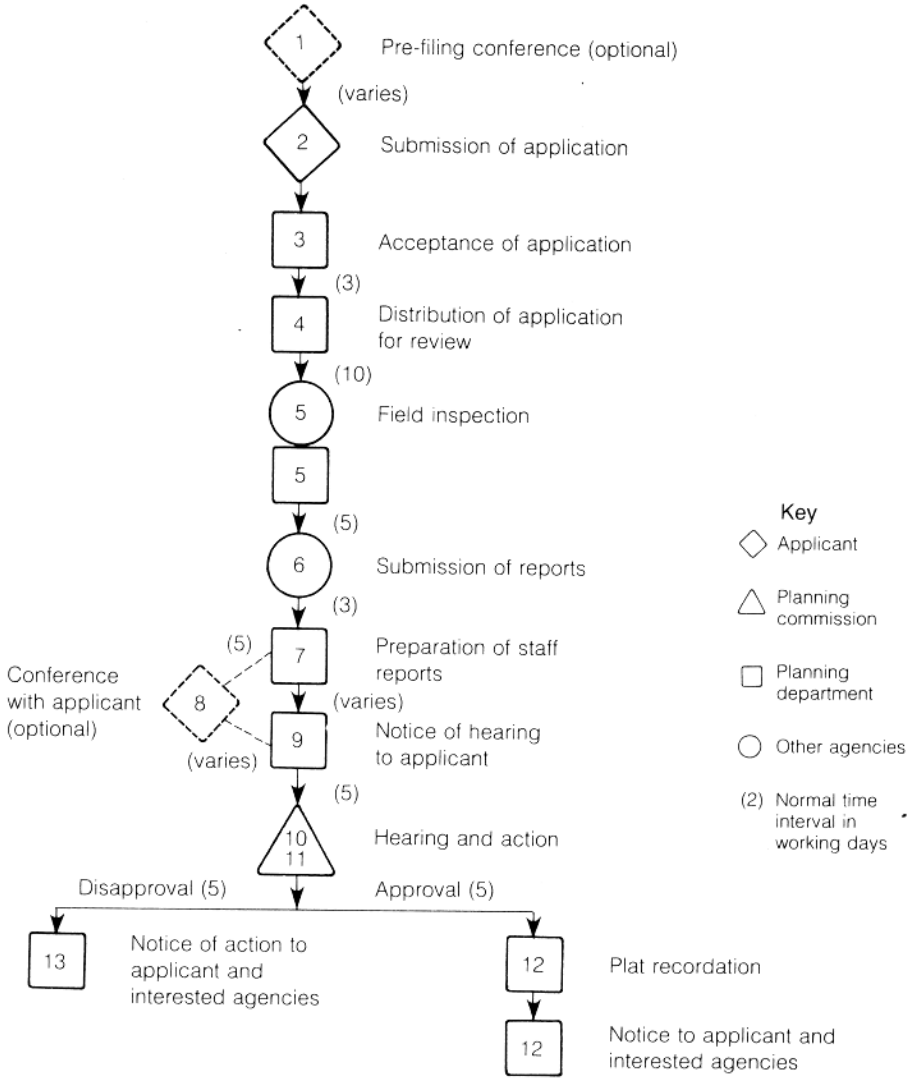
Source: Alan Rabinowitz, *Land Investment and the Redevelopment Process*, Quorum Books (New York), 1988, p. 26

Figure 1.2
Flow Chart for Preliminary Plat Review Process



Source: Richard Ducker, "Land Subdivision Regulation" in Frank S. So and Judith Getzels, eds., *The Practice of Local Government Planning*, International City-County Management Association (Washington, DC), 1988, p. 230.

Figure 1.3
Flow Chart for Final Plat Review Process



Source: Richard Ducker, "Land Subdivision Regulation" in Frank S. So and Judith Getzels, eds., *The Practice of Local Government Planning*, International City-County Management Association (Washington, DC), 1988, p. 232.

The Conundrum of Environmental Regulatory Costs and Benefits

In the absence of regulation of any kind, the introduction of regulation may but not always raise housing prices in several ways. It may reduce the supply of land or materials or labor to build homes. It may delay the time at which home construction can occur. It may add costs to housing construction that had not been present before. And it may elevate quality of life to a level that the market responds favorably. In truth, all these factors are at work simultaneously.

In her *Cityscape* article, Katherine A. Kiel (2005) succinctly reviews the state of current knowledge on the relationship between environmental regulations and housing prices, and indirectly affordable housing. She notes that environmental regulations are intended to improve the quality of the environment; preserve ecosystems, including wildlife; and protect human health. She goes on to review the literature to examine the extent to which there is evidence that environmental regulations by themselves impact on housing prices, as opposed to exclusionary zoning and other non-environmentally related supply-restricting efforts. She concludes that environmental laws can impact the supply of land but that is not all: Such regulations can affect the price of inputs into the house such as on the price of lumber. Regulations can also impact the supply of housing if they extend or exacerbate review procedures or increase the potential for litigation. If effective, however, they may increase the demand for housing if the community environmental quality has been improved relative to competing communities.

Kiel goes on to suggest that academic research and literature has been unable to disentangle the role of specific kinds of regulation on housing prices, or even whether some regulations that appear to raise housing prices do so because benefits of better environmental quality are internalized. In short, there is no definitive work associating environmental regulations per se with changes in housing prices and if so whether changes are merely capitalization of benefits all other price influences being equal. In an unpublished work for the National Center for Housing and the Environment, David Sunding (2004) observes:

> *The topic of environmental regulation of housing developments links several academic literatures, in particular those on urban economics and environmental economics. Despite the large number of papers on urban growth processes and on the costs and benefits of environmental protection, it is somewhat surprising that there are so few papers on the impact of environmental regulation on housing development. Given the potential for large wealth transfers and amenity creation, this seems to be a major area of opportunity for economists, policy analysts and others who study processes of urban growth and development.*

James M. McElfish, Jr., a member of the research team assembled for this HUD report, synthesized Kiel's work as follows:

- Prices go *up* because developable land is scarcer.
- Prices *stay the same* because environmental compliance costs are capitalized into land costs.
- Prices go *down* because of lower developable densities on environmentally restricted land.

- Prices go *up* because of demand for the environmental amenities created by restrictions (see also Boyle and Kiel, 2001).

In short, outcomes vary. While the studies cited primarily examine supply, the effects of environmental regulation on housing affordability depend substantially on issues of *demand* and the question really is the extent to which environmental regulations change demand characteristics.

McElfish goes on to observe that three kinds of land-related costs are related to environmental regulation, with differing effects on housing development and availability:

1. Land scarcity (affected by regulations dealing with wetlands, coastal zone protection, flood plain and hazard protection, and habitat, among others).
2. Site preparation (affected by regulations dealing with stormwater controls, erosion and sediment, and assessment for hazardous substances, among others).
3. Operating costs (affected by regulations dealing with water and sewer, stormwater management, and solid waste management requirements, among others).

Moreover, these costs have different impacts on affordability in different places.

A Perspective on Environmental Benefits and Costs, and the Role of Land Capitalization Theory

David Sunding[6] provides an important perspective, one that ultimately guides the research reported here. His perspectives are reviewed here. Sunding notes that developers are well-versed in anticipating potential effects of regulation on development. The general process developers engage is as follows:

> *In the planning and initiation phase, the development team is assembled, major hurdles are identified and overall project objectives are assessed. Next, the feasibility of the project is considered through an assessment of market conditions, local and regional governmental objectives, availability and cost of financing, and potential project sites. Typically, land will be optioned by the end of this phase at the latest. The commitment phase of the development process involves land assembly, preparation and negotiation of environmental documents, assembly of materials needed for other regulatory approvals, preparation of documents needed for financing, and finalizing the design of the project. This phase culminates when the developer obtains the needed financing and regulatory approvals. The developer then moves on to construction and operation of the project. (Sunding 2004: 6)*

[6] David Sunding, "Housing and Habitat: A Review of the Literature," prepared for the National Center for Housing and the Environment urban university symposium, November 5-6, 2004, Virginia Tech – Alexandria (VA) Center.

One important factor developers consider is delay but this is also related to uncertainty. As Sunding and Zilberman (2002) note, the prospect of delay leads developers to enter into "free look" (low- or no-cost purchase option) agreements with sellers of land allowing them to assess the risks of attaining profitability in light of numerous factors such as clarity of regulations including those relating to the environmental, delay, and normal market risks. This is called the "due diligence" process. It is not a trivial element of the development process. The National Association of Home Builders has developed a list of over 1,000 factors that should be considered before acquiring land for development in the broad areas of:

- Location and neighborhood
- Size and shape
- Accessibility and visibility
- Environmental conditions
- Legal constraints
- Utilities
- Zoning and regulation

Due diligence leads to as informed a decision as may be reasonable for a developer to proceed. Under ideal circumstances it allows developers to negotiate the best land purchase price that reflects the factors noted above. In a relatively competitive housing market – which probably exists in most metropolitan areas and perhaps in the long-run in all of them – such knowledge allows developers to discount the purchase price of land to reflect the costs and risks of these factors and assure normal profit. This is called "backward capitalization" of development costs where the sale price of raw land is the finished land price less improvement costs – or the "residual" illustrated below.

Finished Lot Price
minus Sales Commission and Transfer Cost
minus Improvement Cost Including Normal Profit
minus Risk factor
equals **Residual or Land Purchase Price**

The improvement cost consists of many factors including the cost of processing entitlements (land-use changes, subdivision approval, development agreements, and related legal decisions), physically improving the land into lots for sale to builders, reasonable delay in securing entitlements and installing the improvements, the cost of money, and the opportunity cost of the time it takes to complete these tasks. The risk factor helps account for market shifts, unexpected delays, and other unanticipated events.

Developers reduce their initial costs of land purchase usually by entering into a land purchase option contract. The option allows developers to engage in due diligence analysis and if that process indicates positive outcomes the option then allows a developer a reasonable period of time in which to secure entitlements. Once secured to the satisfaction of the developer the land is often (but not always) purchased at the agreed-upon price, which is sometimes different from that initially negotiated based on the nature of entitlements secured and the conditions of approval attached to them.

Sometimes the land is purchased in stages after the developer installs the improvements. These are called "lot releases" and it has two beneficial effects. First, the developer still has not purchased all the land (although once the option conditions are satisfied the developer will usually make a sizeable down-payment) so the land owner essentially carries the financing. Second, the land owner typically is rewarded with slightly higher prices in exchange for agreeing to defer payment. Deferring payment as long as possible is usually more beneficial to the developer than land owner because as the study found interest rates on non-recourse loans to developers with good credit ratings range between about 15 to 20 percent, depending on local market conditions. A non-recourse loan means that the developer is offering very little or no tangible security so in default the lender may not receive much if any of the loan. Recourse loans that provide security to the lender can reduce the loan to low double-digit or high single-digit interest rates. This is the avenue taken by many small-production or marginal credit developers. On the other, the cost of security – such as a bank letter of credit, performance bond and so forth add to the cost so in the end there is little or no difference in the cost of money between a resource and non-recourse loan.

Theoretically, it is possible that all land development costs including costs associated with environmental regulation could be capitalized backward into the land meaning that the seller of land to developers bears the costs while the home buyer does not. The extent to which this may happen depends on the elasticities of demand among consumers and the availability of close substitutes and short-term versus long-term perspectives. Theoretically, it is also possible that in the absence of close substitutes and relatively inelastic demand for housing that land owners may become an informal cartel. Such a cartel may result in land owners refusing to absorb much of the environmental costs by lowering raw land prices. The result may be forward-shifting of the cost to consumers, be they home buyers or renters.

There is another perspective: What if the environmental regulations generate benefits recognized and capitalized by the market? One interpretation is that some of these benefits may be efficiencies while others are amenities. Efficiency benefits occur when environmental regulations create savings recognized by the market. Not having to handle increased flooding in a site because of better up-stream management can lower site development costs and thus increase the value of land, and conceivably the value of the home, by reducing worries about flooding. Amenity benefits are more subtle and relate to the extent to which a community's overall appeal is increased relative to competing communities because of environmental regulations. Sunding (2004) notes that the effect of these benefits on land and/or housing prices have not been addressed in research but are likely quite real. The problem, therefore, is that in some cases what appears to be a costly environmental regulation is in fact something the market values. As important as disentangling cost and benefit effects is, it is beyond the scope of the research reported here.

Research Design

The HUD study as originally conceived would have conducted 10 to 15 major case studies representing a wide spectrum of environmental regulatory systems to describe and document the circumstances under which environmental regulations are an impediment to the development of affordable housing. The case study design would have been informed by two pilot studies: Fairfax County VA and Montgomery County MD in the Washington DC metropolitan housing market, and two cities in Maricopa County AZ. The case studies would involve selecting a few representative samples of housing developments ranging about 200 to 500 units ("not too big but not too small"), would have been approved in the 1990s, would not have been too controversial (to avoid biasing analysis favoring contentious projects), and would be substantially built-out by now. The design assumed developers would be readily identifiable and willing to share knowledge gained from the process, and help lead to analysis of how different environmental regulations and their application affect housing affordability.

The case studies were to be used to create an environmental protection – housing affordability continuum. It was to be composed of procedural and substantive dimensions. Key elements of the procedural dimension were to include 1) the level of clear and objective requirements as applied to the case studies, 2) length of the review process, 3) clarity of the rationale for decisions made, and 4) use of ad hoc conditions. Key elements of the substantive dimensions were to include 1) delay in excess of scheduled decision parameters, 2) reduction of developable land, and 3) increased construction costs. The purpose of the continuum was to show graphically how certain mixes of environmental regulations in combination with development decision-making processes facilitated or impeded provision of affordable housing. Within the continuum, each of the case studies were to have been illustrated graphically to aid in the description of differences among environmental regulatory and decision-making regimes in terms of their effect on housing affordability. The continuum was to be used to rank states, regions, and local governments in order of the sensitivity of procedural and substantive environmental protection regulations to housing affordability. In addition to the continuum, we proposed to develop a checklist of approaches derived from the case studies that may have been able to be used to improve procedural and substantive dimensions of environmental protection to facilitate affordable housing production but without compromising underlying environmental protection objectives.

The pilot studies indicated that the initial research design had several limitations. First, developers were generally difficult to identify and often were quite busy. Second, their memory of the past was quite sketchy – it was as though the past is history and what is more important is the rezoning hearing next week. Moreover, they simply had no data that could be used to help with historical perspectives. Third, it turned out there were relatively few projects in the size range – they tended to cluster below 100 or more than 500 units reflecting differences in market activity between smaller firms and large regional national ones. Fourth, the planning and environmental review processes of the 1990s do not reflect those of the current period. Fifth, local government files are routinely archived after three to five years, making historical reconstruction difficult.

A revised approach was developed. While still attempting to identify how differences in regulations and their applications affect housing affordability, a different time frame and cross-national perspective were considered. The time frame would be limited to the first decade of 2000 and focus on developments approved and under some level of construction but not necessarily built-out. The time period reflected the reality of information that is available locally, and that in many moderately-sized to large jurisdictions staff reports and other information pertinent to review processes of individual projects are available online. The time frame also reflected current, not retrospective, development permitting climates.

To avoid bias and nuance that may exist among local developers the focus was on finding national-scale builders to review their experiences in communities reflecting a spectrum of environmental regulations and processes based on literature and other sources. National builders reduce (albeit do not entirely remove) bias because all local units follow general company protocols, generate data in reasonably uniform format, and have the scale economies affording use of staff to assist with the project. By choosing reasonably comparable development prototypes proposed in different communities across the county, the new approach could provide more objectivity in assessing differences and their effects on housing affordability.

Using national-scale builders also allows for comparisons involving a wider range of development sizes. For example, not only can comparisons be made among a continuum of communities based on their regulatory regime, but by size of development – ranging from small (under about 100 units) to moderate (100 to 500 units or so) to very-large (exceeding 1,000 units). The latter consideration can enable some analysis of differences in applications of the same federal environmental regulatory scheme across communities since they are more likely than smaller ones to have been subjected to federal review.

The idea of the continuum and checklist remained in effect. National builders would volunteer their information and staff time to generate a common set of data applicable to the spectrum of communities selected for analysis (representing a cross-section of regions and environmental regulatory regimes) so that differences in housing affordability can be compared along the continuum. That continuum would be predetermined based on an assessment of state and local regulations in the study areas. In addition, the scale of development can also be assessed across the same continuum to see whether federal involvement may make a difference.

The "stories" would be based on inliers and especially outliers in the continuum identified from the national-scale analysis. The case studies would vary by region and by scale of development.

This report is the product of learning much about how information from prior actions are stored and used to understand the present, refining the research approach accordingly, and learning what may be useful to inform the development process and future research. This report includes:

- A **critique of the research literature** on the relationship between environmental regulations on affordable housing production.
- A **continuum** illustrating where local governments may be ranked objectively with respect to the relationship between environmental protection and housing affordability. This is based on establishing a set of "baseline" conditions that pre-date the current

regulatory epoch to create perspective about where regulatory processes and developer capacities are relative to where they were a generation ago.

- An **assessment** of the extent to which different environmental protection regulations combined with state and local development decision-making processes create unique decision-making regimes that impact differently on affordable housing provision in terms of procedural and substantive costs, focusing on where environmental regulations do not impact substantially.
- An **audit** approach recommendation to local governments for a protocol that improves procedural and substantive dimensions of environmental protection with respect to housing affordability but without compromising their underlying purposes.
- Recommendations for **future research**.

There are important caveats, including:

- It is assumed that Federal environmental regulations are a constant and that differential price effects on housing are attributable to local regulations and the processes used to perfect them. This is not always true. For example, a study by Sunding and Zilberman (2002) found that a typical Corps of Engineering Section 404 permit required under the Federal Clean Water Act took 788 days to process: 383 days for permit preparation and 405 days to process it. The report notes that implementation of Federal regulations appears to differ across regions with some being less stringent than others in interpreting how those regulations need to be applied. Nevertheless, this report does not pass value judgments on these differences.
- While it appears that few interests challenge the overall objectives of environmental regulations some allege usually anecdotally of "excessive" or "unnecessary" regulation either contained in regulatory documents or as applied. In this report there is no effort made to convert subjective assessments into objective ones so there is no "second-guessing" of the efficacy of locally applied environmental regulations.
- Given what literature appears to conclude, this report does not attempt to disentangle statistically the roles of all regulations in affecting housing prices nor of environmental regulations. While clearly ideal, numerous authors published in HUD's *Cityscape* issue on regulatory barriers to housing note the significant theoretical and resource limitations to doing so.
- This report also does not delve into the technological differences in implementing the same regulations across communities.
- Finally, this report focuses on the environmental review processes applied to residential subdivisions principally in growing suburban areas on "green fields." Given limited resources the research team chose this narrow mode of housing production because it is where the majority of new housing is located. Future work is needed to consider the role of environmental regulations as a barrier to the production of affordable housing in infill, redevelopment, and grey- and brown-field development.

Housing the Next 100 Million Americans

Consider the stakes. America will add the next 100 million people at a faster pace than ever before. Between now and 2040 – by which time America will reach 400 million people – more two-thirds of the built environment existing in 2000 will have been rebuilt. Put differently, more than half the built environment seen in 2040 has yet to be built. Planners have a unique opportunity to lead America into a new era.

The US is alone among the industrialized nations in having substantial growth. The United Kingdom and France will add fewer than 10 percent to their population bases between now and 2040 while Germany, Italy and Japan will lose population. Only "super-populated" India will add 100 million people more quickly than the US.

Consider the following. On October 16, 2006, America reached a milestone – its 300 millionth person. It took the US until 1915 to reach its first 100 million, 53 years (1968) to reach 200 million, and 39 years to hit 300 million. The Census indicates America should reach 400 million by 2043 or 37 years from now. The Census, however, routinely under-projects; its 1996 projections had the US reaching 300 million in 2011, not 2006. Extrapolation of Woods & Poole Economics' 2005-2030 projections indicate the US will reach 400 million by 2037, about 7 years "ahead" of schedule and just 31 years after reaching 300 million.

What do the next 100 million people mean for America's built environment?

For the past decade there has been about 0.4 housing units of all kinds (including vacant and second homes) per person. The next 100 million residents means the nation will need to add about 40 million homes to its current inventory of 125 million. However, about 6 percent of the nation's housing stock is rebuilt every decade (compounded) for natural and manmade reasons. Looking ahead, about 30 million homes will be rebuilt. The next 100 million residents will result in 70 million homes being built or rebuilt, or about 2 million annually. This is just about the pace of housing construction that has been seen during the past decade.

During the past decade, however, about two-thirds of homes constructed were of the single family detached type. Will this trend continue as the nation adds another 100 million people? This appears unlikely for three reasons.

First, the population is aging. In 2006, when the 300 millionth person was added, about 12 percent of Americans were 65 or older. This group will account for 41 million of the next 100 million Americans. In contrast, children (persons 19 and under) will account for only 19 million of the next 100 million Americans, down from the 29 percent share they had in 2006. And the adult/pre-senior group (20-64) will account for the remaining 40 million of the next 100 million Americans, compared to being 59 percent of the population share in 2006. We suspect that the housing preferences of older, childless households will be different from other households.

Second, household types are becoming more diverse. In 1970, just after the 200 millionth person was added, about 44 percent of all households had children and only 17 percent of them were single-person households. The two decades before and after 1970 saw the suburbanizing of

America and this period corresponded with suburban template planning and zoning that separated land uses and favored single family, often large-lot residential development over mixed land uses, mixed housing types, and higher density housing. This was the period where child-raising dominated household concerns so it is only natural that communities catering to households with children fashioned land uses responsive to perceived needs of the time.

Times have changed, however. In 2006 roughly 35 percent of all households had children while 26 percent of them were single-person households. By the time the next 100 millionth person is added, only about 27 percent of households will have children and single-person households will remain at about 26 percent. Put differently, of the net change of 25 million or so new households equivalent to the next 100 million Americans only about 3 million or just 12 percent of them will have children. There will be more children and more households with children as America adds another 100 million people but the net change in housing demand associated with them is small. In contrast, 88 percent of the net change in households will be attributable to those without children. Single-person households will account for about 38 percent of the net change.

Third, housing preferences appear to be changing. Aging, empty-nester, and single-person households will dominate America's future housing markets. It would seem unlikely that their housing preferences conform to the child-rearing zoning template that has dominated America's suburbs for two generations. Two other influences are emerging that may affect preferences. Americans are living longer and life insurance actuarial tables now extend routinely past 100 years. Perhaps only a third of a typical adult's life may be spent child-rearing which means adults may live 50 or more years without raising children. The other factor is that a growing number of households with children are deciding to raise their children in decidedly urban settings. Not most of them but perhaps enough to have a significant effect on planning.

All this adds up to the potential for important changes to housing demand that planners need to anticipate. An article in the fall 2006 issue of the *Journal of the American Planning Association* indicated that because of changing demographics and shifting housing preferences perhaps the 2006 supply of single family detached homes on lots of more than 7,000 square feet already exceeds demand projections after the next decade (Nelson 2006). Put differently, the demand for attached, small lot, cluster and other higher-density options would appear likely to outpace the demand for detached homes on large lots, perhaps by a multiple as America adds its next 100 million people.

As America marches toward 400 million people we know that the household profile of Americans will change. As a percent, far fewer American households at a population of 400 million will have children than at 300 million or at 200 million, and far more will be single-person households. The suburban planning template designed to meet the needs of a society dominated by child-rearing households is probably not in synch with a society dominated by childless and single-person households. From the perspective of market analysis, as much as 88 percent of the net change in the number of households serving the next 100 million Americans will not have children. Put into perspective, the equivalent of up to 35 million of the 40 million new homes needed to meet the demand to house the next 100 million people would be built for childless occupants. Perhaps this helps to explain the resurgence of in-town living, residential demand in many transportation oriented developments, historically unprecedented demand for

central city and close-in suburban infill and redevelopment, and greater stability of housing prices closer-in than seen recently in more distant suburbs.

America at 400 million people will likely be a very different nation than the one at 300 million. Much of this is by necessity because of changing demographics but much of it can also be by design. Even though America's population base will increase by a third, new residential construction will equal nearly 60 percent of all units existing when the 300 millionth American was added and new nonresidential construction will exceed in volume all nonresidential space that existed. Meeting the needs of the last 100 million people was based on a planning and zoning template that may be out-dated. This report in part is dedicated to meeting the challenge ahead.

Chapter 2
LITERATURE REVIEW

Much of the literature advances a tacit assumption that environmental quality is often achieved at the expense of economic development and that costs for environmental quality divert resources and increase costs for development and social well being. However, there is little research that objectively quantifies those effects, especially on housing affordability.
Environmental regulations that may potentially serve as barriers to housing affordability include:

- EIS process review (federal (F), state (S), local (L);
- wetlands permitting (F, S, L);
- endangered species habitat conservation plans and permits (F, S);
- air quality permits (F, S);
- flood plain zoning (F, S, L);
- other natural hazard mitigation (F, S, L);
- management requirements for stormwater and nonpoint source water pollution (F, S, L);
- erosion and sediment control (S, L);
- coastal zone stormwater and sensitive area management (F, S, L);
- source water protection provisions (F, S, L);
- agricultural land protection zoning (S, L);
- open space set-aside requirements (L);
- urban forestry programs, tree preservation permits, and landscaping requirements (L);
- impact fees for environmental measures (L).

The environmental regulatory framework is tiered from federal to state to local governments, but there is considerable integration and relationship between the tiers. This multi-tier regulatory framework may be prone to duplication problems in the permitting and review process, but there is little empirical evidence to support this.

There is considerable variation in environmental regulations across the country. Even federal regulations which aim to provide nation-wide uniformity vary considerably depending on location and conditions. However, the greatest variation in regulations occurs among the states and among localities across the country.

The literature identifies land use and development regulations as a barrier to housing affordability, but most references indicate this impact as “implicit” and many state that there is little empirical data that supports this basic assumption. The little evidence that does exist fails to distinguish between environmental and other regulations. Some studies assert that the overall cost of land and housing is dominated by land and housing markets and not regulatory barriers.

Among the potential barriers cited for environmental regulations are

- review process delays,
- project add-on requirements, and

- removal of land from development.

Some state and local governments have attempted to remove regulatory barriers by streamlining review processes, clarifying requirements to reduce uncertainty, and encouraging affordable housing through incentives, funding, and regulatory exemptions. There are also emerging programs and approaches such as brownfields redevelopment, compact/mixed income development, community revitalization, etc., which aim to integrate environment and affordability.

Many questions remain unanswered by the literature including those regarding

- the extent that environmental regulations actually pose barriers relative to other regulations and market forces;
- the relative impact of regulatory requirements (standards and measures) versus implementation (review process) on housing affordability; and
- the role of reforms and incentives to balance the objectives of housing affordability and environmental protection.

The literature review consists of two areas:

1. Literature on the types and variability of federal, state, and local environmental regulations that potentially impact housing affordability.
2. Literature on the impact of environmental regulations on housing affordability.

The findings and issues raised by the literature are highlighted below. This review is followed by a list of numerically coded references used in it.

Environmental Regulations Potentially Affecting Housing Affordability

The literature on environmental regulations provides an overview of the specific regulations and some assessment of effectiveness in terms of environmental objectives. Much of the literature contains a tacit assumption that environmental quality is often achieved at the expense of economic development and that costs for environmental quality divert resources and increase costs for development and social well being. However, there is little research that objectively quantifies those effects. On the other hand, there is a large body of literature on the concept of sustainable development which aims to advance economic, social, and environmental well-being as multiple objectives. The literature asserts that long term sustainability of the economy, social equity, and the environment requires that development and public policy balance all three objectives [2, 5].

The following sections present the main environmental regulations that may be barriers to housing affordability, and discuss the principal issues that may affect this project.

Federal or federally influenced environmental regulations: [2, 3, 5]

- **NEPA EIS process review** (National Environmental Policy Act). Possible process and review impacts on large projects requiring federal approval, funding, or permitting.
- **Wetlands permitting** (Clean Water Act (CWA): Corps of Engineers, EPA). Permit process and possible mitigation required by Corps of Engineers for development that affects jurisdictional wetlands.
- **Endangered species Habitat Conservation Plans (HCP) and permits** (Endangered Species Act (ESA): Fish & Wildlife Service (FWS), National Marine Fisheries Service (NMFS)). In habitats of ESA listed species, some development is allowed so long as a Habitat Conservation Plan is developed and approved. HCP documentation and mitigation can be very costly. This has currently affected only a few urbanizing areas (e.g. southern California, Austin (TX))
- **Air quality permits** (Clean Air Act (CAA): EPA, states). Permits are required for air pollution discharges in areas of both attainment and nonattainment with federal air quality standards. These generally do not affect housing projects, but large projects in nonattainment areas like Atlanta that have transportation inducing air pollution impacts may require permits.
- **Flood plain zoning** (Federal Emergency Management Administration (FEMA), National Flood Insurance Program (NFIP)). Indirect effect of NFIP: to be eligible for national flood insurance, states and local governments must develop and implement floodplain zoning restricting development in flood prone areas. Restrictions on "substantial improvement" to existing structures in the floodplain may also be a barrier to efforts to improve affordable housing in such areas.
- **Urban stormwater management permits** (CWA: EPA, states). Cities greater than 10,000 population are required to obtain water pollution (NPDES) permits for stormwater discharges.
- **Coastal zone stormwater and sensitive area management** (Coastal Zone Management Act (CZMA): NOAA, states). Participating states receive funding from the CZMP for planning and programs to manage the coastal zone. While the state actions are flexible and variable, some have included regulatory requirements. In addition, the CWA amendments of 1987 mandated certain requirements for nonpoint source pollution control in the coastal zone.
- **Source water protection provisions of Safe Drinking Water Act (SDWA).** SDWA amendments of 1996 imposed source water protection requirements for both surface and groundwater drinking water sources.

State environmental regulations: [1, 5, 6, 7, 8]

- **State environmental review requirements** (State NEPAs). About half the states have EIS requirements similar to NEPA, but most require reviews for just state or public projects. Some (e.g., WA, CA, NY) require reviews for certain local decisions that may affect large projects.
- **Natural hazard zoning and state building codes**. Most states oversee certain natural hazard mitigation programs at the local level, and these state programs may mandate

zoning and development restrictions for flood plains, steep slopes, seismic hazards, karst, wildfire hazards, etc.

- **Wetlands restrictions and permits.** Several states have development restrictions or permitting requirements in the vicinity of wetlands that go beyond federal requirements.
- **Stormwater management regulations**. Several states have adopted urban stormwater regulations and guidelines to reduce impacts of development on water flows and quality but at potentially higher cost to developers and with more extensive review requirements.
- **Erosion and sediment control regulations (E&SC)**. All states have adopted E&SC regulations to control erosion and sediment generation from construction sites, including implementation of specific physical measures to keep sediment on the site and review requirements to ensure proper drainage from the site. These add to the cost of construction.
- **Coastal zone area restrictions and regulations** (State coastal zone acts). All coastal states now participate in the federal CZM program, and many of these have their own development restrictions and permitting that go well beyond the minimum standards of the federal requirements.
- **Agricultural land protection zoning.** Most farming states have programs for farmland preservation, but few use (e.g., OR) use a regulatory approach.
- **Groundwater wellhead protection and watershed protection area restrictions** (State SDWA implementation). While the federal law does not mandate wellhead protection, many states have developed program elements to encourage local governments to protect important sources of drinking water.
- **Threatened wildlife and natural community protection regulations** (State ESA). Some states have their own endangered species legislation

Local Environmental Regulations: [2, 5]

- **Local environmental review requirements.** Local governments have a range of review requirements before subdivision or building permits are issued. Some require formal environmental impact review, others require ad hoc approaches.
- **Local natural hazard mitigation plan implementation** (flood plain zoning, seismic zoning, steep slope zoning, wildfire mitigation requirements, etc). Local governments are the first line of defense in mitigating damages from natural hazards and have developed regulatory programs such as overlay zoning, building codes and restrictions, and other measures that may reduce land for development and increase costs of housing, but serve other social needs.
- **Local watershed and groundwater recharge source protection restrictions.** Local governments implement state requirements for source water protection and many have developed their own.
- **Local stormwater management regulations.** Local governments often go beyond minimum state requirements to manage stormwater and runoff pollution, such as low-impact development standards.
- **Local erosion and sediment control regulations.** Local governments implement state E&SC regulations through inspection and enforcement.

- **Local open space set-aside requirements.** Local zoning ordinances can require open space set-aside requirements that may reduce land for development.
- **Local urban forestry programs, tree preservation permits, and landscaping requirements.** Programs include regulations for tree protection, planting, and landscaping that may raise the cost of development.
- **Local impact fees for environmental measures.** Most local impact fees are imposed for infrastructure or other physical needs or impacts caused by development projects. Some localities impose fees for environmental measures or improvements such as stormwater management and parks and recreation.

Principal issues arising from the review of environmental regulations

The regulatory framework is tiered from federal to state to local governments. There is considerable integration and relationship between the tiers. Many federal regulations such as air and water quality operate under a state primacy provision that allows and encourages states to take on implementation responsibility if their programs are deemed at least equivalent to the federal standards. Some programs, such as the National Flood Insurance Program's provision for flood plain management and the Coastal Zone Management program require implementation by state and especially local governments. Most state regulations affecting land use and development are implemented by local governments.

This multi-tier regulatory framework may be prone to duplication problems in the permitting and review process, but the review of the literature indicates there is little more than anecdotal evidence to support this.

Which regulations are "environmental" and which are not? For this review, we have identified environmental regulations as those that aim to reduce natural environmental impacts; mitigate natural hazard damages; protect wetlands, wildlife habitats, and forest cover; preserve farmland; create or maintain public open space mitigation; manage air and water quality and water quantity; and remediate environmental contamination at brownfield sites. We have not included use and density zoning (such as large lot zoning), subdivision regulations, or non-environmental impact fees.

Variability in regulations. While the federal regulations aim to provide a uniform program for environmental management across the country, there is considerable variation depending on location and conditions. For example, regulations for air and water pollution control are different for areas that are in attainment with federal and state ambient air and water quality standards and those that are not. However, the largest variation in regulations occurs among the states and among localities across the country. Choice of case studies must consider this variation.

Impact of Environmental Regulations on Housing Affordability

This literature review is greatly assisted by the HUD Regulatory Barriers Clearinghouse (www.huduser.org/rbc/) as well as papers from the April 2004 HUD Conference on Regulatory Barriers and Housing Markets (www.2004nationalconference.com), especially those by Keil [10]

and Schill [19]. The literature is drawn from survey articles [10, 11, 15, 17, 19, 24], previous federal government studies (e.g., the 1991 Kemp Commission [9], [20,21,22]) and reports, studies, and plans prepared by states [26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39] and local [40, 41, 42, 43, 44, 45] governments.

The literature clearly identifies land use and development regulations as a barrier to housing affordability, but most references indicate this impact as "implicit" and many cite the lack of empirical data that proves much beyond this ambiguous assumption. Some surveys of developers [13, 14] and local government officials [11] indicate some effect, but there is little evidence that quantifies the impacts or distinguishes between environmental and other regulations. Some studies assert that overall land and housing markets dominate the cost of land and housing despite regulatory barriers. A number of key issues regarding environmental regulations and housing affordability were identified from the literature and are discussed below.

Key Issues on environmental regulatory barriers from literature

Regulatory review **process requirements create delays** and, therefore, increase costs. The review processes and decisions are often inconsistent and unpredictable, especially with wide reviewer discretion [9, 27, 34, 36, 43]. There are often too many reviews, too many departments, too many layers of government [45]. There is uncertainty about length of time and outcome of review often impedes projects [18]. Environmental impact assessment (EIA) requirements, where required, are lengthy and expensive [9, 16, 34, 43]. Extensive review processes create opportunities for NIMBY opponents to create further delays [16, 27, 29]. Finally, often lengthy delays occur imposing an additional cost on developers.

Meeting regulatory requirements increases costs [14]. For instance, EIA documentation studies, where required, are expensive and raise costs [9, 14, 16, 34, 43]. Open space set-asides are costly [13] both financially and often in reducing overall development density. Wetlands permit and habitat conservation mitigation requirements are costly [10, 19]. On-site wastewater (septic) standards are becoming increasingly expensive [30]. However, few other costs are documented to be associated with environmental regulations based on the literature reviewed, but there are others like stormwater management, landscaping/tree protection, and others that may be perceived as the cost of doing business.

Environmental regulations remove land from potential development increasing cost of housing affordability directly (on-site) and indirectly (land markets) [10]. Natural hazard and health standards (flood plains, seismic areas, steep slopes, septic systems, water supply source protection (aquifer and watershed protection, etc.) restrict land development, but most agree they are appropriate for protection of health and safety. [1, 11, 39, 45]. Wetlands protection (national permitting, state requirements) [10, 12, 19]. Endangered Species Act habitat conservation requirements in urbanizing areas [45]. Moreover, farmland protection is sometimes a factor even if not directly related with environmental regulations).

Efforts by state and local governments have tried to reduce regulatory barriers to housing affordability [1, 7, 8]. Most efforts are not directed specifically at environmental regulations, but

at all regulatory requirements [25]. Efforts to streamline review process and reduce duplication through "one-stop" permitting and time limits (i.e., automatic approval if no decision after xx days) [18, 24, 26, 34, 40]. Clearer and stronger policy statements and regulations that reduce uncertainty and reviewer discretion [24, 27, 28]. Funding to assist compliance of affordable housing projects with regulations [27]. Exemptions from some environmental regulations and review requirements for affordable housing [9, 29, 41, 42, 44]. Incentives such as density bonuses and mandates for affordable housing may help [26, 32, 37] but literature is not conclusive on the extent to which they are.

There are **emerging regulatory and design approaches** that can enhance affordable housing opportunities while enhancing environmental protection. Brownfields redevelopment programs aim to reduce uncertainly and liability, streamline project review, offer financial incentives for projects that may have an affordable housing component. Some Smart Growth initiatives aim to enhance community revitalization with affordable housing components [15, 38]. Compact development and "new urbanism" designs often contain mixed income housing requirements. In addition, green building programs aim to reduce longer term operation costs through energy efficiency (affordable comfort) and reduced maintenance. [40]

Numerous **caveats and issues** are raised by the literature. Relative to market forces and other policies (fiscal, infrastructure, etc.) regulations probably affect high housing costs little. [11, 12, 13, 14, 17, 19]. Relative to non-environmental regulations (zoning, subdivision regulations, building codes, impact fees, etc.) environmental regulations probably have a smaller influence on housing costs [17, 25, 35]. Literature addresses important questions such as what are included under the term "environmental regulations" and how can they be separated from other regulatory requirements such as zoning, building codes, subdivision regulations, impact fees, urban containment, smart growth policies, etc. – but there is no clear consensus on these effects.

An issue not addressed is whether the public wishes to attain affordable housing at all costs. When assessing regulatory barriers to affordable housing, one must consider the barriers in the context public objectives other than housing affordability: "…a regulatory barrier impedes the development of affordable housing without a commensurate health and/or safety benefit." For example, flood plain and other natural hazard regulations, wetland protection, endangered species habitat protection, erosion and sediment control, stormwater management, and other requirements will increase the cost of housing directly or indirectly, but they also provide public benefits. In addition, literature is not clear on the impacts of regulations per se versus impacts of their implementation. Barriers and delays are often created by inadequate funding for implementation (e.g., staff for review) rather than the regulations themselves. There are some indications that there is a "learning curve" in that initial implementation requires learning by both the regulator and the regulated, creating delays and barriers that are often overcome after experience is gained.

Barriers from Regulatory Processes

This section is informed significantly by May's (2005) contribution to the *Cityscape* issue on barriers to affordable housing. Following May, the section considers two outcomes of regulatory implementation: 1) delays in construction and the rehabilitation of housing and 2)

added cost and procedural burdens that discourage housing development to begin with.

May found that there are three broad procedural barriers to environmental regulations. One is *regulatory approvals* that consist of delays because of cumbersome decision-making processes and duplication of regulations. These kinds of delays are a special concern of developers. Another is a *patchwork of administrative arrangements* that results from the duplication of administrative structures and gaps in regulatory decision processes. The third is *regulatory enforcement strategies and practices* that are overly rigid and that foster an unsupportive regulatory environment for housing development. This section focuses on the first two implementation issues.

May suggests several broad administrative approaches to improving regulatory processes. One approach stands out: *Regulatory and administrative process simplification.* This includes steps to reduce duplication and procedural hurdles. May has identified other improvements: 1) *Conflict reduction and consensus building approaches* that are aimed at achieving agreement about affordable housing goals, 2) *Smart enforcement practices* that reduce deterrents to housing development by fostering a supportive regulatory environment, and 3) *Facilitative reviews and inspection processes* that speed up housing approvals and construction.

Regulatory and Administrative Simplification

May suggests various approaches to regulatory and administrative simplification, inclucing One Stop Permit Shops, electronic permitting, and third party certification.

Electronic Permitting and "One-Stop" Permitting. May notes that although the benefits of these and related approaches have not been systematically analyzed, anecdotal evidence illustrates potential improvements, such as:

- Streamlining of regulatory functions by the City of Los Angeles that resulted in reductions in waiting times by a factor of nearly 10 for processing of permits, plan checking, and inspection scheduling.
- Use of integrated permit forms and processes among jurisdictions in the three-county Portland, Oregon, area, resulting in a substantial reduction of delays and confusion caused by the prior fragmentation of services.
- Use of on-line processing of permits and inspection requests by Fairfax County, Virginia, which achieved $1.5 million in operational savings for these regulatory functions in 2001 and reduced permit processing times on average from over four hours to under one hour (National Conference of States on Building Codes and Standards (2003)).

The National Institute of Building Sciences (2002) cites over 100 jurisdictions as leaders in electronic permitting while recent research in planning provides a broad review of the promise and pitfalls of E-government (Conroy and Evans-Cowley 2004). Information technology may help streamline regulatory processes and overcome some of the barriers of fragmented regulatory authorities.

Enforcement Delegation and Third-Party Certification. One novel way in which to reduce delays

in development permitting is to delegate approvals and enforcement to third parties. This can accelerate regulatory processes by, for example, having engineers hired by local government to provide inspections and conduct "peer review" of development applications. May observes that use of third parties can be expanded to the use of qualified private certifiers to review plans, conduct inspections, and perform audits of regulatory compliance. Energy conservation and radon reduction provides important examples of third-party certification of regulatory compliance. In these cases, private certifiers evaluate problems and/or certify compliance. One problem with this approach, however, is giving poorly trained consultants authority as certifiers (May 2003). The benefits of such delegation for reducing delays affecting housing development approvals have not been addressed.

The viability of third party certification or plan review depends on a stable source of development permit revenues. Recent comments from city planning directors indicate that in several fast growth communities in California, the recent ebb in the housing market translates into fewer building permits and thus less permit revenue. Planning and development services departments are now laying off private consultants and plan reviewers—fewer building permits should translate to less work, right? Unfortunately, several of these jurisdictions relied so heavily on the private planning consultants that their own planning staffs do not have the capacity or expertise, thereby causing further delays in permit processing of pending development projects.

Administrative Reorganization. According to May, one advantage of administrative reorganization is to reduce duplication and make the lines of decision-making more clear. An issue to be addressed is which functions need to be assigned and where. An obvious approach is to assign all functions related to environmental regulation to a single agency much as building permit functions were long ago assigned to a "building" department. This may not work, however, when authority for decision-making extends across different agencies and departments (e.g., engineering, transportation, planning, water utilities, and environmental services) and different jurisdictions (city, county, state, and federal regulators).

Another approach is to coordinate functions across the different agencies and jurisdictions. E-governance makes it possible to integrate regulatory functions without reorganizing government. Coordination among the agencies and jurisdictions may be achieved with the appointment of a central administrator charged with the responsibility for integrating regulatory functions. For example, ten years ago the former Mayor of San Diego Susan Golding appointed a full time staff person to become the Czar of Red Tape. His job was to coordinate multiple city departments and liaison with state and federal agencies on development projects the major or other city leaders felt were significant to the overall economic development of the city. Several cities adopted similar approaches. Unfortunately, this model does little to streamlining the system for the basic small housing project.

The effect of reorganization on the actual production of housing has not been studied. May observes that literature suggests reorganization may reduce delays but there is no certainty they will. One researcher (Nelson) recounts an experience he had as a land developer in Washington State during the 1980s. The local county created a "one-stop" environmental review process to implement Washington's environmental policy act. The administrator facilitated discussions among the dozen or so state and local agencies involved in Washington's environmental policy

act but instead of reducing the permitting period the period actually increased by half. The problem was that the administrator sought consensus on all environmental issues including those beyond the legal and professional scope of the individual agency heads. The developer ended up meeting with each agency directly to negotiate issues relevant to the individual agency and final permitting was received about a year after initial promises of the "one-stop" permitting system. As May notes, re-arranging the organizational boxes does not necessarily reduce turf considerations and other bureaucratic hurdles. The organizational culture and associated routines need to be transformed as well.

Ombudsmen are yet another technique used in the environmental regulatory arena that could have some applicability to alleviate inconsistent interpretations across multiple agencies or jurisdictions.

Conflict Reduction and Consensus Building. Citizens, acting to preserve their interests but sometimes becoming NIMBY opposition to affordable housing, present a different challenge. Burby (2003) notes that citizen involvement in planning "tends to be dominated by an 'iron triangle' composed of local business and development interests, local elected and appointed government officials, and neighborhood groups" (2003: 38). Interactions among these groups can influence the timeframe for decision-making and the conditions of approval. A variety of ways in which to identify and constructively engage "stakeholders" exists (see reviews by Beierle 2000, Beierle and Konisky, 2000, and Burby, 2003). May concludes that there is not a simple taxonomy of approaches let alone identification of those that are more suitable than others in different situations. As the dispute resolution profession continues to grow and gain credibility, however, a continuum of strategies and tools is emerging. These conflict resolution approaches may range from formal arbitration and administrative hearings to informal mediation and consensus building. More and more communities request and even a few require (e.g., Baltimore County) developers to convene charrettes with local residents for certain special projects. By engaging residents early in the design phases of a project, it substantially minimizes the potential for NIMBY opposition. Within the profession of planning, the National Charrette Institute's workshops and now the American Planning Association Guidebook creates a standard framework that adds predictability and credibility to this consensus building tool.

Much of the conflict resolution literature and research relevant to land development borrows from its roots in environmental mediation. However, a 1999 study by MIT's Consensus Building Institute of more than 500 mediations revealed that land development was the primary conflict in most of the cases. Based on surveys of the participants and mediators in these conflicts, mediation was an effective way to resolve the dispute in many of these cases. Perhaps the lessons learned from the environmental dispute resolution field will continue to spill over into applications directly related to land development permitting systems.

While conflict-resolution and related negotiation processes have been used to reduce delays and unreasonable conditions of approval, there is little solid research into outcomes from different applications or in different situations. There is even less research addressing negotiating conflicts involving affordable housing. Perhaps that is an area for future research—the adaptation of a menu of conflict resolution strategies to address regulatory barriers and community opposition to affordable housing.

One pilot land use program may shed some light on the applicability of dispute resolution to resolve permit problems. From 1988 to 1995 the City of San Diego, with support from the University of San Diego Law School, ran the Center for Municipal Dispute Resolution. CMDR trained zoning and building department supervisors to represent the city in nearly 750 mediations that involved violations of the local building and zoning ordinances. Staff from the law school managed CMDR while mediators from the community mediation center were paid a modest fee to mediate each code enforcement case. Written agreements were reached in more than 90% of the cases (an astounding result within the mediation field) and property owners complied with these written agreements in more than 70% of these cases—an astounding level of agreement and compliance within the mediation of other types of disrupts). Many of these mediations involved the process of how the property owner could obtain building and zoning permits after the fact. While the CMDR experiment focused on code violations, this model could easily apply to development permit issues and institutionalized within a local government or university.

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36. *State of Colorado Consolidated Plan*. 2000.

37. *State of Housing in Arizona 2000*
38. *State of Maryland Consolidated Plan 2000-2004.* 2000
39. *State of Texas Consolidated Plan 2001-2003*. 2000.

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40. *Building Workforce Housing: Meeting SF's Challenge* (2003, San Francisco Chamber of Commerce)
41. *Certification of Affordable Single- and Multifamily Developments Policy* (Tallahassee), 2000.
42. *City of Los Angeles General Plan Chapter 4 Housing.* 2002.
43. *Getting Home: Overcoming Barriers to Housing in Greater Boston.* 2003.
44. *Reducing the cost of new housing construction in NYC*. 1999.
45. *Through the Roof: A Report on Affordable Housing in Austin (TX)* Community Action Network, 1999.

Chapter 3
BASELINE

As noted in the introduction, the purpose of the "baseline" is to establish parameters of the residential development review and approval process existing at a particular point in the past then use it to compare the current situation. The baseline period selected is the middle 1970s, roughly a generation or 30 years from when the research was undertaken. This period is selected for several reasons. First, it comes at the early stages of national and state interest in improving environmental quality. The Federal Environmental Protection Agency was launched in 1970 with several states forming their own versions of the EPA about the same time. Second, it comes at the beginning of several states efforts to engage in state-wide land-use planning processes through local government efforts – principally California, Colorado, Florida, and Oregon. Third, it marks a watershed period in efforts to change development patterns and especially residential development patterns, moving away from low-density, single-use approaches to mixed-use and cluster development ones. Such publications as the Real Estate Research Corporation's *Costs of Sprawl* (1973)[7] and the National Association of Home Builders' *Cost Effective Site Planning* (1976)[8] were especially prominent. And, fourth, numerous "model" development codes and subdivision manuals were published such as the American Bar Association's *Model Land Development Code* (1976)[9] and the American Society of Planning Officials' (now American Planning Association) *Model Subdivision Regulations* (1975).[10] These efforts helped launch the current regulatory environment. One of the techniques researchers use to assess change is establish baseline conditions at the beginning of a change and compare current conditions against that baseline. The middle 1970s seems to be an appropriate period in which to create the baseline. Baseline conditions for the nation as a whole are constructed for costs and processes.

Costs

The baseline is composed of cost and process elements. Ideally, costs involved in making the same kind of residential product available between the middle 1970s and middle 2000s would be identified. Fortunately, the NAHB's *Cost Effective Site Planning* of 1976 provides an important baseline for costs. The NAHB analysis created prototypes of single family developments for traditional and cluster or modern configurations, showing substantial savings in development costs plus increases in amenities that enhanced the value of residential developments. The baseline cost condition used here is that for the "typical standards" for a subdivision of four dwelling units per acre. The total share of the cost per lot assigned to environmentally-related costs is about 15 percent.

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[7] Real Estate Research Corporation, *Costs of Sprawl*, U.S. Department of Housing and Urban Development (Washington, DC), 1973.

[8] National Association of Home Builders, *Cost Effective Site Planning: Single Family Development*, NAHB (Washington, DC), 1976.

[9] American Bar Association, *Model Land Development Code*, ABA (Chicago, IL), 1976.

[10] Robert H. Freilich, *Model Subdivision Regulations: Text and Commentary*, American Society of Planning Officials (Washington, DC), 1975. on, DC), 1973.

[10] National

Table 3.1
Distribution of Subdivision Improvement Costs, 1975

Cost Category	Cost	Share
Clearing & Grubbing	$381	6.1%
Grading Streets	$392	6.3%
Street Pavement	$731	11.7%
Grading, Seeding Lots/R.O.W.	$768	12.3%
Sanitary Sewer	$923	14.8%
Water Distribution	$531	8.5%
Curbs & Gutters	$679	10.9%
Driveways	$700	11.2%
Sidewalks	$212	3.4%
Street Trees	***$306***	***4.9%***
Storm Drainage	***$619***	***9.9%***
Total	$6,242	
Environmentally-Related Cost	***$925***	***14.8%***

Source: National Association of Home Builders, *Cost-Effective Site Planning* (1976), p. 135. Figures for 2005 adjusted using Engineering News & Record used to adjust costs to 2005 dollars based on its 20-Cities 4th-quarter index of 2279 and its 4th quarter 2005 index of 4302 or a factor of 1.89.

How do improvement costs, especially those related to environmental regulations, compare to finished lot prices? The average finished lot price for 1975 is estimated from the Urban Land Institute's *Residential Development Handbook*, second edition[11] (p. 4), being $10,055 (the unweighted average of the 30 markets reported). Improvement costs are estimated to be about 62 percent of finished lot prices with environmentally-related costs being about 9 percent of the finished lot price, as seen below:

$$\frac{\text{Improvement Costs per Lot}}{\text{Finished Lot Cost}} = \frac{\$6{,}242}{\$10{,}055} = 62.1\%$$

$$\frac{\text{Environmental-Related Costs per Lot}}{\text{Finished Lot Cost}} = \frac{\$925}{\$10{,}055} = 9.2\%$$

Data from the middle 1970s does not allow for the construction of a continuum of environmental-related costs per lot. In statistics a normal distribution of variation in measurement assuming an randomly-selected population would have about two-thirds of all cases distributed on both sides of the mean. If environmentally-related costs in the middle 1970s had a mean of around 9 percent and assuming a normal distribution about the mean about two-

[11] Urban Land Institute, *Residential Development Handbook*, 2nd Ed., Community Builders Handbook Series, ULI (Washington, DC), 1990.

thirds of all cases would fall between 6 percent and 12 percent. Given this limitation a range is constructed here with low, normal, and high categories as follows:

< 6% of Lot Cost	6-12% of Lot Cost	>12% of Lot Cost
Low	**Normal**	**High**

Processes

For information on processing subdivision approvals the research is aided by analysis by Ben-Joseph (2003) who compared changes in various subdivision regulatory features and procedures based on a 1976 survey of developers by Seidel (1978) and Ben-Joseph's replication of that survey in 2002. It is interesting to note that over the 26-year period 1976-2002 the mean time to process subdivisions has increased only two months, from 15 to 17. The mode length of time to process subdivisions, 13-24 months, remained the same in both surveys. However, the distribution of subdivisions approved in under 7 months in 1976 was halved by 2002, while those approved in more than 24 mores nearly doubled.

Table 3.2 Average Time to Receive Residential Subdivision Approvals According to Developers, 1976 & 2002

Survey	<7 months	7-12 months	13-24 months	24+ months	Mean Months
1976 (Seidel 1978)	14.5%	27.5%	47.0%	11.0%	15
2002 (Ben-Joseph 2003)	6.4%	28.0%	45.0%	20.5%	17

Source: Ben-Joseph (2003). Mean months calculated by authors based on 6 months, 9 months, 18 months, and 30 months respectively for the categories of <7 months, 7-12 months, 13-24 months, and 24+ months.

However, an increasing percentage of residential subdivisions also require variances, special exceptions and/or rezoning decisions in addition to plat approval. As seen in Table 3.3, the incidence of securing zoning relief (variances, special exceptions, and/or rezonings) rose from about 33 percent in 1976 to about 46 percent in 2002, an increase of nearly 40 percent.

How much time this adds to the overall entitlement process is not known. Sometimes the zoning relief is processed as part of an overall package of land-use decisions but other times the zoning relief entails a separate process. The only study that may address this is Ben-Joseph's but here only an inference may be made. Table 3.4 shows developers' representations of the time it took to secure zoning relief in 2002. It is assumed that zoning relief adds to the processing time. Yet, because of due diligence, developers likely know in advance if their proposal will require zoning relief and thus anticipate the process in their decision on whether to proceed.

Table 3.3 Incidence of Developers' Application for Zoning Relief, 1976 & 2002.

Percent of Time Applied for Zoning Relief	Percent Developers 1976	Percent Developers 2002
Almost never	49.5%	14.1%
5% - 10% of the time	5.3%	11.3%
11% to 25%	6.1%	8.5%
26% to 50%	10.2%	11.3%
51% to 75%	3.9%	15.5%
76+%	31.6%	36.6%
Weighted Average Incidence	33.1%	45.7%

Source: Ben-Joseph (2003). Weighted average incidence of 33% in 1976 and 46% in 2002 calculated by authors based on 0%, 7.5%, 18%, 38%, 63% and 80%.

Table 3.4 Developers' Estimate of Approval Time for Zoning Relief, 2002

Procedure	Time Required	Percent of Developers
Variance or special exception	<1 month	0.0%
	1-2 months	28.6%
	3-4 months	32.9%
	4+months	38.5%
	Mean	3.9
Rezoning	<1 month	0.0%
	1-2 months	6.8%
	3-4 months	23.3%
	4+months	69.9%
	Mean	5.1
Unweighted Combination	Mean	4.5

Source: Ben-Joseph (2003). Weighted average incidence calculated by authors based on 0 months, 1.5 months, 3.5 months, and 6 months for each category of percent of time applied for zoning relief respectively times the incidence for 2002 respectively.

On average, a zoning relief decision takes 4 to 5 months to process but this is already included in the residential subdivision approval estimates reported in Table 3.2. The overall increase by 2 months between 1976 and 2002 is essentially equivalent to the mean unweighted combination zoning relief approval months in Table 3.4 times the incidence of needing zoning relief in 2002 from Table 3.3, or about 2.1 months.

<7 months	7-12 months	13-24 months	24+ months
Expedited	**Accelerated**	**Normal**	**Delayed**

Limitations and Caveats

The cost and process continua necessitate important caveats. These are broad, national average benchmarks that may bear little resemblance to regions or unique local conditions. Areas rich with diverse but fragile habitats such as much of Southern California and many parts of Florida may require higher levels assessment than other areas with a narrower range of habitats and/or more resilient ones such as much of the Piedmont region in the Southeast or the Great Plains that span the middle of the nation from Canada into Texas. They also apply mostly to new, suburban density single family detached residential subdivisions in "green" fields and not to complex, mixed-use, mixed-housing, urban/suburban in-fill or redevelopment sites. Single-use, traditional residential subdivisions on green fields in the Piedmont region and Texas may very well face relatively fewer and more efficiently addressed environmental concerns than complex projects in fragile landscapes that may also entail environmental remediation.

Additionally, the estimated category mean time used to calculate the weighted verages are approximations. To the extent that they misrepresent the actual tendency of any category in either year, the weighted estimates may be biased

These continua may need to be refined for different regions and for different kinds or scales of developments, and such is beyond the scope of this research. Nonetheless, the approaches developed and applied in this research may inform future research on how to construct continua relevant to different conditions.

Chapter 4
PILOT STUDY

Introduction

Over the period 1995 to 2005, the Washington, DC metropolitan region became one of nation's most expensive places in which to purchase a home. Economic and job growth throughout the region has spawned substantial demand for new development, especially for new housing within the suburban counties and cities that surround the District of Columbia. While these communities share a robust regional housing market, metropolitan Washington, DC includes three distinct models of local government, two traditionally different state environmental regulatory systems (Maryland and Virginia), and several extensive land development review processes. Given these regulatory variations and its strong regional housing market, metropolitan Washington, DC provides an ideal laboratory to explore how environmental protection permit and regulatory systems may affect suburban housing affordability.

The pilot case study compares the environmental regulatory systems between Maryland and Virginia and two adjacent counties (Montgomery and Fairfax) that are separated by the narrow band of the Potomac River. The pilot case study examines how land development processes differ between the two local jurisdictions and states, how they affect environmental compliance and reviews, and how much time it takes home builders to obtain the final development approvals for standard subdivisions. A developer active in the area granted access to a number of projects completed in the region. This access enabled the team to investigate the effect of jurisdictional and regulatory differences from within the uniformity of a single firm in a single market.

Evaluating regional housing projects of similar size and character aims to clarify the effect of environmental regulations on housing affordability. Before reviewing the county development review processes and environmental regulations in light of the seven development projects investigated, the following section provides an overview of the case study objectives and methodology.

Framing the Environmental vs. Housing Policy Debate

Environmental protection can benefit a community and can also increase the cost of development and the resulting cost of housing. Environmental regulation can affect the cost of development and housing in three ways:

1. Compliance costs for environmental mitigation and management measures can increase the development cost of housing projects;
2. Environmental reviews and approvals can add to the time required from entitlement to project completion, possibly incurring additional costs of delays, labor, and inflation; and

3. Environmental regulations can preclude development in sensitive or hazardous areas, taking land out of development and possibly increasing land costs and the cost of development.

These potential costs must be compared to the benefits of environmental regulations:

1. Environmental regulations can reduce future damage costs associated with natural hazards, including stormwater and flooding hazards, erosion and sediment problems, steep slope hazards, and others.
2. Environmental regulations can prevent adverse impact of land development on environmental resources deemed by public policy to have societal value, including water quality, air quality, natural habitats, open space, productive farmland, cultural resources, and others.
3. Environmental regulations can enhance property values by providing environmental amenities and reducing impacts of new developments on existing neighborhoods, through such measures as hazard mitigation and resource protection given in (1) and (2), as well as tree preservation, landscaping, noise abatement, and other measures.

For the purposes of this project, the research team focused on the costs of environmental regulations but not on their benefits. Regarding the three types of costs (compliance costs, process costs, and reduced land for development), the project focuses on the first two. The third cost associated with reduced land for development resulting from environmental regulations could not be investigated within the constraints of this study because of the complexities of isolating factors affecting land costs.

Although the project does not address the economic and societal benefits environmental regulations in detail, it is important to mention these benefits to put regulatory costs in the proper context. While the results will likely not lead to the elimination of environmental regulations, they may reveal the distribution of such costs and opportunities for reducing the costs to ease barriers to housing affordability.

The study focuses on housing affordability – and the cost of building new homes more generally – but not HUD's term of art "affordable housing." The best set of data on the effect of environmental regulations on cost is from large contemporary housing development projects. These projects often have provisions for "affordable housing" units, but in vibrant housing markets the average price of housing units in these developments tends to be high; for example the average price of new housing in Fairfax and Montgomery counties is $750-800 thousand. Therefore, the study does not focus on "affordable housing" per se, but on the incremental costs associated with environmental regulations on the price of new housing units.

Research Goals and Hypotheses

This pilot study investigates the relationship between housing cost and environmental regulations in the metropolitan Washington, DC housing market. The study examines the interaction between environmental regulations and the housing industry using projects within the same county, between counties, and between states. It investigates the similarities and differences

identified in two counties in two states. The goal is to generate insights into the impacts of environmental regulations and the systems used to support them on the housing industry and specifically on the cost of housing units.

Hypotheses

1. **Environmental Compliance Costs:** Drawn from the academic literature, the research team investigated two hypotheses relating to environmental compliance costs:
   1a. Environmental compliance costs include costs for additional environmental plans and studies and costs for physical measures for mitigation, restoration, and protection, and that these combined costs are a significant percentage of the costs of development and the price of housing.
   1b. The compliance costs of physical measures for environmental mitigation, restoration, and protection carry a higher cost commitment than the preparation or implementation of plans to protect these resources.
2. **Costs of Environmental Review and Approval Processes:** Drawn for the academic literature, the study investigated three hypotheses relating to development review processes:
   2a. Increased levels of environmental regulations require more time and resources for development review and permit approvals.
   2b. The longer it takes to navigate the development review process, the greater the costs to the home builder and these costs are transferred to the customer in higher housing prices.
   2c. Environmental regulations are more effective and less costly when the administrative processes are streamlined and provide greater clarity and certainty to both developers and the staffs of reviewing and approving agencies.

Methodology

In this pilot case study, the research team enlisted the support of regional home builders to inventory the direct costs associated with the environmental and development review processes incurred in completing four residential subdivisions in Fairfax County and Montgomery County. In addition, cost information was gathered on three projects in two adjacent northern Virginia counties (Loudoun and Prince William). Because of the long standing environmental regulatory systems, comprehensive land development processes, and staff capacities in Fairfax and Montgomery counties, the research team focused their case study comparison and cost calculation on the regulatory systems and projects in those counties. The additional projects provide additional cost data beyond those two counties, but in the same regional housing market.

The Fairfax/Montgomery case study examines:

1. Environmental Regulatory Systems: a survey of relevant and applicable state and local environmental regulations (statutes, ordinances, polices, and guidelines) imposed on the projects, such as erosion controls, stream buffers, tree inventories, open space set asides, etc.;
2. Local Development Review Processes: a careful evaluation of how the local development processes interfaces with the environmental regulatory systems, especially tracking how

long it takes (from application to entitlement) and how many decision steps are involved (such as zone change, plan amendment, subdivision approval, etc.); and

3. Developer Costs: an inventory of typical costs incurred by the home builder, such as engaging the services of environmental consultants and installing erosion control measures and stormwater infrastructure.

Information for this pilot study was collected from interviews with local elected officials and their planning staff; review of planning documents and approved final plans acquired from a home builder active in the metropolitan region; online research from each County's website; and interviews with local builders, developers, and engineers. The builders provided access to final construction plans and documents for seven project sites, six in Virginia and one in Maryland. The projects were surveyed and inventoried for information regarding environmental regulations, general characteristics, and special requirements pertaining to environmental situations on the site. Interviews with the developers and their environmental and design consultants were used to gather information about the process and costs associated with the projects. Online research of municipal data was used to acquire information about project timing and requirements.

Before reviewing details of the research approach, present and analyze the data it is useful to assess the metropolitan Washington, DC, housing market.

Metropolitan Washington, DC Profile

The metropolitan Washington, DC region has been experiencing significant growth in recent times. According to the U.S. Census, the metropolitan statistical area (MSA) grew from 3,923,574 persons in 1990 to 4,796,183 in 2000.[12] It is estimated there are 5,139,549 residents in the MSA as of 2005, with the Metropolitan Washington Council of Governments (MWCOG) forecasting it to reach 6,609,900 by 2030.[13] This growth has been partially generated by a robust employment market, fed by both federal government and private sector jobs. Nearly 125,000 new jobs have been added in the region since 2000, raising the employment figures to 2,677,815 in the MSA.[14]

As a result of this growth, the housing market in the metropolitan Washington region can be characterized as strong, with a high demand for residential units in all categories. According to the June 2006 Metropolitan Washington Annual Regional Housing Report released by MWCOG, there were an estimated 27,420 permits issued for single family and multifamily residential units in 2005.[15] This figure is divided between an estimated 18,523 permits for single family residential units and 8,897 multifamily residential units. Since 1998, nearly 157,000 single family residential units have been constructed in the metropolitan region, which includes the following locations:

[12] Annual Estimates of the Population of Metropolitan and Micropolitan Statistical Areas: April 1, 2000 to July 1, 2004

[13] "Economic Trends in Metropolitan Washington 2000 – 2004" available at www.mwcog.org/uploads/pub-documents/y1tXVw20050914134641.pdf (June 2006)

[14] "Economic Trends in Metropolitan Washington 2000 – 2004" available at www.mwcog.org/uploads/pub-documents/y1tXVw20050914134641.pdf (June 2006)

[15] "Metropolitan Washington Annual Regional Housing Report" available at www.mwcog.org/uploads/pub-documents/9VlcXg20060717084410.pdf (July 2006).

- *Washington, DC*
- *Virginia*
    - City of Alexandria
    - Arlington County
    - City of Fairfax
    - Fairfax County
    - City of Falls Church
    - Loudoun County
    - City of Manassas
    - City of Manassas Park
    - Prince William County
- *Maryland*
    - Frederick County
    - Montgomery County
    - Prince George's County

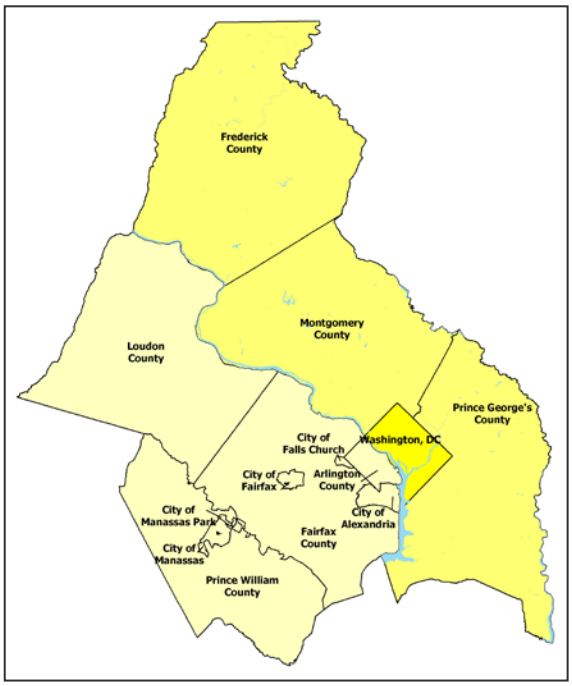
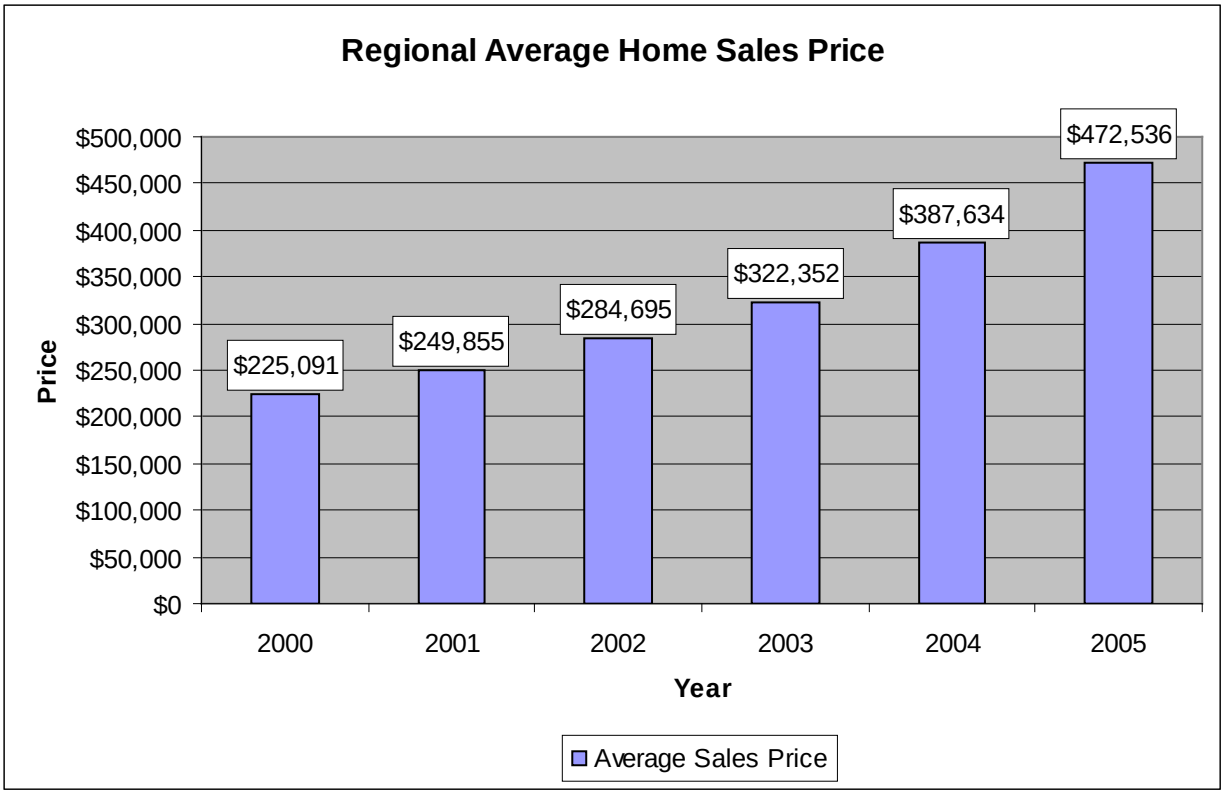


Figure 4-1: Metropolitan Washington, DC

The report also revealed the metropolitan region has experienced a 130 percent increase in average homes sales price since 1998, a figure that incorporates single family detached and attached homes as well as condominium units. This figure is evidenced by the increase from an average home sales price of $205,964 in 1998 to $472,536 in 2005 as shown in Figure 4-2. From 2000 to 2005, the average number of days a home spent on the market has decreased from 46 days to 23 days, indicating a practically insatiable demand for residential units.

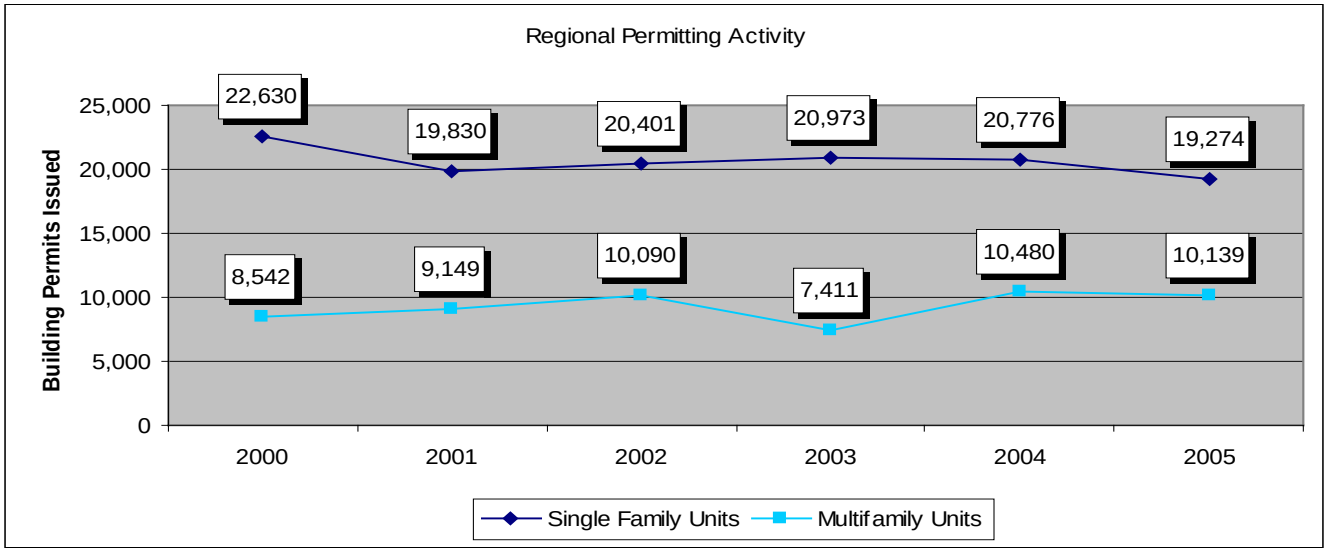
Figure 4-2.
DC Metropolitan Regional Home Sales Price



Source: Metropolitan Regional Information Systems, Inc.

The U.S. Census, which tracks building permit activity annually for single family and multifamily units, reveals the regional permitting activity have decreased and increased, respectively, between 2000 and 2005. During this same time period, the average number of permits to construct single family and multifamily units has been nearly 30,000 where multifamily units have accounted for between one-quarter and one-third of the building permits issued. The Census does not track whether the permitted units are to be owner or renter occupied. Figure 4-3 illustrates the single family and multifamily building permits issued from 2000 through 2005.

Figure 4-3
DC Metropolitan Regional Permitting Activity



Source: U.S. Census Bureau

The housing market in the Washington metropolitan region has been strong for a number of years. More recently, the market is starting to slow, although not significantly, partially because of an expanding inventory of homes for sale and high prices.[16] With a steady source of employment in the government sector and a strong regional technology sector, this scenario is not anticipated to last. The region is forecast to add an average of 69,000 new residents per year through 2030.[17]

The Chesapeake Bay is a major natural asset unique to the metropolitan Washington, DC region. Environmental regulatory issues that arise in connection with this important natural resource are stormwater management, sedimentation and erosion controls, impervious surfaces, air pollution, tree cover, and open space preservation.

One of the interesting features of the Pilot Study area is that major jurisdictions of roughly comparable market characteristics compete in the same market yet are located in two states having very different legal and planning traditions. The next section reviews them.

[16] "Changing Seasons, Changing Markets" available at www.washingtonpost.com/wp-dyn/content/article/2006/03/24/AR2006032400869.htmlwww.washingtonpost.com/wp-dyn/content/article/2006/03/24/AR2006032400869.html (July 2006)
[17] "Growth Trends to 2030: Cooperative Forecasting in the Washington Region" available at www.mc-mncppc.org/research/data_library/montgomery_county_glance/ataglance.pdfwww.mc-mncppc.org/research/data_library/montgomery_county_glance/ataglance.pdf (June 2006)

Fairfax County, Virginia, and Montgomery County, Maryland

Fairfax County, Virginia, and Montgomery County, Maryland represent two very distinct institutional approaches to governance and land development—it would be hard to find such contrasting styles in another metropolitan area. Officially part of the Washington, DC, PMSA, Fairfax and Montgomery counties now share similar trends in demographics, population growth, development pressures, and high-end housing markets. These suburban counties, separated only by the Potomac River, have historically varied considerably in governance structure and state-level environmental regulatory review requirements. Fairfax County operates in a Dillon's Rule state, meaning its local powers are strictly limited by what the Virginia legislature expressly says they can do. In contrast, local governments in Maryland enjoy a greater level of autonomy and wider range of powers.

Virginia law has a deep tradition and high respect for the interests of private property owners making it historically more conservative when it comes to state and local environmental regulations, land use planning, and zoning powers. In recent years Maryland has promoted itself as one of the nation's leaders in Smart Growth and land use planning. Compared with its neighboring state of Virginia, Maryland has a stronger state environmental regulatory system that shares significant implementation responsibilities with county governments. With the advent of federal and Virginia state regulations aimed at reducing pollution in the Chesapeake Bay, Fairfax County has started to resemble Montgomery County and Maryland in its environmental approaches.

Table 4-1
General Comparison

Category	**Fairfax County**	**Montgomery County**
Population 1990 (total/rural)	818,584/19,918	757,027/34,081
Population 2000 (total/rural)	969,749/13,644	873,341/24,589
Population 2005 (est.)	1,006,529	927,533
Median Household Income in 2004	$88,133	$82,971
Single family detached homes in 2004	194,453	184,085
Attached residential units in 2004	177,945	168,634
Total housing units in 2004	380,637	353,051
Median New Home Sales Price 2005	$807,266	$759,933
Median New Home Sales Price 1997	$389,747	$343,295

Source: U.S. Census

Fairfax County, Virginia, and Montgomery County, Maryland, are counties representative of the environmental and affordable housing challenges the facing the region. Table 4-1 provides a general comparison for the demographic and housing characteristics of the two counties. Their proximity to the District has helped these counties evolve from one time bedroom suburban communities into localities with strong economic development and regional employment attractions. Their respective approach to the increased residential development pressures is indicative of the challenges each faces in preserving the environment and providing affordable housing. Virginia's Dillon's Rule structure limits the ability of local governments to directly

regulate or control the activities of developers and builders when it comes to environmental protection and affordable housing needs. For example, developers are encouraged and offered incentives to participate in Fairfax County's affordable housing program but state law does not expressly empower the county to enact a local ordinance that would mandate affordable housing set asides. Municipal law in Maryland allows Montgomery County to play a more active land use management role by preparing and enforcing area master plans, affordable housing requirements, and environmental regulations. Therefore, Montgomery County requires developers over a predetermined threshold to provide affordable housing units.

Fairfax County, Virginia

Many of the demographic and economic characteristics of the two counties are similar. Fairfax has slightly more than one million residents, comparable to Montgomery. Like Montgomery County, Fairfax has experienced double digit population growth in the last ten years and housing prices and household income are well over the national average.

Where they differ is in land use policy and regulation based on their governing structure. Fairfax County, which is guided by an elected Board of Supervisors and a chairman, at-large, tends to be more advisory than regulatory in its approach, whereas Montgomery County is very involved in land use decisions and growth patterns. This is partially due to the fact that Virginia is a Dillon's Rule state, meaning all powers not expressly granted to the county must be petitioned for at the State Legislature in Richmond. Fairfax County has a relatively sprawling growth pattern as compared to Montgomery County. An extensive network of transportation corridors in Fairfax County allowed for dispersed suburban development, whereas Montgomery has developed more or less along the Metro rail corridors. Since 1970, the County has not developed as much land around Metro stations, in contrast to Montgomery County. Fairfax development has tended to cluster around highway exits, causing it to be a fairly decentralized area with no "county core."[18]

Demand for housing has remained fairly high in the county – the homeowner vacancy rate was 0.7 percent and the rental vacancy rate was 4.9 percent in 2004, lower than the national average.[19] Between 2000 and 2003, Fairfax County grew at a rate of 4 percent, as compared to a 1 percent rate in Montgomery County.[20] Housing prices have also steadily increased. The median housing unit market value in 2004 was $415,418, a change of 13.6 percent over 2003, significantly higher than the national value of $151,366.[21] Most housing units in Fairfax in 2004 were single family residences according to the U.S. Census.[22] The median sales price of a new

[18] "Mid-Atlantic RESAC Measuring Sprawl in the Washington Metropolitan Region" available at www.geog.umd.edu/resac/sprawl.htm (June 2006)
[19] "Fairfax County, Virginia Selected Housing Characteristics: 2004" available at http://factfinder.census.gov/servlet/ADPTable?_bm=y&-context=adp&-ds_name=ACS_2004_EST_G00_&-tree_id=304&-all_geo_types=N&-_caller=geoselect&-geo_id=05000US51059&-format=&-_lang=en (June 2006)
[20] "2003 Housing Data Survey" available at www.mwcog.org/uploads/pub-documents/8V1WXA20041029084116.pdf (June 2006)
[21] "2004 Data Profiles – American Community Survey" available at www.census.gov/acs/www/Products/index.htm (June 2006)
[22] "2004 Data Profiles – American Community Survey" available at www.census.gov/acs/www/Products/index.htm (June 2006)

single family home in 2005 was $807,266.[23] An existing single family home resale price in 2005 was $615,000.[24] The median family income in 2005 was $94,160.[25] In Fairfax County, where providing affordable housing units as a part of a development project cannot be required, the Affordable Housing Partnership Program works with non-profit and for-profit housing development organizations to develop and preserve affordable residential units in the county.[26]

The regulatory structure of the state limits the environmental and affordable housing regulations the county is able to develop and enforce. Therefore, the county follows the traditional state and federal guidelines set forth for stormwater and wetlands. Fairfax County also seeks to protect rural space by allowing one house per five acres in the Occoquan area and has a conservation easement partnership in place. The Chesapeake Bay Preservation Act was also influential in the county's environmental regulatory structure. The county adopted the Chesapeake Bay Ordinance in 1993 in compliance with the 1988 Virginia Chesapeake Bay Preservation Act. The ordinance established Chesapeake Bay Preservation Areas such as Resource Protection Areas and Resource Management areas to protect water quality. The ordinance has been an environmental success in support of protecting water resources for the county, which received the Chesapeake Bay Program's Local Government Advisory Committee "Gold" Partner Community in 1997 and 2003.

Montgomery County, Maryland

Montgomery County, Maryland, is a large county adjacent to and northwest of Washington, DC. Like Fairfax, it is home to more than 900,000 people of diverse races and backgrounds – and it is growing.[27] The County Executive is elected and oversees a large governing body that offers its residents a strong public schools system, jobs, and attractive suburban neighborhoods and rural areas for living.

Almost half (48 percent) of Montgomery County residents live in multifamily housing.[28] Existing single family homes, attached and detached, provide the most affordable option for housing in the county, which have seen an increase in prices at a rate of 1.1 percent since 1991 as compared to 2.5 percent annually for new residential units.[29] In 2005, the median sales price of a new single family home was $759,933,[30] and for an existing single family home was $500,000.[31] For all single family homes, attached, detached, new, and existing, the median sales price in

[23] "Economic Indicators" available at www.fairfaxcounty.gov/economic/indicat/2006/02.pdf (June 2006)
[24] "Economic Indicators" available at www.fairfaxcounty.gov/economic/indicat/1998/02.pdf (June 2006)
[25] "2005 Data Profiles – American Community Survey" available www.census.gov/acs/www/Products/index.htm (December 2006)
[26] "Affordable Housing Partnership Program" available at www.fairfaxcounty.gov/rha/ahpp.htm (June 2006)
[27] "Montgomery County at a Glance – Current Estimates: Population, Housing, Employment" available at www.mc-mncppc.org/research/data_library/montgomery_county_glance/ataglance.pdf (June 2006)
[28] "Montgomery County at a Glance – Current Estimates: Population, Housing, Employment" available at www.mc-mncppc.org/research/data_library/montgomery_county_glance/ataglance.pdf (June 2006)
[29] "Federal Programs Section" available at www.montgomerycountymd.gov/dhctmpl.asp?url=/content/dhca/community/conplan99exsum.asp (June 2006)
[30] "Consolidated Plan for Montgomery County, Maryland" available at www.montgomerycountymd.gov/content/dhca/community/conplan07_exec_summary.doc (June 2006)
[31] "Consolidated Plan for Montgomery County, Maryland" available at www.montgomerycountymd.gov/content/dhca/community/conplan07_exec_summary.doc (June 2006)

2005 was $440,000.[32] The median household income in 52005 was $82,187.[33] In 2003, 29 percent of households (approximately 98,000) in the county fell below the household income cap for the Moderately Priced Dwelling Unit Program, which is set at 65 percent of the county median income.[34] Montgomery County, which has a mandatory affordable housing requirement for new residential development projects over a certain number of units, leads the metropolitan region in building affordable housing. It was recognized as a pioneer in affordable housing dating back to the 1970s. Since 1976, 11,647 Moderately Priced Dwelling Units have been constructed.[35]

The county also has a long standing tradition of being a regional leader in environmental protection. Open space, farmland preservation, and natural resource protection are issues of importance to the county. In some localities within the county, Special Protection Areas have been established to protect high quality water courses. Developed in 1994, Montgomery County's Special Protection Area (SPA) program strives to protect streams with existing high quality and sensitive environmental resources relating to water quality by closely coordinating water quality protection measures with land use controls.[36]

Montgomery County was also one of the first localities in the nation to create a program using Transfer of Development Rights (TDR) to protect agricultural land. The voluntary program, which was created in 1981, has preserved over 40,000 acres.[37] Property owners in "sending areas" can transfer their development rights at one unit per five acres to a "receiving area" through a sales process. The owner can choose not to participate in the program, but in doing so, is only permitted to develop units at a one to 25 acre density. The program helps to direct growth to appropriate areas while maintaining the agricultural activities in the western portions of the county.

The different county and state governmental structures impact the land development process and subsequent environmental and affordable housing issues in each locality. The following sections further highlight the development processes and environmental regulations in each county.

[32] "Consolidated Plan for Montgomery County, Maryland" available at www.montgomerycountymd.gov/content/dhca/community/conplan07_exec_summary.doc (June 2006)
[33] "2005 Data Profiles – American Community Survey" available at (www.census.gov/acs/www/Products/index.htm (December 2006)
[34] "Census Update Survey 2003" available at www.mc-mncppc.org/research/data_library/CUS2003/summary/CUS03Summary.pdf (June 2006)
[35] "County MPDU" available at www.mc-mncppc.org/research/data_library/real_estate_development/housing/pdfs/countympdu.pdf (June 2006)
[36] "SPA Annual Report for 2001" available at www.montgomerycountymd.gov/content/dep/SPA/2001annualreport/summary.pdf (June 2006)
[37] "Montgomery County TDR Program" available at www.ctahr.hawaii.edu/awg/downloads/rp_AFT_TDRstudies_Boone.doc (July 2006)

Relevant Environmental Regulations and Programs

This section reviews the relevant environmental regulations and programs that operate in all or parts of the metropolitan Washington, DC housing market.

Overview of Environmental Policy and Regulatory System

Federal and state environmental policy essentially shapes the environmental regulatory systems found in the Washington, DC metropolitan region. Broad policy goals of protecting water and air quality in the name of public health and also preserving natural resources and habitat guide federal, state, and local policymakers in enacting the federal laws, state statutes and local ordinances that govern the environment. Federal and state policy goals generate federal, state and local regulations. A hierarchy of responsibility is created as multiple federal, state, and local agencies may be responsible for the implementation of the regulations. Federal and state environmental regulators may further adopt guidelines that govern the environmental review process. These intergovernmental dynamics have a significant impact on the implementation of environmental regulations and ultimately on the compliance costs incurred by home builders.

The policies and the regulations generated for their implementation may be federal, state, local, or a partnership between various entities in a region. Federal policies such as the Clean Water Act stipulate states must develop their own regulations for meeting the requirements. States may also decide to regulate or encourage the regulation of environmental resources through measures such as forest conservation acts. Local governments may respond to state acts or, given the authority, develop regulations of their own. Unique environmental features may also propel inter-state agreements leading to state mandates and local legislation. The following section discusses federal, state, and local environmental regulations influential in the metropolitan Washington, DC area.

The regulatory framework in the pilot case study area reflects interplay between federal, state, and local regulations. The existence of a unique natural resource, the Chesapeake Bay, has also led to the creation of a regional alliance which influences state and local regulations. Table 4-2 illustrates the generalized breakdown of the environmental regulatory structure governing development in the Washington area.

The remainder of this section (pp. 65-80) provides more detail about specific regulations. We put this section in the body of the report rather than in an appendix because it brings to life the detailed regulations governing development in the region. Readers not interested in this level of detail may wish to move to the next section on the development review process on page 81.

Table 4-2
Environmental Regulatory Acts

Governmental Body	Environmental Element	Regulatory Act	Oversight
Federal	Water	Clean Water Act	Wetlands, stormwater
	Endangered Species	Endangered Species Act	Threatened and endangered species and their habitats
State	Water	Virginia Erosion & Sediment Control Law, Virginia Stormwater Management Law, Code of Virginia Wetlands Policy, Code of Virginia Standards for Use & Development of Wetlands, Maryland Economic Growth, Resource Protection, and Planning Act of 1992, Maryland Nontidal Wetlands Act	Wetlands, stormwater, erosion and sediment control, floodplains
		Chesapeake Bay Preservation Act (VA) Maryland Critical Area Program of 1984 (Expanded 2002)	Chesapeake Bay
	Forest and Trees	Code of Virginia Tree Replacement, Maryland Forest Conservation Act of 1991	Forest and trees preservation and conservation
Local	Water	Fairfax County Code Erosion and Sediment Control, Fairfax County Code Wetlands Zoning Ordinance, Code of Montgomery County Erosion, Sediment Control and Stormwater Management Regulations	Stormwater, wetlands, floodplains, erosion and sediment control
		Fairfax County Code Chesapeake Bay Preservation Ordinance	Stormwater, wetlands, stream corridors
		Code of Montgomery County Erosion, Sediment Control and Stormwater Management Regulations, Water Quality Review for Development in Designated Special Protection Areas (MD)	High quality water sheds
	Forest and Trees	Fairfax County Code Subdivision Provisions, Code of Montgomery County Forest Conservation Regulations,	Forest and tree preservation, conservation and cover
	Noise	Fairfax County Code - Noise, Code of Montgomery County Noise Regulations	Noise reduction for residential developments
	Cultural Resources	Code of Montgomery County Forest Conservation Regulations	Archeological and cultural resources
	Threatened and Endangered Species	Code of Montgomery County Erosion, Sediment Control and Stormwater Management Regulations	Threatened and endangered species and their habitat

Special Regional Environmental Protection Programs—Chesapeake Bay Program

The Chesapeake Bay Program is a good illustration of the environmental hierarchy that can develop around state and federal policies and laws. Different government agencies active at state and local levels and a layering of regulations help to implement the policies established in this federal and state environmental protection program.

In the metropolitan Washington, DC area, concerns over the long-term health of the Chesapeake Bay have prompted regional cooperation between federal and state agencies to develop policies for protecting the resource. Established in 1983 as part of the Clean Water Act to restore and protect the Chesapeake Bay, the "Program brings together members of various state, federal, academic and local watershed organizations to build and adopt policies that support Bay restoration."[38] The Program collaboratively involves members of organizations affiliated with Maryland, Virginia, Pennsylvania, the District of Columbia and the United States Environmental Protection Agency. Members participate in three types of committees to drive and implement the Program efforts:

- Committees that govern the Bay Program and guide policy changes;
- Advisory committees that provide external perspectives on current issues and events;
- Internal subcommittees that work to coordinate restoration activities.

The Chesapeake Bay protection legislation greatly influences the environmental regulatory systems for both Fairfax and Montgomery counties. Compliance with the regulations and incentives developed by each state to implement the plan has played a role in the unique environmental regulations found in each county such as Resource Protection Area (Fairfax County) and Special Protection Areas (Montgomery County)

The Chesapeake Bay Preservation Act of Virginia, adopted in 1988, requires that state and local governments work to balance economic development and water quality protection. The protection of the Chesapeake Bay and the general welfare of the residents of Virginia require:[39]

- The counties, cities, and towns of Tidewater Virginia incorporate general water quality protection measures into their comprehensive plans, zoning ordinances, and subdivision ordinances
- The counties, cities, and towns of Tidewater Virginia establish programs, in accordance with criteria established by the Commonwealth, that define and protect certain lands, hereinafter called Chesapeake Bay Preservation Areas, which if improperly developed may result in substantial damage to the water quality of the Chesapeake Bay and its tributaries
- The Commonwealth make its resources available to local governing bodies by providing financial and technical assistance, policy guidance, and oversight when requested or otherwise required to carry out and enforce the provisions of this chapter

[38] "Overview of the Chesapeake Bay Program" available at www.chesapeakebay.net/overview.htm, (May 2006)
[39] "Code of Virginia 10.1-2100" available at http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+10.1-2100 (July 2006)

- All agencies of the Commonwealth exercise their delegated authority in a manner consistent with water quality protection provisions of local comprehensive plans, zoning ordinances, and subdivision ordinances when it has been determined that they comply with the provisions of this chapter.

The Act gives local governments the role of planning and implementing the provisions of the Act. The Commonwealth is to support these local efforts by establishing criteria and providing oversight and the necessary resources to carry out and enforce the Act. The Act also establishes the Chesapeake Bay Local Assistance Board, which is responsible for coordinating state, regional, and local initiatives for implementing the Act. More specifically, the board is to "ensure local government comprehensive plans, zoning ordinances, and subdivision ordinances are in accordance with the provisions of" the Act.[40] The Board is required to assist local governments with the programs which, in concert with other state water quality programs, encourage and promote:

a. Protection of existing high quality state waters and restoration of all other state waters to a condition or quality that will permit all reasonable public uses and will support the propagation and growth of all aquatic life, including game fish, which might reasonably be expected to inhabit them
b. Safeguarding the clean waters of the Commonwealth from pollution
c. Prevention of any increase in pollution
d. Reduction of existing pollution
e. Promotion of water resource conservation in order to provide for the health, safety and welfare of the present and future citizens of the Commonwealth

The Act requires the following elements be part of a local Chesapeake Bay preservation program:[41]

1) A map delineating Chesapeake Bay Preservation Areas
2) Performance criteria applying in Chesapeake Bay Preservation Areas that will become mandatory on the local program adoption date. This criteria will:
   a) Prevent a net increase in nonpoint source pollution from new development and development on previously developed land where the runoff was treated by a water quality protection best management practice
   b) Achieve a 10 percent reduction in nonpoint source pollution from development on previously developed land where the runoff was not treated by one or more water quality best management practices
   c) Achieve a 40 percent reduction in nonpoint source pollution from agricultural and silvicultural uses
3) A comprehensive plan or revision that incorporates the protection of Chesapeake Bay Preservation Areas and of the quality of state waters and ensures consistency between the Act and the local comprehensive plan
4) A zoning ordinance or revision that

[40] "Code of Virginia 10.1-2103" available http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+10.1-2103 (July 2006)
[41] "Regs3-01-02" available at www.cblad.virginia.gov/docs/Regs3-01-02.pdf (July 2006)

a) Incorporates measures to protect the quality of state waters in Chesapeake Bay Preservation Areas, ensuring their consistency with the Act; and
b) Requires compliance with all criteria set forth in Part 2 above

5) A subdivision ordinance or revision that
   a) Incorporates measures to protect the quality of state waters in Chesapeake Bay Preservation Areas, ensuring their consistency with the Act; and
   b) Requires compliance with all criteria set forth in Part 2 above
6) An erosion and sediment control ordinance or revision that requires compliance with the criteria in Part 2 above
7) A plan of development process prior to the issuance of a building permit to assure that use and development of land in Chesapeake Bay Preservation Areas (CBPA) is accomplished in a manner that protects the quality of state waters.

Virginia Chesapeake Bay Preservation Act – Area Designation and Management Regulations[42]

The Virginia Chesapeake Bay Preservation Area Designation and Management Regulations establish the criteria by which local governments must model ordinances. The Regulations outline the criteria for designating preservation areas, and the performance measures development requirements are achieve.

Designation Criteria for Chesapeake Bay Preservation Areas

- Resource Protection Areas (RPA) (sensitive areas with intrinsic water quality value)
  - Tidal wetlands
  - Non-tidal wetlands connected to tidal wetlands
  - Tidal shores
  - Other lands with intrinsic water quality value
  - Buffer areas at least 100 feet landward of above areas and on both sides of perennial streams
- Resource Management Areas (RMA) (areas outside of RPA with potential water quality impacts)
  - Floodplains
  - Highly erodible soils
  - Steep slopes
  - Highly permeable soils
  - Non-tidal wetlands not included in RPA
  - Other lands necessary to protect water quality
- Intensively Developed Areas (IDA) (developed areas as an overlay to CBPA available for redevelopment where little natural environment remains)
  - Existing development has more than 50 percent impervious cover, or
  - Public water and sewer or constructed stormwater drainage system currently serves the area, or

[42] For additional information, see www.cblad.virginia.gov/docs/Regs3-01-02.pdf (July 2006)

- Housing density greater than or equal to four dwelling units per acre

Performance Criteria for Chesapeake Bay Preservation Areas

- Generalized Performance Criteria
  - Minimize
    - land disturbance
    - indigenous vegetation removal
    - impervious cover
  - Maximize rainwater infiltration
  - Ensure long-term performance of best management practices (BMPs)
  - Land disturbance exceeding 2,500 square feet requires plan of development review and erosion and sediment control compliance
  - New septic systems to have reserve system equal to primary system
  - Post-development non-point source runoff load shall not exceed pre-development, redevelopment requires additional 10 percent reduction if no existing BMPs
  - Evidence of wetlands permits, if required
- Additional requirements for RPAs
  - Only water-dependent development in RPA or redevelopment of existing development allowed
  - Buffer requirements
    - 100 feet of vegetation effective in retarding runoff, preventing erosion, filtering non-point source pollution
    - If none present, reestablish to provide woody vegetation that assures the buffer functions
  - Buffer maintenance required
  - If conditions are such that required buffer precludes prior buildable lot, the buffer may be reduced if reduction is minimized (but no more than 50 feet) and additional buffer provided elsewhere on lot
  - Redevelopment within IDA may be exempt from additional buffer requirement but consideration should be given to establishing buffer over time.
  - Water quality assessment is required that demonstrates compliance with the program's established goals and requirements

Traditionally more lax in its regulatory role, Fairfax County has been increasing environmental regulations to emulate similar requirements in Montgomery County. This has been done in compliance with the Chesapeake Bay Preservation Act, which requires the local comprehensive plan, zoning ordinance, and subdivision ordinance to implement the Chesapeake Bay program agreements.

Fairfax County Chesapeake Bay Ordinance[43]

The Fairfax County Chesapeake Bay Ordinance, adopted in 1993, designates RPAs, RMAs, and the requirements developers must follow when completing a project in the county.

[43] For additional information, see www.fairfaxcounty.gov/dpwes/environmental/cbay/ch118final.pdf (July 2006)

Designation Criteria for Chesapeake Bay Preservation Areas

- Resource Protection Areas (RPA) (sensitive areas with intrinsic water quality value)
    - Tidal wetlands
    - Tidal shores
    - Water body with perennial flow
    - Non-tidal wetlands connected to tidal wetlands or to a water body with perennial flow
    - Buffer areas
        - at least 100 feet landward of above areas
        - any land within major floodplain
- Resource Management Areas (RMA) (areas outside of RPA with potential water quality impacts)
    - Any area not designated as an RPA
        - Floodplains
        - Highly erodible soils
        - Steep slopes
        - Highly permeable soils
        - Other lands necessary to protect water quality
- Intensively Developed Areas (IDA) (developed areas as an overlay to CBPA available for redevelopment where little natural environment remains)
- Performance Criteria for Chesapeake Bay Preservation Areas
- Generalized Performance Criteria
    - Prevent a net increase of non-point source pollution
    - Achieve a 10 percent reduction in non-point source pollution from redevelopment
    - Minimize
        - land disturbance
        - indigenous vegetation removal
        - impervious cover
    - Maximize rainwater infiltration
    - Ensure long-term performance of BMPs
    - Development and redevelopment projects shall employ BMPs to control stormwater runoff to reduce projected phosphorous loading by 40 percent (development) or 10 percent (redevelopment)
    - BMPs of adjacent projects may be combined to satisfy water quality protection requirements
    - Land disturbance exceeding 2,500 square feet requires plan of development review and erosion and sediment control compliance
    - New septic systems to have reserve system equal to primary system
    - Post-development non-point source runoff load shall not exceed pre-development, redevelopment requires additional 10 percent reduction if no existing BMPs
    - Wetlands permits, if required, shall be procured prior to commencement of land disturbing activities
- Additional requirements for RPAs
    - Water quality assessment required demonstrating compliance with the program's established goals and requirements

- Only water-dependent development in RPA or redevelopment of existing development allowed
- Buffer requirements
  - Vegetation effective in retarding runoff, preventing erosion, filtering non-point source pollution
  - Indigenous vegetation may be removed (subject to approval) to provide for reasonable sight lines, access paths, general woodlot management, and habitat management
  - If none present, reestablish with mixture of overstory trees, understory trees, shrubs, and groundcovers to provide woody vegetation that assures the buffer functions
- Buffer maintenance required
- If buffer precludes prior buildable lot, buffer may be reduced if reduction minimized (but no more than 50 feet) and additional buffer provided elsewhere on lot
- Redevelopment within IDA may be exempt from additional buffer requirement, but consideration should be given to establishing buffer over time.

Maryland Critical Area Program of 1984 (Expanded 2002)[44]

The Critical Area Program establishes a Resource Protection Program as the state recognizes:

- The significance of the Chesapeake and Atlantic Coastal Bays and their tributaries to the state and nation
- Human activity can have an immediate and adverse impact on water quality and natural habitats
- The capacity of the shoreline and adjacent lands to withstand continuing demands without further degradation to water quality and natural habitats is limited
- It is necessary wherever possible to maintain a minimum 100 foot buffer landward from the mean high water line
- The restoration of the Chesapeake Bay and Atlantic Coastal Bays and their tributaries is dependent, in part, on minimizing further adverse impacts to the water quality and natural habitats of the shoreline and adjacent lands, particularly in the buffer
- The cumulative impact of current development and of each new development activity in the buffer is inimical to these purposes
- There is a critical and substantial state interest, for the benefit of current and future generations, in fostering a more sensitive development activity in a consistent and uniform manner to minimize damage to water quality and natural habitats

The Chesapeake Bay Critical Area and Atlantic Coastal Bays Critical Area consist of:

- All waters of and lands under the bays and their tributaries to the head of tide and all state and private wetlands

[44] For additional information, see www.dsd.state.md.us/comar/Annot_Code_Idx/NaturalResIndex.htm, Title 8, Subtitle 18 (July 2006)

- All land and water areas within 1,000 feet beyond the landward boundaries of state or private wetlands and heads of tides
- A local jurisdiction may exclude:
    - Developed, urban areas (or portions thereof) where the imposition of a program would not substantially improve protection of tidal water quality, wildlife, or their habitats
    - Areas located 1,000 feet from open water and separated by an area of wetlands which is found to protect tidal water quality, wildlife, or their habitats
- A portion of urban land to be excluded must be at least 50 percent developed and not less than 2,640,000 square feet
- Local jurisdictions shall have primary responsibility for developing and implementing a program, subject to review and approval by the Commission. A program shall consist of those elements necessary or appropriate to:
    - Minimize adverse impacts on water quality discharged from structures or conveyances or runoff from surrounding lands
    - Conserve fish, wildlife, and plant habitat
    - Establish land use policies for development in the Critical Areas which accommodate growth and address the fact that, even if pollution is controlled, the number, movement, and activities of persons in that area can create adverse environmental impacts
- A local program includes:
    - A map designating critical areas
    - Comprehensive zoning map for the critical areas
    - New or amended:
        - Subdivision regulations
        - Comprehensive or master plan
        - Zoning ordinances or regulations
        - Enforcement provisions
        - Grandfathering provisions
    - Provisions to limit impervious coverage and to require or encourage cluster development
    - Establish buffer areas for agricultural activities and minimum setbacks for development
- Conditions for development within the Critical Areas
    - Growth allocation for a locality shall be calculated based on five percent of the total resource conservation in a local jurisdiction
    - When locating new development:
        - New intensely developed acres should be located in limited development areas or adjacent to existing intensely developed areas
        - New limited development areas should be located adjacent to existing limited development areas or intensely developed areas
        - No more than one-half of the expansion may be located in resource conservation areas
        - New intensely or limited development areas located in the resource conservation area shall conform with all criteria and shall be designated on the comprehensive zoning map

- Resource conservation area private wetlands may be included in land area of a 1 in 20 acre density if:
  - The upland density does not exceed a 1 in 8 acre density
- One additional dwelling unit may be considered per lot or parcel as part of a primary unit for the purpose of the density calculation if:
  - The unit is located within the primary unit or its entire perimeter is within 100 feet of the primary unit
  - It does not exceed 900 square feet
  - Is served by the same sewage disposal system as the primary unit
  - Its construction does not increase the impervious surface area attributed to the primary unit
- Intrafamily transfers of property may take place on properties between seven and sixty acres and are subject to the following conditions
  - Parcels seven to twelve acres may be subdivided into two lots
  - Parcels twelve to sixty acres may be subdivided into three lots
  - Cannot be subdivided for commercial sale
- Impervious surface limitations in limited development areas and resource conservation areas:
  - Man-made impervious surfaces are limited to 15 percent of a parcel or lot
  - Lots or parcels up to one-half acre are limited to 25 percent
  - Lots or parcels between one-half and one acre are limited to 15 percent
  - Individual lots one acre or less, that are part of a subdivision, may not exceed 25 percent imperviousness, but the entire subdivision may not exceed 15 percent imperviousness
- Impervious surface limitations may be exceeded if the following conditions exist:
  - New impervious surfaces have been properly minimized
  - Lots or parcels up to one-half acre are limited to 25 percent or 500 square feet, whichever is greater
  - Lots or parcels between one-half and one acre are limited to 15 percent or 5,445 square feet, whichever is greater
  - Water quality impacts can be and have been minimized through site design or BMPs
  - On-site mitigation are implemented or fees are paid
- Development sites in intensely developed areas are to provide a forest or developed woodland cover of at least 15 percent after development or a fee-in-lieu payment adequate to ensure the restoration or establishment of an equivalent forest area
- Localities may develop:
  - A provision encouraging the use of bioretention for stormwater management associated with redevelopment in intensely developed areas
- The approving authority of any subdivision plat approval or approval of a zoning amendment, variance, special exception, conditional use permit, or use of a floating zone affecting any land or water area located within the Critical Area shall render its decision based on the specific findings that:
  - The proposed development will minimize adverse impacts on water quality

        - The development has been designed to minimize adverse impacts on any identified fish, wildlife, or plant habitat whose loss would substantially diminish the continued ability of those populations to sustain themselves
    - Undeveloped lots in existence prior to the adoption of this program are entitled to construct a single family dwelling unit in accordance with the local critical area program to the extent possible

Maryland Economic Growth, Resource Protection, and Planning Act of 1992[45]

Development regulations must be consistent with comprehensive plan

- Statement of goals and objectives, principles, policies, and standards that serve as a guide for development and economic and social growth.
- A land use plan element that shows proposals for the most appropriate and desirable patterns for the general location, character, extent, and interrelationships of the manner in which the community should use its public and private land.
- A transportation element that shows proposals for the most appropriate and desirable patterns for the general location, character, and extent of the channels, routes, and terminals for transportation facilities, and for the circulation of persons and goods. The transportation element shall also provide for bicycle and pedestrian access and travelways.
- A community facilities plan element that shows proposals for the most appropriate and desirable patterns for the general location, character, and extent of public and semipublic buildings, land, and facilities.
- A Mineral Resources Element
- An element that contains recommendations that encourage streamlined review of development applications within areas designated for growth; encourage the use of flexible development regulations to promote innovative and cost-saving site design while protecting the environment: and use innovative techniques to foster economic development in areas designated for growth. Please refer to Models and Guidelines # 94-02: Regulatory Streamlining and #95-06, Achieving Environmentally Sensitive Design Through Flexible and Innovative Regulations for more information.

The predominant effect of these activities in Fairfax and Montgomery counties has been in the areas of nutrient and sediment pollution. Increased review processes, land use and development performance criteria, and erosion and sediment control requirements are employed in an effort to restore the health of the Chesapeake Bay.

Environmental Regulatory Programs Common to Both Fairfax and Montgomery Counties

Common or typical environmental regulatory issues that have arisen over residential development projects in the metropolitan Washington, DC region include:

[45] For additional information, refer to www.mdp.state.md.us/general/planact.htm (July 2006)

- Water: Regulatory systems for protecting water resources are generally developed by the state to meet federal requirements. These state regulatory systems may be supplemented with local laws and guide the protection of wetlands and other bodies of water, stormwater management, and floodplains.
    - Wetlands – issues regarding wetland protection and mitigation have an impact on water quality, development practices, and mitigation costs.
        - Delineating and permitting is required on all but the smallest projects.
        - Mitigation is required when a project is found in violation of a permit or to have violated the law requiring the project to acquire a permit prior to beginning construction.
    - Stormwater Management – established to protect water resources from degradation, stormwater management regulations seek to control water quality and quantity.
        - Water Quality is controlled by erosion and sedimentation controls as well as other best management practices designed to reduce or eliminate pollutant levels in the stormwater runoff.
        - Water Quantity is also controlled by best management practices but is designed to mitigate flooding, and thus property damage, at downstream locations by controlling the quantity and rate of discharge from development sites.
    - Floodplain Regulations – like stormwater management, floodplain regulations seek to prevent the loss of life and property by guiding development in areas subject to flooding.
    - Environmental Protection Areas – these locally developed guidelines can be used to protect water resources as well as wildlife habitat. Both Fairfax and Montgomery counties, through Virginia RPA or Maryland Special Protection Area (SPA) designations, have established local regulatory systems guiding development in environmental protection areas.
    - Environmental Quality Corridor (EQC) system – developed to identify, protect, and enhance an integrated network of ecologically valuable land and surface waters in Fairfax County
- Habitat Preservation: The protection of critical habitat areas for threatened and endangered species can be regulated by federal and state laws. The preservation of habitat is one of the main methods of enforcing the protection of these species.
    - Threatened and Endangered Species – Field surveys, sometimes limited to certain times of the year, are used to establish the presence of threatened and endangered species and identify the resources to be protected.
- Open Space Preservation: The protection of open space helps to preserve and protect habitat for all flora and fauna species, a benefit recognized by local governments who may require minimal percentages of project sites to be dedicated for preservation.
- Forest Preservation: Forest cover provides stormwater runoff management and wildlife habitat, among other environmental benefits, which has prompted many localities to pass forest and tree preservation ordinances.
- Cultural and Historical Resources: Preserving the connection to our history in the physical environment helps provide educational resources for understanding human

activities and the relationship between the environment and historic activities often link these two when completing environmental regulation requirements.

- Archeological Studies – Phase I, II, and III archeological surveys are often required when developing a site to identify, inventory, and preserve or document historic resources present.

Based on the tasks performed by the environmental consultants in the case study development projects, the research team identified the following categories of relevant federal, state, and local environmental laws and policies. Each task listed in Table 4-3 follows the chronological process of an environmental consultant's general work plan. Developers and their consultants may develop a systematic method for meeting these regulations, often directed by state and local requirements. Consultants familiar with these regulations are often employed by developers to mitigate the time delays and confusion involved with meeting the requirements.

Table 4-3
Fairfax/Montgomery Case Study Environmental Regulations

Water	**Cultural Resources**	**Forest and Tree Resources**	**Species**
Background research	Archeological study	Tree Preservation	Background research for threatened or endangered species
Wetland Delineation	Cultural Resource Designation	Forest Conservation	
County RPA Requirements			
SPA Requirements			
CWA Permitting: sewer, stormwater, streams			
County Stream Outfall Analysis			
Mitigation & CWA permit modifications			
Regular Stream & Sewer Monitoring			

- **Background research** includes preliminary assessment of probable wetland locations and environmental elements regulated by the county used to estimate the potential environmental resources on the site.
- **Wetland delineation** involves mapping the location of the wetlands on the site. This phase of a project involves a review process by the Army Corps of Engineers. Wetland delineation costs are dependent on the amount of wetlands present on the site.

- **Clean Water Act Permits for Wetlands (404)** for a site may involve acquiring an individual or a general permit. The preparation of either of these permits will involve a review by the Army Corps of Engineers (COE). Depending on the property conditions, the regulatory review by the COE might proceed quickly under a nationwide permit or require special hearings for individual permits. Changes in projects may arise causing modifications to be made to the original permit. The following categories of permits may need to be applied for to comply with Clean Water Act requirements associated with wetlands. Mitigation is required for impacts as a result of a project or violations of permits. If a project scope changes, a modification is made to a previously issued permit or a new permit may be required.
    - **Nationwide Permit #39:** This permit covers residential, commercial and real estate development activities that will not result in the filling of more than ½ acre of wetlands.
    - **Nationwide Permit #43:** This permit covers stormwater management facilities and is required for projects with more the 1 acre of disturbance.
    - **Joint Permit Application:** This application consolidates the application process for local, state and federal agencies regarding activities impacting wetlands and waters in the Commonwealth of Virginia. These agencies include:
        - US Army Corps of Engineers
        - Virginia Department of Environmental Quality
        - Virginia Marine Resources Commission
        - Local Wetlands Boards
    - **Individual Permit:** An individual permit is required in place of the general permit when the project will have significant impacts on wetlands and waters of the U.S. An individual permit is required when:
        - The project is located in or adjacent to prime wetlands, tidal wetlands or buffer zone, sand dunes, bogs
        - The wetland is an exemplary natural community
        - Threatened or endangered species are present
        - Greater than 20,000 square feet of wetlands, surface waters or banks are impacted
        - Major docking systems are constructed or modified
        - More than 20 cubic yards are dredged in public waters
        - Greater than 200 linear feet of a stream, river, lake or pond shoreline and/or bank is disturbed
    - **Pre-construction Notification:** A pre-construction notification must be filed if the project will result in the fill of more than 1/10 acre of wetlands
    - **Permit Modifications:** Permit modifications are required for projects when there is a change in the scope of work. If there is an increase in the amount of wetland impact, a new permit is required.
- **Clean Water Act Permitting for Stormwater (402)** for a site also involves state and local agencies. These agencies enforce construction and municipal separate storm sewer regulations aimed at improving water quality. It is under this section of the act that erosion and sediment control regulations are developed and enforced at the state and local level.

- **Archeological & Cultural Resource Surveys** for a project involve preliminary scoping of the site's previous historical and cultural assets. All projects require a Phase I survey to assess the site for the potential presence of any cultural resources. A Phase II and III survey are required only when significant resources are discovered. These surveys are specific to identified locations on the site, not the entire project area.
    - **Cultural Resource Designation:** The cultural resource designation involves the preparation of a National Historic Register application for an eligible site. An intense survey and documentation process of the resource is completed.
- **Threaten or Endangered Species Assessment** may need to be completed for all or a portion of a project site**.** A preliminary assessment, done if it is suspected such conditions may exist on the site, may reveal the potential presence of such an element. If threatened or endangered species are identified, a more intense study and preservation plan is completed.
- **Mitigation & Clean Water Act permit modifications** may be needed to account for changes to the approved project or impacts to wetlands resulting from approved or unapproved construction.

Fairfax County's Environmental Regulatory Ordinances and Guidelines

Beyond the environmental consultant's inventory of relevant environmental regulations, Fairfax County has several special environmental ordinances and guidelines that have a significant affect on housing developments:

- The Chesapeake Bay Ordinance
    - Resource Protection Areas
    - Resource Management Areas
- Environmental Quality Corridors
- Open Space Preservation
- Vegetation Preservation and Planting
- Outfall Analysis

The county's compliance with the **Chesapeake Bay Ordinance** through the creation of **RPAs** and **RMAs** affects development planning in significant ways by requiring more detailed data analysis and mitigation efforts. Amendments to the Chesapeake Bay Ordinance affect stormwater management expectations and require more detailed information in the graphic and narrative portions of special permits, special exceptions, rezoning and development plan applications. Other amendments expanded the area of RPAs by 11,300 acres through changing the definition of what constituted a perennial stream in the County. RPAs are buffered areas around perennial streams where development must be very limited to protect water quality from degradation associated with pollutants and other adverse impacts associated with human activities. No expansions or additions to current property may be allowed and no new development is permitted within a RPA. RMAs are designated adjacent to RPAs to provide a buffer from certain types of development in an effort to preserve RPA functional integrity for

protecting water resources from contaminants. Chapter 118 of the Fairfax County Code establishes requirements for development in and adjacent to RPAs and RMAs.[46]

Fairfax County's Chesapeake Bay Ordinance, which establishes Resource Protection Areas, Resource Management Areas, and provides authority to designate Intensely Developed Areas, sets forth the following requirements:

- It is on the burden of the applicant to show appropriate RPA and RMA boundaries.
- If a conflict arises, the greater requirement or higher standard shall govern.

Environmental Quality Corridors are a more broad application of the RPA system. EQCs are designed to protect and restore the ecological quality of streams, which provide habitat, replenish water supplies, and provide recreation and aesthetic amenities. As stream corridors represent the central feature of the EQC system as well as a significant portion of the County's parkland, objectives and policies to minimize the adverse impacts of land use and development in relation to these corridors are established in the Environment section of the Fairfax County Comprehensive Plan. [47]

Open Space Preservation is required by Fairfax County through the Zoning Ordinance when completing a development.[48] This requirement may be enforced through by-right development regulations or through proffered conditions of approval when working through the rezoning process. Another method of conserving open space encouraged within the county is through easements.

A **Vegetation Preservation and Planting** ordinance was passed by the County to regulate the removal of vegetation from public and private property in order to preserve, protect, and enhance forest cover and trees. The ordinance reads such that it establishes standards for limiting the removal and ensuring the replacement of vegetation sufficient to safeguard the ecological and aesthetic environment.[49]

Outfall Analysis monitoring and mitigation is required to minimize the impacts of concentrated flow increases on existing stream beds by demonstrating no adverse impacts will result in existing stream corridors post development. In areas where impact is considered unacceptable by county regulators, mitigation measures may be required. This process is currently atypical but as less challenging developable sites become scarce, it is likely to increase in prominence as the county recently adopted amendments to the Public Facilities Manual,

[46] "Fairfax County Code: Chapter 118 – Chesapeake Bay Preservation Ordinance" available at www.fairfaxcounty.gov/dpwes/environmental/cbay/ch118final.pdf (June 2006)
[47] Fairfax County Comprehensive Plan: Environment" available at www.fairfaxcounty.gov/dpz/comprehensiveplan/policyplan/environment.pdf (June 2006)
[48] "Fairfax County Code: Article 2" available at www.fairfaxcounty.gov/dpz/zoningordinance/articles/art02.pdf (June 2006)
[49] "Public Facilities Manual 12-0100" available at www.fairfaxcounty.gov/dpwes/publications/pfm/12-0100.htm (June 2006)

Zoning Ordinance, and Subdivision Ordinances establishing review and notification requirements.[50],[51]

- **Mitigation and Permit Modifications:** A few of the projects required mitigation measures and changes to the original project design because of stream erosion and subsequent CWA permit violations. These may take place on site or offsite and can be in the form of fines.
- **Routine Stream Monitoring & Reporting:** Stream monitoring costs were also involved in one project to determine the outfall impact of development on existing water courses.

Montgomery County's Environmental Regulatory Ordinances and Guidelines

Important tools in the County's land use regulatory toolbox are its environmental guidelines, which it can use in guiding developers to achieve environmental protection goals during the development process. Some, such as Special Protection Areas, are directly linked to the comprehensive plan while others, such as conservation easements, rely on the voluntary actions of developers and residents. Environmental regulations specific to Montgomery County include:

- Chesapeake Bay Protection: Special Protection Areas (SPAs)
- Forest Conservation

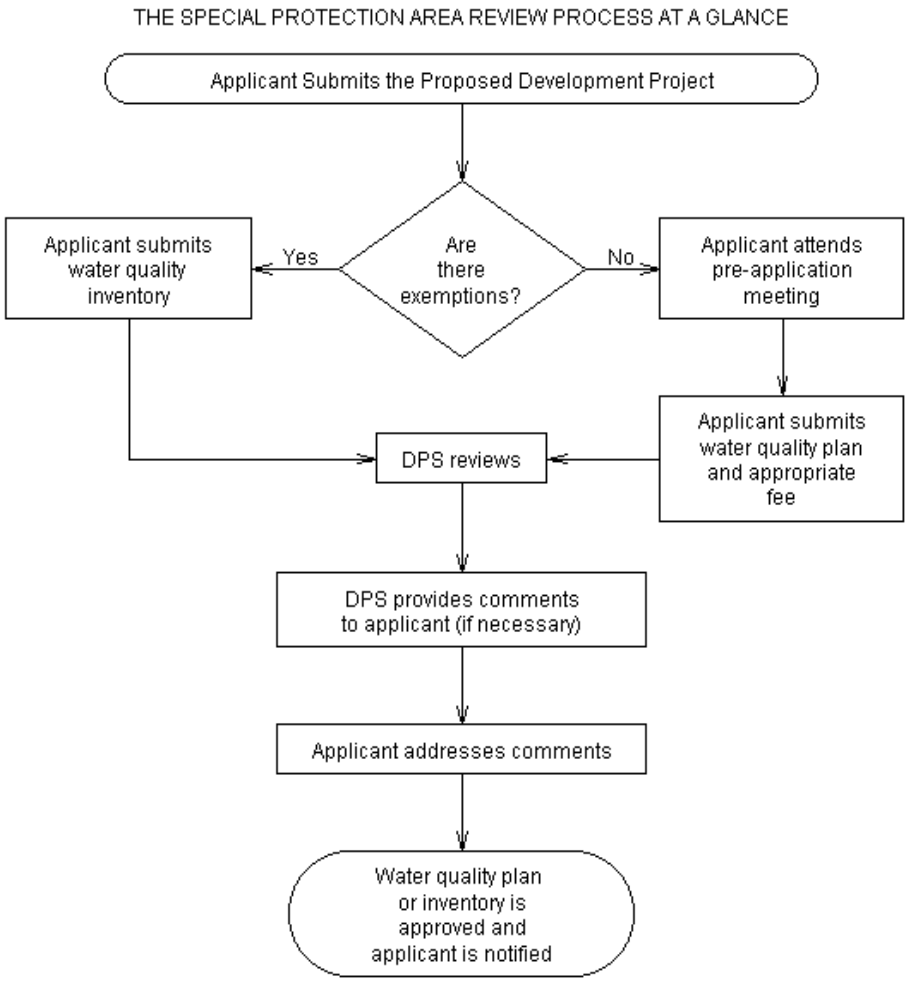
SPAs are areas within a watershed where natural features, especially those related to water, are of a high quality. Unlike many environmental regulations in Fairfax County, which are directives of the state, the SPA program is derived from Montgomery County's comprehensive plan goal of watershed and stream protection. The SPA program was established by the Montgomery County Code Chapter 19, Article V in 1994.[52] Since that time, four SPAs have been designated in the County: Upper Paint Branch, Piney Branch, Clarksburg, and Upper Rock Creek. Existing single family homes within SPAs may expand as long as they are consistent with zoning laws. However, the development process is different for projects proposed within a SPA. The local government must work closely with environmental agencies to minimize impacts, a 1-year, pre-submission stream monitoring program is required, and a multi-agency review process is involved. There is a conservation plan for each SPA and an annual report on stream data and development activities. The developer's design requirements include a higher level of erosion and sediment control, stormwater management, environmental buffers around streams, and provision of long-term protection of these areas through easements or park dedications.[53]

The preliminary plan approval time does not include the one year water monitoring period required for development projects in a SPA. This monitoring is used to establish a water quality

[50] "6-0000 Storm Drainage Amendment 1" available at www.fairfaxcounty.gov/dpwes/publications/pfm/ao/amendment1.pdf (June 2006)
[51] "6-0000 Storm Drainage Amendment 2" available at www.fairfaxcounty.gov/dpwes/publications/pfm/ao/amendment2.pdf (June 2006)
[52] "SPA Annual Report for 2001" available at www.montgomerycountymd.gov/content/dep/SPA/2001annualreport/summary.pdf (June 2006)
[53] "MNCPPC: Special Protection Areas" available at www.mc-mncppc.org/environment/spa/index.shtm (June 2006)

baseline to measure effects of the new development on the high quality water resources. The new development is monitored for five years after construction to evaluate the effectiveness of the installed mitigation facilities. In addition, a $500 per acre environmental impact fee is assessed by the Department of Environment on developments in a SPA to be used for additional studies. The preliminary plan required the completion of a natural resources inventory, conceptual stormwater management plan and preliminary grading plan. With a significant level of detail involved in the preparation of these components, the developer invests heavily in meeting environmental regulations at the front end of the project.

Figure 4-4 Special Protection Review Process



Source: Montgomery County

Planning for **forest conservation** was given priority in the county following Maryland's 1991 Forest Conservation Act, after which the County Council passed the Montgomery County Forest Conservation Law. The purpose of the law is to preserve and protect existing trees and forest cover in the county because of their numerous environmental benefits. It established procedures,

standards and requirements for afforestation and reforestation of land subject to an application for development approval or a sediment control permit. In addition, regulations exist to minimize tree loss as a result of development and to protect trees and forests during and after land development activities.[54]

Development Review Processes

The development review process is where the environmental regulations are enforced. Each local jurisdiction develops review processes consistent with state and federal requirements. These processes are also influenced by state enabling legislation, allowing more regulatory control in Montgomery County and a proffer system in Fairfax County.

Elicited by new state and federal requirements, changes in environmental regulations and their enforcement have expanded the development review process for residential development in recent years. According to development professionals working in the field, ten to fifteen years ago the development review process did not require the level of detail needed for approval in more recent times.

Fairfax County Development Process

Development review in Fairfax County can involve either a by-right or rezoning application. Each application is required to meet a series of criteria for approval regarding environmental regulations. The process for preparing a by-right or rezoning application is similar but a rezoning application often is associated with proffers agreed to by the developer.

A number of Fairfax County and outside reviewing agencies can be involved with the development approval process. This provides an opportunity for these agencies to review the projects' conceptual compliance with environmental and other regulations. These agencies include:

Fairfax County Government

- Department of Planning and Zoning
- Department of Public Works and Environmental Services
- Planning Commission
- Department of Transportation
- Board of Zoning Appeals
- Board of Supervisors

Outside Agencies

- Army Corps of Engineers
- Virginia Department of Environmental Quality

[54] "Chapter 22A: Forest Conservation – Trees" available at www.mc-mncppc.org/environment/forest/law.pdf (June 2006)

- Virginia Department of Transportation
- Virginia Marine Resource Commission
- Utility companies

To gain approval for a development application, a layout plan must be prepared by a certified architect, landscape architect, engineer, or land surveyor licensed in the Commonwealth of Virginia, and must include information, such as: boundaries of the property; locations, dimensions and height of existing and proposed structures; ingress/egress from a public street; parking, proposed landscaping and screening; stormwater management facilities; and the presence of any floodplains or Environmental Quality Corridors.[55] A pre-application meeting is recommended at which staff will meet with applicants to identify any environmental, land use, or transportation issues early in the development process.

A natural resource inventory is completed during the development application process. The inventory identifies and maps:

- Wetlands
- Threatened and Endangered Species
- Floodplains and environmental quality corridors such as a Resource Protection Area or Resource Management Area
- Existing vegetation
- Soils

The natural resource inventory identifies environmentally regulated components of the site. Wetland delineation guides the project layout and is used in acquiring the necessary permits. The identification of threatened and endangered species and their habitat designates areas where development will be prohibited or limited. Forest stands and specimen trees may be mandated as part of a tree preservation plan or a forest canopy cover requirement. Floodplains, stream corridors and associated riparian buffers may be included as part of an Environmental Quality Corridor or Resource Protection Area. In areas where scenic or natural features exist that deserve protection and preservation, these assets must be delineated on the plan and a statement is to be submitted regarding how they will be protected and preserved.[56]

By-right Development Process

If the land development project is by-right, meaning it is being done in conformance with the existing zoning regulations, then plan review and acquisition of a building permit is generally less involved. Prior submitting a plan for review, the developer or applicant must check on covenants and deed restrictions, comply with building codes, and create a grading and building plan that conforms to county requirements. The following steps illustrate the development review process for a by-right application;

[55] "Department of Planning and Zoning – Zoning Application Process" available at www.fairfaxcounty.gov/dpz/zoning/applaccept.htm (June 2006)
[56] "Fairfax County Rezoning Application Package" available at www.fairfaxcounty.gov/dpz/zoning/applications/nofind/2005/rzconvpkg.pdf (June 2006)

1. An accepted application is transferred to the Zoning Permit Review Branch where the grading plan is reviewed.
2. The application is then transferred to the Department of Public Works and Environmental Services Permit Branch. At this stage, the plan goes through various environmental review processes including:
    a. the conservation agreement
    b. grading
    c. soils
    d. conformity to the Chesapeake Bay Ordinance
3. If the project will be on a septic or well system, the Health Department also reviews the plan.
4. The Building Plan Review Division reviews the plan for adherence to building codes.
5. Approval for the project may be issued once all of the departments have reviewed and signed off on the plans and the required fees have been paid.

Throughout the building phase of the project, inspectors from the Environmental and Facilities Inspection and Residential Inspections divisions visit the site to make sure the building and site plans approved coincide with what is being built. They also make sure all environmental regulations and agreements are being followed. A land ombudsman is also assigned to projects taking place near RPAs, floodplains, or wetlands to ensure the developers are adhering to the special requirements the County has in place for these areas.

Rezoning Process Includes Additional Review Requirements

A rezoning may be sought for completing a development project in Fairfax County. An overview of Fairfax County's Rezoning Process, from the time an application is filed, to the time of the Board of Supervisors Public Hearing is as follows:[57]

1. Application filed by Applicant
2. Application submissions are reviewed. When all Zoning Ordinance submission requirements are met, the application is accepted and distributed to various county agencies.
3. Application is scheduled for a Planning Commission Public Hearing and is assigned to a staff coordinator.
4. Prestaffing of application. Applicant will be contacted by staff about initial staff comments.
5. Revisions relating to prestaffing comments are submitted.
6. Staffing of application. Applicant contacted by staff about final staff comments.
7. Revisions relating to the staffing comments are submitted.
8. Final submission deadline (6 weeks prior to Planning Commission Public Hearing). Staff report is published based on information received by this date.
9. Notification to adjacent property owners sent to applicant 30 days prior to hearing. Notices mailed by Applicant postmarked at least 15 days prior to hearing.
10. Staff report published (2 weeks prior to Public Hearing).

[57] "Zoning Applications: Rezoning Process" available at www.fairfaxcounty.gov/dpz/zoning/rzprocess.htm (June 2006)

11. Planning Commission Public Hearing.
12. Application is scheduled for Board Of Supervisors Public Hearing
13. Notification to adjacent property owners (sent to Applicant 30 days prior to hearing, notices mailed by Applicant postmarked at least 15 days prior to hearing).
14. Board of Supervisors Public Hearing.

When the project is not a by-right development, conditions of approval are often included in the staff report prepared during the process. The conditions, called proffers, may include locations of improvements, landscaping, or additional requirements for meeting environmental conditions present on the site. These proffered conditions become binding with the approval of the application by the Planning Commission, Board of Supervisors, or Board of Zoning Appeals.[58]

An archeological survey of the site may also be completed during the rezoning application process to identify culturally significant resources present on the site. Based on this survey, additional studies, preservation and/or mitigation may be required. A statement must also be submitted identifying any known environmental contamination that may exist on the site, such as the size and contents of any underground storage tanks, hazardous or toxic substances. This requirement also includes the identification of any proposed hazardous material usage or storage on the site.[59]

Development Review Challenges

The presence of permit expeditors at the Fairfax County government center may signal this process can be somewhat confusing for developers or the pressure to produce is high, creating a need to keep the process moving forward. Permit expeditors are hired by developers to literally walk plans through the development approval process. Many are at the county offices several times a week.

Fairfax County does have an expedited process for developers who have trained their engineers through the Engineering Services Institute (ESI). ESI's program can certify engineers and builders through a program designed to educate them on County and State regulations and standards. Through the expedited process, projects are peer-reviewed and approved within half the time of the conventional process. Peer-reviewed projects are given priority status during the building plan review process.

Infill Sites Present Additional Challenges

Infill sites, which are being pursued more by the development community in areas where all of the low hanging fruit has been picked, present new challenges. These sites are still held accountable for the previously discussed environmental regulations as well as new regulations concerning items such as contamination because of their prior use. The remediation of environmental contamination on sites adds new forms of environmental regulations and their agencies to the development process. Depending on the location and intended use of the site, the standards required may incur additional costs associated with financial, liability and capital expenditures. The political nature of pursuing infill development often makes it easier to meet the environmental regulations on a similarly complex site in an exurban location. Local residents of infill sites are more likely to be "involved" in the rezoning application process, potentially adding pressure for a more stringent interpretation of environmental regulations.

[58] "Department of Planning and Zoning – Zoning Application Process" available at www.fairfaxcounty.gov/dpz/zoning/applaccept.htm (June 2006)
[59] "Fairfax County Rezoning Application Package" available at www.fairfaxcounty.gov/dpz/zoning/applications/nofind/2005/rzconvpkg.pdf (June 2006)

Preliminary stormwater management plans must be developed as part of the application process. The goal of these plans is to scientifically identify pre- and post-construction runoff quantities in order to ensure the post-construction runoff is equal or less than the pre-construction quantities. In addition, a narrative describing best management practices to be employed on the site and outfall abatement techniques used to meet adequate outfall requirements to prevent stream erosion and scouring.[60] Outfall regulations are designed to mitigate adverse impacts of development on stream corridors by establishing requirements for pre- and post-construction monitoring to demonstrate no degradation has occurred.

Negotiations with Planners and Environmental Engineers

The rezoning application process does leave some room for negotiations on certain issues. The quality of the resource is, at times, considered in its regulation. Environmentally regulated resources with a perceived lower environmental value have been granted leeway in regulation, although this is left up to interpretation by the regulating agency. For example, lower quality Environmental Quality Corridors can be used as part of a lot, although the developer is not allowed to grade into or construct a structure within the corridor. A formal interpretation process may be used to rectify disputed or misidentified environmental boundaries. Once a project has received rezoning approval, it must move through the same channels as a by right development to receive subdivision/site plan approvals within the Department of Public Works and Environmental Services.

The identification, inventory and avoidance of these regulated areas during the development review process can create more expense for the rezoning of a development site than in years past. This expense comes in the form of time and direct expenditures for meeting the requirements. However, should the developer continue with the project, much of the planning and data acquisition expense does not have to be repeated in later stages of site design approval.

Tree Preservation Regulation Influence on Development in Northern Virginia

Tree preservation regulations are different from wetland or stormwater regulations because they are not a derivative of a federal environmental policy. In the state of Virginia, state enabling legislature has allowed local jurisdictions to develop canopy coverage ordinances and a tree preservation ordinance for heritage, memorial, champion or other specimen trees. When developing a tree preservation ordinance for heritage, memorial, champion or other specimen trees, owners of the properties on which the trees are located have the option to not participate in the ordinance.

The Code of Virginia allows any locality with a population density of at least 75 people per square mile to adopt an ordinance providing for the planting and replacement of trees during the development process.[61] Minimum canopy coverage requirements are to be based on a 20-year coverage calculation and applied at different percentages based on zoned land uses:

[60] "Fairfax County Rezoning Application Package" available at www.fairfaxcounty.gov/dpz/zoning/applications/nofind/2005/rzconvpkg.pdf (June 2006)
[61] Code of Virginia Section 15.2-961

Zoned Land Use	20-year Canopy Coverage
Business, Commercial or Industrial	10%
Residential (20 units per acre)	10%
Residential (10 – 20 units per acre)	15%
Residential (<10 units per acre)	20%

Source: Code of Virginia Section 15.2-961

In localities where ordinances have not been passed or where these density requirements have not been met, the proffer system may be used to direct developers to provide tree preservation plans. Utilizing the proffer system, a developer may agree to meet the localities forest canopy or tree preservation requirements set during the rezoning phase of a project in exchange for changes in density requirements. The calculation used for determining the requirements of the tree preservation plan differ between municipalities. Some require the calculation to be based on forest cover where others may use the disturbed acreage of the project.

Tree preservation plans identify areas where the locality desires to maintain or improve existing forest stands. These existing or proposed areas are generally associated with riparian buffers, stream corridors, or other areas of contiguous forest cover. The tree preservation plan preparation process, which may include a reforestation component, involves:

- Site inventory
- Identification of tree preservation areas
- Mitigating issues that may have an adverse effect on identified tree preservation areas

Preservation plans may include the removal of sub marginal forest cover and replacing it with species deemed to be of higher environmental quality. The removal of trees deemed to pose a safety hazard to humans may also be required as part of the preservation plan. The ordinance or proffer may require the developer to work with the municipal urban forester to identify desirable species.

Reforestation can be a component of the forest canopy or tree preservation plan. The areas typically targeted for reforestation are riparian buffers. The process involves:

- Initial planning
- Site preparation
- Planting of seedlings and/or larger caliper trees
- Mowing and herbicide application
- Deer browse control
- Monitoring and replacement

A three year monitoring period for reforestation projects is generally set. After one year, the survival goal is typically 2/3 of the planted seedlings. In instances where large-caliper trees have been installed, maintenance costs to ensure their survival are typically higher when compared to areas where seedlings have been planted because of the higher replacement cost associated with replacing large-caliper trees.

Montgomery County Development Process

With a Home Rule Charter in effect, Montgomery County plays a stronger role in orchestrating development. The county combines multiple guiding regulations, such as area Master Plans and Special Protection Areas, to guide development patterns. Area Master Plans are documents prepared by the Planning Board, with input from various agencies, government officials, and citizens. The plan incorporates current and future development trends pertaining to housing, transportation, stormwater management, preservation of historic and agricultural resources, and environmental resources among other items. Each plan outlines the locations for land uses, zoning, and provides guidance for the future placement of public facilities. Plans are subject to approval after a public hearing, adoption by the Maryland-National Capital Park and Planning Commission (MNCPPC), and, as implementing elements, are incorporated into the General Plan.[62] Developed in 1994, Montgomery County's Special Protection Area program strives to protect streams with existing high quality and sensitive environmental resources relating to water quality by closely coordinating land water quality protection measures with land use controls.[63]

A variety Montgomery County and outside reviewing agencies can be involved with approving permits for development projects.[64] These include:

Montgomery County Government

- Department of Public Works and Transportation
- Department of Fire and Rescue Services
- Office of the County Attorney
- Department of Environmental Protection
- Department of Finance
- Board of Appeals

Outside Agencies

- Utility Companies
- State Highway Administration
- Washington Suburban Sanitary Commission
- Assessments Office
- USDA, Soil Conservation District
- Maryland-National Capital Park and Planning Commission
- Historical Preservation Section and Commission

During the subdivision and development process, the MNCPPC, through the Montgomery County Planning Board, and the Montgomery County Department of Permitting Services, plays

[62] "MNCPPC: Community Based Planning Master Plans Master List" available at www.mc-mncppc.org/community/plan_areas/master_plans.shtm (June 2006)
[63] "SPA Annual Report for 2001" available at www.montgomerycountymd.gov/content/dep/SPA/2001annualreport/summary.pdf (June 2006)
[64] "DPS/General Information – Permitting Process" available at http://permittingservices.montgomerycountymd.gov/dpstmpl.asp?url=/permitting/gi/nfatm.asp (June 2006)

the role of the lead reviewing agency. This quasi-governmental agency is responsible for coordinating review and negotiating compromises when conflicting requirements or interests arise. MNCPPC, through the Planning Board's Department of Park and Planning's Development Review division, is charged with assuring the proposed development complies with the recommendations of the area Master Plan and the requirements of the:

- Zoning Ordinance
- Subdivision Regulations
- Annual Growth Policy
- Adequate Public Facilities Ordinance
- Forest Conservation Regulations.[65]

The Department of Permitting Services (DPS), through the Land Development Division, which reviews water-quality related construction practices, is responsible for approving the conceptual stormwater management plan for the development.[66] DPS is also responsible for the coordination of approvals from other agencies, such as MNCPPC, on permits issued by the department.[67]

The use of an area Master Plan by the county usually eliminates the need for a rezoning process because the intended land use characteristics for the site have already been determined. In special circumstances, such as competing area Master Plans or errors in a Plan are discovered, rezoning may be allowed. Generally, Montgomery County's subdivision review process requires:

1. An optional **pre-preliminary plan** is recommended to obtain advice from the planning staff or board to better conform to the County regulations.
2. **Preliminary plan** approval requirements include, but are not limited to, the submission of a stormwater management concept plan, sewer and water conceptual plan, preliminary site layout of lots and streets, preliminary forest conservation plan, natural resources inventory, and a preliminary grading plan.[68]
3. **Site plan** approval requirements include, but are not limited to, more detailed information for the requirements from the preliminary plan, a landscape plan, a Forest Conservation plan, and a sediment control plan.[69]
4. **Final construction plan** approval requires the submission of the final site and grading plan and final landscape and lighting plan as well as other final development plans.
5. The **record plat**, which allows building permits to be issued, requirements include, but are not limited to, submission of the previously approved plans from both the preliminary and site plan reviews.[70]

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[65] "How to participate effectively in the subdivision process in Montgomery County, Maryland" available at www.mc-mncppc.org/development/about/subdivision.pdf (June 2006)
[66] "Department of Permitting Services – About DPS" available at http://permittingservices.montgomerycountymd.gov/dpstmpl.asp?url=/aboutdps.asp (June 2006)
[67] "Department of Permitting Services – About DPS" available at http://permittingservices.montgomerycountymd.gov/dpstmpl.asp?url=/aboutdps.asp (June 2006)
[68] "FY05PRELIM" available at www.mcparkandplanning.org/development/forms/prelimplan_aug04/FY05PRELIM.pdf (July 2006)
[69] "FY05SITE" available at www.mcparkandplanning.org/development/forms/siteplan_aug04/FY05SITE.pdf (July 2006)

The Montgomery County Department of Park and Planning's Development Review division, responsible for coordinating the timely review of proposed development projects, also sends notice to any affected home owners associations. A staff member from Development Review is assigned to each case for evaluation. The staff member coordinates input from the Department's environmental and transportation staff and the Development Review Committee (DRC). DRC is an interagency task force composed of representatives from public agencies and utilities such as PEPCO, the State Highway Administration, and the departments of Permitting Services, Environmental Protection, Public Works, and Transportation. The DRC meets regularly in meetings that are open to the public but are not public hearings. Once the Board receives the staff evaluation, it approves, approves with conditions, or denies the project. Record plat approval, after which a building permit can be issued, is granted after Board approval of the preliminary, site, and final construction plans.

Housing Affordability in Fairfax and Montgomery Counties

The comparisons turn now to key housing indicators. Note first the figures reported in Table 4-4.

Table 4-4. Median Sales Price for Single Family Homes

Fairfax County**		
Year	***New***	***Existing***
2005[71]	$807,266	$615,000
1997[72]	$389,747	$203,000
Montgomery County*		
2005[73]	$759,933	$500,000
1997[74]	$343,295	$230,000

*Price for single family detached
**Price for single family detached and attached

The median sales prices for single family homes in Montgomery County are shown to be lower than Fairfax County for both new and existing units. It is possible the difference between the median values in the two counties is even greater because the figures for Fairfax County include attached units, which are typically sold for a lower price than detached units.

To address housing affordability needs, both counties have roughly comparable programs. First, note that "affordable housing" is a term that can mean different things to different people. It can mean housing individuals can qualify to buy, housing for low-income households or it may be considered any housing built with government assistance. Montgomery County's Housing

[70] "FY05PLAT" available at www.mcparkandplanning.org/development/forms/plat_Oct_04/FY05PLAT.pdf (July 2006)
[71] "Economic Indicators" available at www.fairfaxcounty.gov/economic/indicat/2006/02.pdf (June 2006)
[72] "Economic Indicators" available at www.fairfaxcounty.gov/economic/indicat/1998/02.pdf (June 2006)
[73] "Consolidated Plan for Montgomery County, Maryland" available at www.montgomerycountymd.gov/content/dhca/community/conplan07_exec_summary.doc (June 2006)
[74] "Updated Five-Year Consolidated Plan for Montgomery County" available at www.montgomerycountymd.gov/dhctmpl.asp?url=/content/dhca/community/conplan99exsum.asp (June 2006)

Policy, contained in Chapter 25B of the County Code, defines an affordable housing unit as "any dwelling unit constructed for sale or rent at a price equal to or less than that provided in Chapter 25A, (the Moderately Priced Dwelling Unit (MPDU) Ordinance), and any assisted elderly housing."[75] Fairfax County's comprehensive plan defines the affordable housing as that which is affordable to households with incomes that are 70 percent or less of the Metropolitan Statistical Area (MSA) median family income.[76]

Under the Fairfax County Zoning Ordinance, the county may provide a density bonus (up to 20 percent) for developers who elect to incorporate Affordable Dwelling Units (ADUs) in an eligible project in certain districts. The program was established to provide dwelling units affordable to households earning 70 percent or less of the median income for the Washington, DC MSA. This translates into a household earning approximately $50,000 in 2004. The ordinance is only applicable to projects affected by a rezoning or a special exception or a subdivision of 50 or more dwelling units at a density of greater than one per acre within an approved sewer service area.[77]

Montgomery County also has a requirement to provide affordable housing units as a part of any new residential development project in the county consisting of 20 or more units. These units are to be made available for households earning 80 percent of the County's median household income, or approximately $66,000 in 2004. The provision of Moderately Priced Dwelling Units (MPDUs) applies to the entire project and requires a developer to identify all land owned in the County to prevent avoiding compliance. The percentage of MPDUs required ranges from 12.5 percent to 15 percent of the total projected units, although if a density bonus is awarded, projects are required to develop more than the 12.5 percent minimum requirement.[78] The county does have a Green Tape Process for Affordable Housing for projects where at least 20 percent of the units are designated affordable. This process enables the project to receive expedited application review, modifies application forms, and expedited construction and utilities permit processing. The process also dictates improved inter-agency communication and the creation of a GIS map showing overlays of affordable housing projects.

Residential Subdivision Projects Reviewed

The developers working with the research team provided seven projects for review. Of these, three were in Fairfax County and one was in Montgomery County. These projects were reviewed for the environmental regulations and affordable housing provisions they were required to meet, either outright or through a proffering system. This section describes these requirements, as well as the time and known financial costs associated with their development. Using available information, the following will be highlighted for each project:

[75] "Intro" available at www.mcparkandplanning.org/research/analysis/housing/affordable/intro.pdf (July 2006)
[76] "Comprehensive Plan Glossary" available at www.fairfaxcounty.gov/dpz/comprehensiveplan/glossary/ (July 2006)
[77] "Fairfax County Zoning Ordinance - Article 2: General Regulations" available at www.fairfaxcounty.gov/dpz/zoningordinance/articles/art02.pdf (June 2006)
[78] In Brief: The MPDU Process for Builders and Developers" available at www.montgomerycountymd.gov/dhctmpl.asp?url=/content/dhca/housing/housing_P/mpdu/MPDU_Process_Developers.asp (June 2006)

- General project characteristics:
    - site acreage
    - units developed
    - type of application
    - time needed to complete the development review process
    - affordable dwelling units developed
    - proffers and conditions of approval
- Environmental regulations and reviews triggered
- Estimated costs pertaining to compliance with environmental regulations
    - Percentage each regulation represented of the overall environmental compliance cost
- Timeframe for acquiring the required environmental permits

Methodology

The process used for categorizing the environmental regulatory costs was twofold. First, a meeting was held with representatives of the firm responsible for the completion of the environmental regulatory related components for each of the projects. The representatives identified and provided background on the activities involved in the steps completed for each element of the project. These steps were then grouped into larger categories and the costs associated with these categories were evaluated against the total environmental regulatory-related costs. This comparison was done to provide an indication of the impact each category had on the total environmental regulatory cost pertaining to natural resource inventory and mitigation.

Limiting Factors

The process for identifying the environmental costs for each project was limited by a number of factors. While many of the consultants were more than willing to talk about the development process and the associated environmental regulations, it was often difficult to acquire hard cost numbers pertaining to their fees for meeting these requirements. It was also difficult to maintain consistency between the different consultants' accounting practices, especially regarding the different tasks associated with meeting the regulations. In some cases, we were provided with a lump sum number that may have included meeting many different environmental regulations while other instances, a very detailed cost breakdown identifying specific processes and time commitments was acquired.

Identifying the development costs and the land costs for the project would have been useful in more accurately evaluating the effects of environmental regulations on housing affordability. Development costs can be categorized as those associated with consulting services and construction and include:

- Consultant fees
- Site surveys
- Tree preservation planning

- Wetland and natural resource inventories
- Archeological surveys
- Permitting fees
- Design & engineering

Land costs can be categorized as acquisition of the property, the carrying cost of the property during the review process, and the opportunity costs that may have been lost as a result of the enforcement of environmental regulations. For this pilot study, development costs were more readily identified but, due to differences in accounting practices between the developers consultants, each of the projects may not have isolated all of these costs.

Land costs were not able to be identified. While changes in plans were probably generated early in the process, these iterations were lost to the final site plan. Although consultants were found to be very helpful in discussing the process of meeting environmental regulation throughout the development process, information regarding early plans submitted and changes to these plans resulted in little or no feedback regarding loss of lots or site plan restructuring that may have decreased the development potential due to environmental constraints.

Fairfax County Projects

The developers provided information for three projects in Fairfax County. Two, which have been grouped together, were separate phases of a large development project and one was a stand alone, single phase project.

Phased Project

This project, which consisted of two phases, developed nearly 300 acres and proposed approximately 700 new homes on an infill site. Due to the increasingly scarce supply of greenfield parcels, many projects in the county are finding themselves located on more challenging infill sites. As one consultant phrased it “all the low-hanging fruit has been picked.” One challenge of developing infill sites is they sometimes involve remediation actions as a result of past uses. In the case of this project, environmental contaminants were identified and removed as part of the development process. This project was not a by-right development, as it required a zoning change. As a result, a set of proffered conditions was agreed upon during the approval process. The rezoning process was for the entire site, after which site plan approvals were sought for each phase.

The rezoning process took approximately eight months. During the rezoning process, proffers pertaining to the site’s development and environmental conditions were agreed to by the developer. These included stream monitoring for impacts on a RPA, the procurement of an offsite conservation easement, and the installation of best management practices (BMPs) for improving stormwater runoff quality. The proffers also included the completion of archeological studies on the site.

The rezoning application and approval process for the entire project was completed in approximately eight months. The approvals for the site plans for each of the phases of the project

took between 10 and 18 months. Both phases were required to be submitted at least two times because previous submissions were disapproved. The total project development time for each phase was between approximately 18 and 26 months.

Site conditions triggered the following environmental regulations:

Table 4-5
Phased Project Environmental Regulations

Regulation/Review	Federal	State	Local
Wetlands Permitting[79]	X	X	
Stormwater		X	X
Wastewater Collection and Treatment		X	X
Other Non-point Water Quality[80]			X
Erosion & Sedimentation Control		X	X
Resource Protection Area			X
Open Space Set-aside			X
Tree Preservation			X
Landscaping			X
Noise			X
Archeological Review			X
Proffers for Environmental Measures			X
Water Distribution			X
Soils/Geotechnical Report			X

Each phase of the project was required to meet certain environmental regulations, either determined from federal, state, or local requirement, or agreed upon during the rezoning process. During each phase, for example, separate portions of the site were dedicated as open space. Other regulations applied to the entire site and required coordination of both overall and phase-specific requirements. For instance, an overall wetland permit was required as well as permits for specific activities pertaining to the different phases of the project not covered under the overall site permit.

As part of the proffering process, the developer was required to submit a tree preservation plan that provided for the preservation of trees over a certain diameter within a specified distance of identified grading and clearing limits and environmental quality corridors. This plan, however, could not alter the number or reduce the size of the proposed dwelling units.

The project, because it required a rezoning, was eligible and elected to include affordable dwelling units (ADUs). One phase incorporated approximately 20 units, although under the guidelines of the ordinance, a minimum of nearly 100 units was to be provided at the conclusion of the entire project.

[79] Bought credits from wetlands bank.
[80] BMP/Water Quality measures in effect for the Chesapeake Bay Preservation Area. Requires phosphorous removal measures.

Known or estimated project costs relating to environmental regulation compliance:

Table 4-6 **Phased Project Environmental Costs**		
Pre-construction	**Cost**	**Percentage of Improvement Cost***
Wetland Delineation	$68,500	2%
Resource Protection Area Delineation	$7,500	<1%
Environmental Quality Corridor Delineation	$2,000	<1%
Environmental Contamination Remediation	$400,000	10%
Archeological Investigation	$84,000	2%
Tree Preservation Plan	$5,500	<1%
Wetland Permitting	$65,000	2%
Construction		
Stormwater Management Ponds	$1,000,000	25%
Erosion and Sedimentation Control	$1,700,000	42%
Noise Attenuation	$380,000	10%
Post-construction		
Wetland Mitigation	$155,000	4%
Outfall Mitigation	$93,500	2%
Total Environmental Regulatory Compliance Cost	$3,961,000	100%
Total Project Cost for Land**	$53,000,000	
Average Environmental Regulatory Cost per Unit	$5,500	7%
Average Lot Cost per Unit	$75,000	

**Percentage of total known environmental regulatory compliance costs*
***Cost for finished lot, does not include construction cost for dwelling unit*

As previously stated, the rezoning application and approval process for the entire project was completed in approximately eight months. The approvals for the site plans for each of the phases of the project took between 10 and 18 months. Both phases were required to be submitted at least two times because previous submissions were disapproved. The total project development time for each phase was approximately 18-26 months. These processes occurred concurrently with the environmental permitting required. The approval of the development plans required the permits listed below to be acquired prior to beginning construction.

Table 4-7 **Phased Project Environmental Permitting**			
Permit	**Approval Time (in months)**		
	COE	DEQ	VMRC
Individual (Site)	3	3	4
Modification (Site)	1	1	Not avail
NWP #39	2	Not req'd	Not req'd
Individual (Utility)	2	Not req'd	3
Modification (Utility)	3	Not req'd	6
Temporary Access Road	1	Not req'd	5
NWP #39 (Phase)	2	Not req'd	Not req'd
Individual (Phase)	1	Not req'd	Not req'd
Modification (Phase)	1	Not req'd	Not req'd

The amount of time needed to acquire the necessary permits associated with the Clean Water Act, which is enforced by the state, is relatively short compared to the entire length of time it took to approve the project. It is necessary to have these permits in hand prior to beginning construction, prompting the application process to be undertaken concurrently with other approvals to minimize time delays. Therefore, there are minimal additional costs associated with the time necessary to receive these permits.

The homes in this development have been listed at prices ranging from approximately $400,000 to $1,000,000.

Single Phase Development

The other project in Fairfax County was a single phase development on an approximately 50-acre site. A mix of nearly 100 single family attached and detached dwelling units were developed, approximately 10 percent of which were affordable dwelling units (ADUs). The project set aside approximately 30 percent of the site as open space, which was above the county requirement of 25 percent. This project took longer to receive rezoning approval (approximately 11 months) than it did to receive entitlement, which required roughly eight months. A total of approximately 19 months transpired over the course of completing the necessary reviews, from applying for the rezoning to receiving final site plan approval.

The conditions of the site necessitated environmental regulations governing the following situations:

Table 4-8
Single Phase Environmental Regulations

Regulation/Review	Federal	State	Local
Wetland	X	X	
Stormwater		X	X
Wastewater Collection			X
Erosion & Sedimentation Control		X	X
Open Space Set-aside			X
Tree Preservation[81]			X
Landscaping			X
Noise		X	X
Archeological Review[82]			X
Water Distribution			X

The developer was required to submit a tree preservation plan as part of the proffering process that provided for the preservation of specific quality trees or stands of trees to the maximum extent feasible. This plan, however, could not alter the number of units, reduce the unit size, significantly alter their lot location, or require the construction of major retaining walls. These proffers also required including language in the HOA documents stipulating the proper use by residents of areas where tree preservation was required, such as under what conditions they are allowed to remove trees.

The site had minimal wetland disturbance and required only a preconstruction notification for its permitting activities. The project also required the construction of a noise attenuation wall, which necessitated additional permitting and landscaping requirements. A Phase I archeological study was also required.

[81] Prepared by a certified arborist
[82] Phase I Review

Known or estimated project costs relating to environmental regulation compliance:

Table 4-9 **Single Phase Environmental Costs**		
Pre-construction	**Cost**	**Percentage of Improvement Cost***
Wetland Delineation	$10,500	1%
Background Environmental Research	$1,500	<1%
Archeological Investigation	$4,000	<1%
Wetland Permitting	$2,500	<1%
Construction		
Stormwater Management Ponds	$150,000	14%
Erosion and Sedimentation Control	$225,000	20%
Noise Attenuation	$666,000	61%
Post-construction		
Wetland Mitigation	$39,500	4%
Total Environmental Regulatory Compliance Cost	$1,099,000	14%
Total Project Cost for Land**	$7,500,000	
Average Environmental Regulatory Cost per Unit	$12,000	14%
Average Lot Cost per Unit	$75,000	

**Percentage of total known environmental regulatory compliance costs*
***Cost for finished lot, does not include construction cost for dwelling unit*

As noted, the rezoning application and approval process for the site plans entire project was completed in approximately 19 months. The rezoning and site plan approval processes occurred concurrently with the environmental permitting required. The approval of the development plans required the permits listed below to be acquired prior to beginning construction. The only permit required for this project pertaining to wetlands was a Pre-Construction Notification.

Table 4-10 **Single Phase Environmental Permitting**			
Permit	**Approval Time (in months)**		
	COE	DEQ	VMRC
Pre-Construction Notification	1	Not req'd	Not req'd

The amount of time needed to acquire the necessary permits associated with the Clean Water Act as it is enforced by the state is relatively short compared to the entire length of time it took to approve the project. It is necessary to have these permits in hand prior to beginning construction, prompting the application process to be undertaken concurrently with other approvals to minimize time delays. Therefore, there are minimal additional costs associated with the time necessary to receive these permits.

The homes in this development have been listed at prices ranging from approximately $775,000 to $875,000.

Montgomery County Project

The project reviewed for Montgomery County developed approximately 250 dwelling units, practically evenly split between attached and detached residences, on nearly 125 acres of land located in a SPA. 12.5 percent of the units were provided as MPDUs, the minimum percentage required of all new residential projects in the county. Approximately 40 percent of the site was dedicated as open space.

The preliminary approval time for the project was approximately nine months. Approval for the site plan and completion of the record plat, which initiates the building permit process, averaged about 18 months for each phase of the project. The review process for each of the phases was done concurrently so the overall planning process, from preliminary plan to record plat approval, took approximately 28 months.

The site conditions required adherence to environmental regulations governing the following:

Table 4-11
Montgomery Project Environmental Regulations

Regulation/Review	Federal	State	Local
Wetlands Permitting[83]	X	X	
Floodplains[84]			X
Stormwater			X
Erosion & Sedimentation Control			X
Resource Protection Area[85]			X
Resource Water Protection			X
Open Space Set-aside			X
Tree Preservation			X
Landscaping			X
Reforestation			X

Site environmental conditions and resulting requirements caused and increase in the percentage of attached units above the limits in the master plan. These requirements included the forest conservation plan developed using county guidelines and conflicting stipulations for stormwater management in the SPA and Master Plan. This conflict required a waiver from the swale requirement but preventing the installation of any stormwater management facilities within the environmental preservation areas. The project also had to be phased to minimize the overall environmental disturbance impact, requiring the preparation and approval of erosion and sedimentation control plans for each phase.

[83] Buffer established as per local requirements.
[84] Buffer established as per local requirements.
[85] Called a "Special Protection Area" in Montgomery County.

The project received preliminary plan approval prior to the developer acquiring the property. After acquisition, the developer reconfigured the preliminary plan design in order for the home product to fit the site. This was done without altering the approved development envelope from the preliminary plan. While modifying the approved preliminary plan and seeking site plan approval, the developer also moved forward with producing engineering plans. This produced added costs because changes made during site plan approval had to be re-engineered.

SPA development guidelines required the developer to install multiple stormwater best management practice (BMP) facilities in order to reduce development impact on the high quality water resource. These facilities were required to be oversized in comparison to similar installations outside of an SPA, allowing them to accommodate more stormwater volume. The stormwater BMPs were also required to be installed in a series. The intention behind such requirements is to create backups so that should one BMP facility fail the others would be able to adequately handle the additional loading. This requirement prompted the developer to install a number of these typically at-grade stormwater BMP facilities under parking lots or other site elements, an added expense for the developer. This approach was chosen in order to maximize the building potential of the site.

The county required a forest preservation plan as a part of this project. The plan required reforestation to take place along the riparian buffer of a water course present on the site. This reforestation process includes a five year monitoring period with a 100 percent survival rate of the plantings. In addition, the plan required a stand of existing forest to be preserved. This reduced the density that could be achieved on the site, requiring a waiver from the MP requirements. This density waiver, a result of environmental regulations, meant additional homes were not constructed on the site.

As a component of the final construction plan approval process, officials required the construction schedule to be completed in three phases to minimize the disturbance to the site at any one time. Requiring a phased construction schedule for the project added cost because, in some instances, earthwork had to be done multiple times. This could have been avoided by planning for a phased project construction schedule from the outset because the developer could have balanced each phase of the development.

Known or estimated project costs relating to environmental regulation compliance are as follows:

Table 4-12 **Montgomery Project Environmental Costs**		
Pre-construction	**Cost**	**Percentage of Improvement Cost***
Natural Resources Inventory	$15,000	1%
Wetlands Delineation	n/a	
Wetlands Permitting	n/a	
Forest Conservation Plan	$75,000	5%
Construction		
Stormwater Management	$850,000	59%
Site Demolition and Construction Preparation	$260,000	18%
Erosion and Sedimentation Control	$250,000	17%
Total Environmental Regulatory Compliance Cost	$1,445,000	100%
Total Project Cost for Land**	$22,000,000	
Average Environmental Regulatory Cost per Unit	$5,500	7%
Average Lot Cost per Unit	$86,000	

**Percentage of total known environmental regulatory compliance costs*
***Cost for finished lot, does not include construction cost for dwelling unit*

No environmental permit time frames were provided for this project.

The homes in this development have been listed at prices ranging from approximately $450,000 to $800,000.

Projects in Neighboring Virginia counties

Three additional projects were provided by the developers for this study. The projects were not used in the pilot study because they were not located in either Fairfax or Montgomery counties. These additional projects were in Loudon and Prince William counties and do not include the time to acquire any necessary rezoning approvals.

Two projects were evaluated in Loudon County. One project was a by-right development, meaning there were no rezoning conditions of approval developed. The other project was part of a larger development and included numerous rezoning proffers.

The by-right project in Loudon County consisted of roughly 200 detached units developed on approximately 200 acres of land. The project set aside over 40 percent of the site in open space. The project divided into phases and only one phase was provided for analysis. This phase developed roughly 50 detached residential units on approximately 40 acres, of which 20 percent was set aside as open space. The project was part of a larger preliminary plan approval that included approximately six additional phases. The project was in review and approval processes for nearly 27 months.

The conditions of the site necessitated environmental regulations governing the following situations to be adhered to:

Table 4-13 **By-right Project Environmental Regulations**			
Regulation/Review	**Federal**	**State**	**Local**
Wetlands Permitting	X	X	
Stormwater		X	
Wastewater Collection		X	
Erosion & Sedimentation Control		X	X
Open Space Set-aside			X
Tree Preservation			X
Landscaping			X
Archeological Review[86]			X
Water Distribution		X	X
Soils/Geotechnical Report			X
Reforestation[87]		X	X

The site involved background research, archeological study, wetland delineation, CWA permitting and mitigation. The site survey costs of the wetland delineation are not reflected in the categories. This project required Phase I, II and III archeological surveys to be completed. No proffers were required, as this project was a by-right development.

[86] Phase I archeological survey completed.
[87] 20% canopy cover required.

Known or estimated project costs relating to environmental regulation compliance:

Table 4-14 **By-right Project Environmental Costs**		
Pre-construction	**Cost**	**Percentage of Improvement Cost***
Wetland Delineation	$22,500	<1%
Background Environmental Research	$6,000	<1%
Archeological Investigation	$63,000	2%
Environmental Contamination Remediation	$400,000	13%
Wetland Permitting	$46,500	1%
Construction		
Stormwater Management Ponds	$1,400,000	44%
Erosion and Sedimentation Control	$880,000	28%
Post-construction		
Wetland Mitigation	$343,000	11%
Total Environmental Regulatory Compliance Cost	$3,161,000	100%
Total Project Cost	$14,325,000	
Average Environmental Regulatory Cost per Unit	$16,500	22%
Average Lot Cost per Unit	$75,000	

**Percentage of total known environmental regulatory compliance costs*
***Cost for finished lot, does not include construction cost for dwelling unit*

Again, the approval process for the site plans entire project was completed in approximately 27 months. The preliminary plan, construction plan and profiles review, and record plat approval processes occurred concurrently with the environmental permitting required. The approval of the development plans required the permits listed below to be acquired prior to beginning construction.

Table 4-15 **By-right Project Environmental Permitting**			
Permit	**Approval Time (in months)**		
	COE	DEQ	VMRC
Joint Permit Application	6	7	Not req'd
NWP #43	2	Not req'd	Not req'd
NWP #39	2	Not req'd	Not req'd
Modification	1	7	Not req'd
Modification	4	11	Not req'd

COE=Corps of Engineers; DEQ=Department of Environmental Quality;
VMRC=Virginia Marine Resources Commission

The amount of time needed to acquire the necessary permits associated with the Clean Water Act as it is enforced by the state is relatively short compared to the entire length of time it took to approve the project. It is necessary to have these permits in hand prior to beginning construction, prompting the application process to be undertaken concurrently with other approvals to

minimize time delays. Therefore, there are minimal additional costs associated with the time necessary to receive these permits.

The homes in this development have been listed at prices ranging from approximately $675,000 to $975,000.

The other Loudon County project is part of a phased development plan to create approximately 300 units on nearly 200 acres that required rezoning approval. The phase of the project provided for the pilot study creates approximately 100 detached units. As a part of the rezoning process, the developer agreed to proffer cash to the County's Affordable Housing Trust Fund in lieu of providing affordable dwelling units in the project. The project took approximately 22 months to be approved from the time it entered the rezoning process.

The conditions of the site necessitated environmental regulations governing the following situations to be adhered to:

Table 4-16
Phased Project Environmental Regulations

Regulation/Review	Federal	State	Local
Wetlands Permitting	X	X	
Floodplains	X		
Stormwater		X	X
Wastewater Collection			X
Wastewater Treatment		X	X
Erosion & Sedimentation Control		X	
Open Space Set-aside			X
Tree Preservation			X
Landscaping			X
Archeological Review			X
Water Distribution			X
Soils/Geotechnical Report			X

This project was part of a phased development plan that required rezoning. The rezoning process resulted in numerous proffered conditions of approval, many of which were influential in bringing additional environmental regulations into play. The construction of a recreation facility along a water course prompted additional permitting to be acquired from federal, state, and local agencies. The developer also agreed to have an outside agency prepare an environmental management plan to promote sustainable resource management through sound environmental planning, construction, and management of the project. This plan was to include management plans for numerous environmental resources and issues related to the site.

A number of proffers related to tree preservation and forest cover. The developer agreed to complete an afforestation plan, preserve at least 80 percent of the identified tree preservation areas, maintain a minimum acreage of trees in an identified area of the project, and complete a riparian buffer planting plan to preserve and protect water quality and wildlife habitat while enhancing aesthetic value. Afforestation is the creation of a biological community dominated by

trees and other woody plants at a density of at least 100 trees per acre.[88] At least 50 percent of the trees must have the capability to reach a two inch diameter 4.5 feet from the ground within seven years. Complying with these proffers involved the guidance of a certified arborist or landscape architect and plans were to be approved by the county's Urban Forester.

The project also initiated proffers relating to archeological resources present on the site. These included the completion of a Phase I survey prior to any grading and, if required, a Phase II and III survey. In addition, some of the cultural resources present on the site were to be preserved and enhanced by the developer. This included the completion of the process for listing resources eligible for the National Register of Historic Places.

Open space and riparian buffer proffers were also agreed to by the developer.

Known or estimated project costs relating to environmental regulation compliance are as follows:

Table 4-17
Phased Project Environmental Costs

Pre-construction	**Cost**	**Percentage of Improvement Cost***
Wetland Delineation	$78,500	6%
Background Environmental Research	$500	<1%
Archeological Investigation	$122,500	11%
Cultural Resource Designation	$32,500	3%
Environmental Contamination Remediation	$85,000	7%
Tree Preservation Plan	$14,000	1%
Wetland Permitting	$25,000	2%
Construction		
Stormwater Management Ponds	$100,000	9%
Erosion and Sedimentation Control	$445,000	39%
Tree Preservation Plan Implementation	$200,000	18%
Archeological Resource Management	$35,000	3%
Total Environmental Regulatory Compliance Cost	$1,138,000	100%
Total Project Cost for Land**	$23,775,000	
Average Environmental Regulatory Cost per Unit	$3,800	5%
Average Lot Cost per Unit	$75,000	

**Percentage of total known environmental regulatory compliance costs*
***Cost for finished lot, does not include construction cost for dwelling unit*

The permitting for the wetland regulations associated with this project was completed prior to the developer's purchasing the site. The costs associated with the permitting process, as outlined above, resulted in the developer's paying a higher price for the land because this work had already been completed. Compliance with regulations completed before land sale increase the value of the property because it reduces the obligations and uncertainty facing the buyer.

[88] "Appendix A" available at www.mcparkandplanning.org/Environment/forest/trees/append_trees.pdf (July, 2006)

However, the developer was still responsible for any mitigation costs associated with the permits.

The homes in this development have been listed at prices ranging from approximately $525,000 to $1,000,000.

Prince William County

The other project was in Prince William County. It is part of a phased development to create nearly 200 homes on approximately 100 acres, although one-third of the site will be preserved as open space. The phase evaluated for the pilot study planned to develop between 60 and 70 detached units on approximately 30 acres and preserve nearly 10 acres as open space. The developer agreed to proffer a cash contribution to the County's Housing Preservation and Development Fund. Prince William County requires rezonings be consistent with the comprehensive plan. If a rezoning application is necessary, a request to amend the comprehensive plan is made by the developer in January of each calendar year. This project was required to request such an amendment. The project required approximately 29 months to receive approval.

The conditions of the site necessitated environmental regulations governing the following situations to be adhered to:

Table 4-18
Prince William Project Environmental Regulations

Regulation/Review	Federal	State	Local
Wetlands Permitting	X	X	X
Stormwater			X
Wastewater Collection			X
Erosion & Sedimentation Control		X	X
Endangered Species	X	X	
Open Space Set-aside			X
Tree Preservation			X
Landscaping			X
Noise			X
Archeological Review			X
Water Distribution			X
Soils/Geotechnical Report			X

The endangered species requirement is a unique element in the context of this study. This project required a study for endangered species because preliminary assessment revealed a potential presence of such an element. This additional study did not discover any such species.

A rezoning was required for this project, leading to the creation of proffered conditions of approval. The proffers included certain agreements that had environmental implications. These proffers included cash contributions by the developer for environmental monitoring, more stringent erosion and sedimentation control plan guidelines, and additional landscaping

requirements. The proffers agreed to also stipulate the developer was to preserve and protect identified tree preservation areas to the greatest extent practical and feasible. An archeological study and resource preservation proffer was also part of the approval conditions.

Known or estimated project costs relating to environmental regulation compliance:

Table 4-19
Prince William Project Environmental Costs

Pre-construction	**Cost**	**Percentage of Improvement Cost***
Wetland Delineation	$16,000	<1%
Background Environmental Research	$1,500	<1%
Resource Protection Area	$3,000	<1%
Endangered Species Research	$6,000	<1%
Archeological Investigation	$8,500	<1%
Environmental Contamination Remediation	$220,000	12%
Wetland Permitting	$19,000	1%
Construction		
Stormwater Management Ponds	$300,000	16%
Erosion and Sedimentation Control	$863,000	47%
Archeological Resource Management	$65,000	4%
Noise Attenuation	$215,000	12%
Post-construction		
Wetland Mitigation	$117,000	6%
Total Environmental Regulatory Compliance Cost	$1,834,000	11%
Total Project Cost for Land**	$16,125,000	
Average Environmental Regulatory Cost per Unit	$8,500	11%
Average Lot Cost per Unit	$75,000	

**Percentage of total known environmental regulatory compliance costs*
***Cost for finished lot, does not include construction cost for dwelling unit*

As previously stated, the rezoning application and approval process for the site plans entire project was completed in approximately 29 months. The Joint Permit Application required for the project was completed prior to the submission of the project for rezoning approval. The rezoning and site plan approval processes occurred concurrently with the required modified environmental permitting.

Table 4-20
Prince William Project Environmental Permitting

Permit	**Approval Time (in months)**		
	COE	DEQ	VMRC
Joint Permit Application	3	2	Not req'd
Modification	1	1	Not req'd

COE=Corps of Engineers; DEQ=Department of Environmental Quality;
VMRC=Virginia Marine Resources Commission

The amount of time needed to acquire the necessary permits associated with the Clean Water Act as it is enforced by the state is relatively short compared to the entire length of time it took to approve the project. It is necessary to have these permits in hand prior to beginning construction, prompting the application process to be undertaken concurrently with other approvals to minimize time delays. Therefore, there are minimal additional costs associated with the time necessary to receive these permits. The homes in this development have been listed at prices ranging from approximately $575,000 to $675,000.

Insights from the Pilot Study

The Pilot Study was based on information provided to the research team by experienced, national developers working in the local market for many decades. Each case study provided highly useful information on costs and delays associated with environmental regulations. Each case study aimed to gather the following:

- General project characteristics: site acreage, units developed, type of application, time needed to complete the development review process, affordable dwelling units developed, proffers and conditions of approval
- Environmental regulations and reviews triggered
- Estimated costs of compliance with environmental regulations, cost per unit, cost as percentage of housing price, cost as percentage of land and development costs.
- Timeframe for acquiring the required environmental permits. (Although the study sought to estimate the cost of delays this could not be done. One reason is that projects actually gained value during the review process. A second is that it was difficult to ascribe delays specifically to environmental regulations as opposed to other reasons.)

Six projects were included in the case studies, two in Fairfax County (one was a two phase project and data was aggregated to one project), one in Montgomery County, two in Loudoun County, and one in Prince William County.

- Fairfax 1: Two phase, 700 unit development on a 300 acre infill site. Rezoning required, 22 months to approval. Up to 100 affordable dwelling units (ADU) were proffered. House price range from $400,000 to $1,000,000.
- Fairfax 2: 100-units on 50 acre greenfield site with 30 percent open space and 20 ADUs. Rezoning required, 18 months to approval. Home price from $775,000- $875,000.
- Montgomery: 250 units on 100 acres, 20 ADUs. Rezoning required, 28 months to approval. Home prices from $450,000 to $800,000.
- Loudoun 1: 200 units on 200 acres, 40 percent open space. By-right development that nevertheless required 27 months for approval. Home prices $675,000 to $975,000.
- Loudoun 2: 300 units on 200 acres, proffered cash to Affordable Housing Trust Fund in lieu of providing ADUs. Rezoning required, 22 months to approval. Home prices $525,000 to $1,000,000.
- Prince William: 200 units on 100 acres, 1/3 preserved as open space, proffered cash to County's Housing Preservation and Development Fund. Rezoning and amendment to comprehensive plan required, 29 months to approval. Home prices $575,000 to $675,000.

The following table compares the six case study projects. Total environmental compliance costs and their breakdown by specific environmental area are given, as well as time to approval, proffers, and various indicators of compliance cost. These indicators include environmental compliance cost per lot and cost as percent of land and development cost.

Table 4-21
Comparing Six Case Studies

Feature	Fairfax 1	Fairfax 2	Montgomery	Loudoun 1	Loudoun 2	Prince William	Average
Land-Use Decision	Rezoning	Rezoning	Rezoning	By-right	Rezoning	Rezoning; plan amendment	
Acres	300	50	100	200	200	100	--
Units	700	100	250	200	300	200	--
ADUs	20-100	20	30	0	AHTF	0	--
% open space	0%	30%	0%	20%	0%	0%	--
Environmental Compliance Cost	$3.96 mil	$1.10 mil	$1.52 mil	$3.16 mil	$1.14 mil	$1.83 mil	--
% Erosion / Sedimentation	42%	20%	15%	28%	39%	47%	32%
% Stormwater	25%	14%	54%	44%	9%	16%	27%
% Remediation	10%	0%	20%	13%	7%	12%	11%
% Wetlands/ESA	8%	5%	5%	13%	8%	8%	7%
% Tree/Forestry	<1%	0%	5%	0%	19%	<1%	4%
% Noise	10%	60%	0%	0%	0%	12%	13%
% Other	4%	1%	1%	2%	18%	5%	5%
Environmental Cost per unit	$5,650	$11,000	$6,000	$15,800	$3,800	$9,150	$8,600
Environmental Cost Share of Land + Development Cost	1.9%	3.3%	2.3%	5.3%	1.2%	3.6%	2.9%
Imputed Lot Cost*	$187,250	$205,500	$167,500	$187,250	$197,500	$156,750	$183,500
Environmental Cost Share of Finished Lot Cost	3.0%	5.0%	3.6%	8.4%	1.9%	5.8%	4.7%
Approvals	Concurrent	Concurrent	Concurrent	Concurrent	Concurrent	Concurrent	--
Time to approval	22	18	28	27	2	29	24
Proffers	Stream monitor; BMPs; archeological review; offsite conservation easement	Tree preservation.	None in MD	None for by-right	Tree preservation; forest cover; archeological review; open space	Funds to monitor, E&SC, tree preservation; housing fund	

* The builders also built homes so the finished lot price is not provided directly. This figure is based on a 25 percent finished lot-to-home sale ratio which is conservative and will have the effect of increasing the relationship of environmentally-related costs to finished lot cost.

The research team was impressed by the finding that the percent of environmentally-related costs to total improvement costs (4.7%) was less than half the percent estimated for 1975 (9.2%) in Chapter 3; that as a percentage of finished lot prices, environmental compliance costs were generally on the low end of the cost continuum established in Chapter 3 and only one of the case studies had cost percentage in the "normal" range. One reason may be that land and house prices are simply so high in this market that environmentally-related costs are simply not a large percent of the total. The Focus Groups and other case studies reported in later chapters will help inform this.

The research team also finds that on average the time-to-approval was at the high end of "normal." However, three cases were in the "delay" category while none were in the "accelerated" category. Two of the three of the "delayed" cases are interesting. The developer for the Prince William case indicated that planning and other staff at Prince William County are overwhelmed by rapid growth in that county and look to how other counties – especially Fairfax – handle such issues as environmental concerns. Through some delay, the staff would use ad hoc approaches to condition final development approval on Fairfax-like environmental and other regulations; had Prince William County the same regulations or regulatory approval process the approval may have been given several months sooner. The second is Montgomery County. While there is only one case study from this county the research team learned through on-line planning records and interviews that this was about a normal period of time to approval for the County. Yet, its home sale and imputed finished lot prices were the second lowest among the six case studies and 10 percent lower than the overall average. The developer for this project knew Montgomery County's processes and indicated it had anticipated much of the time-to-approval process from the outset.

Lessons from the Pilot Study

The Pilot Study led to a number of insights into how to refine environmentally-related policy in ways that may reduce direct costs and time-to-approval costs. The Pilot Study also revealed a number of very specific improvements that could be made by the jurisdictions in the study area individually and/or collectively. While some are nuances to the Fairfax and Montgomery Counties the insights are relevant for other jurisdictions as well.

Summary: The simple lessons from the DC region pilot study are that

- Water issues dominate but a large number of other issues can affect specific projects.
- Typical costs for environmental compliance are about $8,600 per unit.
- Concurrent reviews are critical to avoid long and uncertain delays.
- About 24 months is typical of the time to approval, even for rezoning.
- Uncertainty prevails in negotiated approvals needed for rezoning.
- Retaining environmental specialists trusted by local jurisdictions can develop good environmental information early and mitigate public concerns.

This section discusses the lessons learned by the research team from its pilot study of housing projects in the Washington, DC Metropolitan region. The study of seven subdivision projects highlights how jurisdictions can improve certainty and administrative efficiency when applying environmentally regulations to residential development. The appendix also includes the forms developed and used for the Pilot Study that may be adapted and applied to future studies addressing the relationship between environmental regulations and housing affordability.

Home builders are likely to incur greater costs under more complex development reviews and more comprehensive environmental regulatory systems. However, the pilot study showed that compliance costs were not more for the Montgomery County project than for the Fairfax County projects despite Montgomery's more complex regulations. For the projects reviewed, the average sales price in Fairfax County was nearly $750,000 for a new home while for the Montgomery County project it was $670,000.[89]

By examining the costs from these typical housing projects in light of relevant state and local environmental regulations, the research team drew a number of important policy conclusions about the relationship of environmental regulatory systems on suburban housing developments. While the original research methodology was more extensive, the Fairfax-Montgomery County pilot case study still offers valuable insights regarding: 1) the controlling influence of local government development review processes; 2) the relationship of environmental costs to housing affordability; and 3) the design and implementation of state and local environmental regulations. The research team also hypothesized about future research questions and set forth ideas about potential next steps that could flow from the case study.

Local development planning processes played a critical role in the implementation of state and local environmental regulations. How the local governments synchronized environmental and development reviews had a direct impact on the time, resources, and costs incurred by the home builder, especially in the early evolution of the projects. A greater level of integration seemed to facilitate greater certainty and higher levels of trust during the negotiations among local government staff and the builder's consultants; thus, greater integration should result in less time to obtain approval and hence less cost to the home builder. The research design did struggle with how to separate environmental regulations from standard planning and zoning regulations as the two systems are intricately integrated.

What are the costs of environmental regulations?

One of the threshold inquiries is determining the universe of direct and indirect costs associated with environmental regulations and when they occur before, during, and after construction. Based on our case study research, we found these costs to include:

- Pre-construction Costs
    - Background research and natural resource inventory

[89] One could speculate that perhaps the difference is not significant in light of the robust regional housing market from 1997 to 2006. Maybe the additional environmental costs affected the home builder's rate of return for Montgomery County, but had little financial impact given the multiple projects in multiple counties; thus, the costs are spread across the companies' portfolio of projects.

    - Wetland delineation
    - Environmental contamination remediation
    - Tree and forest conservation planning
    - Archeological investigation
    - Cultural resource designation
    - Permitting processes and approvals
- Construction Costs
    - Stormwater management ponds
    - Erosion and sediment control measures
    - Noise attenuation elements
    - Archeological resource management
- Post-construction Costs
    - Mitigation
        - Wetlands
        - Stream outfall

Direct costs include those paid by developers to meet environmental regulations. These costs may include the cost of installing erosion and sediment control measures, stormwater best management practices, mitigation, and completing a wetland permit. Direct costs also include fees paid for meeting these regulations, either to employees or consultants.

Indirect costs may be more difficult to identify. These may include the lost opportunity costs associated with environmental regulations or costs incurred due to time delays. Examples may include the loss of development site because of the presence of wetlands or endangered species habitat. Time also plays a role in the cost of environmental regulations, although this element was difficult to tease out in the case study. Developers indicate the time it takes to acquire approval, partly due to environmental regulation review, has increased, therefore adding land holding costs to a project. Market influences may also play a role, as land value may increase during the time it takes to review a project, especially in hot market region. The study was unable to directly identify increased land holding costs, as well as attribute costs to environmental regulations or the overall review process.

The complexity of the issues and the local conditions often requires developers to become dependent on outside environmental consultants for expertise and assistance in acquiring approval for a project. Developer's fees for consultant services are increased because of the influence of environmental regulations. The additional cost of hiring an outside consultant may prevent smaller firms from entering the development market as well as increase the costs of development for the larger firms who do not have the staff able to provide these services.

Note the type and nature of the environmental costs will depend on the scope and nature of the regional and local environmental resources. For the Pilot Case Study of Fairfax/Montgomery County, protection of the water resources and water quality of the Chesapeake Bay are important environmental policy priorities for the region. Hence water resource regulations accounted for the majority of environmental costs in the subdivision projects reviewed in the case study. For the developers participating in the focus groups, environmental issues involving endangered species and habitat protection rose to the surface.

The following are the key lessons from the Pilot Study cases:

1. Cost of compliance with environmental regulations:

The six case studies indicate that the cost of compliance with environmental regulations is not trivial, amounting to $1.1-4.0 million for the six projects. Only a small amount of the cost (<5 percent) went to studies and permit fees, and nearly all of the expenditures went to controls and mitigation. While this cost seems high, as a percent of project land and development cost (1.2-5.3 percent), as a cost per home ($3,800-$11,000), and especially as a percent of home sale price (0.5-2.1 percent), they are very small.

In a high priced market like DC, developers are less concerned about actual compliance costs than they are about the uncertainties and delays that can occur in the approval process. Before addressing this issue, let's look more closely at some of the compliance costs.

Environmental Regulatory Costs Range from $3,800 to $16,500 Per Unit—Depends on Special Environmental Site Conditions

By translating the home builder costs to a "per dwelling unit" ratio, the relationship between environmental regulations and suburban housing affordability seems even more tenuous. Based on a comparison of the pilot case study projects, the environmental costs in Montgomery and Fairfax counties ranged from $5,500 to $12,000 per unit. The Montgomery County project, with its increased development approval times and added costs for stormwater management construction, was closer to $5,500. The single phase project in Fairfax County was more expensive mainly due to the installation costs associated with the noise attenuation features. Considering all of the pilot case study projects, the costs of environmental regulations ranged significantly from $3,800 to over $16,500. Interestingly, the by-right development in Loudon County had a per-dwelling unit environmental regulatory cost of over $16,500.

Another way of evaluating the wide range of costs is to take note of the special environmental conditions on the project site. Developer costs were substantially higher for the Loudon County project because of the special environmental challenges of the site—development required extensive mitigation of the wetland impacts of the project. With fewer large tracts of land open for development in the Washington, DC metropolitan area, developers now have fewer opportunities for housing development and will likely encounter more sites with important natural resources, thus, increasing environmental costs. The scarcity of simple sites for new housing may actually drive the increase in home builder costs more than environmental regulations.

As was demonstrated by the projects described earlier, the costs associated with environmental regulations can be divided by the number of units produced to provide a "per unit" cost. For the projects evaluated in this pilot case study, these costs range from as little as $2,900 to $16,500, with the average for the six projects at about $8,500. It is difficult to determine from the data how this influences the cost of housing. It is unclear whether these environmental costs are added

to the selling price of the house, causing higher sales prices, or how they influence the bottom line of the developers profit margin.

Moreover, local developers informed the research team that the **cost to carry money ranges from 15-20 percent**. However, because the developers do not secure the loans the lenders have no recourse for collection. A one year delay on a $10 million carried for a project would thus cost $1.5 million to $2 million. In a very real sense "time is money." If there is more certainty in the review and approval schedule, financing can be timed accordingly. However, if there is uncertainty, costs of delay expand because money must be held.

What effects do these costs have on the price of housing?

The effects of the environmental regulations costs on the price of housing were not able to be identified as a result of the pilot study. Overall, the price of housing in the Washington DC metropolitan region is robust, leading the costs of environmental regulation to be a minor player in housing price, which is determined by the market. The costs of meeting environmental regulations more likely detract from the developers' profit margin.

With a comparable population in a metropolitan region experiencing nearly homogenous growth pressure, the research team expected these two counties would be similar in their housing prices and supply. However, the median cost of a new home in Montgomery County has consistently been lower than Fairfax County, most recently the difference being nearly $50,000 in 2005. Montgomery County also has nearly 30,000 fewer housing units available than Fairfax. Following the premise that increased environmental regulations and added time to receive approval increase costs, it would be expected that Montgomery County would have higher home sales prices in order to accommodate these increased costs. Given the additional development costs to meet environmental regulations, either through extended review processes or increased design and construction requirements, Montgomery County should have a higher median sales price for new homes. The results from projects in the pilot case study were in fact the opposite. Fairfax County, with its quicker review processes, less restrictive environmental regulatory regime, and greater pool of housing from which to distribute among residents, has an average new home sales price for the projects reviewed that is $80,000 higher than Montgomery County.

What are these costs relative to other costs?

The costs incurred by environmental regulations averaged 11 percent of the overall total project costs, not including the costs of constructing the dwelling units. Environmental regulations generated costs whose percentage ranged from five to 22 percent of the total project costs, not including the costs of constructing dwelling units. The Montgomery County project's costs associated with environmental regulations comprised seven percent while the by-right development's environmental costs accounted for 22 percent of the total project costs, not including the costs of constructing dwelling units.

2. Stormwater, Erosion & Sediment Control:

In the six case studies, stormwater and E&SC measures cost 59 percent of all environmental compliance costs, or about $5,000/lot. A national executive of a large builder shared with us their rule of thumb for stormwater costs in different states:

California	$9,000/lot
Florida	$5,000/lot
Texas	$1,500/lot

Water Resource Regulations Account for Majority of Costs

Since the DC region has strict controls for protection of the Chesapeake Bay, which falls in line with Florida, compliance with water resource protection regulations accounted for nearly 66 percent of the overall environmental regulatory costs identified in the case study projects. These costs include pre-construction, construction, and post construction figures. The construction of noise attenuation features also represents an average of nearly 16 percent of the costs, although these elements were only present in three projects. Environmental contamination cleanup, present in five projects, averaged 13 percent of the total environmental regulatory costs. The remaining environmental regulations, cultural resources, endangered species, and tree preservation, represent less than 5 percent of the total environmental regulatory costs.

3. Site Remediation:

Remediation was required at five of the six projects and amounted to the next highest compliance cost after stormwater and E&SC. Remediation is a catch-all for a wide range of measures, including removing existing structures, old fuel tanks, drainfields, wells, and other hazardous or contaminated materials.

4. Wetlands Permitting:

Surprisingly, the principal federal environmental regulations affecting land development, wetlands permitting and Endangered Species Act compliance, were relatively minor costs in the six case study projects. All projects had wetlands delineation and permitting costs, and four of the six required wetlands mitigation measures. Still, wetlands compliance ranged from $53,000 to $411,000 for each project. This translates to only 7 percent of environmental costs or $300 to $2000 per unit.

Table 5 traces the Fairfax 1 project wetlands permitting process and approval time. Although the 16 months required for Corps of Engineers approval of various project phases, this ran concurrently with other permitting and did not add appreciably to the project delays.

Table 5 **Fairfax 1 Wetlands Permitting**			
Permit	**Approval Time (in months)**		
	COE	DEQ	VMRC
Individual (Site)	3	3	4
Modification (Site)	1	1	NA
NWP #39	2	NR	NR
Individual (Utility)	2	NR	3
Modification (Utility)	3	NR	6
Temporary Access Road	1	NR	5
NWP #39 (Phase)	2	NR	NR
Individual (Phase)	1	NR	NR
Modification (Phase)	1	NR	NR

NR=not required; NA=not available

5. Endangered Species Act:

While all projects had to consider ESA requirements, only one project (Prince William) had any suspected endangered species habitat. A $6,000 assessment did not find any such habitat.

6. Vegetation, Forest Cover, Open Space

Local tree preservation, open space, and forest cover ordinances and proffered requirements were included in several projects. Tree and forest conservation were part of the Montgomery County project ($75,000 forest conservation plan) and the Loudoun 2 project ($214,000 tree preservation). At least two of the projects had open space set asides.

7. Other measures: Noise attenuation, archeological studies

Projects vary and so do their environmental requirements. Four projects required archeological studies and two required resulting resource management (up to $157,500 for the Loudoun 2 project). Fairfax 1 and Fairfax 2 required noise attenuation barriers ($380,000 and $666,000 respectively).

8. Rezonings, Proffers, and "Voluntary" requirements beyond formal regulations:

By-right projects are rare, nearly all projects require rezonings. Rezonings open up a negotiated process with proffers a big part of the process in Virginia. These add considerable environmental and other features to projects that are beyond regulations. While they are officially "voluntary" they become a required concession in the negotiated approval for rezoning. Although proffers are specific to Virginia, similar mechanisms are used whenever a rezoning requires conditions and concessions for a negotiated agreement.

9. Time to approval, uncertainties and delays

ULI (1989) set a rule of thumb for approval times: approvals without zoning changes in areas with few regulations take 6-9 months and those in areas with many regulations take 2-5 years. Our case studies in the DC region did not follow this pattern. All cases were in jurisdictions with many complex regulations. The one by-right case did take over two years. But all of the others involved zoning changes, one required a comprehensive plan change, and all required negotiations including open-ended Virginia proffers, yet they took 18-29 months for approval.

All projects had **concurrent review** of different permitting and approval requirements, and this is crucial to minimize delays.

One large developer gave its rule of thumb for Fairfax County: 12 months for rezoning, 12 months for site plan approval, add 12 months if comprehensive plan revision needed and not done concurrently. And in Loudoun County add another 4 months for rezoning.

Competing regulations enforced by different departments can also cause unpredictable delays and additional costs. Even with concurrent review, the process of rectifying competing regulations requires internal negotiations by different departments, delaying the developer's ability to move forward with design approvals until an agreement is reached between the departments. If this regulatory disparity is not identified until late in the design process, additional costs are incurred if completed designs need to be redone to meet the requirements of the departmental regulatory compromise.

What are excessive delays? Developers said anything beyond 12 months if no rezoning needed, anything beyond 24 months with a rezoning. Some complex projects, like Metro West, a transit oriented infill development in Fairfax County, take longer, in this case 48 months.

10. Various Regulatory and Market Factors Influence the level of environmental regulatory costs.

Distinct Land Development Processes Can Directly Affect Environmental Regulatory Reviews

Montgomery and Fairfax County approach development review from slightly different planning processes. With fewer tracts of land available for development, Fairfax County relies on the rezoning of existing land for new housing developments. As a local government operating in a Dillon's Rule state, Fairfax uses the proffers system (a type of conditional zoning) to mitigate the potential environmental impacts of new development.[90] With a long tradition of comprehensive planning, cluster development and open space conservation, Montgomery County relies on its comprehensive planning regime (comprehensive plans, master plans, and special protection area (SPA) plans) to ensure new housing developments minimize environmental impacts.

Each development review process has its own nuances affecting the time it takes to garner approval and the level of involvement by agencies and developers. When considering these six

[90] Fairfax County also does not have broad authority to impose impact fees compared with local governments in Maryland.

projects, environmental regulations and review essentially became a critical focus of the development review process. **The research team hypothesized that additional environmental reviews would increase the involvement of the builder's environmental and planning consultants and hence take more time—more time should translate into higher overall cost of housing in the respective county.**

The research from these six projects has shown that the average cost per unit for environmental regulations ($8,483) was slightly over one percent of the average home sales price of $734,626, with the average review time for the projects was 24 months. Projects with a longer review period did average a higher cost per unit but so did the projects with the two shortest review periods. The average sales amount for the projects with the two longest approval times averaged a lower sales price ($648,471) than the overall average. Projects with the shortest approval times (18 and 22 months) average sales price was $773,528, nearly $40,000 more than the group. This indicates that during the study period the sales price of homes are not influenced by the review time of the project. However, the study period was during a time when housing prices were rising at unprecedented rates largely because of historically low interest rates, rising incomes, increasing job opportunities, and overall greater demand for housing than there was supply.

Figure 4-1
Project Average Sale, Cost, Approval Time

County	*Project*	*Average Sale Amount*	*Cost per Unit*	*Review Time (months)*
Fairfax	Phased	$ 748,852.00	$ 5,500.00	22
	Single Phase	$ 821,900.00	$ 12,000.00	18
Montgomery		$ 670,042.00	$ 5,500.00	28
Loudon	Phased	$ 749,833.00	$ 2,900.00	22
	By-Right	$ 790,233.00	$ 16,500.00	27
Prince William		$ 626,900.00	$ 8,500.00	29
	Average	**$ 734,626.67**	**$ 8,483.33**	**24**

Merging of County Environmental Regulatory Systems

Interviews with home builders in Northern Virginia and in Montgomery County revealed that Fairfax County's environmental regulatory system is becoming ironically similar to Montgomery County. Although important differences still remain (e.g., the scope and breadth of their respective planning regime—comprehensive and master plan processes—devoted to environmental protection and open space conservation), when it comes to stormwater, stream erosion and other water quality regulations the similarities are striking. Part of this trend towards similar environmental regulatory systems is the unifying influence of the Chesapeake Bay Compact. During the 1990s the state of Virginia made modest commitments to comply with the minimum requirements of the Bay Compact while Maryland (the state and its local governments) made the Bay's water quality a high policy priority. More recently several local governments in Virginia have adopted more comprehensive environmental regulations to address the Bay's decreasing water quality.

Increased Development Approval Time for Montgomery County Generates More Home Builder Costs

For the pilot study projects Montgomery's preliminary plan review process and Fairfax's rezoning application process took roughly the same amount of time to complete. On average, the home builder spent approximately nine months in both counties to get the requisite approval during these critical first steps. However, during the site review and final construction plan approval process, the Montgomery County process was 10 months longer compared with Fairfax County projects.

Results from the case study indicate the home builder incurred additional out of pocket costs for the Montgomery County project. Moreover, the home builder no doubt incurred costs (e.g., property taxes and financing) for holding idle property while the project when through plan review. While the research team was unable to document these land holding costs for the projects, a savvy developer could minimize these costs if it purchased with an approved and attached preliminary plan.[91]

Inconsistent Environmental Regulations Can Increase Costs

Most environmental regulatory systems have certain inherent conflicts over competing environmental goals and objectives. While there are environmental policy benefits associated with the regulations, regulations may, for example, protect against stormwater runoff but also might reduce habitat or tree cover. Other conflicts might arise over the design of a more comprehensive and long term maintenance and operation of the on site stormwater management system. Each of these environmental programs might be managed by two separate county departments. Resolving such inconsistencies takes time and resources to work through the negotiation with county planners and environmental engineers that may eventually require a redesign of a previously approved preliminary or master plan. With numerous and complex plan requirements, reworking one component often means revising other elements of the development plan.

Inconsistent environmental regulations and conflicts over different departmental interpretations can generate significant costs of time and resources when compared to the original project design and engineering plans. In Montgomery County, for example, an area Master Plan was developed to require one form of development, eliciting a certain type of design solution to meet environmental regulations that conflicted with an environmental overlay district.

County executive and city/county managers, working with their planning directors, should devise a process for resolving conflicting policies between different county/city departments. Planning departments should also closely track and monitor the interpretations that arise with complex development proposals to ensure consistency, not only for the project in question but also for future development approvals.

[91] This development/acquisition strategy makes sense for the smaller home builders/developers as they tend to acquire properties with such preliminary approvals; while many larger, regional or national home builders have business models that now focus on the acquisition and development of raw land.

Environmental Engineering Design Complexity Influences Environmental Regulatory Cost

Home builders rely more and more on the abilities of their environmental consulting team to not only identify potential environmental problems on the site but also to design innovative plans that protect the environment. Environmental conditions on the site may demand more complex engineered and constructed solutions, such as underground stormwater retention and treatment facilities or extensive noise attenuation structures. With some projects the developer chooses the comprehensive approach that costs more to design and build, but in others situations, the site necessitates these extraordinary measures. However, as infill projects become more prevalent, these additional measures (e.g., such as tree preservation and outfall mitigation) are becoming the norm in suburban counties such as Fairfax and Montgomery. Given these existing realities home builders and their team of consultants and engineers will need to develop alternative methods for meeting these requirements, modify current construction practices, and improve their use of technologies to manage the costs for installation and compliance.

Fairfax/Montgomery County Tree Preservation Management

An area where environmental regulations may impact the cost of housing is tree preservation. While tree preservation can serve important environmental objectives of reducing urban heat island effects and provide valuable neighborhood amenities, local tree preservation programs could benefit from a long term approach. Unless there is a reforestation component of the preservation plan requiring a monitoring period, tree preservation plans expire at the completion of the project. There are no long-term provisions ensuring the achievements of the tree preservation plan extend beyond the life of the project. This presents an issue when the developer has incurred costs to develop and implement a plan only to have the homeowner adversely impact an area of preserved forest. Better management plans coordinated by the Home Owners Association or municipality would create additional validity for requiring these plans.

Infill Development Creates Additional Environmental Challenges to Mitigate

Increasingly, infill projects are becoming the norm in localities with few sites available for development. In the words of one interviewee – "All of the low-hanging fruit has been picked." Development of infill sites in the Washington, DC region presents additional challenges, such as tree preservation planning and environmental remediation. Montgomery and Fairfax County each have special ordinances, extensive programs and staff devoted to tree preservation. At certain infill sites the policies of housing and tree preservation can conflict. At times, the value of a specimen tree or area of forest canopy takes precedence over the development of additional housing units. In instances where increased density is not allowed on the site, the tradeoff for tree preservation might encourage the development to locate someplace else, potentially fueling growth in other areas with similar issues. This increases costs for the municipality because it has to provide and maintain public infrastructure in newly developing places when it could be maximizing those existing services at infill sites. Long-term, these actions could damage planning efforts seeking to better manage growth.

By limiting density and building more residences at sites under development, added pressure is placed in other locations to meet the rising demand for new homes. The higher costs of infill development affect housing prices because the expense is transferred to the units sold. When fewer units are developed, their prices need to reflect these increased costs, resulting in a higher selling price. This unintended consequence could be mitigated by allowing for increased densities in areas where environmental regulations decrease the amount of developable land.

The potential for environmental remediation presents another infill development challenge. With the high cost of housing, Fairfax and Montgomery counties are exploring the construction of homes on former commercial and industrial lands. Many of these greyfields and brownfields properties have sat idle or partially vacant for years. They often have large tracts of parking lots and storage yards that could easily be converted to residential uses. No doubt some level of environmental contamination exists on most of these sites that will require a Phase I and perhaps a Phase II environmental assessment along with the eventual remediation. If the state approved environmental cleanup allows for some contamination to remain on the site in protective engineering caps, the developer and the local government will need to design a system of institutional controls to monitor the use and activities on the property for decades to come. Environmental covenants and overlay zoning are common approaches. For many home builders the regulatory maze of brownfields redevelopment is breaking new ground.

Within Fairfax County the cumulative impact of stormwater flows presented special challenges for many infill developments. As a result of changes in local ordinances to comply with new Chesapeake Bay standards, Fairfax County was requiring new development projects to have more extensive stormwater infrastructure to handle the cumulative flow from adjacent properties. While these other properties had some level of stormwater controls, they were not as extensive or modern. Thus, the environmental regulatory system placed the onus on the home builder seeking to develop the most recent development project.

11. Predictable vs. Unpredictable delays. Do ministerial decisions cause delays?

When approval timelines are vague, the review process can bog down between, say, an E&SC plan approval and pre-construction meeting.

12. Approvals turn from ministerial to political, creating greater uncertainty and more delays

This is developers' biggest concern. Those we interviewed stated that they would rather have more stringent environmental regulations that they could meet without question than the uncertainty of negotiated rezonings that take on an uncertain political process.

According to developers, this is exacerbated where staffs or elected officials do not have the expertise or time to understand the complexities of new environmental technologies. They are happy to ask for a long list of measures, e.g., LID and Filter systems, without necessarily understanding them. The bar keeps being raised, if not in formal regulations, then in negotiated rezonings. In the political process environmental regulations are not often the driving factor for

opposition and uncertainty, but they are hot button issues that are often used by project opponents.

13. Expediting the approval and negotiation process with good information and environmental expertise:

Good information up front is very critical to get off to a good start. It is important to anticipate environmental concerns and address them first, rather than waiting for an elected official or citizens to raise them.

Retaining a respected **environmental consultant** to perform site studies and present information to staff and public hearings is a critical strategy. Best way to comply with regulations and appease local staff, elected officials, and the public who may object on environmental grounds is to get out in front of them and provide good environmental information and incorporate good environmental design. Don't follow but lead.

Builders Can Employ Accounting Practices and Environmental Consultants to Reduce the Costs of Environmental Compliance and Delay

Developers may employ different methods to help reduce costs associated with environmental compliance. One method used is subcontracting work to environmental consultants familiar with the review process. These consultants have an established and respected reputation with state and local regulators. A consultant group familiar with a wide range of environmental regulations can point out inconsistencies in the process and help to navigate the requirements and reduce costs. These firms have cornered a niche market by knowing the system and being familiar with the requirements and programs necessary to avoid delays, meeting the needs of developers concerned with timely project completions.

Developers could do a much better job tracking environmental costs. If the builders had more concrete data on environmental costs it would greatly assist the home building industry in understanding where improvements in the process are needed to help reduce expenditures. While the pilot study projects provided a wealth of information regarding many of the development costs related to environmental regulatory compliance, this was due to the diligence of the developer and its environmental consultant. An industry standard may help to track costs and allow developers to better understand their influence on projects. This information could be useful for working with local and state regulators in creating more efficient and effective environmental regulatory review processes.

The use of permit expeditors may also aid in reducing the costs associated with the time it takes to acquire approval, thus reducing land holding costs. While the developer would have to pay for the services of the expeditor, these costs would likely be significantly less than the costs of paying additional taxes on land awaiting development. In addition, developers could take advantage of local incentives allowing for expatiated approval times such as the ESI program in Fairfax County.

Another method developers use to reduce environmental compliance and delay costs is to purchase a property that already has completed a portion of the development review process. This may mean the preliminary plan or rezoning approval has already been completed, a step that requires a majority of the environmental background data compilation and analysis to be completed. While the developer may pay a premium for the project, the costs associated with completing the background work and early approvals may be reduced in the long-term. Overall, the reduction of environmental compliance and delay costs are still subject to the complexity of the site, a characteristic on the rise in the study region, and the efficiency and effectiveness of the development team and its consultants.

14. How do the cost of environmental compliance compare to the benefits of environmental protection?

Gathering More Complete Environmental Data Earlier in the Development Review Process

Municipal reviewing agencies in Fairfax and Montgomery County now require greater detail in the early planning phases of the development, including rezoning and preliminary plan submissions. Having more complete environmental information earlier in the process minimizes the potential for later surprises and extensive delays. Plans submitted for review and approval during these stages provide the home builder and the local government with a solid baseline of critical environmental data, such as the inventory of wetlands, threatened and endangered species, floodplains, forest stands and specimen trees, and quality of soils and water resources.

These natural resource inventories can identify potential environmentally regulated elements of the site.[92] Wetland delineation guides the project layout and becomes essentially in acquiring the necessary federal and state permits. The identification of threatened and endangered species and their habitat ensures that certain designated areas may be off limits for development or may require special mitigation measures. Local ordinances in Montgomery and Fairfax require a close look at forest stands and specimen trees that might eventually be protected through a tree preservation plan or a forest canopy cover requirement. Floodplains, stream corridors and associated riparian buffers may become part of an environmentally regulated area, such as an Environmental Quality Corridor or Resource Protection Area in Fairfax County or a Special Protection Area in Montgomery County.

Early gathering of environmental baseline data can also positively affect the design and layout of the project, thus potentially saving the home builder time and resources. Once the environmental features of the site are accurately identified, the developer's team can prepare a conceptual layout and identify potential strategies for mitigating or perhaps even avoiding any development impact on these resources.

As a project develops, the level of detail required early in the planning process facilitates a clearer vision of how the project will be completed. Wetland and other natural resource inventories combined with preliminary grading studies indicate the development potential for the

[92] In addition to natural features, archeological and cultural resources are frequently required for inventory during the early planning approval phases of the project.

site. Armed with the most accurate and current environmental data, the local planners and environmental engineers gain a greater level of trust in opening the negotiations with home builder and the respected environmental consultant. All parties are now in a much better position to identify potential environmental "hot spots" on the site and tailor potential mitigation measures or best management practices to mitigate any adverse development impacts. Moreover, during the early approvals, the local governments may impose additional environmental measures, such as Phase II or III site inventories, through rezoning conditions or proffering in Fairfax or SPA amendments in Montgomery County.

In many respects the regional home building and environmental consultant communities seem to focus their energies more on gathering in-depth environmental data than opposing new or expansive environmental regulations. Such a preventative approach might be an out growth of a maturing of the regional home building industry and their increasing level of comfort with the overall objectives of the underlying environmental regulations.

Elusive Monetary Benefits Contrasted to Captured Costs

Often, the environmental benefits associated with the costs highlighted in this report are elusive because they are difficult to associate with a monetary value. However, this does not preclude the benefits of environmental regulations from being considered when weighing their average $8,500 cost per unit. The value of clean air, water, and a higher quality of life derived from environmental regulations, which developers often find a higher return on their investment, are difficult to quantify.[93] These economic benefits include higher property values and lower long term maintenance and remediation costs. More research must be done to quantify the environmental benefits from environmental regulations, such as stormwater management practices and wetlands mitigation.

Compliance with environmental regulations is less costly than non-compliance. In Fairfax County, the expense of mitigating breaches of environmental regulatory compliance amounted to an average of 5 percent additional costs to the projects. In all projects where mitigation measures were required, either from violating a permit or failure to acquire the necessary documents, the mitigation costs increased the project costs significantly above those where permits were acquired and followed. In other cases, the county may be left footing the bill as developers default on their obligations to comply with agreements and regulations.[94]

[93] According to year long study by University of Pennsylvania researches Susan Wachter and Kevin Gillen, investment in "green infrastructure" (natural open space) strategies not only enhanced the overall vitality of Philadelphia neighborhoods but increased the values to adjacent and nearby properties (based on 2004 median home price of $82,700):

- Adjacent to stabilized and greened lot: 17% increase in value or $14,059
- Near a new tree planting: 9% increase in value or $7,443
- Near a excellent commercial corridor 23% increase in value or $19,021
- Near streetscape improvements 28% increase in value or $23,156
- Located with in BID 30% increase in value or $24,397

Public Investment Strategies: How They Matter for Neighborhoods in Philadelphia, October 2006).

[94] "Developers' Neglect Is Costly to Fairfax" available at www.washingtonpost.com/wp-dyn/content/article/2006/06/24/AR2006062400780.html (June 2005)

Chapter 5

FOCUS GROUPS

Introduction

To obtain input from various regions of the country, a series of interviews or focus group meetings were held with large volume developer/builders in selected high-growth areas. The meetings provided an opportunity to compare the Maryland-Virginia (MD-VA) study results to other regions by identifying participant perceptions on the extent of environmental regulations, their costs, the approval process, and schedules.
This chapter covers the input provided by developers in the markets in and surrounding Denver, Colorado, Pima County (Tucson), Arizona, and Dallas-Ft. Worth. It is divided into four parts. Parts 1, 2, and 3 address each location including background information on the local area and an overview of the development process. Results of the developer input are described including specific regulations and how they impact the construction of housing.

Part 4 is a discussion of the overall findings from all three locations relative each other and to the MD-VA market.

Denver, Colorado

The city and county of Denver are one of the few combined city-county governments in the United States. They are part of the Denver-Aurora Metropolitan Statistical Area (MSA) along with the counties of Adams, Arapahoe, Broomfield, Clear Creek, Douglas, Elbert, Gilpin, Jefferson, and Park. Both Douglas and Adams County were listed in the top 100 Fastest Growing U.S. Counties between 2000 and 2004, according to the U.S. Census Bureau.

The Denver-Aurora MSA had a population of 2,262,650 in 2005 (U.S. Census). By comparison, Denver County's 2005 population was 557,917. Although rapid growth of over 18 percent (U.S. Census QuickFacts) occurred in Denver County from 1900 to 2000, a much slower growth rate of less than 1 percent occurred in the five years after 2000. Most other counties in the MSA also experienced rapid growth in the 1990s.

Population growth in most counties, as in Denver, has fallen off since 2000. However, some counties like Adams (14.8 percent between 2000 and 2005) and Douglas (41.9 percent in same period) continue to grow faster than the state-wide rate of 8.4 percent over the first five years of the 21st century.

Metro Denver Economic Development Corporation's (EDC) Monthly Economic Summary for July 2006 reveals a mixed view on the local economy. Job growth is stable at about 2.1 percent and the May 2006 unemployment rate at 4.3 percent was the lowest since 2001.

On the other hand, EDC reports record inventories of existing homes, although home sales are also up over the same period from 2005. Likewise foreclosures are running high and only half of their 18 economic indicators are positive.

The housing market included 20,751 permits in 2005, including 17,586 for single family homes (U.S. Census). The 2005 median price for single family homes in the MSA was $246,350 compared to $217,492 nationwide (U.S. Census).

For new homes, the market has followed a pattern of strong escalation. Single family detached homes in the Denver Metropolitan Area in 2005 sold for an average of $329,967, an increase of about $80,000 from 2000 (Source: The Genesis Group, Denver). Attached home prices rose by about $40,000 in the same period to $240, 814 (The Genesis Group).

Development in the region spreads far beyond Denver into the surrounding counties. Development is limited to the west by the Rocky Mountains. The big growth areas are north from Denver along I-25 and along the "ring" (Rt. 470) that forms a loop around the east side of the city. To the south, there is a gap in activity below about Castle Rock until it picks up again near Colorado Springs.

Several of the Denver developers indicated that they will soon be active in Colorado Springs. They also indicated that growth to the east will pick up, but is not as fast as the other areas around Denver.

The Development Process

The process for approval of a development varies according to the jurisdiction. The counties are generally the authority that governs development. We selected Denver County to describe the typical process. Keep in mind that the details of the approval process may be slightly different in other surrounding counties.

Local approval

Information on the development approval process in Denver (city and county) is available at www.denvergov.org. For by-right development, the process begins with preliminary work by the applicant to determine if the property falls in a special district (Historic, Urban Design, View Preservation Area, Commercial corridor, or Parkway/Boulevard). Where a rezoning is required, the project is subjected to the rezoning process as discussed later in this report.

Development review includes three phases. During a concept phase, a case manager is assigned. This is followed by a Formal Phase and the Final Recordation Phase. Each phase is described below from language on the www.denvergov.org website:

1. *The Concept Phase of the site plan review process is designed to provide the applicant and the City with the opportunity to identify all significant and major issues (building location and footprint, orientation, site layout, access issues, required studies, etc.) that will affect the basic design and feasibility of the project.*

The City will also identify all public health and safety issues. Additional information or required studies necessary for the Formal Phase will also be identified at this phase. All Concept Phase conflict must be resolved at this stage. At the conclusion of the Concept Phase, the applicant and owner will receive a written summary of all comments and expectations, along with an "Authorization to Proceed to Formal Submittal". Both the City and the applicant may rely upon the work done and agreements entered into at this stage for all subsequent aspects of the process. However, if the applicant makes significant changes to their submittal in subsequent phases, the Concept Phase must be repeated.

2. *The Formal Phase begins with a detailed schematic site plan and proceeds through to the final refinement and approval. This phase provides the City with the information, redesign and actions required for final approval, (i.e. technical data, drainage studies, transportation studies, design review compliance issues, and other requirements) which will enable the City to properly review and approve the project. The majority of engineering plans and studies are completed during the Formal Phase.*
3. *The Final Recordation Phase concludes with the signing and recordation of the mylar's.*

Each phase is a distinct procedural phase involving the submittal of development plans and supporting technical documents, review team meetings, inter-agency review of the submittal, a determination that the submittal is complete, including comments reflecting requirements and expectations for the next phase of the process. Timing for each phase is outlined below and does not include the amount of time required by the applicant to respond to the City's comments and requirements.

The process starts upon acceptance of the concept plan by the case manager. At that point, the case manager must schedule a review team meeting between 10 and 15 working days out. This is a concurrent review by all of the responsible local government (Denver) agencies. If there are disputes during the review team meeting, the case manager is charged with resolving these between the participants within three working days. Should disputes still exist, there is a two-stage appeals process that must be conducted within 20 working days. Despite the presence of a process and timelines for the concept phase, the results of the concept approval are not binding on either the county or the developer.

Upon approval at the concept phase, a formal submittal is permitted. The formal submittal must satisfy the case manager or risk being rejected. Technical data, drainage studies, transportation studies, engineering plans, and similar information are part of the formal process. There is also a concurrent review by the responsible government agencies. Fees based on the number of acres of the site are due with the formal submission. For example, a ten acre site for a PUD has a fee of $7,000.

A less stringent process is available for minor subdivisions, generally one acre or less in size. Fees for the minor subdivision review are $1,000.

During the review process, Denver staff also addresses requirements for stormwater quality and management. They enforce local standards and Federal standards for site less than 5 acres of land disturbance. For sites larger than 5 acres, a State Stormwater permit is required.

By-right development is limited to county staff reviews for compliance with applicable codes and ordinances. The review team consists of representatives of the Public Works, Parks, and Planning Departments.

Similar to the concept phase, the formal review phase has some timelines built into the schedule. However, in both the concept and formal phases, the timelines are more goals than requirements.

Rezoning process

According to the developers in this study, there is very little land that does not require a rezoning. Most land outside of the city is zoned for agricultural use. If a developer is requesting a change in zoning, a PUD, or a variance, then a separate application to the planning board is required. Information from the county indicates that the zoning process must be complete prior to initiating development review. However, the developers we interviewed indicated rezoning can occur concurrently with the development approval process and does not always result in delays.

Zoning applications are submitted first to the Planning Department. After staff comments are addressed, the Planning Board reviews the plan. Finally, the County Council must approve all zoning or re-zoning applications. Since, as the developers indicated, there are few sites that are by-right development for residential, the council basically has the final say on all land use decisions affecting housing.

State approval

The primary role of the state regarding development is to issue permits for stormwater management under the NPDES process enforced by the U.S. Environmental Protection Agency (EPA). The Colorado Department of Public Health and Environment issues a permit upon submittal of an erosion and sedimentation (E&S) plan by the developer.

Federal approval

As stated above, the Colorado Department of Public Health and Environment, Water Quality Division-Stormwater Program is responsible for enforcing Federal (EPA) stormwater permits under the NPDES. For sites less than 5 acres, the local government in Denver is approved to administer the permit. For small sites (again less than 5 acres) that can be shown to have minimal impact based on a rating system employed by the state, there is also the opportunity to receive a waiver on the State stormwater permit. However, the developers we interviewed believe that a state permit is always required.

Flood plain regulations are also under the Federal government's domain and require FEMA approval for development in the flood plain. However, Denver County typically enforces the

flood plain regulations at the local level and handles the FEMA submission based on the developer's plans.

Developer Participants

Five large volume developers/builders participated in the study during August 2006. The developers produce anywhere from 150 to over 1200 building lots per year. They primarily develop single family housing lots.

Participants included one local volume developer who builds in all the local markets but is now primarily in Aurora and Castle Rock; a national builder/developer active in all the surrounding areas including Lowery, Ft. Collins, Aurora, and Castle Rock; two regional developer/builders active throughout Denver and surrounding counties; and a local development/building/ management company involved in infill and new urbanist projects in the Denver area.

Summary of Developer Input

This section is based on the comments of the developer participants. Thus, there may be differences in their interpretations of the regulatory requirements compared to the actual county requirements. Where this is the case, we attempt to present the views obtained from separate interviews with members of the Denver County staff. The developers also attempted to discuss the approval process and regulations in a general sense and noted that there are differences in some jurisdictions. Where these differences are important to our objectives related to environmental regulations, they are addressed in this section.

Major environmental regulations

The developers quickly identified three issues as the most significant environmental regulations in the Denver area – stormwater management, endangered species, and wetlands. Each is discussed below:

Stormwater management – This issue typically involves the county development department enforcing local stormwater and E&S regulations as well as the state health department enforcing the Federal NPDES permit requirements. A permit is required from the county as part of the local land development application process. A second permit is required from the state. The developers indicated that the county will often ask if the state permit is in hand before granting final local approval. On the other hand, the permit requirements from the state were not viewed as difficult since they basically consist of the E&S plan that is typically required as part of the county application process.

Endangered Species Act (ESA) – Formal responsibility for enforcement of the ESA falls on the Federal U.S Fish and Wildlife Service (FWS), although the developers stated that the local jurisdictions require the Federal approval to be obtained as part of their review process. The county staff we interviewed indicated that they recommend having the Federal approval but it is not a requirement.

Typically a letter of certification is requested from FWS and if the site is not impacted by the ESA, the certification is granted with an expiration date. The developer must reapply from time to time to continue working at a site. The developers noted that their certification letters were as short as 1 to 3 years.

Typical restrictions surrounding the ESA include preservation of habitat and a surrounding buffer. In the Denver region, the Preble Jumping mouse is the most often encountered endangered species. Other endangered species in the region include rare rats, orchids. toads and migratory birds.

The developers uneasiness over this issue is primarily due to its ever changing nature and the unknowns in the process. They will typically avoid land that their due diligence shows is impacted by the ESA. However, even if they believe they are free of endangered species, the process allows later surprises that can stop or severely limit development after substantial resources have been invested in the property. The developers believe there should be more certainty at the beginning of the process to reduce their risk.

The changing nature of the ESA regulatory process also is a large barrier to development. For example, if reapplying for a certification letter, a different opinion can be issued by the FWS resulting in mitigation costs and lost lots.

Another murky issue is the inclusion of threatened species by the FWS. The developers claim there are no clear rules for threatened species and decisions from FWS appear arbitrary.

Wetlands – The wetlands regulations are enforced by the Denver region of the U.S Army Corp of Engineers. The largest issues for the developers with wetlands are that the process is somewhat subjective. They do not believe upland or isolated wetlands are covered under the Federal statutes. The Corps of Engineers often identifies dry streams as waters of United States because they periodically have some flow.

Often the easiest way to secure approval from the Corp is to hire a consultant who is well known by the Corp reviewers. Decisions often vary depending on the reviewer. When a ruling is made, a developer is typically given five years before a new certification letter is required.

Although technically not required, developers we interviewed submit every site to the Corp for a determination, even if they and their consultants believe the site has no wetlands. Otherwise they risk an adverse ruling later due to the subjective nature of the process.

The counties do not usually get involved in wetlands permit issues. However, the developers stated that the local jurisdictions typically will require the Federal certification letter to be in hand during the review process. Like the ESA issues, the Denver County staff we talked to indicated that they do not require the Corp approval but recommend it.

Other less significant environmental regulations – A few of the local counties have their own environmental regulations. These include view preservation, tree planning ordinances, noise

reduction, and light pollution. For the most part, the developers did not see these as difficult to comply with because they happen rarely or complying with them is not particularly costly.

Noise abatement is required only near certain districts affected by air traffic. Very rarely is noise abatement for traffic or other sources required. Some jurisdictions are pushing methods to reduce light pollution, but like noise, this is not a big issue yet but more of an evolving issue.

Denver has a ridgeline or view preservation ordinance that limits building heights, but this rarely impacts single family housing. Aurora County is one of the few areas with a tree planting ordinance. The developers did not believe it was much of a burden and several said they do more than it requires anyway so their homes are appealing to buyers. The one exception where the tree planting issues get expensive is when a county planner pushes for street trees.

Mineral exploration cleanup – This is not typically a regulatory issue for the developer, but more of a potential liability due to previous use of the land. All of the developers in the study had faced this issue before since much of the land near the metro Denver area has previously been explored for oil, gas, or minerals. Previous exploration on the land is regulated by the Colorado Oil and Gas Conservation Commission (COGCC). The developers claim that the COGCC sets bonds on the exploration or mining operations that are so low that the companies often just forfeit the bond and walk away from the site. Thus, if a problem is discovered later, the builder or developer is stuck with the clean up.

Due diligence on the part of the developer is the best protection against unknown mitigation costs. However, this is not a guarantee that future problems will not arise. Typically this would include relocation of gas lines or removal of asbestos pipes. If an extensive clean up is necessary, then it is possible that the Colorado Health Department or U.S. EPA may become involved. This latter scenario is rare.

Flood plain regulations - None of the participants identified flood plain regulations during the initial meeting. One of the regional builder/developers later indicated that they have faced some flood plain issues but considered them to be minor.

Perceptions on costs of regulations

The developers identified stormwater management, endangered species and wetlands as the regulations with the greatest potential cost impact. They have the best understanding of the costs associated with stormwater management (including E&S control), which they estimate is around 4-5 percent of the total development cost (the cost to get from purchase through finished lot, not including house construction costs). This was independent of the type of development (greenfield, redevelopment or infill). On a per lot basis, the costs are in the range of $300-1000 per lot.

The developers generally believe that wetlands and ESA compliance costs are too site dependent to provide a general range of costs. Much of the land in the region has no wetlands so the costs are mostly related to obtaining a certification letter from the federal government. One developer did estimate that his costs are typically about 2.5 percent each for wetlands and ESA issues.

Another indicated that wetlands costs can be as high as 50 percent of development costs if mitigation is required.

For tree planting, they believe costs related to the regulations are less than 1 percent or otherwise negligible.

Another way to assess costs is to compare local costs to the MD-VA case studies.

The developers believe the MD-VA costs are similar to Denver for wetlands delineation and permitting (about 0.15 percent or less for each), but that the wetlands mitigation costs are too variable to compare to MD-VA.

Likewise, the VA-MD experience with stormwater management and E&S costs are similar in Denver. They typically run about 5 percent of development costs for these items.

The costs of tree preservation in Denver are also comparable to the MD-VA costs. They are less than 1 percent. Most developers do more than the local counties require because the market expects it.

Other MD-VA costs for archeological investigations, noise attenuation, and resource protection area delineation were not discussed since they are not typically applicable in the Denver area.

Schedule implications of regulations

The development process for by-right development generally takes nine to 18 months depending on the jurisdiction. However, by right development is rare in the Denver area, since most land outside the city is zoned agricultural. Rezoning or some variance is almost always required and can generally add three to 18 more months to the approval process depending on the local jurisdiction and the complexity of the development. Some extreme cases have taken up to five years.

Stormwater management usually is part of the general application process so it does not add to the 9 to 18 month time frame for a typical by-right development. If present, wetlands issues can add 9 to 12 months and ESA issues up to 24 months for approval, but in each case it is highly variable.

Developers try to get these processes moving concurrently to minimize delays. They could not give specific cost for delays, but indicated it is a simple calculation based on their loan amounts and the cost of money.

The county staff we talked to indicated that the time frames cited by the developers were probably accurate. One noted that the Denver mayor is aware of the long time frames and had proposed changes to speed up the process.

Other developing issues

Although not an environmental regulation, the developers cited a developing threat to the affordability of housing in the form of voter initiatives. Citizens have a right to collect enough support to put the approval of zoning decisions on the election ballot. Opponents of some development have begun to effectively use this as a tool to limit development.

Discussion on the Denver process and regulations

Developers in the Denver area do not appear to face as many restrictions on development related to environmental regulations as developers in the MD-VA market. However, they believe that many environmental regulations are on the way and are being discussed in the local regulatory environment.

Costs for compliance are similar to MD-VA for major items that are faced in Denver. In the case of tree preservation, the developers often voluntarily spend more than in MD-VA.

The participants indicated that compliance with most environmental regulations is not really a significant barrier. From a regulatory perspective, the unknowns and inconsistencies in Federal regulations and decisions are the most worrisome environmental issues. The regulations can be an avenue for opposition to slow down development. A larger factor is whether a zoning change is necessary. This was evident in their claims that a development application can take up to three years for approval of a project that requires rezoning.

Dallas-Ft. Worth Market

The area of study for this location is defined as the Dallas-Fort Worth-Arlington, TX Metropolitan Statistical Area (MSA). The primary growth areas identified by the participants generally falls within a triangle formed by the city of Dallas on the south and Plano and McKinney on the northern end. Growth is also healthy in the areas surrounding Ft. Worth, although it is confined to a more compact area than in the Dallas side of the MSA.

Brief descriptions of some selected jurisdictions in the MSA are as follows:

Dallas - In the year 2000, the city of Dallas had a population of 1,188,580 (U.S. Census), making it the eight largest city in the nation. Although rapid growth of 18.1 percent (U.S. Census QuickFacts) occurred in Dallas from 1990 to 2000, a much slower growth rate of less than 2 percent occurred in the three years after 2000. Most other cities in Texas also experienced rapid growth in the 1990s.

The city of Dallas had 2.6 percent employment growth in June of 2006. The professional and business services sectors are responsible for most of the job growth taking place in Dallas. Meanwhile, the unemployment rate in June 2006 was 4.9 percent, just above the national average

The housing market included 3,497 building permits (5,789 units) in 2005, of which 3,353 were for single family homes (U.S. Census). The 2005 median single family home price in the city of Dallas was $165,000 compared to $189,500 in Dallas County, and $217,492 nationwide (U.S. Census).

Dallas County - In the year 2000, the county of Dallas had a population of 2,218,899 (U.S. Census), tenth largest in the nation.

The FDIC reported that the County of Dallas had a healthy 3.7 percent growth in employment for the first quarter of 2006. Meanwhile, the unemployment rate remained stable at 5.5 percent in the first quarter of 2006.

The housing market included 10,749 building permits (14,404 units) in 2005, including 10,520 for single family homes (U.S. Census). The 2005 median single family home price for Dallas County was $189,500 (U.S. Census).

Plano - In the year 2000, the city of Plano had a population of 222,030 (U.S. Census). Although growth of 72.8 percent (U.S. Census QuickFacts) occurred in Plano from 1990 to 2000, the growth rate slowed to 9.0 percent in the three years after 2000.

The city of Plano had just under 3 percent employment growth in May of 2006. Meanwhile, the unemployment rate in May 2006 remained steady at 4.9 percent, just above the national average.

The housing market included 1,409 building permits in 2005, of which 803 were for single family homes (U.S. Census). The 2005 median single family home price in the city of Plano was $162,300 (U.S. Census).

Ft. Worth - In the year 2000, the city of Fort Worth had a population of 534,694 (U.S. Census). Although rapid growth of 19.3 percent (U.S. Census QuickFacts) occurred in Fort Worth from 1990 to 2000, the growth rate slowed to 8.1 percent in the three years after 2000.

The city of Fort Worth had less than 1 percent employment growth in May of 2006. Meanwhile, the unemployment rate in May 2006 remained steady at 4.8 percent, just above the national average.

The housing market included 10,267 building permits (12,457 units) in 2005, of which 10,046 were for single family homes (U.S. Census). The 2005 median single family home price in the city of Fort Worth was $147,200 (U.S. Census).

Overall population growth in most Texas cities has slowed since 2000. However, some cities like Plano (9.0 percent between 2000 and 2003) and Fort Worth (8.1 percent in the same period) continued to grow faster than the state-wide rate of 6.1 percent over the first three years of the 21st century.

The Dallas-Ft. Worth new home construction market has remained strong through mid-2006 despite the national downturn. According to the Dallas Morning News (*New homes extend*

surge, August 24, 2006), the median new home price was $179,000 as of the second quarter of 2006.

The Development Process

Local approval

Development in the area is almost all greenfield development, although infill plots are becoming more common in cities like Plano. There is little redevelopment. This is mostly due to the large supply of land and the resulting choice that developers have in selecting a parcel of land to purchase.

Although there are variations between different jurisdictions, there is also much in common between the approval processes for residential development. According to the developer/builder participants in the study, all platting, zoning, and similar development issues are regulated by the city or other incorporated jurisdiction. In unincorporated areas, the county is the land use authority. Exceptions to local control are discussed below for State and Federal approvals.

For by-right development, the local city staff reviews the plan for conformance with local requirements and subdivision ordinances. The developers estimate this process takes about 12 months until approval is granted.

If a rezoning or variance is involved, then the process typically involves a planning staff review, a zoning commission approval, and city council approval. This stretches out the process for approval to about 18 to 24 months.

There is no time limit on zoning decisions. However, Texas has a 30 day statutory time limit for platting of subdivisions. The developers stated that they often face multiple delays beyond this time limit. They risk disapproval if they do not agree to a request for an extension.

Responsibilities at the local level focus on conformance with zoning and subdivision ordinances. This includes the typical plat, streets, lot size, setbacks, landscaping, engineering and similar requirements. A specific example of the process using Plano as an example is discussed below. This information was provided during an interview with representatives from the city planning department and from information on the city's website.

Plano approval process

An application for a single family detached residential development in Plano must first be submitted to the planning department. The process includes two steps that require a pre-application conference and a third final plat approval step.

> *Step 1* requires submission of a land study, general tree survey, conveyance plat and stormwater management plan.
>
> *Step 2* adds a landscape plan and preliminary plat, as well as a specific tree survey.

Step 3 can only be initiated after public improvements are completed. This results in the final plat approval.

By state law, the plat approval must be granted or disapproved within 30 days. Plano (and most other jurisdictions) meets this requirement by granting a preliminary approval in the first stage of the process, but it is approved pending engineering approval and completion of public improvements. This at least partially explains why the developers in this study estimated approval time at 12 months. The developers tend to look at the final plat approval as the completion of the process, whereas the local government planners look at the preliminary plat approval.

The primary objectives of the Plano review are to insure compliance with the zoning and subdivision ordinances. This includes a SWPPP (stormwater pollution prevention plan) and a flood plain review. Plano officials enforce their own flood plain requirements but also submit the plan to FEMA for Federal approval.

The Plano staff makes a recommendation for approval or disapproval to the City Planning and Zoning Commission, which meets twice a month to consider plat and zoning issues. Typically within this time frame, there is a mark up and resubmission period before it goes to the Commission for a decision.

Although there is no State requirement for a time limit on zoning applications, zoning applications in Plano follow a similar process as for plats. First the application must be submitted to the planning department. The staff provides a mark-up and the developer submits a corrected plan. Within about five weeks from a twice monthly submittal deadline, the plan with staff recommendations is heard by the Planning and Zoning Commission. Unlike the platting process, the City Council also must approve zoning applications.

The City of Plano has a schedule that shows about a two month time frame from submittal to a City Council decision. Developers insisted that it takes much longer (as much as 18 to 24 months) because they are often forced to withdraw applications at several points along the way and start over. However, none of the developers in this study spoke specifically about Plano and its processes.

State approval

The state of Texas has limited involvement in land use issues. The state's primary responsibility is to issue permits under the Federal NPDES regulations for stormwater management and water quality. Although the state issues the permit for stormwater management, in many cases, the local inspector enforces the regulations.

The state SWM process consists of submission of an application which is used by the state to issue a permit. There are no plan reviews involved. The developer participants described this as more of a data base than as a permit process.

Federal approval

Technically, the Federal government regulates stormwater management under the EPA's NPDES program, the endangered Species Act (ESA) through the U.S. Fish and Wildlife Service, wetlands through the Army Corp of Engineers, and flood plains through FEMA. However, from the perspective of what has a large impact on a typical development, stormwater management is the primary issue that comes into significant play in the Dallas areas.

There are few endangered species. Given the abundant supply of land, developers typically avoid land with these issues and thus avoid interaction with the Fish and Wildlife Service on almost all projects.

Similar to the ESA issues, wetlands are not typically encountered in the area. One developer estimates less than 10 percent of sites are impacted in any way by wetlands.

FEMA involvement is limited to sites in the flood plain. Complying with the regulations is not difficult. However, FEMA approval can hold up a site because the process is typically very slow.

Additional information on the local, state and federal regulations and processes is provided in the following sections that cover input from the developers and local planning officials.

Developer Participants

Four participants were interviewed as part of the study during August 2006.

Two of the participants are from the top ten largest builders in the United States and build several thousand homes in the Dallas market each year. Two others are from civil engineering/planning firms who support several of the other largest builder/developers in the area. One firm develops plans for about 1200 lots annually and the other around 4000 lots. All of the participants deal primarily with single family housing.

The participant activity is spread out in almost all of the incorporated areas in and surrounding Ft. Worth and the Dallas-Plano-McKinney region.

Summary of Developer Issues on Environmental Regulations

This section is based primarily on the comments of the developer participants. Where there are differences in the developer interpretations of the regulatory requirements than as described by the county requirements or planners, additional information from the government sources is provided.

The developers attempted to discuss the approval process and regulations in a general sense and noted that there are differences in some jurisdictions. For example, tree preservations regulations run from none to very restrictive and costly. Where these differences are important to our objectives related to environmental regulations, they are addressed in this section.

Major environmental regulations that impact housing development

The developers quickly identified two issues as the most significant environmental regulations in the Dallas-Ft. worth area – stormwater management and tree preservation. Other issues such as wetlands, floodplains, and endangered species were also raised but were viewed as much less significant than trees preservation and stormwater management (SWM) regulations. Each is discussed below:

Stormwater management – This issue typically involves the local planning department or development department's enforcing local stormwater and E&S regulations as well as the Texas Commission of Environmental Quality's (TCEQ) enforcing the Federal NPDES permit requirements. A separate permit is required from the state. On the other hand, the permit requirements from the state were not viewed as difficult since they basically consist of an application only and a $100 cost to enter the development into a database.

The developer's design team will typically produce a SWPPP (stormwater pollution prevention plan) for the local jurisdiction, but it is not required to be submitted to the TCEQ.

Local inspections are performed in Dallas and Ft. Worth by city staff. Plano is instituting a plan to administer the SWM permits on behalf of the State. Currently, Plano and most other local jurisdictions have inspectors who will look over the site for general plan conformance and may ask to see that the state permit has been secured but often the State or EPA inspectors are left to oversee field compliance. Because they have few inspectors, the end result is the developer must voluntarily comply with their SWPPP.

Without strict enforcement, developers generally do SWPPPs to create a paper trail to reduce the potential for liability. Most cities also have a "mud in the street" ordinance that requires builders to keep the streets clean.

The cost to the developer for a typical SWPPP is about $300-$400/lot in erosion control, planning, and maintenance. The same amount can be expected to be incurred by the builder once home construction commences.

Tree removal and preservation - Trees are rare on the plains, so all cities in the area (with few exceptions) have ordinances requiring tree preservation and replanting. Some cities require an inch for inch replacement for all trees removed. Others limit protection to certain species and caliper of tree.

The most significant cost to the developer is in surveying trees. This is typically about $20 per tree. A recent project cited as an example required a $100,000 survey on a 400 acre site.

Tree surveying often needs to be done before the approval is considered to develop on the land. The process can take from one to three months prior to submission of a plan for approval.

If a developer can't plant all the trees on the site, they can give to a tree fund or plant elsewhere (medians, etc.). However, Dallas is no longer accepting alternatives to site planting because they are unable to meet water needs of street trees.

Other less significant environmental regulations

Wetlands "404" regulations – The participants agreed that wetlands are not much of a problem since the area's concerns relate more to headwaters then waters of the United States. Most developers do not apply for a determination from the army Corp of Engineers (CoE). They claim this would shut down development because of the excessive time it takes for an answer. The typical approach is to simply avoid any areas their consultant believes may be wetlands. Developers who don't go through the Corps run the risk of repercussions but they do not believe there are enough wetlands for this to be much of a risk. Local jurisdictions may include wetlands on their checklist, but they generally accept the developer's civil engineer's or consultant's report on wetlands.

At least one of the largest developers in the market takes a different route and submits every project to the CoE. However, even in this case, very few sites end up having applicable wetlands or requiring mitigation or other action.

Endangered Species Act (ESA) - The TCEQ application for SWM requires a sign off that the developer is compliant with the ESA. This is a self-certification process. The developers claim that endangered species are rare in this area and they just don't incur cost or delays related to the ESA.

Flood plains – Although flood plain management may not technically have environmental protections as its main objective, this issue was raised by the participants as one that does not necessarily raise construction costs for the developer directly but can delay the ability to start home construction for 12 months or longer once the lots are finished. This is not an issue for all development but only those where the flood plain has been delineated and a plan needs to be submitted to FEMA.

A "letter of map revision" generally must be secured to begin home construction. The path of the permit application to FEMA flows first to the local jurisdiction, which submits it to the FEMA regional office in Denton, which submits it to FEMA's DC office. A contractor (Michael Baker Engineers at the present time) then makes a determination on the application. The time required can be nine months to one year, although several examples of up to two or three years were cited.

Cities often let developers move forward at their own risk in anticipation of FEMA's report. Flood plain rules are much more objective than they are for wetlands. Thus, the issue isn't compliance (which is easy enough to do), but the time required to make this happen.

Septic systems - Very few of these are used. They typically require a 1 acre minimum lot. State (TCEQ) and local jurisdictions regulate septic systems. However, most developers figure out how to get sewer to a site so they can build a denser development.

Natural Gas Drilling Regulations – Although not technically an environmental regulation in terms of its objectives, gas drilling regulations were identified as a smaller concern by developers. Gas pad sites are popping up everywhere. For example, a developer typically can't buy a parcel of land in Ft. Worth without a natural gas site. The State requires that development must stay 200 feet away from the well head. Cities can require much more – up to 600 feet. Typically the State determines where drilling can occur, the rail road commission authorizes a permit, but the county or city enforces development restrictions. Gas wells can be developed after building starts (called a high-impact zone), but then it's the gas companies' responsibility to ensure that the setback requirements are met.

Developers may lose some lots because of gas drilling or they may have to discount others. However, generally, they know what they are getting before the land purchase and do often have the choice to buy elsewhere.

Perceptions on costs of regulations

The participants believe that most environmental regulations can be avoided by selective purchase of land. There is enough land that problems sites can be avoided.

All sites are impacted by SWM regulations. SWM costs were thought to be much lower than the 5 percent in the MD-VA area used as a benchmark for comparison. The participants estimated $300 to $400 per lot or less than 1 percent of total development costs (including land purchase price) were required for SWM compliance. This is also less than the estimates provided in a separate study involving Denver developers.

About 75 to 80 percent of local jurisdictions have tree preservations ordinances. The participants estimated that a heavily treed area could cost 3 percent to 5 percent of development costs which is much greater than the MD-VA and Denver areas. Much of the cost is in the upfront survey.

When wetlands are applicable, the developers agreed that the MD-VA costs of less than 1 percent were consistent with cost in the Dallas region, but again stressed that wetlands regulations are rarely applicable. One large developer stressed that although wetlands do not affect many sites, there is typically a minimum $20,000 cost to conduct the upfront study to make this determination.

Other regulations were so rarely applicable that estimates were not provided. Flood plain issues may cause costs for delays if FEMA does not turn the plan around quickly. No estimates were provided on these costs but they are basically the carrying cost of the development and land purchase costs.

Schedule implications of regulations

The development process for by-right development generally takes about 12 months and 18 to 24 months when a rezoning is required.

The planners from Plano and Ft. Worth we interviewed both disagreed with the time frames identified by the developer participants. They insisted that approval for a by-right development is 30 days as mandated by Texas law.

A likely explanation for the differences in opinion over approval time is the way each group views the term "approval." For a developer, approval is the point at which they can move lots or start home construction. The planners viewed plat approval by the planning commission as the approval. However, both sides acknowledged that the plat approval is not really final but subject to engineering approval and final plat recording.

The review of most environmental issues runs concurrent with the subdivision review or is a part of it, so there in not necessarily added time to the schedule for these regulations. The one main exception is in obtaining a FEMA map revision for a flood plain.

In some cases, FEMA may actually increase the amount of available land for building because they base the determination on the planned site conditions after development. However, the developers cited the time for FEMA review as a potentially serious delay. Developers can proceed at their own risk after the local approval is given, but often they are forced to wait up to 12 months after local approval before they can start building homes. Depending on the market conditions (if the builder will buy pending FEMA approval), either the developer or the builder would have to carry the costs of waiting for FEMA approval. Again, it should be stressed that the flood plain regulations do not impact all sites.

Other observation about restrictions on housing development

The participants stressed that Texas is all about property rights and they have been slow to embrace restrictions on development. However, the rise in tree preservation ordinances and much discussion at the local level about "green building" has sent a message that more and more environmental regulations will be the norm in the future.

Discussion on the Dallas process and regulations

There do not appear to be as many environmental regulations that have a practical impact on residential development in the Dallas region as in the MD-VA market or in Denver, but many are on the way and being discussed in the regulatory environment. In fact, the market, with a few exceptions, is not highly regulated compared to the other parts of the United States.

Except for tree ordinances, stormwater management, and to a lesser extent, FEMA Flood plain reviews, most environmental regulations were not considered significant problems for the participants in this study. Although there are some extreme examples where regulations have had a large impact on development costs, typically a developer can avoid most environmental regulations because there is a large supply of land from which they can select for development.

Costs to comply with most environmental regulations are similar to MD-VA for major items, but again most are rarely applicable.

The developers also noted that there are many regulations on the horizon but they are not here yet.

Pima County (Tucson), Arizona

Pima County, which includes the city of Tucson, is located south of Phoenix and extends to the US-Mexico border. The county population in 2005 was about 925,000 according to the U.S. Census. This compares to a population of approximately six million for all of Arizona. Although population growth in Pima county has lagged behind the 40 percent rate for Arizona in the period from 1990 to 2000, it is still managed a 26.5 percent increase in population during the 1990s (Pima County Quick facts – US Census).

The housing market included 10,521 permits in 2004 for new homes and 397,150 existing homes (U.S. Census). About 75 percent of homes in the county are single family detached units. The median sales price for all homes in the county for 2005 was $202,957 and the average was $238,058 (Source: Bright future Business Consultants, Tucson, AZ). For new homes, the 2005 average and median were $245,804 and $219, 068, respectively (Source: Bright Future Business Consultants). This represents an increase of over $85,000 or roughly 54 percent over 2000 average new home prices.

The median household income was $37,454 (2003 US Census) in the county and $41, 963 throughout Arizona. Unemployment in 2005 was at 4.6 percent, down from a peak of 5.6 percent in 2002 according to the USDA Economic Research Service (www.ers.usda.gov/Data/Unemployment/RDList2.asp?ST=AZ).

Development in the region spreads throughout the county. Most development is on open or "green field' parcels. There is some, but minimal infill or redevelopment in Tucson, but most development is in the county.

The Development Process

The process for approval of a residential development in Pima County is similar to many jurisdictions around the country. There is a mix of local, state and Federal regulations and processes, although most activity is at the County level.

<u>Local requirements</u>

For a by-right development where existing zoning has established a legal right to build at a certain density, the county staff reviews the application and the County Board of Supervisors (BOS) votes on an administrative action for final approval. For developments requiring zoning action, the county staff makes recommendations to the County Planning Commission. The Commission then makes a recommendation to the BOS, who is responsible for final approval or denial. The staff and Planning Commission roles are advisory. The BOS can accept or reject their recommendations.

There are no statutory limits on the time for approval or denial of a development or zoning action. According to the county staff person we interviewed, the process typically takes about 12 months for a project that does not involve a rezoning action and an additional 6 months if rezoning is involved.

Applications are initially submitted to the Pima County Development Review Division. Although other agencies are also required to review the plans, the Development Review Division will frequently provide feedback to applicants on how other agency's requirements may impact the development. A summary of the Division's role from county website (www.pimaxpress.com/Dev_Review/Default.htm) is as follows:

Pima County Development Review Division serves as a single point of contact for developers, engineers, architects, and the general public requesting information concerning development of property within Pima County.

We review rezoning requests, tentative and final plats, development and site plans in accordance with Pima County ordinances, policies, and procedures.

The Development Review division also reviews paving, grading, drainage, and sanitary sewer construction plans for new developments in accordance with the Department of Transportation and Flood Control District, the Wastewater Management Department, and the Department of Environmental Quality.

Development Review coordinates with all other departments within Public Works when questions requiring policy interpretation arise.

County staff also addresses some Federal issues, for example, the county requests whether an application has been submitted to the Army Corp of Engineers (CoE) if wetlands are involved. The county also enforces SWM issues that overlap with Federal and state regulations. However, the developer also must submit an application to the Arizona Department of Environmental Quality (DEQ) for stormwater management.

Developers must also submit an application to the Regional Flood Control District. This is a separate legal entity from the county, although the BOS members also oversee their activities.

The Regional Flood Control District reviews the development application for compliance with Riparian Zone regulations (a separate local ordinance) and county flood plain requirements. The Regional Flood Control District also submits the proposed plan to FEMA for compliance with Federal flood plain regulations.

For developments requiring rezoning applications, the Planning and zoning staff prepares comments which are forwarded to the Planning Commission for their review and comments before going to the BOS for a final determination.

Currently, rezoning applications must also comply with the county's habitat preservation plan, which meets the intent of parts of a larger plan called the Sonoran Desert Conservation Plan.

State approval

The primary role of the state regarding development is to issue permits for stormwater management under the NPDES process enforced by the U.S. Environmental Protection Agency (EPA). The Arizona Department of Environmental Quality (DEQ) requires developers to submit an application prior to development activities. Similar to other states, this is more of a database than an actual application or review process.

The State also has native plants requirements. It is up to the developer to secure this review and approval, similar to Federal ESA permits.

Federal approval

As stated above, the Arizona DEQ is responsible for enforcing Federal stormwater permits under the NPDES.

Flood plain regulations are also under the Federal government's domain and require FEMA approval for building in the flood plain. However, the Regional Flood Control District typically enforces the flood plain regulations at the local level and handles the FEMA submission based on the developer's plans.

The county representative was not sure if a builder could start construction without a FEMA letter of map revision. A staff member from the Regional Flood Control District clarified that a conditional letter of map revision from FEMA is required prior to issuance of building permits (for lots within the original flood plain limits). Prior to final approval of the map revision by FEMA, permits will be issued but lots must meet elevation criteria if within the original flood plain limits. The extent of the flood plain limits are often broader than what FEMA has identified, since the county has a stricter definition of the 100 year flood plain than FEMA.

Each of the regulations or ordinances identified here is discussed in more detail later in this report.

Developer Participants

Input from the development community was obtained from six participants during a meeting on September 2006 at the Southern Arizona Home Builders Association (HBA) facility in Tucson and a follow-up interview with a developer who could not make the HBA meeting. Participants included one local developer with an active 99 unit inner-city development, two national builders who develop and build over 1000 homes each year in the Tucson area, a national builder who entered the market in the past 18 months and currently has about 300 active building lots, a local building consultant who specializes in regulations and their cost impact, and the president and a senior staff member of the HBA.

The developer participants primarily develop single family housing lots on greenfield parcels, although a couple have some smaller active infill sites.

Summary of Developer Input

This section is based on the comments of the developer participants. Thus, there may be differences in their interpretations of the regulatory requirements than as described in the county requirements. Where this is the case, we attempt to present the views obtained from a separate interview with members of the PIMA County staff. The developers also attempted to discuss the approval process and regulations in a general sense and noted that there are some differences between local jurisdictions. Where these differences are important to our objectives related to environmental regulations, they are addressed in this section.

It should be noted that this summary is not a comprehensive review of all environmental regulation. Rather, it is focused on the issues identified by participants in the study as having the most significant impact on residential development.

Major environmental regulations

The developers identified a series of the most significant environmental regulations in the Tucson-Pima county area. From the discussion, it was clear that the participants see stormwater management as a key issue. In fact, they tended to discuss multiple issues as if they were subsets of or arise out of the stormwater regulations. From the developer's perspective, it was not important where the requirements originated, but rather that they are all issues that they have to address as part of their development plan. Thus, the discussion started with general remarks that tied the NPDES regulations to other Federal regulations including wetlands and endangered species, as well as local conservation regulations and stormwater issues. All of these issues are presented below as individual items along with hillside and ridge conservation, native plant preservation, and flood plain issues.

Note that the participants had a difficult time keeping the various regulations separate during the discussion. This is due to the significant amount of overlap between the various ordinances at all levels of government. The categories used in the following sections attempt to group regulations according to the perception of the developer participants.

Stormwater management – This issue typically involves the county's enforcing local stormwater and E&S regulations as well as the state DEQ's enforcing the Federal NPDES requirements. Approval is part of the local land development application process, where a stormwater pollution prevention plan is required. However, a separate approval is required from the state. The developers indicated that the requirements from the state consisted of an application that puts them on record with the DEQ and submission of their stormwater pollution prevention plan. The state may conduct some periodic inspections.

The subject of riparian protection areas was also raised as part of the stormwater discussion. From a review and enforcement perspective, it is easy to see how the development community views this as part of the stormwater management regulations. However, it is triggered by a separate ordinance under the Sonoran Desert Conservation Plan. This plan is discussed in a later part of this report.

Species/habitat protection– For this discussion, the participants identified separate but related regulations from local, state and Federal agencies.

At the top of the list is the U.S Fish and Wildlife Service (FWS) process for enforcing the Federal Endangered Species Act (ESA). According to the participants, the FWS currently list 55 species of wildlife or plants as endangered or threatened in Pima County.

Typically a letter of certification or permit is requested from FWS by the developer. The county requires FWS approval before local approval for a development is granted.

One twist in the enforcement of the regulations is the introduction of multiple Federal Agency requirements regarding the ESA. Although the primary responsibility falls on the U.S. FWS, the Army Corp of Engineers (COE) also has taken an active role in requiring FWS approval before they will take final action on a wetlands application. According to the Pima County representative, this is required of the COE by Federal statute, even if it has not been common practice in the past.

The state has identified their own list of species that must be protected. This is enforced by the Arizona Department of Agriculture's Native Plants Division. Similar to the Federal ESA, the developer is responsible for securing the state approval from the Native Plants Division.

The county also has an ordinance for native plants. It is described on the Pima County website as follows:

A Native Plant Preservation Plan (NPPP) is required if the total of existing disturbance/grading and proposed grading on any lot exceeds 14,000 square feet, the total lot area is larger than 36,000 square feet, or if required by a subdivision plat.

*The set aside method is one of 3 methods according to the Pima County Zoning Code that can be used to comply with the Native Plant Preservation Ordinance. It is the **ONLY** method acceptable for Single Lot Residential NPPO compliance that does not require certification by a plant professional; however, if there is any doubt in the applicant's ability to identify protected native plants, the submittal must be prepared by a qualified plant professional. In order to comply with this method, **30%** of the subject property shall be **set aside in perpetuity as Natural Open Space (NOS) to remain undisturbed** and shall include the area of **highest resource value** such as riparian habitat, washes, and areas of dense vegetation. Saguaros, Ironwoods, and Safeguarded Species which occur outside of the designated 30% Natural Open Space shall be inventoried, given a disposition and mitigated for according to Chapter 18.72 of the Pima County Zoning Code.*

According to the participants, the Saguaro cactus is the most troubling of the protected species. A survey by a plant professional can be expensive. Further, the participants claim they are required to move each Saguaro to a protected area and plant two new ones for each one that is moved, or set aside the land from development.

Wetlands – The wetlands regulations are enforced by the U.S Army Corp of Engineers (COE). The developer is responsible for determining if they are required to submit to the COE for a permit. Typically, the developer relies on a report or advice from their Civil Engineering firm or a wetlands specialist in determining whether a specific site falls under the wetlands regulations. The participants are most concerned about inconsistencies and ambiguities in the way the COE makes determinations. They are aware of developers who have been "burned" because they believed their site does not have wetlands, or waters of the United States, but the COE later made a contrary determination.

Flood Plain – The regulations for flood plains enforced by FEMA were identified as some of the more restrictive environmental issues in Pima County. Part of the issue is due to FEMA's process and part is related to the county's enforcement of flood plain requirements.

At the Federal level, FEMA can take up to 12 months to provide a letter of map revision. The request can not be submitted until the building pads are in place and at appropriate elevations. In the past, home construction could start but on an at-risk basis for the builder. Pima County (through the Regional Flood Control District) has instituted restrictions that limit the ability to move forward with construction even under an at-risk scenario. The participants stated that the county now only allows building in areas outside of the original flood plain until the FEMA approval is in place. However, a representative of the Regional Flood Control District clarified that construction can move forward if a conditional letter is provided by FEMA and the homes are elevated to meet the FEMA requirements.

Hillside Development Overlay Zone – This is a Pima County ordinance designed to protect ridge tops and steep slopes by restricting development in applicable areas. The County website at www.pimaxpress.com/Dev_Review/hdz_grading_faqs.htm provides FAQs that summarize the areas impacted under the ordinance as follows:

This chapter applies to any land parcel, lot or project site containing slopes of fifteen percent (15%%) or greater, which are both longer than fifty feet (50') when measured in any horizontal direction and higher than seven and one-half feet (7-1/2') when measured vertically.

Protected Peaks and Ridges are designated and mapped peaks and ridges. Grading or development is not permitted within a horizontal radius of one hundred and fifty feet (150') of the protected peak or ridge.

Sonoran Desert Conservation Plan (Riparian Areas) – This is a comprehensive plan with many different objectives that overlap other regulations already addressed in this document. The builders identified two parts of the Plan that significantly impact housing development. The first part is the actual restrictions placed on development in the form of conservation areas that must be left in a natural or undisturbed state. The second issue is the Plan's objectives of using public funds to purchase and conserve lands. This second issue was raised by the participants several times throughout the discussions because they believe it has a large impact on home costs by reducing the supply of build-able land.

A subset of the Plan is the Conservation Lands System (CLS). This is applicable to residential developments that are being rezoned, waivers to the zoning ordinance, and to comprehensive plan amendments and specific plan requests. By-right developments are not covered.

Many of the requirements under the CLS are covered in other ordinances and regulations. The one specific and unique part of the CLS that was cited by the participants in this study is referred to as "Important Riparian Areas." This part of the CLS is triggered by flood plain use permits enforced by the Regional Flood Control District.

According to the CLS as amended June 21, 2005, the following is applicable regarding riparian areas:

At least 95% of the total acreage of lands within this designation shall be conserved in a natural or undisturbed condition.

For the developer/builder participants, this basically equates to a total restriction on areas that are covered. The participants questioned the value of the definitions for riparian areas that are basically dry and isolated from other waterways or habitat areas.

Perceptions on costs of regulations

The developers identified stormwater management as the regulation with the greatest potential cost impact. They have the best understanding of the costs associated with stormwater management (including E&S control), which they estimate are around 4-5 percent of the total development and construction costs, or about $4000 per lot.

Stormwater management includes maintenance costs that the developer has to incur up through the completion of the very last house. In the past, these cost were much lower, but emphasis on maintaining structures and clean up after storm events has increased costs during development and construction activities.

The developers generally believe that the compliance costs for the other significant environmental regulations are too site dependent to provide a general range of costs. For example, the cost of a survey for the Saguaro Cactus, which is basically required under the native plant protection regulations, depends on how many of these are on the site. Thus, they were not comfortable providing a general cost estimate for other regulations as they impact a typical site.

The HBA estimates that regulations add at least $40,000 to the cost of each finished lot. Despite the added cost to each lot to comply with individual regulations, a larger concern cited by the participants is the impact these regulations have on the available supply of land. By way of example, the participants cited a doubling of lot costs almost immediately following a FWS delineation in the 2000 time frame that set aside approximately 1.2 million acres.

Schedule implications of regulations

According to the participants, the development process for by-right development generally takes about 12 months. Rezoning or some variance can generally stretch the process out to as long as two years, depending on the complexity of the development. For simple zoning issues, they can sometimes stay within the 12 months required for a by-right development. *These estimates are within the range of the Pima County representative's estimates of one year for a by-right development and 6 additional months for a typical rezoning action.*

It is not apparent from the input we received that specific county environmental regulations greatly impact the schedule, as reviews are performed concurrently with other non-environmental regulations. This does not mean that the combined impact of the environmental regulations as a whole has not added to the time required for approval, but rather that we could not determine how much the schedule was impacted by one or more regulations. Because of the concurrent review and issues like scheduling of reviews, some local and state regulations may add to the schedule while others may not. Federal flood plain regulations are the exception since the FEMA process for a map revision clearly extends the overall process.

Discussions on Pima County process and regulations

Developers in the Pima County/Tucson area appear to face at least as many restrictions on development related to environmental regulations as developers in the MD-VA case studies. The impacts on development appear much more significant than in Denver and Dallas in terms of the complexity of the approval process and number of regulations.

Costs for compliance are similar to MD-VA, Denver and Dallas for stormwater management regulatory compliance. The developers generally believe that the compliance costs for the other significant environmental regulations are too site dependent to provide an estimate for a typical project.

One outcome resulting from environmental regulations that is troublesome to the builders and developers is the impact on the supply of land for housing. Only about 15 percent of land in Arizona is privately owned - the rest is State, Federal, or Tribal land. Thus, land costs are particularly sensitive to set asides or other conservation measures.

Last, it became evident in the interviews and discussions that the process and requirements in Pima County for residential land development are much more complex than in the Denver or Dallas areas. *Neither the county officials nor the developers seemed to have a comprehensive understanding of the process.* The county website is not particularly helpful. There is no master checklist one could use as a guide through the process.

The County has recognized the need for some clarity. A master checklist is under development. In addition, the County plans to use the Sonoran Desert Conservation Plan to consolidate the process for the regulations that now require multiple reviews and approvals.

Discussion on findings from the three market studies

Cost analysis was not made available to the research team in the detailed manner reported in Chapter 4. However, the Focus Groups did provide sufficient information to allow the researchers to conclude that on the whole environmentally-related costs per lot were in the normal to low range, and about in line with those found for the Pilot Study. Costs varied in dollar amounts, certainly, but not in relatively magnitudes given different markets.

In addition, the time-to-approval can generally be described as "normal" based on experiences dating back to the 1970s, being roughly between a one and two years for the entire approval process including any zoning relief needed (see Table 5.1). Compared to the VA-MD Pilot Study, the Focus Group representatives indicated that their local governments on the whole appear to process applications a few months faster.

This section now reviews the three markets compared to each other in terms of their differences and similarities relative to environmental regulations. Note that these discussions are based on the responses of the participants and are more qualitative than quantitative. Where appropriate, this section also discusses how the three markets compare to the VA-MD region. A general comparison of the regulations in each market is shown in Table 5-1 and discussed in the following sections.

Overall regulatory environment – The MD-VA region would be viewed by most people as one of the more heavily regulated markets in the United States. Federal, state, regional, and local environmental regulations are abundant.

The views of the participants in the other three markets varied from one extreme to the other. In the Tucson market, the participants believe they are highly regulated in a manner that sharply increases housing costs. In Dallas and Denver, the participants believe the environmental regulations they face are not significant barriers to affordable housing. However, the Denver and Dallas participants see trends that point to increasing environmental regulation in the future. In both of these markets, there is no shortage of communities proposing new regulations, especially related to tree preservation.

Statements from the participants support their views that it is just a mater of time before the Dallas and Denver developers will be in a similar situation as more heavily regulated areas. For example, in the Dallas market, there is currently an abundance of land and it is relatively easy for a builder/developer to choose from among many sites when planning a development. Through due diligence, most are able to avoid land that has a potential environmental issue. As available and preferable land is used, the options will decrease and more and more environmental issues will come into play.

Although the participants in the three markets shared some frustration over environmental regulations - particularly due to inconsistent interpretations by EPA, the U.S. Army Corp of Engineers, and the Fish and Wildlife Service - the Tucson participants were more adamant that these regulations are a significant barrier to affordable housing. Their rationale was based not only on the cost of compliance, but also on the impact on land supply. Only about 15 percent of

land in Pima County is privately owned. When a regulation is introduced that includes a land set aside to protect endangered species or for other reasons, it restricts an already small supply of land available for development.

Environmental regulations with similar impacts in each market – One observation from participants in all three markets is that the *Federal regulations, in particular those related to the Endangered Species Act, wetlands protection, flood plains, and stormwater management, are viewed as having the most significant impact on housing costs*. State and local regulations were less frequently cited as an issue.

Even when state or local regulations were cited as significant barriers, they tended to be regulations that were related to the Federal regulations. For example, some participants identified more stringent flood plain requirements than FEMA or state additions to the Federal endangered species list.

It is difficult to compare items like wetlands regulations, endangered species regulations or tree preservation across jurisdictions because they vary widely in terms of the number of sites affected and the impact on each site. However, there do appear to be some similarities with flood plain and stormwater regulations.

Stormwater management regulations have been around longer than most other environmental regulations. Thus, the approach for addressing these issues has started to take on a degree of consistency in terms of interpretation of the regulations and the practices used for compliance. The participants in each location quickly identified SWM as one of the most significant regulations. They were very confident in estimating the costs for compliance because it has become somewhat standard practice. *Generally, compliance with Federal, state, and local SWM requirements runs about 4 to 5 percent of the total cost of a finished lot (percent of development costs).* Dallas was the lone exception. Their SWM costs were estimated by the participants to be about 1 percent of development costs. Some of this can be expected because overall housing costs in Dallas are lower than in the other markets.

Although the amount of land that is impacted by flood plain is highly variable, the response to flood plain issues was similar across the various markets. *FEMA's process is viewed as a significant barrier due to the time it takes to obtain approvals. Compliance with the requirements is not the main issue, but rather the time it takes for FEMA to issue a letter of map revision*. In each location, we were informed that FEMA will not begin the process until the plans are approved (i.e., final elevations are approved for each lot). Lots inside the original flood plain can be built upon, but only if the final map revision shows them outside of the new limits, or if the lots or buildings are elevated. Since the FEMA process takes up to 12 months, the developer is frequently stopped in a waiting mode until the map revision is approved. In some jurisdictions, developers can move forward at their own risk, but other jurisdictions have restricted this as an option for developers.

Local or regional differences – Despite the heavy influence of Federal environmental regulations in each market, regional or local regulations also impact housing. Most of these regulations either are extensions of the Federal regulations or are designed to protect a unique local resource.

For example, the Tucson area developers cited protection of the Saguaro Cactus as a significant barrier or cost. In the Dallas-Ft-Worth Market, natural gas drilling platforms can place restrictions on development. In Denver and Tucson, protection of ridges and slopes are regulated. Likewise, there are regulations in the VA-MD market designed to protect the Chesapeake Bay from runoff.

All of the markets have various ordinances designed to protect trees or require tree plantings. However, these are somewhat unique to each area in that they focus on preservation of native species.

Overall impact on schedule - Generally, it is hard to determine if environmental regulations impact the time required to obtain an approval. But any additional regulations that must be addressed and reviewed undoubtedly add some amount of time, effort or costs, even if they are minimal. Most of the environmental regulations are evaluated as part of the overall approval process so isolating the impact of a single regulation was not possible. Only the FEMA map revision process under the Federal flood plain regulations clearly adds extensive time to the process. Again, this is not to say that the other regulations do not add to the time required for approval, but rather that we were not able to determine the exact impact they have on the schedule.

There are many factors that cloud the ability to separate out impacts of a specific regulation on the schedule. For example, the rezoning process is in itself very time consuming in most jurisdictions and may be the most important factor in determining how long it takes to get an approval. When other reviews and approvals can take place concurrently, they may have little discernable impact on the overall schedule, even if they otherwise add to the developer's costs.

Attitudes toward enforcement – The approach to enforcement greatly influences how an environmental regulation impacts the cost of housing. In Dallas, there seems to be less interest in enforcing Federal regulations at the state and local level. Thus, some jurisdictions do not place as much emphasis on compliance with the Federal regulations, leaving it to the developers to make sure they have obtained all Federal permits or approvals. Conversely, Pima County (Tucson) includes some Federal approvals as a condition for local approval. When the local officials see a regulation as their responsibility to enforce, often local ordinances spring up along side the Federal regulations. Once it is part of their process, stricter interpretation and enforcements tends to follow. This may partially explain how developers in the three markets can have widely differing views of the impact of a specific Federal regulation.

Table 5.1
Most significant environmental regulations with potential impact on residential development costs[1]

	Denver	**Dallas**	**Tucson**	**MD-VA**
Stormwater (including E&S control)	X	X	X	X
Remediation				X
Wetlands	X		X	X
Endangered species	X		X	X
Tree/Forestry		X		X
Noise				X
Flood plain		X	X	X
Riparian areas			X	
Hillside/ridge preservation			X	
Average new home cost	$329,967	$179,000[2]	$245,804	$734,000
Typical time to approval (including zoning decision)	12 to 28 months	18 to 24 months	12 to 24 months	~24 months

[1] An "X" in the box indicates that the participants identified this as a significant environmental regulation. Other environmental regulations are present in each market, but were not identified as having a significant impact on costs.

[2] The average new home cost for Dallas was not available. This number represents the median price. See text for more details on housing costs in each area.

Chapter 6
ASSESSMENT, LESSONS AND FUTURE DIRECTIONS

Introduction

The literature on regulatory barriers to housing affordability argues that land use regulations, including environmental requirements, drive up the cost of development and thus the price of housing it provides. Although there has been little empirical data to support this argument, it is, of course, true. Some regulations take land out of development, increasing the price of that which remains. Some regulations call for additional costs for assessments and documentation and these add to the cost of development. Some regulations require physical changes in projects including impact measures and mitigation that also add to development costs. But the literature largely fails to quantify these regulatory costs to see if they outweigh the public benefits these regulations provide. Only then would they be regarded "excessive" or "unnecessary" as some have claimed.

This study does not address the question of whether the costs of regulations exceed the benefits they provide. But it aims to shed additional light on the costs associated with environmental regulations, how those costs compare to land and development costs and housing price, and how the related approval processes contribute to delays and financing costs in the development process. The study investigated six large housing projects in the Washington, DC, regional suburban market in a pilot study. Lessons learned in the pilot were tested in three other major markets, Denver, Dallas, and Tucson, where focus groups with large builders and interviews with local officials provided a glimpse of the similarities and differences in those markets.

Claims from the Literature and Insights from This Study

The research began with a list of claims from the literature so one way to summarize this study's conclusions is to see how our sample held up against the claims of the literature.

1. **Environmental regulations remove land through federal regulations to protect wetlands and habitats of listed species, and state and local requirements for sensitive areas.**

   There was little indication that wetlands protection removes significant buildable land out of development in any of the markets studied. In the Tucson region, developers indicated that habitat protection under federal and state regulations was limiting land for development, this in a state with only 15 percent of its land in private ownership.

2. **Meeting regulatory requirements increases costs**.

   The DC pilot study showed that regulatory requirements can cost as much as $4 million for a very large housing project, mostly for water related issues, such as stormwater and erosion and sediment control. Other large expenses include site remediation; wetlands delineation, permitting, and mitigation; tree preservation and forest cover; noise abatement; and archeological resource management. Still, environmental regulatory costs averaged about

$8,500 per housing unit but only 1-5 percent of land and development costs (not including construction). The environmentally-related share of costs relative to total improvement costs and to the imputed price of finished lots is at the low-end of the ***cost continuum*** *developed in Chapter 3.*

The "focus group" markets confirmed the increasing emphasis and cost for stormwater and E&SC. Costs of stormwater compliance were about the same as DC in Tucson, significantly lower in Denver, and the lowest in Dallas. Dallas had lower compliance costs overall. Information developed from the Focus Groups indicated that environmentally-related costs relative to total improvement costs and to the imputed price of finished lots is at the low-end of the ***cost continuum.***

- EIA documentation studies, where required, are expensive and raise costs. *Yes, but not significantly.*
- Open space set-asides are also costly *but on-site density bonuses are often provided* as noted in the Washington, DC Pilot Study and through information provided from the Focus Groups.
- Wetlands permit and habitat conservation mitigation requirements are costly. *Although there was little evidence that wetlands permitting reduce available land, the compliance costs and time required were significant. In the DC Pilot Study wetlands compliance ranged from $53,000 to $411,000 for each project, but only about 7 percent of environmental costs or $300 to $2,000 per finished lot – averaging quite a bit less than one percent of the imputed finished lot cost in that area. In areas addressed by the Focus Groups these costs seem to be less and in line with the small share of total finished costs observed for the Pilot Study.*
- Few other cost increase requirements of environmental regulations are cited in literature reviewed but there are others like stormwater management, landscaping/tree protection, and others that may be perceived as the cost of doing business. *As discussed in the Pilot Case Study, stormwater management was clearly the major compliance cost while tree provision/preservation costs were significant. Interestingly, stormwater management and street trees were noted separately in the NAHB's Cost Effective Site Planning book published in 1976 – showing them to be a very small share of overall improvement costs and an even smaller share of finished lot costs.*

3. **Regulatory review process requirements create delays** and, therefore, increase costs, a concern registered in numerous reports especially those addressing barriers to housing affordability published by HUD. There is the concern that review processes and decisions are often inconsistent and unpredictable, especially with wide reviewer discretion (see Appendix A for specific issues uncovered in the Pilot Study). There is also the attitude among developers interviewed for this study that uncertainty about length of time and outcome of review often impedes projects. These twin issues are discussed here.

These concerns may be especially the case when rezoning and negotiated approvals enter the political process. ***Concurrent reviews*** *have helped streamline the process, although rezonings typically take two years in all markets studied. Yet, this is within the "normal"*

period of review in 1976 and in 2002 when approval of both subdivision and zoning relief is needed [based on the study by Ben-Joseph (2003)].

Developers commented that the processing time had increased over the years but they could not be specific by how much. Those interviewed for the DC Pilot Study also commented on how all jurisdictions in the area were "learning" from each other, thereby expanding environmental review in jurisdictions with less staff expertise and capacity. This often resulted in delay when a jurisdiction was ramping-up its review processes to mimic the other, more sophisticated jurisdictions. Developers expected the review periods would fall back to previous normal levels for the area as a whole once the administrative learning-curve had matured.

More to the point: How much extra time do environmentally-related regulations add to the residential subdivision review process? That time could be zero if responding to environmental issues is concurrent with the rest of the development review process – and in any event may be difficult to disentangle as a separable element of review delay. There are two pieces of evidence, however, that may suggest the additional time environmentally-related regulations impose on the process. One is Ben-Joseph's 2003 study showing that overall there was an increase from 15 to 17 months to process residential subdivisions between 1976 and 2002. Yet, during the same period, the incidence of residential subdivisions needing zoning relief increased from about a third to a half with the weighted-average increase being 2 months. In this respect, the zoning relief action added 2 months but whether environmentally-related regulations added more time per se is not clear. It may be that environmental concerns dominate the zoning relief process but this is not known.

The other piece of evidence is through the example of a "by-right" case study in Loudoun County. This project had proper zoning and under Virginia law, was entitled by-right to all the residential units it proposed. No zoning relief was required, although the project had to go through normal residential subdivision procedures. Despite its by-right nature, this project still took 27 months to process, three months longer than the average in the DC case study.

Likewise, the Focus Groups provided very little direct, verifiable evidence that environmentally-related regulations added to the development review process. The research team surmises that there is little cross-section evidence to suggest that environmentally-related regulations themselves create unexpected delays in the normal development review process. While the overall time-to-approval has increased, research suggests this is attributable mostly to zoning relief.

If anything, the research team finds it remarkable that residential subdivision approvals are processed as fast as they are relative to the middle 1970s and in any event clearly within the norms of the mid 1970s. This is not the case everywhere, but it seems so generally. There are at least six reasons for this.

a) There is more knowledge about development impacts on the environment today than in the 1970s. For one thing, knowing simply what questions to ask has been refined. For

another, techniques to assess environmental conditions that may trigger mitigating exactions are far more efficient than in the past.

b) *Relative to the 1970s and later periods, experts probably know far better how to address environmental concerns during the due-diligence phase of a development process. Land-purchase contracts may now better reflect these costs than in the past. Experts – such as engineering and environmental consultants – may also know better than in the past how to address environmental concerns in more cost-effective ways than may have been possible in the past. The result is that developers can negotiate a land-purchase option agreement reflecting this knowledge and otherwise design projects that reduce (although do not eliminate) the costs.*

c) *The role of experts in the review process has likely expanded generally to the benefit of residential subdivision developers — and perhaps to the benefit of the environment and the community. Through interviews the research team heard numerous anecdotes of how a developer's engineering or environmental expert would craft solutions to environmentally-related issues in ways that reduced development costs while also gaining staff support and often taking NIMBYist's environmentally-related objections off the table. These experts and the environmental solutions they designed certainly added costs to projects but they do not seem out of line proportionately with costs seen in the 1970s.*

d) *Environmental regulations – at least those in mature jurisdictions with professional, experienced staff – add the very kind of certainty to processes developers need. Developers informed the research team that knowing in advance what is required allows them to perform more accurate analysis and better anticipate costs associated with improvements and the process to secure approvals. This theme was prevalent in interviews from both the Pilot Study and the Focus Groups. For example, in the Pilot Study, the research team learned that Fairfax County, the one adding the largest number of new homes per year, had the strictest environmental regulations, yet the fastest approval process because they were clearly detailed in their codes and procedure.*

e) *Technology and the expanding environmental consultant profession have likely reduced environmentally-related improvement and investigation costs relative to the past. Interviews with the environmental consulting firms engaged for the developments evaluated in the Pilot Case Study highlighted the growth and sophistication of these full service environmental consultant companies within the greater metro region of Washington, DC. While it was difficult to quantify the direct cost savings, the research team believes this may particularly explain why the percentage of environmental costs to total project costs continues to remain about the same over the past twenty five years.*

f) *The research team heard time and again that developers would rather have "Stricter and more certain regulations (and process)" than "More lenient and more uncertain regulations (and process)."*

4. **Efforts by state and local governments** have tried to reduce regulatory barriers.

This research has found, however, that:

a) *Relative to market forces and other policies (fiscal, infrastructure, etc.), regulations probably have little impact on housing prices.*

b) *Relative to non-environmental regulations (zoning, subdivision regulations, building codes, impact fees, etc.) environmental regulations probably have a smaller influence on housing costs. In the case of the Pilot Study, the cost of environmental compliance per unit was less than 1% of the unit sales price.*

Lessons for Policymakers and Practitioners

The research leading to this report did not second-guess local governments' use of environmental regulations to guide development and as such does not address what some may consider "excessive" or "unnecessary" environmental regulation. Other research may address these issues. However, the research undertaken for this report does provide lessons on which to base a framework for improving implementation of those environmental regulations. This section presents such a framework. It is informed significantly by May's (2005) contribution to the *Cityscape* issue on barriers to affordable housing discussed in Chapter 2. This section will highlight insights from our research, focus groups, and pilot case study that support May's observations and recommendations. Following May, the section considers two outcomes of regulatory implementation: 1) delays in construction and the rehabilitation of housing and 2) added cost and procedural burdens that discourage actual housing development.

The research generally supports two of May's propositions that there are three broad procedural barriers involving environmental regulations. One is *regulatory approvals* that consist of delays because of cumbersome decision-making processes and duplication of regulations. These kinds of delays are a special concern of developers. Another is a *patchwork of administrative arrangements* that results from the duplication of administrative structures and gaps in regulatory decision processes. The research did not find major concerns about *regulatory enforcement strategies and practices* that are overly rigid and that foster an unsupportive regulatory environment for housing development although May sees this as important. This section will focus on the two implementation issues that arose from the development community.

Although May suggests several broad administrative approaches to improving regulatory processes, one stood out as needed based on our research: *Regulatory and administrative process simplification.* This includes steps to reduce duplication and procedural hurdles. May identified other improvements that did not seem important among the developers participating in this research: 1) *Conflict reduction and consensus building approaches* that are aimed at achieving agreement about affordable housing goals, 2) *Smart enforcement practices* that reduce deterrents to housing development by fostering a supportive regulatory environment, and 3) *Facilitative reviews and inspection processes* that speed up housing approvals and construction. As part of the Fairfax/Montgomery County Pilot Case Study, the research team identified potential opportunities for these dispute resolution strategies to resolve conflicts over inconsistent interpretations and applications of environmental regulations by local government staff.

Regulatory and Administrative Simplification

Developers interviewed for this research echoed many of approaches to regulatory and administrative simplification that May suggests, such as One Stop Permit Shops, electronic permitting, and third party certification, as discussed in chapter 2.

This study also indicated the importance of *conflict resolution and consensus building*. It is not simply regulators who slow the process of approval, but citizens acting to preserve their interests present a different challenge. They can work the regulatory approval process making it more political than ministerial. Developers interviewed for this study believed that citizens with NIMBY (not in my backyard) opposition to projects often used environmental issues and regulations as a tool, not necessarily to protect the environment, but to delay or obstruct a project they did not want. Conflict resolution and consensus building methods can address this challenge.

This project adds another way to improve regulatory processes: *Clear and objective standards with expert review*. The idea of having clear and objective standards is not new but the extent to which it has been applied has not been studied. The concept is simple. *Clear* standards are those that experts in the field know what is meant – such as stormwater retention based on a 1-year storm event extending 1 hour. *Objective* standards would then show how the stormwater retention may be achieved through design, choice of materials, and so forth. Ideally, if the clear and objective standard is met there may be no discretion by local decision-makers to add further requirements that address stormwater. *Expert review* provided by both the applicant and the local government would also be available The use of clear and objective standards with expert review thus assures public policy is achieved by addressing the environmental concern, discretion is reduced, and the time to approval perhaps reduced. Only the state of Oregon requires this approach among all its jurisdictions. However, there has been no research comparing time-to-approval and condition of approval differences between Oregon's approach and others..

Policy Challenges and Opportunities

What can be done by the states and/or local governments to assure that environmental concerns are addressed reasonably and without significant delay in processing development approvals? Before suggesting some actions it is important to note that our research did not find that review processes have added significant to the approval period – indeed it is surprising the review period is not much longer – or that in general the cost of environmental compliance is excessive – being roughly the order of magnitude in share of land improvement costs since the middle 1970s. There are always local variations, anecdotes of processes and conditions of approval run-amok, and the occasional litigation that stymies projects sometimes for years and often with little improvement in outcomes. What can be done?

Federal and State Programs and Policy Reforms

The issues and solutions for improving the efficiency of local land development processes rest primarily with state and local governments and not the federal government. May (2005) offers the same limited view of the Federal role as this report.

May suggests some indirect ways in which the Federal government may improve the efficiency and efficacy of environmental regulations to reduce their potential affects on housing affordability. One is to conduct research to identify the sources of regulatory barriers and the means for addressing them. HUD has done this on a number of fronts, including sponsoring this study. Another is to gather and share information including examples of best practices. HUD's

Housing Barriers Clearinghouse is an example of this. A third is through sponsorship of local government demonstration programs that serve as exemplars of regulatory reforms.

Federal as well as state policymakers may also consider a carrot-and-stick approach by attaching conditions to federal and/or state grants to local governments. However, as May suggests, the federal government has neither the political inclination nor budgetary support to take on such a centralized role, and this concept is not worth pursuing. But several of these ideas and suggestions could apply equally to state governments.

For example, the state of Maryland's Smart Growth Program targets certain state infrastructure and technical assistance funds to local governments for certain types of projects that facilitate the principles and goals of Smart Growth. These Priority Funding Areas (PFA) essentially impose state conditions on the state grants to local grants. A similar system could be devised that conditions state funds to local governments in dynamic real estate markets on the ability of the local government to institute a range of permit streamlining initiatives (e.g., technology and/or conflict resolution strategies).

Another potential state role is through the housing elements of comprehensive plans. In those states, such as California, that require comprehensive land use plans, the state could establish criteria on permit streamlining approaches for local governments to integrate within their housing elements. Comprehensive planning and housing element already establish affordable housing goals, so it would seem logical they could require adoption of relevant permit streamlining strategies.

Several states provide matching technical assistance grants to local governments for different planning tasks, such as Wisconsin's Department of Administration that annually provides about $3 million to local government to draft comprehensive plans. States could provide local governments with technical assistance dollars to upgrade and retrofit their development permit systems. These state grants could establish a range of performance criteria for permit processing based on the size and capacity of the local jurisdiction—what might work in a large city with fast growth would be vastly different from a small, rural town or a city struggling with blight and abandonment.

Local Government Policies and Practices

What measures can local government employ to reduce the costs of environmental compliance and delay?

Local governments can also play a role in reducing the costs associated with environmental regulation compliance. One method may be to ensure continuity between regulations and minimize areas overlap and conflict. While this may be beyond their control, such as in instances involving compliance with state or federal regulations, local governments can work within their own system to eliminate competing regulations. This may also assist in identifying conflicting state and federal regulations and be used to encourage the respective agencies to reconcile these differences.

Reconciling Competing Regulations Can Further Reduce Environmental Regulatory Costs
Local governments could help to reduce costs associated with environmental regulations and delays by taking affirmative steps to reconcile duplicative and conflicting environmental regulations. We found in this study that regulatory delays can be minimized by collaborative review by multiple agencies and when developers sought multiple approvals concurrently. For example, Table 5 in chapter 4 shows that wetlands permitting required by three separate agencies would have required at long as 38 months for review and approval if done sequentially, but took 16 months because it was done collaboratively and concurrently.

In Fairfax County, where the planners orchestrate environmental protection through the rezoning or proffer system, the builder in the pilot study received development approvals in roughly half the time of a similar sized project in Montgomery County. Rezoning and environmental reviews by planners in Fairfax seemed less contentious and adversarial. While Virginia and Maryland mandate similar environmental requirements in limited areas such as wetlands and stormwater, Montgomery County seemed to have multiple departments setting and interpreting special environmental regulations, and this added to the time for review and approval.

Adapt and Develop Infill Specific Regulation

Local governments should develop specific environmental requirements for infill sites, especially in areas where "build out" will soon be or has been achieved. Infill sites often have more unique characteristics, making it more difficult and time consuming, and therefore more costly, to develop under the current environment regulations and review procedures. By creating regulations allowing for density bonuses, facilitating more efficient and effective infill projects, and streamlining the review process for infill sites, localities may help developers reduce their overall project costs for complying with environmental regulations.

The Regulatory Cost Inventory

There may be an alternative approach to improve regulatory processes and the conditions they impose at least during the interim before research provides important information. It is the concept of an audit-like inventory. Audits are used in many contexts but perhaps the best known is in accounting based on generally accepted accounting practices. Audits of environmental conditions affecting sites are common, such as environmental assessments of brownfields and other developed sites to determine environmental remediation needs. Within the context of green building, the LEED process now established energy efficient standards and is moving towards broader site characterization and land use planning goals under LEED-ND.

The idea of a **regulatory cost inventory** or audit would be a new application of the concept intended to assess the regulatory burden on the development process. It would be devised by a panel whose members would include those knowledgeable of comparative regulatory processes, housing and/or urban economics and finance, environmental engineering, landscape architecture, ecology/environmental analysis, and others who can inform the process to be described. Like most audits, it would be intended to reveal the costs and benefits of the regulatory processes, and lead to a set of **best practices and standards** addressing each area of environmental concern along several dimensions:

1. Cataloging the nature of particular environmental concerns such as stormwater drainage, habitat preservation, tree preservation and enhancement, soil erosion and sedimentation, and so forth that would be applicable to a wide range of residential developments and mixed-use developments that have housing components.
2. Identifying and specifying through descriptions, drawings/diagrams and other means the appropriate range of development and design responses to each of the environmental concerns.
3. Framing the regulatory review process needed to address each concern, including the reasonable time needed to provide public review, and the extent to which discretion may be needed.
4. Determining where multiple environmental concerns may be addressed by the same review function, discipline, and group of design solutions.
5. Characterizing an over-arching administrative process that implements the above four elements in a reasonably efficient manner that nonetheless accords discretion to unusual or complex cases.

The work outlined above would lead to a publication on standards and guidelines not too dissimilar from the *Time-Saver Standard* series of technical reference books for architecture, urban design and planning published by Wiley and Sons. The publication, however, would include important auditing features that would allow local governments – or others – to assess current environmental regulatory processes and conditions in relation to the standards and thus identify area for improvement. The standards and guidelines would allow local governments to establish benchmarks to measure the effectiveness and efficiency of their own procedures and requirements. This may result in changes that move current practices towards more efficient and efficacious outcomes – and create the potential for some to advertise that their processes are better than the standards.

This approach need not wait for research to fully inform refinements or reforms needed to reduce potentially adverse effects of environmental regulations, processes and conditions on housing affordability. It could result in a kind of LEED-based rating system from platinum to lower grades of metal that may induce some local governments to aspire to higher ratings. The ratings themselves may over time be used by Federal and state agencies to allocate scarce resources on the basis of audit performance. HUD may wish to explore how such a system of standards and practices may be assembled, who should be involved, and how it may be used to inform local governments, states, and Federal agencies.

Outstanding Research Questions and Next Steps

As May (2005) notes, there are important gaps in understanding how environmental and other regulations influence the time-to-approval process and especially the cost of housing. There are also important limitations in linking regulation per se – and in the context of this research, environmental regulations – on housing prices and housing affordability. On the one hand, most studies to date rely heavily on what developers report as their concerns, which creates bias in the survey outcomes. On the other, estimates of the costs associated with regulatory burdens are imprecise – and given their source (developers) perhaps biased. Some estimates appear to lump together costs of administrative burdens with legitimate regulatory conditions which make it

difficult to fairly assign regulatory inefficiencies. Our experience with the Pilot Case study confirmed many of these observations. We were surprised to discover that accounting practices for even a large scale residential builder did not specifically track environmental costs and distinguish them from other development costs. Finally, it is difficult to generalize findings to broader, national impacts on housing supply and affordability.

HUD and other Federal agencies can sponsor new research in this area. The following four avenues of research can help close these important gaps in understanding and lead to more informed regulatory processes. The first two are the most salient

1. *Understanding the True Costs of Regulatory Process Barriers to the Availability and Affordability of Housing.* Research on these topics is limited to case studies in selected jurisdictions based on particular housing types. The solution requires systematic data collection for a sample of jurisdictions and development types across the country.
2. *Understanding the Balance between the Economic, Social and Environmental Benefits of Environmental Regulations and the Cost Impacts on Housing.* Do the costs of regulations exceed the benefits they provide? Regulatory barriers do increase the cost of housing but they also provide benefits to the environment and society. Research is needed to assess the economic, social, and environmental costs and benefits of environmental and other regulations.
3. *Understanding the Effects of Regulatory Practices for Areas other than Regulation of Building Safety.* Much of the current understanding of the effect of different regulatory processes on housing production and prices are based on building regulation studies. Whether the insights from such research apply to environmental, land use and other forms of regulation is not clear.
4. *Understanding Lesser-Studied Aspects of Regulatory Processes.* There has been little attention paid to estimating the relative effects of environmental regulations, non-environmental regulations, citizen opposition to housing projects, land and development costs, and other factors affecting housing affordability.

Research in each area would close important gaps in data and especially create a credible – rather than biased and anecdotally-based – body of knowledge on the relationship between regulation per se and especially environmental regulation and housing affordability. Such needed research may take years to accumulate, but it is necessary to move beyond the status quo in the meantime. While that research is conducted, communities could initiate the regulatory auditing process described above.

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APPENDIX A
Templates Used for the Pilot Study

The criteria listed below served as the basis for inventorying the development projects used in the pilot case study. The criteria list may be more inclusive than what is shown in the project descriptions because:

- The projects may not have all of the criteria listed.
- Not all of the information in the criteria was available.
- Some of the items may have been changed to protect the identity of the developer.

ENVIRONMENTAL REGULATIONS AFFECTING PROJECT			
	(Check all that apply)		
Environmental Regulation/Review	**Federal**	**State**	**Local**
Wetlands permitting			
Endangered species habitat conservation			
Flood plain			
Stormwater			
Wastewater treatment			
Other nonpoint water quality			
Erosion and sediment control			
Coastal zone storm water management			
Sensitive area management			
Resource water protection			
Agricultural land protection			
Open space set-aside			
Urban forestry			
Tree preservation			
Landscaping			
Noise			
Archeological review			
Impact fees for environmental measures			
Proffers for environmental measures			
Other financial payments for environmental measures			
Other (specify)			

BACKGROUND PROJECT CHARACTERISTICS	
General Features	**Figure**
Total Size (acres)	
Proposed Development	
Open Space (acres)	
Net Development (acres)	
Residential	
Detached Units	
Detached Land Area (acres)	
Minimum Price Intended	
Maximum Price Intended	
Weighted Average Price Intended	
Attached Units - For Sale	
Attached Land Area (acres)	
Minimum Price Intended	
Maximum Price Intended	
Weighted Average Price Intended	
Attached Units - For Rent	
Attached Land Area (acres)	
Minimum Rent Intended	
Maximum Rent Intended	
Weighted Average Rent Marketed	
Nonresidential Structures	
Land Area (acres)	
Size (square feet)	
Approved Development	
Open Space (acres)	
Net Development (acres)	
Detached Units	
Detached Land Area (acres)	
Minimum Price Marketed	
Maximum Price Marketed	
Weighted Average Price Marketed	
Attached Units - For Sale	
Attached Land Area (acres)	
Minimum Price Marketed	
Maximum Price Marketed	
Weighted Average Price Marketed	
Attached Units - For Rent	
Attached Land Area (acres)	
Minimum Rent Marketed	
Maximum Rent Marketed	
Weighted Average Rent Marketed	
Nonresidential Structures	
Land Area (acres)	
Size (square feet)	

DEVELOPMENT REVIEW		
Overall Process	**Month and Year**	**Cumulative Months in Review**
First Official Filing		0
Amending Filing		
Project Entitlement		
Complexity	**Review Steps**	**Decision Needed (check)**
Local		
	Plan Amendment	
	Zone Change	
	Conditional Use	
	Variance	
	Subdivision	
	Site Plan Review	
	Other (specify)	
	Appeal to Planning Commission	
	Appeal to Governing Body (Elected Board)	
	Appeal to Lower State Court	
	Appeal to Higher State Court	
Multi-Jurisdictional		
	Development of Regional Impact	
	Federal Environmental Impact Assessment	
	State Environmental Impact/Review Assessment	
	Other (specify)	
	Appeal to Planning Commission	
	Appeal to Governing Body (Elected Board)	
	Appeal to Lower State Court	
	Appeal to Higher State Court	

ESTIMATED ENVIRONMENTAL REGULATION COST	
Overall Project	**Figure**
Anticipated Environmentally-Related Costs for Project	
Actual/Estimated Environmentally-Related Costs for Project	
Environmental Feature (all in excess of clear and objective standards otherwise contained in relevant codes, ordinances, rules, etc.)	**Cost Per Detached Unit Approved**
Wetlands permitting	
Endangered species habitat conservation	
Flood plain	
Stormwater	
Wastewater treatment	
Other nonpoint water quality	
Erosion and sediment control	
Coastal zone storm water management	
Sensitive area management	
Resource water protection	
Agricultural land protection	
Open space set-aside	
Urban forestry	
Tree preservation	
Landscaping	
Impact fees for environmental measures	
Proffers for environmental measures	
Other financial payments for environmental measures	
Other (specify)	
Total	$0

APPENDIX B

Environmental Policies of Fairfax County, Virginia and Montgomery County, Maryland

This Appendix inventories environmental regulations affecting new residential subdivisions in Fairfax County, Virginia and Montgomery County, Maryland, in effect during 2006. Not all subdivisions need to comply with all regulations in either county but both the staff and developer review to extent to which each regulation applies and if so how it may be addressed. Fairfax County is inventoried first followed by Montgomery County. For each, the statewide requirements are shown first, followed by the specific countywide applications.

Virginia

Virginia Chesapeake Bay Preservation Act[95]

The Act requires the following elements be part of a local Chesapeake Bay preservation program:

1. A map delineating Chesapeake Bay Preservation Areas
2. Performance criteria applying in Chesapeake Bay Preservation Areas that will become mandatory on the local program adoption date. This criteria will:
    a. Prevent a net increase in nonpoint source pollution from new development and development on previously developed land where the runoff was treated by a water quality protection best management practice
    b. Achieve a 10 percent reduction in nonpoint source pollution from development on previously developed land where the runoff was not treated by one or more water quality best management practices
    c. Achieve a 40 percent reduction in nonpoint source pollution from agricultural and silvicultural uses
3. A comprehensive plan or revision that incorporates the protection of Chesapeake Bay Preservation Areas and of the quality of state waters and ensures consistency between the Act and the local comprehensive plan
4. A zoning ordinance or revision that
    a. Incorporates measures to protect the quality of state waters in Chesapeake Bay Preservation Areas, ensuring their consistency with the Act; and
    b. Requires compliance with all criteria set forth in Part 2 above
5. A subdivision ordinance or revision that
    a. Incorporates measures to protect the quality of state waters in Chesapeake Bay Preservation Areas, ensuring their consistency with the Act; and
    b. Requires compliance with all criteria set forth in Part 2 above
6. An erosion and sediment control ordinance or revision that requires compliance with the criteria in Part 2 above

[95] "Regs3-01-02" available at www.cblad.virginia.gov/docs/Regs3-01-02.pdf (July 2006)

7. A plan of development process prior to the issuance of a building permit to assure that use and development of land in Chesapeake Bay Preservation Areas is accomplished in a manner that protects the quality of state waters.

Virginia Chesapeake Bay Preservation Act – Area Designation and Management Regulations[96]

Designation Criteria for Chesapeake Bay Preservation Areas

- Resource Protection Areas (RPA) (sensitive areas with intrinsic water quality value)
    - Tidal wetlands
    - Non-tidal wetlands connected to tidal wetlands
    - Tidal shores
    - Other lands with intrinsic water quality value
    - Buffer areas at least 100 feet landward of above areas and on both sides of perennial streams
- Resource Management Areas (RMA) (areas outside of RPA with potential water quality impacts)
    - Floodplains
    - Highly erodible soils
    - Steep slopes
    - Highly permeable soils
    - Non-tidal wetlands no included in RPA
    - Other lands necessary to protect water quality
- Intensively Developed Areas (IDA) (developed areas as an overlay to CBPA available for redevelopment where little natural environment remains)
    - Existing development has more than 50 percent impervious cover, or
    - Public water and sewer or constructed stormwater drainage system currently serves the area, or
    - Housing density greater than or equal to four dwelling units per acre
- Performance Criteria for Chesapeake Bay Preservation Areas
- Generalized Performance Criteria
    - Minimize
        - land disturbance
        - indigenous vegetation removal
        - impervious cover
    - Maximize rainwater infiltration
    - Ensure long-term performance of BMPs
    - Land disturbance exceeding 2,500 square feet requires plan of development review and erosion and sediment control compliance
    - New septic systems to have reserve system equal to primary system
    - Post-development non-point source runoff load shall not exceed pre-development, redevelopment requires additional 10 percent reduction if no existing BMPs
    - Evidence of wetlands permits, if required

[96] For additional information, see www.cblad.virginia.gov/docs/Regs3-01-02.pdf (July 2006)

- Additional requirements for RPAs
    - Only water-dependent development in RPA or redevelopment of existing development allowed
    - Buffer requirements
        - 100 feet of vegetation effective in retarding runoff, preventing erosion, filtering non-point source pollution
        - If none present, reestablish to provide woody vegetation that assures the buffer functions
    - Buffer maintenance required
    - If buffer preclude prior buildable lot, buffer may be reduced if reduction minimized (but no more than 50 feet) and additional buffer provided elsewhere on lot
    - Redevelopment within IDA may be exempt from additional buffer requirement but consideration should be given to establishing buffer over time.
    - Water quality assessment required demonstrating compliance with the program's established goals and requirements

Virginia Erosion and Sediment Control Law[97]

A program and regulations shall be developed for the effective control of soil erosion, sediment deposition, and nonagricultural runoff to prevent the unreasonable degradation of properties, stream channels, waters, and other natural resources.

The regulations shall:

- Be based upon relevant physical and development information such a
    - Land use
    - Soils
    - Hydrology
    - Geology
    - Size of land area being disturbed
    - Proximate water bodies and their characteristics
    - Transportation
    - Public facilities and services
- Include a survey of lands with critical erosion and sediment problems
- Contain conservation standards for various types of soils and land uses for the control of erosion and sediment resulting from land-disturbing activities
- Establish minimum standards of effectiveness, with review criteria and procedures, for erosion and sediment control programs
- Regulated land-disturbing activities
- No person may engage in any land disturbing activity until an erosion and sediment control plan has been submitted and approved
- An agreement may be substituted for a plan for the construction of a single family residence.

[97] For additional information, refer to www.dcr.virginia.gov/sw/docs/eslawrgs.pdf (July 2006)

In order to prevent further erosion, a local program may require approval of a conservation plan for any land identified in the as an erosion impact area

Minimum Standards

- Permanent or temporary soil stabilization shall be applied to denuded areas within seven days after final grade is reached
- Temporary soil stabilization shall be applied within seven days to denuded areas that may not be at final grade by will remain dormant longer than 30 days
- Permanent stabilization shall be applied to areas to be left dormant for more than one year
- Soil stockpiles and borrow areas shall be stabilized or protected with sediment trapping measures
- Permanent vegetative cover shall be established on denuded areas not otherwise permanently stabilized
- Sediment basins and traps, perimeter dikes, sediment barriers, and other measures intended to trap sediment shall be constructed prior to any land-disturbing activity
- Stabilization measures shall be applied to earthen structures immediately after installation
- Sediment traps and basins shall be designed and constructed based upon total drainage area to be served
    - Minimum storage capacity for a sediment trap is to be 134 cubic yards per acre of drainage area and no trap shall control more than three acres
    - Minimum storage capacity for a sediment basin shall be 134 cubic yards per acre of drainage area and the outfall system shall maintain structural integrity during a 25-year storm of 24-hour duration
- Cut and fill slopes shall be designed and constructed to minimize erosion
- Concentrated runoff shall only flow down cut or fill slopes in an adequate temporary or permanent channel, flume, or slope drain structure
- Water seeps shall be protected
- Storm sewer inlets operable during construction shall be protected to prevent sediment-laden water from entering the system
- Adequate outlet protection and temporary or permanent channel lining shall be installed prior to new stormwater channels or pipes are made operational
- Work in a watercourse shall minimize encroachment, control sediment transport, and stabilize the work are to the greatest extent possible
- Temporary vehicular stream crossings must be constructed for any watercourse crossed by construction vehicles more than twice in a six month period
- Bed and banks of a watercourse shall be stabilized immediately after work in the watercourse is completed
- Underground utilities shall be installed in accordance with the follow standards:
    - No more than 500 linear feet of trench may be opened at one time
    - Excavated material shall be placed on the uphill side of trenches
    - Effluent from dewatering operations shall be filtered or passed through a sediment trapping device
    - Backfilled trenches shall be properly compacted to minimize erosion and promote stabilization

- Provisions shall be made to minimize the transport of sediment by vehicles onto paved roads. Roads where sediment deposition occurs shall be cleaned thoroughly at the end of each day
- Temporary erosion and sediment control measures shall be removed within 30 days after final site stabilization
- Properties and waterways downstream from development sites shall be protected from sediment deposition, erosion and damage due to increases in volume, velocity, and peak flow rate for the stated frequency storm of 24-hour duration in accordance with the following criteria:
    - Concentrated stormwater runoff shall be discharged into an adequate receiving channel, pipe, or storm sewer system. Downstream stability analyses at the outfall of the pipe or pipe system must be completed
    - Adequacy of all channels and pipes shall be verified by:
        - Demonstrating the total drainage area to the point of analysis within the channel is 100 times greater than the contributing drainage area of the project
        - Channels, pipes, and storm sewers will be analyzed to verify stormwater will not overtop channel banks nor cause erosion of channel bed or banks and will be contained within the pipe or system:
            - Natural channels shall use the two-year storm
            - Man-made channels, pipes, and storm sewer systems shall use the 10-year storm
    - Existing natural channels or man-made channels or pipes that are found to be inadequate shall do one of the following:
        - Improve to prevent a 10-year storm from overtopping the banks and a two-year storm will not cause erosion
        - Improve the pipe or pipe system to contain the 10-year storm
        - Develop a site design that will not cause the pre-development peak runoff rate storm to increase
        - Provide a combination of channel improvement, stormwater detention, or other measures to prevent downstream erosion
    - All hydrologic analyses shall be based on the existing watershed characteristics and the ultimate development of the project
    - A maintenance plan shall be set forth that designates requirements and responsible parties for projects including stormwater detention facilities
    - Energy dissipaters shall be placed at the outfall of all detention facilities as necessary to provide stabilized transition from facility to receiving channel
    - All on-site channels must be verified as adequate
    - Increased volumes of sheet flows causing erosion or sedimentation on adjacent property shall be diverted to a stable outlet, adequate channel, pipe or pipe system, or to a detention system
    - The development as a whole shall be considered to be a single development project
    - All measures to protect properties and waterways shall be employed in a manner minimizing impacts on the physical, chemical, and biological integrity of rivers, streams, and other waters of the state.

- All erosion and sediment control structures and systems shall be maintained, inspected and repaired as needed to insure continued performance of their intended function. A statement describing the maintenance responsibilities shall be included in the approved erosion and sediment control plan.
- An erosion and sediment control plan shall be filed for a development and the buildings constructed within, regardless of the phasing of construction
- Land-disturbing activities of greater than 10,000 square feet are required to complete an erosion and sediment control plan
- Land-disturbing activity of less than 10,000 square feet on individual residential lots shall not be considered exempt if the total land-disturbing activity of the development is 10,000 square feet or greater
- If a plan is not implemented within 180 days of approval, or land-disturbing activity ceases for 180 days, the erosion and sediment control plan is subject to re-evaluation and possible modification

Virginia Erosion and Sediment Control Handbook[98]

For an erosion and sediment control program to be successful, the provisions for control measures need to be made in during the planning process. These measures, when properly implemented, help to ensure and orderly development process while minimizing environmental degradation. The following principles should be instituted to the maximum extent possible on all projects:

- Plan the development to fit the particular topography, soils, drainage patterns, and natural vegetation of the site.
- Minimize the extent of the area exposed at one time and the duration of the exposure
- Apply erosion control practices to prevent excessive on-site damage
- Apply perimeter control measures to protect disturbed are from off-site runoff and to prevent sedimentation damage to areas below the development site
- Keep runoff velocities low and retain runoff on the site
- Stabilize disturbed areas immediately after final grade has been attained
- Implement a thorough maintenance and follow-up program

Virginia Stormwater Management Law[99]

The lands and waters of the Commonwealth are great natural resources. As a result of intensive land development and other land use conversion, degradation of these resources frequently occurs via water pollution, stream channel erosion, depletion of groundwater resources, and more frequent localized flooding. These impacts adversely affect fish, aquatic life, recreation, shipping, property values, and other uses of lands and waters. It is in the public interest to enable the establishment of stormwater management programs.

Development of regulations

[98] For additional information, refer to www.dcr.virginia.gov/sw/e&s-ftp.htm (August 2006)
[99] For additional information, refer to www.state.va.us/dcr/sw/docs/VAswmlaw.PDF (August 2006)

- State and local programs are required to maintain pre-development runoff characteristics as the post-development runoff rate of flow
- Establish minimum design criteria for measure to control nonpoint source pollution and localized flooding
- Require the provision of long-term responsibility for and maintenance of stormwater management control devices
- Localities may adopt more stringent stormwater management regulations based upon the findings of local comprehensive watershed management studies and subject to a public hearing

Regulated activities

- After the adoption of a local ordinance, until a stormwater management plan has been submitted and approved:
    - A person shall not develop any land for residential, commercial, industrial, or institutional use
    - No grading, building, or other permit shall be issued
- Activities exempt from regulation include:
    - Single family residences separately built and not part of a subdivision, including additions or modifications to existing single family detached residential structures
    - Land development projects that disturb less than one acre of land area

Virginia Stormwater Management Regulation[100]

The state regulation provides a framework for enforcing the Virginia Stormwater Management Law while providing flexibility for innovative solutions to stormwater management issues.

Technical criteria for local stormwater management programs:

- Determination of flooding and channel erosion impacts to receiving streams due to land development projects shall be measured at each point of discharge and include any runoff contributing to the discharge
- Outflows from a stormwater management facility shall be discharged to an adequate channel and velocity dissipaters shall be placed at the outfall of all stormwater management facilities and along the length of any outfall channel as necessary to provide a nonerosive velocity of flow
- Proposed residential, commercial, or industrial subdivisions shall apply these criteria to the land development as a whole
- Individual lots in new subdivisions shall not be considered separate land development projects but rather the entire subdivision shall be considered a single land development project.
- All stormwater management facilities shall have a maintenance plan identifying the owner and responsible party for carrying out the maintenance plan

[100] For additional information, refer to www.state.va.us/dcr/sw/docs/VAswmregs.PDF (August 2006)

- Construction of stormwater management impoundment structures within the 100-year floodplain shall be avoided to the extent possible.
- Natural channel characteristics shall be preserved to the maximum extent practicable
- Land development projects shall comply with the Virginia Erosion and Sediment Control Act

Compliance with water quality criteria may be achieved by applying performance-based or technology-based criteria to either the site or a planning area

Performance-based criteria:

- Calculated post-development nonpoint source pollutant runoff load shall be compared to the calculated pre-development load
- A BMP shall be located, designed, and maintained to achieve target pollutant removal efficiencies to effectively reduce pollutant load such that one of the following conditions is met:
    - No reduction in the after development pollutant discharge is required
    - The pollutant discharge post-development shall not exceed the pre-development discharge based on the average land cover condition
    - The pollutant discharge post-development shall not exceed:
        - The pollutant discharge based on pre-development conditions less 10 percent; or
        - The pollutant discharge based on the average land cover, which ever is greater.
    - The pollutant discharge post-development shall not exceed the existing pollutant discharge based on the existing percent impervious cover while served by the existing properly designed and functioning BMP.

Technology-based criteria:

- Post-development stormwater runoff from impervious cover shall be treated by an appropriate BMP as required by the post-development condition percent impervious cover present in the following table:

Water Quality BMP	Target Phosphorous Removal Efficiency (percent)	Percent Impervious Cover
Vegetated filter strip	10	16-21
Grassed swale	15	
Constructed wetlands	30	22-37
Extended detention	35	
Retention basin I	40	
Bioretention basin	50	38-66
Bioretention filter	50	
Extended detention-enhanced	50	
Retention basin II	50	
Infiltration	50	
Sand filter	65	67-100
Infiltration	65	

Retention basin III	65	

Stream channel erosion protection

- Properties and receiving waterways downstream of any land development project shall be protected from erosion and damage due to increases in volume, velocity, and peak flow rate of stormwater runoff
- Some watersheds or receiving stream systems require enhanced criteria in order to address the increased frequency of bankfull flow conditions brought on by land development projects, which shall therefore provide 24-hour extended detention of the runoff generated by the 1-year, 24-hour storm
- Localities may adopt more stringent channel analysis criteria or design standards to ensure the natural level of channel erosion will not increase due to land development projects. These criteria may include:
    - Criteria and procedures for channel analysis and classification
    - Procedures for channel data collection
    - Criteria and procedures for the determination of the magnitude and frequency of natural sediment transport loads
    - Criteria fro the selection of proposed natural or man-made channel linings

Flooding

- Downstream properties and waterways shall be protected from damages from localized flooding due to increases in volume, velocity, and peak flow rate of stormwater runoff
- The 10-year post-development peak rate of runoff shall not exceed the 10-year pre-development peak rate of runoff
- Localities may adopt alternate design criteria based up geographic, land use, topographic, geologic factors or other downstream conveyance factors
- Linear development projects shall not be required to control post-developed stormwater runoff for flooding except where watershed or regional stormwater management plans apply

Regional stormwater management plans

- Localities may develop regional stormwater management plans to more economically and efficiently plan address runoff concerns.3

Technical criteria for local programs

- Local programs may base quality criteria on:
    - Existing land use data at time of local Chesapeake Bay Preservation Act Program or stormwater management program adoption
    - Watershed or locality size

Virginia Code – Tree Replacement[101]

Any locality with a population density of at least 75 persons per square mile may adopt an ordinance providing for the planting and replacement of trees during the development process such that:

- The site plan for any subdivision or development include the planting or replacement of trees on the site to the extent that, at 20 years, minimum tree canopies and covers will be provided as follows:
    - 10 percent tree canopy for a site zoned business, commercial, or industrial
    - 10 percent tree canopy for a residential site zoned 20 or more units per acre
    - 15 percent tree canopy for a residential site zoned more than 10 but less than 20 units per acre
    - 20 percent tree canopy cover for a residential site zone 10 units or less per acre
- Existing trees that are to be preserved may be included to meet all or part of the canopy requirements if the trees meet standards of desirability and life expectancy

Virginia Administrative Code – Wetlands Policy[102]

Virginia water resource policy must be based upon the following broad precepts of natural and man-made law and must recognize natural conditions and the distribution of growth of Virginia's population and industry:

- Floodplains are the natural relief mechanism for surface streams
- Quality of surface flow is, to a degree, dependent upon quantities of flow, natural pollution sources and, in part, activities of man
- Development and use of water resources should be based on sound planning
- Water resources use is affected by and affects land resource management, population, and economic growth
- For the maximum social and economic benefits to all citizens, Virginia must act to protect its water resources and the ecosystems dependent upon them from unnecessary pollution, degradation, or destruction. The needs of Virginia's citizens for water resources should be met in such a manner as to preserve these water related environments to the greatest possible degree
- Potential sites for reservoirs for flood control and water supply are limited and the need for their preservation must be recognized by the Commonwealth so that their use for these purposes, if it is consistent with ecological and scenic considerations, will not be precluded by uncontrolled development on these sites

The State Water Control Board has established the following Water Resource Policies:

- Assure water quality and quantity needs are met consistent with the responsibility to protect natural values of water resources

[101] For additional information, refer to http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+15.2-961 (August 2006)
[102] For additional information, refer to http://leg1.state.va.us/000/reg/TOC09025.HTM#C0380 (August 2006)

- Protect wetlands
- Minimize hazards from floods to human life, economic, and natural values
- Evaluate the effect of projects and structures on
    - Future water resource use and project operation
    - Man-made historic and natural environments
    - Local, regional, and statewide land use plans and growth policies
- Minimize the bureaucratic process in order to facilitate cost effective implementation of water resources policy
- Promote technological innovations and be responsive to the institution of such advancements

Code of Virginia – Standards for use and development of wetlands[103]

The following standards shall apply to the use and development of wetlands and shall be considered when granting or denying a permit:

- Wetlands of primary ecological significance shall not be altered so that the ecological systems are unreasonably disturbed
- When any activity authorized by a permit issued pursuant to this chapter is conditioned upon compensatory mitigation for adverse impacts to wetlands, the applicant may be permitted to satisfy all or part of such mitigation requirements by the purchase or use of credits from any wetlands mitigation bank, including any banks owned by the permit applicant, that has been approved and is operating in accordance with applicable federal and state guidance, laws, or regulations for the establishment, use and operation of mitigation banks as long as:
    - the bank is in the same U.S.G.S. cataloging unit, as defined by the Hydrologic Unit Map of the United States (U.S.G.S. 1980), or an adjacent cataloging unit within the same river watershed, as the impacted site, or it meets all the conditions found in clauses (i) through (iv) and either clause (v) or (vi) of this subsection;
    - the bank is ecologically preferable to practicable on-site and off-site individual mitigation options, as defined by federal wetland regulations; and
    - the banking instrument, if approved after July 1, 1996, has been approved by a process that included public review and comment.
- When the bank is not located in the same cataloging unit or adjacent cataloging unit within the same river watershed as the impacted site, the purchase or use of credits shall not be allowed unless the applicant demonstrates to the satisfaction of the Commission that:
    - the impacts will occur as a result of a Virginia Department of Transportation linear project or as the result of a locality project for a locality whose jurisdiction crosses multiple river watersheds;
    - there is no practical same river watershed mitigation alternative;
    - the impacts are less than one acre in a single and complete project within a cataloging unit;

[103] For additional information, refer to http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+28.2-1308 (August 2006)

- there is no significant harm to water quality or fish and wildlife resources within the river watershed of the impacted site; and either
- impacts within the Chesapeake Bay watershed are mitigated within the Chesapeake Bay watershed as close as possible to the impacted site or
- impacts within U.S.G.S. cataloging units 02080108, 02080208, and 03010205, as defined by the Hydrologic Unit Map of the United States (U.S.G.S. 1980), are mitigated in-kind within those hydrologic cataloging units, as close as possible to the impacted site. After July 1, 2002, the provisions of clause
- shall apply only to impacts within subdivisions of the listed cataloging units where overlapping watersheds exist, as determined by the Department of Environmental Quality, provided the Department has made such a determination by that date.

Fairfax County

Fairfax County Chesapeake Bay Ordinance[104]

Designation Criteria for Chesapeake Bay Preservation Areas

- Resource Protection Areas (RPA) (sensitive areas with intrinsic water quality value)
  - Tidal wetlands
  - Tidal shores
  - Water body with perennial flow
  - Non-tidal wetlands connected to tidal wetlands or to a water body with perennial flow
  - Buffer areas
    - at least 100 feet landward of above areas
    - any land within major floodplain
- Resource Management Areas (RMA) (areas outside of RPA with potential water quality impacts)
  - Any area not designated as an RPA
    - Floodplains
    - Highly erodible soils
    - Steep slopes
    - Highly permeable soils
    - Other lands necessary to protect water quality
- Intensively Developed Areas (IDA) (developed areas as an overlay to CBPA available for redevelopment where little natural environment remains)
- Performance Criteria for Chesapeake Bay Preservation Areas
- Generalized Performance Criteria
  - Prevent a net increase of non-point source pollution
  - Achieve a 10 percent reduction in non-point source pollution from redevelopment
  - Minimize
    - land disturbance
    - indigenous vegetation removal
    - impervious cover
  - Maximize rainwater infiltration
  - Ensure long-term performance of BMPs
  - Development and redevelopment projects shall employ BMPs to control stormwater runoff to reduce projected phosphorous loading by 40 percent (development) or 10 percent (redevelopment)
  - BMPs of adjacent projects may be combined to satisfy water quality protection requirements
  - Land disturbance exceeding 2,500 square feet requires plan of development review and erosion and sediment control compliance
  - New septic systems to have reserve system equal to primary system

[104] For additional information, see www.fairfaxcounty.gov/dpwes/environmental/cbay/ch118final.pdf (July 2006)

- Post-development non-point source runoff load shall not exceed pre-development, redevelopment requires additional 10 percent reduction if no existing BMPs
- Wetlands permits, if required, shall be procured prior to commencement of land disturbing activities

- Additional requirements for RPAs
  - Water quality assessment required demonstrating compliance with the program's established goals and requirements
  - Only water-dependent development in RPA or redevelopment of existing development allowed
  - Buffer requirements
    - Vegetation effective in retarding runoff, preventing erosion, filtering non-point source pollution
    - Indigenous vegetation may be removed (subject to approval) to provide for reasonable sight lines, access paths, general woodlot management, and habitat management
    - If none present, reestablish with mixture of overstory trees, understory trees, shrubs, and groundcovers to provide woody vegetation that assures the buffer functions
  - Buffer maintenance required
  - If buffer preclude prior buildable lot, buffer may be reduced if reduction minimized (but no more than 50 feet) and additional buffer provided elsewhere on lot
  - Redevelopment within IDA may be exempt from additional buffer requirement but consideration should be given to establishing buffer over time.

Fairfax County Code Erosion and Sediment Control[105]

Section 104-1-8. Conservation standards.

(a) *Conservation standards* or *standards* shall be the State Erosion and Sediment Control Regulations and the Standards & Specifications as contained in the current Virginia Erosion and Sediment Control Handbook with modifications as follows:

(1) *Standard & Specification #3.04 Straw Bale Barriers*-- Rebars are not to be used to stake these barriers. Straw bales are to be used only for sheet flow application; they are not to be used for any drainageway, or channel flow applications or site development perimeter control.

(2) *Standard & Specification #3.06 Brush Barrier*-- This practice is not to be used without the specific authorization of the Director.

(3) *Standard & Specification #3.07 Storm Drain Inlet Protection*-- Any storm drain inlet protection measure which completely blocks the drain throat or entrance is not to be used.

[105] For additional information, see http://library1.municode.com:80/mcc/home.htm?view=home&doc_action=setdoc&doc_keytype=tocid&doc_key=d3c3fb51159f38f005eb7292245fe227&infobase=10051 (November 2006)

Straw bales and cinder block wrapped with filter fabric are not to be used for curb inlet protection.

(4) *Standard & Specification #3.13 Temporary Sediment Trap*-- For land areas designated as Resource Protection Areas (RPAs), the storage volume shall be two hundred two (202) cubic yards per acre of disturbed area. Pipe outlet sediment traps shall be required for drainage areas of one (1) to three (3) acres. For land areas designated as RPAs, pipe outlet sediment traps may also be required for areas of less than one (1) acre where topographical and drainage conditions are favorable for field implementation (see Plate 2-11 of the current *Public Facilities Manual* for details). Stone outlets for temporary sediment traps under one (1) acre of drainage area outside of RPAs shall be constructed according to current Virginia Erosion and Sediment Control Handbook specifications.

(5) *Standard & Specification #3.14 Temporary Sediment Basin*-- For land areas designated as RPAs, the storage volume shall be two hundred two (202) cubic yards per acre of disturbed area.

(6) *Standard & Specification #3.34 Bermuda Grass and Zoysia Grass Establishment*-- This practice is not to be employed in Fairfax County.

(7) *Standard and Specification #3.38 Tree Preservation and Protection*-- This section is not to be used in Fairfax County. In its place, Article 12, "Vegetation Preservation and Planting," of the *Public Facilities Manual* shall be used.

(8) *Standard & Specification #3.02 Temporary Stone Construction Entrance*-- The minimum length for the temporary gravel construction entrance shall be seventy-five (75) feet and a woven filter fabric underliner is required. If the action of vehicles traveling over the gravel pad is not sufficient to remove the majority of the mud, then a wash rack shall be required with an appropriate water source to wash the mud off the tires before entering the public road.

(9) *Standard & Specification #3.31 Temporary Seeding*-- Temporary seeding and mulching shall be required once an area is denuded for a maximum of fourteen (14) days except for that portion of the site in which work will be continuous beyond fourteen (14) days. For winter stabilization, any area denuded for fourteen (14) days after November 1, shall be seeded and mulched with the appropriate seed mixture as specified in Chapter 3 of the current Virginia Erosion and Sediment Control Handbook.

(10) *Standard & Specification #3.05 Silt Fence*-- Manufacturer's certification shall be required to meet the physical properties given for synthetic filter fabric per the construction specifications as specified in the current Fairfax County Checklist for Erosion and Sediment Control Manual. This certification shall be presented to the Fairfax County inspector prior to installation in the field.

(b) *Authorization for more stringent standards.* The Board of Supervisors is authorized to adopt more stringent soil erosion and sediment control regulations than those necessary to ensure

compliance with the State's minimum regulations. However, this section shall not be construed to authorize the Board of Supervisors to impose any more stringent regulations for plan approval or permit issuance than those specified in Sections 104-1-3 and 104-1-4. (5-82-104; 27-88-104; 15-8-104; 9-90-104; 21-93-104; 38-94-104.)

Fairfax County Wetlands Zoning Ordinance[106]

Section 116-1-3. Permitted uses and activities.

The following uses of and activities in wetlands are authorized if otherwise permitted by law:

(1) The construction and maintenance of noncommercial catwalks, piers, boathouses, boat shelters, fences, duckblinds, wildlife management shelters, footbridges, observation decks and shelters and other similar structures; provided that such structures are so constructed on pilings as to permit the reasonable unobstructed flow of the tide and preserve the natural contour of the wetlands;
(2) The cultivation and harvesting of shellfish, and worms for bait;
(3) Noncommercial outdoor recreational activities, including hiking, boating, trapping, hunting, fishing, shellfishing, horseback riding, swimming, skeet and trap shooting, and shooting on shooting preserves; provided that no structure shall be constructed except as permitted in Subsection (1) of this Section;
(4) Other outdoor recreational activities, provided they do not impair the natural functions or alter the natural contour of the wetlands;
(5) Grazing, haying and cultivating and harvesting agricultural, forestry or horticultural products;
(6) Conservation, repletion and research activities of the Commission, the Virginia Institute of Marine Science, Department of Game and Inland Fisheries and other conservation-related agencies;
(7) The construction or maintenance of aids to navigation which are authorized by governmental authority;
(8) Emergency measures decreed by any duly appointed health officer of a governmental subdivision acting to protect the public health;
(9) The normal maintenance and repair of or addition to, presently existing roads, highways, railroad beds, or facilities abutting on or crossing wetlands, provided that no waterway is altered and no additional wetlands are covered;
(10) Governmental activity in wetlands owned or leased by the Commonwealth, or a political subdivision thereof; and
(11) The normal maintenance of manmade drainage ditches, provided that no additional wetlands are covered. This Subdivision does not authorize the construction of any drainage ditch. (47-88-116; 26-94-116.)

Section 116-1-4. Application for permit.

[106] For additional information, seehttp://library1.municode.com:80/mcc/home.htm?view=home&doc_action=setdoc&doc_keytype=tocid&doc_key=072ee544f5aad889cd2d5e208f616c4a&infobase=10051 (November 2006)

(a) Any person who desires to use or develop any wetland within this County, other than for the purpose of conducting the activities specified in Section 116-1-3, shall first file an application for a permit directly with the wetlands board or with the Commission.

(b) The permit application shall include the following: the name and address of the applicant; a detailed description of the proposed activities; a map, drawn to an appropriate and uniform scale, showing the area of wetlands directly affected, the location of the proposed work thereon, the area of existing and proposed fill and excavation, the location, width, depth and length of any proposed channel and disposal area, and the location of all existing and proposed structures, sewage collection and treatment facilities, utility installations, roadways, and other related appurtenances or facilities, including those on adjacent uplands; a description of the type of equipment to be used and the means of equipment access to the activity site; the names and addresses of owners of record of adjacent land and known claimants of water rights in or adjacent to the wetland of whom the applicant has notice; an estimate of cost; the primary purpose of the project; any secondary purposes of the project, including further projects; the public benefit to be derived from the proposed project; a complete description of measures to be taken during and after the alteration to reduce detrimental offsite effects; the completion date of the proposed work, project, or structure; and such additional materials and documentation as the wetlands board may require.

(c) A nonrefundable application processing fee, in the amount specified by Section 116-2-1, shall accompany each permit application. (47-88-116; 26-94-116; 3-00-116, § 1.)

Section 116-1-10. Grounds for decision of board regarding application.

(a) In deciding whether to grant, grant in modified form, or deny a permit, the Board shall consider the following:

(1) The testimony of any person in support of or in opposition to the permit application.

(2) The impact of the proposed development on the public health, safety and welfare; and,

(3) The proposed development's conformance with standards prescribed in *Code of Virginia,* Section 28.2-1308 and guidelines promulgated pursuant to *Code of Virginia,* Section 28.2-1301.

(b) The Board shall grant the permit if all of the following criteria are met:

(1) The anticipated public and private benefit of the proposed activity exceeds its anticipated public and private detriment.

(2) The proposed development conforms with the standards prescribed in *Code of Virginia,* Section 28.2-1308 and guidelines promulgated pursuant to *Code of Virginia,* Section 28.2-1301.

(3) The proposed activity does not violate the purposes and intent of this Chapter or *Code of Virginia,* Title 28.2, Chapter 13, Section 28.2-1300 et seq.

(c) If the Board finds that any of the criteria listed in Subsection b of this Section are not met, the Board shall deny the permit application but allow the applicant to resubmit the application in modified form. (47-88-116; 26-94-116.)

Fairfax County Code – Subdivision Provisions[107]

ARTICLE 2. Subdivision Application Procedure and Approval Process

(13) *Stormwater quality.* All required Water Quality Impact Assessments, site-specific determinations of water bodies with perennial flow, Resource Protection Area Boundary Delineations and Resource Management Area Boundary Delineations shall be submitted and adequate measures shall be provided in compliance with Chapter 118 of the County Code and the Public Facilities Manual.

(16) *Soil identification and Soil Report.*[108]

(A) Adequate identification of soil characteristics shall be provided in accordance with the requirements of the Public Facilities Manual and the County Code.

(B) Unless waived in accordance with Chapter 107 of the Code, a soil report prepared by or under the direction of a professional engineer experienced in soil and foundation engineering must be submitted for proposed subdivisions located in problem soil areas, which are delineated on the official map adopted by the Board of Supervisors, and for such other proposed subdivisions where special soil or water conditions are deemed by the Director to be potentially injurious, and instances where marine clays and/or swelling and shrinking clays are discovered on the project site.

(C) The required soil report and associated plans, specifications and other documentation must be prepared in accordance with the procedures outlined in the Public Facilities Manual adopted by the Board of Supervisors and must be accompanied by written proof of notification to five (5) adjoining property owners, or all adjoining property owners if there are less than five (5) when the Director deems that the proposed construction or grading in problem soil may adversely impact adjacent properties as a result of unstable slopes, grading or construction methods including, but not limited to, blasting or dynamic compaction. The form of such notice shall be approved by the Director.

[107]For additional information, see http://library1.municode.com:80/mcc/home.htm?view=home&doc_action=setdoc&doc_keytype=tocid&doc_key=37fa96b6612e9138eb52c56d68d96b47&infobase=10051 (November 2006)

[108] The "Guidelines for the Preparation of Geotechnical Studies" have been duly adopted by the Board of Supervisors and are published in the *Public Facilities Manual.*

(17) *Erosion and sediment control.* Adequate erosion and sediment control measures shall be installed in every subdivision in compliance with the requirements of Chapters 104 and 118 of the County Code, Article 11 of the *Public Facilities Manual*, and the current Virginia Erosion and Sediment Control Handbook.

(18) *Vegetation.* Vegetation removal and replacement shall be accomplished in conformance with the requirements of Paragraph (16), *supra*, and with the policies and procedures of the *Public Facilities Manual.*

(21) *Tree cover requirement standards.*

(A) All developments requiring submission and approval of a subdivision plan, except for those controlling subdivision boundary adjustments through which no new lots are created, shall include the preservation and planting of trees on the site to the extent that, at maturity of ten years, minimum tree cover shall be provided as follows:

Zoning Districts	Percentage Cover
Commercial; Industrial; PDC; R-20; R-30; PDH-20; PDH-30; PDH-40; PRM; R-MHP; Medium and high density areas of a PRC District.	10%
R-12; R-16; PDH-12; PDH-16.	15%
R-A; R-P; R-C; R-E; R-1; R-2; R-3; R-4; R-5; R-8; PDH-1; PDH-2; PDH-3; PDH-4; PDH-5; PDH-8; Low density areas of a PRC District.	20%

(B) The tree cover requirement may be met through the preservation of existing trees and/or the planting of trees. Existing trees which are suitable for use in compliance with the provisions of the Public Facilities Manual may and should be used to meet the tree cover requirement. Existing trees which are intended to be preserved and used to meet the tree cover requirement shall be selected in accordance with the Public Facilities Manual, and the area around such existing trees shall be designed so that the existing trees can reasonably be expected to survive for a minimum of ten (10) years in accordance with the Public Facilities Manual. Trees to be planted to comply with the tree cover requirements shall be selected and planted in accordance with the Public Facilities Manual such that they can reasonably be expected to survive a minimum of ten (10) years.

Fairfax County Code – Noise[109]

Article 4 – Noises Prohibited

Section 108-4-4. Maximum permissible sound pressure levels.

[109] For additional information, see http://library1.municode.com:80/mcc/home.htm?view=home&doc_action=setdoc&doc_keytype=tocid&doc_key=a61fbca789c8cc751e6af98686c3602c&infobase=10051 (November 2006)

(a) It shall be unlawful for any person to operate, or permit to be operated, any stationary noise source in such a manner as to create a sound pressure level which exceeds the limits set forth in the table following titled "Maximum Sound Pressure Levels" when measured at the property boundary of the noise source or at any point within any other property affected by the noise. When a noise source can be identified and its noise measured in more than one zoning district classification, the limits of the most restrictive classification shall apply.

(b) Notwithstanding the provisions of the foregoing Subsection, sound created by the operation of power equipment, such as power lawn mowers and chain saws, between the hours of 7 a.m. and 9 p.m. the same day shall be permitted so long as they do not constitute a noise disturbance. (7-17-68, § 17-4-3; 24-75-16A; 1961 Code, § 16A.4.4.; 34-76-108.)

MAXIMUM SOUND PRESSURE LEVELS				
ZONING DISTRICT CLASSIFICATION	MAXIMUM dBA	OCTAVE BAND LIMIT		
			CENTER FREQUENCY HERTZ --(HZ)	dB
		31.5	70	
		63	69	
		125	64	
		250	59	
RESIDENTIAL	55	500	53	
		1,000	47	
		2,000	42	
		4,000	38	
		8,000	35	
		31.5	75	
		63	74	
		125	69	
		250	64	
COMMERCIAL	60	500	58	
		1,000	52	
		2,000	47	
		4,000	43	
		8,000	40	
		31.5	85	
		63	84	
		125	79	
		250	74	
INDUSTRIAL	72	500	68	
		1,000	62	
		2,000	57	
		4,000	53	
		8,000	50	

Maryland

Maryland Economic Growth, Resource Protection, and Planning Act of 1992[110]

Development regulations must be consistent with comprehensive plan

- Statement of goals and objectives, principles, policies, and standards that serve as a guide for development and economic and social growth.
- A land use plan element that shows proposals for the most appropriate and desirable patterns for the general location, character, extent, and interrelationships of the manner in which the community should use its public and private land.
- A transportation element that shows proposals for the most appropriate and desirable patterns for the general location, character, and extent of the channels, routes, and terminals for transportation facilities, and for the circulation of persons and goods. The transportation element shall also provide for bicycle and pedestrian access and travelways.
- A community facilities plan element that shows proposals for the most appropriate and desirable patterns for the general location, character, and extent of public and semipublic buildings, land, and facilities.
- A Mineral Resources Element
- An element that contains recommendations that encourage streamlined review of development applications within areas designated for growth; encourage the use of flexible development regulations to promote innovative and cost-saving site design while protecting the environment: and use innovative techniques to foster economic development in areas designated for growth. Please refer to Models and Guidelines # 94-02: Regulatory Streamlining and #95-06, Achieving Environmentally Sensitive Design Through Flexible and Innovative Regulations for more information.

Maryland Forest Conservation Act of 1991[111]

The Maryland Forest Conservation Act was enacted in 1991 to minimize the loss of Maryland's forest resources during land development by making the identification and protection of forests and other sensitive areas an integral part of the site planning process.

- The provisions of the Act apply to any public or private development activity (subdivision, grading permit, or sediment control permit) on areas 40,000 square feet or greater.

The Act requires:

- Local government having planning or zoning authority shall develop a local forest conservation program consistent with the Act.

[110] For additional information, refer to www.mdp.state.md.us/general/planact.htm (July 2006)
[111] For additional information, see www.dsd.state.md.us/comar/Annot_Code_Idx/NaturalResIndex.htm, Title 5, Subtitle 16 (July 2006)

    - The program shall include
        - A policy document and all applicable new and amended local ordinances relating to the implementation of the regulated activities
        - A technical manual outlining the submittal requirements for stand delineations, required information for the approval of a forest conservation plan, and specific forest conservation criteria and protection techniques
    - A local authority shall review and amend, as appropriate, all current local ordinances, policies, and procedures inconsistent with the intent and requirements of the Act
    - A local forest conservation program may:
        - Allow clustering and other innovative land use techniques that protect and establish forests where open space is preserve, sensitive areas are protected, and development is physically concentrated
- A forest stand delineation for the entire site shall be prepared by a licensed forester, landscape architect, or other qualified professional when submitting an application for subdivision, grading, or sediment control permit on projects of 40,000 square feet or greater
    - The forest stand delineation shall be used during preliminary review to determine the most suitable and practical areas for forest conservation
        - Topographic map delineating intermittent and perennial streams and steep slopes over 25 percent
        - Solis maps delineating soils with structural limitations, hydric soils, or erodible soils of slopes at 15 percent or greater
        - Forest stand maps indicating species, location, and size of trees as well as dominant and codominant forest types
    - The local authority may adopt a simplified process that:
        - Limits the required forest sampling to areas not proposed for protection under long-term protective agreements as long as all priority areas on the site are protected
        - Minimizes overlapping mapping and sampling requirements fore sites where no disturbance of priority forest retention areas is contemplated.
- After finalizing a complete and correct forest stand delineation, an applicant must complete a forest conservation plan for the site, developed by a licensed forester, landscape architect, or other qualified professional. It shall contain:
    - Map of site at same scale as grading or subdivision plan
    - Table listing
        - Net tract area
        - Square foot area of forest conservation required for the site
        - Square foot area of forest conservation provided for the site at on-and off-site locations
    - Graphically indicate areas of retention and planned afforestation
    - Anticipated construction timetable
    - An afforestation or reforestation plan with timetable and description of needed site and soil preparation, species, size, and spacing to be utilized
    - Location and types of protective devices for trees and areas of forest designated for conservation to be used during construction activities

    - Limits of disturbance and stockpile locations delineated
    - A binding 2-year management agreement detailing how areas designated for afforestation or reforestation will be maintained to ensure protection or satisfactory establishment including
        - Watering
        - Reinforcement planting provisions should survival fall below required standards
- Agriculture, resource, and medium density residential areas having less than 20 percent of the net tract area in forest cover shall be afforested up to 20 percent of the net tract area
- Institutional development, high density residential, mixed use and planned unit developments, commercial, and industrial use areas having less than 15 percent of the net tract area in forest cover shall be afforested up to 15 percent of the net tract area
- If on- or off-site afforestation or reforestation cannot be reasonably accomplished, a payment to the Forest Conservation Fund may be made
- Afforestation or reforestation requirements must be accomplished within one year or two growing seasons after the completion of the development project
- A forest conservation threshold is established based on land use
    - Agricultural and resource areas: 50 percent of net tract area
    - Medium density residential areas: 25 percent of net tract area
    - Institutional development areas: 20 percent of net tract area
    - High density residential areas: 20 percent of net tract area
    - Mixed use and planned unit development areas: 15 percent of net tract area
    - Commercial and industrial use areas: 15 percent of net tract area
- For all existing forest cover measured to the nearest $1/10^{th}$ acre cleared on the net tract area above the applicable forest conservation threshold, the area of forest removed shall be reforested at a ratio of ¼ acre planted for every 1 acre removed
- For all existing forest cover measured to the nearest $1/10^{th}$ acre cleared on the net tract area below the applicable forest conservation threshold, the area of forest removed shall be reforested at a ratio of 2 acre planted for every 1 acre removed
- Afforestation and reforestation procedures shall be employed only after all techniques for retaining existing forest cover on-site have been exhausted. These procedures shall:
    - Enhance existing forest
    - Allow off-site measures in the same watershed when no on-site alternative exists, has already been fully utilized, or exceeds the benefits derived from on-site planting
    - Off-site measures may include the use of forest mitigation banks
- Forest creation may be accomplished with:
    - Transplanted or nursery stock
    - Whip or seedling stock
    - Natural regeneration where it can be shown to adequately meet the objective of the forest conservation plan
    - Street trees may be credited subject to local approval but cannot exceed 50 percent
    - Use of native plant materials when appropriate

- When on- and off-site techniques have been exhausted, landscaping that established a forest 35 feet wide and 2,500 square feet in area may be used
- Priority trees, shrubs, and areas for retention and protection include:
    - Those located in sensitive areas (100-year floodplain, intermittent and perennial streams and buffers, coastal bays and buffers, steep slopes, and critical habitats
    - Contiguous forest connecting the largest undeveloped or most vegetated tracts of land within and adjacent to the site
    - Rare, threatened, or endangered species
    - Those that are part of a historic site or associated with a historic structure or designated as a national, state, or local Champion Tree
    - Trees have a diameter of 30 inches or 75 percent of the diameter of the current state Champion Tree of that species as measure at 4.5 feet above the ground
- Priority afforestation or reforestation areas include establishing or enhancing:
    - Forest buffers adjacent to perennial and intermittent streams and coastal bays to widths of at least 50 feet
    - Existing forest corridors, where practical to a minimum width of 300 feet
    - Forest buffers adjacent to critical habitats where appropriate
    - Forested areas in 100-year floodplain
    - Planting to stabilize slopes of 25 percent or greater and slopes of 15 percent of greater with erodible soils
    - Buffers adjacent to areas of differing land uses, highways, or utility rights-of-way where appropriate
- Review of the forest conservation plan shall be concurrent with the review process fore the subdivision plan, grading, or sediment control permit
    - The forest conservation plan shall be approved before the approval of the final subdivision plan or issuance of the grading or sediment control permits
    - Noncompliance with this Act, approved forest conservation plan, or 2-year management agreement is subject to an assessment of 30 cents per square foot of area in violation
- A State or Local Forest Conservation Fund is established to collect a 10 cents per square foot of required planting area when it has been effectively demonstrated on- and off-site afforestation or reforestation cannot be reasonably accomplished
    - The money shall be used within two years or three growing seasons for afforestation or reforestation activities, after which it shall be returned to the contributing party to be used for tree planting within the same county or watershed

Maryland Critical Area Program of 1984 (Expanded 2002)[112]

The Critical Area Program establishes a Resource Protection Program as the state recognizes:

- The significance of the Chesapeake and Atlantic Coastal Bays and their tributaries to the state and nation

[112] For additional information, see www.dsd.state.md.us/comar/Annot_Code_Idx/NaturalResIndex.htm, Title 8, Subtitle 18 (July 2006)

- Human activity can have an immediate and adverse impact on water quality and natural habitats
- The capacity of the shoreline and adjacent lands to withstand continuing demands without further degradation to water quality and natural habitats is limited
- It is necessary wherever possible to maintain a minimum 100 foot buffer landward from the mean high water line
- The restoration of the Chesapeake Bay and Atlantic Coastal Bays and their tributaries is dependent, in part, on minimizing further adverse impacts to the water quality and natural habitats of the shoreline and adjacent lands, particularly in the buffer
- The cumulative impact of current development and of each new development activity in the buffer in inimical to these purposes
- There is a critical and substantial state interest for the benefit of current and future generations in fostering a more sensitive development activity in a consistent and uniform manner to minimize damage to water quality and natural habitats

The Chesapeake Bay Critical Area and Atlantic Coastal Bays Critical Area consist of:

- All waters of and lands under the bays and their tributaries to the head of tide and all state and private wetlands
- All land and water areas within 1,000 feet beyond the landward boundaries of state or private wetlands and heads of tides
- A local jurisdiction may exclude:
    - Developed, urban areas (or portions thereof) where the imposition of a program would not substantially improve protection of tidal water quality, wildlife, or their habitats
    - Areas located 1,000 feet from open water and separated by an area of wetlands which is found will serve to protect tidal water quality, wildlife, or their habitats
- A portion of urban land to be excluded must be at least 50 percent developed and not less than 2,640,000 square feet
- Local jurisdictions shall have primary responsibility for developing and implementing a program, subject to review and approval by the Commission. A program shall consist of those elements necessary or appropriate to:
    - Minimize adverse impacts on water quality discharged from structures or conveyances or runoff from surrounding lands
    - Conserve fish, wildlife, and plant habitat
    - Establish land use policies for development in the Critical Areas which accommodate growth and address the fact that, even if pollution is controlled, the number, movement, and activities of persons in that area can create adverse environmental impacts
- A local program includes:
    - A map designating critical areas
    - Comprehensive zoning map for the critical areas
    - New or amended:
        - Subdivision regulations
        - Comprehensive or master plan
        - Zoning ordinances or regulations

        - Enforcement provisions
        - Grandfathering provisions
    - Provisions to limit impervious coverage and to require or encourage cluster development
    - Establish buffer areas for agricultural activities and minimum setbacks for development
- Conditions for development within the Critical Areas
    - Growth allocation for a locality shall be calculated based on five percent of the total resource conservation are in a local jurisdiction
    - When locating new development:
        - New intensely developer dares should be located in limited development areas or adjacent to existing intensely developed areas
        - New limited development areas should be located adjacent to existing limited development areas or intensely developed areas
        - No more than one-had of the expansion may be located in resource conservation areas
        - New intensely or limited development areas located in the resource conservation area shall conform with all criteria and shall be designated on the comprehensive zoning map
    - Resource conservation area private wetlands may be included in land area of a 1 in 20 acre density if:
        - The upland density does not exceed a 1 in 8 acre density
    - One additional dwelling unit may be considered per lot or parcel as part of a primary unit for the purpose of the density calculation if:
        - The unit is located within the primary unit or its entire perimeter is within 100 feet of the primary unit
        - It does not exceed 900 square feet
        - Is served by the same sewage disposal system as the primary unit
        - Its construction does not increase the impervious surface area attributed to the primary unit
    - Intrafamily transfers of property may take place on properties between seven and sixty acres and are subject to the following conditions
        - Parcels seven to twelve acres may be subdivided into two lots
        - Parcels twelve to sixty acres may be subdivided into three lots
        - Cannot be subdivided for commercial sale
    - Impervious surface limitations in limited development areas and resource conservation areas:
        - Man-made impervious surfaces are limited to 15 percent of a parcel or lot
        - Lots or parcels up to one-half acre are limited to 25 percent
        - Lots or parcels between one-half and one acre are limited to 15 percent
        - Individual lots one acre or less, that are part of a subdivision, may not exceed 25 percent imperviousness, but the entire subdivision may not exceed 15 percent imperviousness
    - Impervious surface limitations may be exceeded if the following conditions exist:
        - New impervious surfaces have been properly minimized

        - Lots or parcels up to one-half acre are limited to 25 percent or 500 square feet, whichever is greater
        - Lots or parcels between one-half and one acre are limited to 15 percent or 5,445 square feet, whichever is greater
        - Water quality impacts can be and have been minimized through site design or BMPs
        - On-site mitigation are implemented or fees are paid
    - Development sites in intensely developed areas are to provide a forest or developed woodland cover of at least 15 percent after development or a fee-in-lieu payment adequate to ensure the restoration or establishment of an equivalent forest area
    - Localities may develop:
        - A provision encouraging the use of bioretention for stormwater management associated with redevelopment in intensely developed areas
    - The approving authority of any subdivision plat approval or approval of a zoning amendment, variance, special exception, conditional use permit, or use of a floating zone affecting any land or water area located within the Critical Area shall render its decision based on the specific findings that:
        - The proposed development will minimize adverse impacts on water quality
        - The development has been designed to minimize adverse impacts on any identified fish, wildlife, or plant habitat whose loss would substantially diminish the continued ability of those populations to sustain themselves
    - Undeveloped lots in existence prior to the adoption of this program are entitled to construct a single family dwelling unit in accordance with the local critical area program to the extent possible

Maryland Sediment Control Provisions[113]

A grading or building permit may not be issued until the developer:

- Submits an approved grading and sediment control plan
- Certifies all land clearing, construction, and development will be done under the plan
- Construction may not begin unless:
    - The measures contained in the improved plan are implemented
    - The construction is conducted as specified in the sequence of construction contained in the approved plan
    - The provisions of the approved plan are maintained
    - Any sediment control measures reasonably necessary to control sediment runoff are implemented
- Major changes to an approved sediment control plan are subject to review and approval by the oversight authority

[113] For additional information, see www.dsd.state.md.us/comar/Annot_Code_Idx/EnvirIndex.htm, Title 4, Subtitle 1

Maryland Specifications for Soil Erosion and Sediment Control[114]

The purpose of the state soil erosion and sediment control standards is to provide minimum criteria for developing plans to control runoff during construction. These plans should minimize the potential for erosion to occur. This can be accomplished by:

- Reducing the amount of area exposed and the time for which it is exposed
- Stabilize disturbed areas as soon as work has stopped
- Minimize the amount of grading necessary by working with existing topography when planning the site development
- Preserving natural vegetation

The planning procedures for preparing an erosion and sediment control plan consist of:

- Determining the limits of clearing and grading
- Dividing the site into natural drainage areas
- Selecting the soil and sediment control practices
    - Vegetative controls
    - Structural controls
- Management measures

Maryland Stormwater Provisions[115]

The rules and regulations of the Department of the Environment shall establish criteria and procedures for stormwater management that:

- The primary goal of stormwater management is to maintain after development, as nearly as possible, the predevelopment runoff characteristics
- Indicate water quality practices may be required for any redevelopment

A grading or building permit may not be issued for development unless a stormwater management plan has been approved.

Maryland Stormwater Design Manual, Volumes I & II[116]

[114] For additional information, see www.mde.state.md.us/assets/document/sedimentstormwater/1994ErosionSed.pdf (July 2006)
[115] For additional information, see www.dsd.state.md.us/comar/Annot_Code_Idx/EnvirIndex.htm, Title 4, Subtitle 2

To prevent adverse impact of stormwater runoff, Maryland developed the following performance standards that must be met at development sites. These standards apply to any construction activity disturbing 5,000 or more square feet but exempt additions or modification to existing single family homes and agricultural land management activities.

- Site designs shall minimize the generation of stormwater and maximize pervious areas for stormwater treatment
- Stormwater generated from development and discharged directly into jurisdictional wetlands or other State waters shall be adequately treated
- Annual pre-construction groundwater recharge rates shall be maintained post-construction by promoting infiltration
- Water quality management shall be provided
- Structural BMPs shall be designed to remove 80 percent of total suspended solids and 40 percent total phosphorous load of post construction conditions
- Safe conveyance of the 100-year storm event shall be provided
- Stream channels will be protected from degradation by providing extended detention storage for the one-year storm event
- Stormwater discharges to critical areas with sensitive resources may be subject to additional performance criteria and BMPs
- All BMPs shall have an enforceable operation and maintenance agreement to ensure the system functions as designed
- Every BMP shall have an acceptable form of water quality pretreatment
- Redevelopment is governed by special stormwater sizing criteria depending on the amount of increase or decrease in impervious area created
- Stormwater discharges from land uses or activities with a higher potential for pollutant loadings may require the use of specific BMPs and pollution prevention activities and runoff may not be infiltrated without proper treatment

Maryland Nontidal Wetlands Act (1989)[117]

The Nontidal Wetlands Act is designed to protect these resources by regulating and restrict activities that could impact wetlands or waters of the state and seeks to ensure "no net loss" by requiring mitigation or compensation for any wetland losses.

More stringent than federal law in that it:

- Prohibits placement of fill, soils, trash, and other pollutants in wetlands;
- Prohibits drainage, excavation, dredging or other changes to wetland hydrology;
- Prohibits activities that would destroy or alter natural vegetation;
- Regulates construction on or in wetlands in Maryland;
- Regulates isolated wetlands; and

[116] For additional information, please see www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/stormwater_design/index.asp (July 2006)
[117] For additional information, refer to www.dsd.state.md.us/comar/subtitle_chapters/26_Chapters.htm#Subtitle23 (July 2006)

- Requires a 25-foot buffer around wetlands (100 feet for Wetlands of Special State Concern).

Nontidal wetlands protected by an expanded 100 foot buffer include:

- Those of special state concern
- Those with adjacent areas of slopes greater than 15 percent, highly erodible soils, and Outstanding National Resource Waters

Criteria for Review of Nontidal Wetland Permit Applications

- Regulated activity first avoids and then minimizes adverse impacts to nontidal wetlands based on existing topography, vegetation, fish and wildlife resources, and hydrologic conditions
- Regulated activity does not cause or contribute to degradation of ground waters or surface waters
- Proposed project is consistent with any comprehensive watershed management plan
- Applicant shall prove alternative sites for the propose have been examined during the initial planning phase that would result in less or no adverse nontidal wetland impacts
- Applicant shall evaluate the feasibility of the project and the adverse impact on nontidal wetlands at the earliest stage of the development process before substantial resources have been committed
- Applicant shall demonstrate all necessary steps have been taken to avoid and minimize adverse impacts to nontidal wetlands including:
    - Reduction of size, scope or density
    - Alternative configuration or design
    - Consideration for existing structural or natural features dictating project configuration
- Project shall be evaluated for the following to consider the extend to which it has avoided or minimized adverse impact on nontidal wetlands
    - Reduction in acreage of nontidal wetlands
    - Harm to threatened, endangered, or conservation priority species or critical habitat
    - Movement of wildlife indigenous to the nontidal wetland or water body
    - Ability for the nontidal wetland to continue to support and provide habitat for wildlife
    - Hydrologic regime of upstream and downstream areas relative to the impact
    - Functions of the impacted or adjacent nontidal wetlands
    - Passage of normal or expected high flows, or the relocation of water
    - Subsurface water flow
    - Presence of fish spawning areas
    - Presence of areas having significant plant or wildlife value
    - Cumulative impact to nontidal wetlands
- Comprehensive watershed management plans, which can be prepared by local, state or federal government agencies, with the assistance of private property owners and other government agencies, shall include:
    - Functional assessment of nontidal wetlands in the watershed

- Location of potential mitigation sites
- Protection of nontidal wetlands
- Plan for limiting cumulative impacts to nontidal wetlands
- Water supply management
- Flood management

- Mitigation standards to attain a no net overall loss:

Nontidal Wetland Type	**Standard Replacement**	**When using Credit from Wetland Bank**
Emergent	1:1	1.5:1
Scrub-shrub	2:1	3:1
Forested	2:1	3:1
Emergent (special State concern)	2:1	3:1
Scrub-shrub (special State concern)	3:1	4.5:1
Forested (special State concern)	3:1	4.5:1

- Mitigation priority locations, which shall preferably be connected to existing nontidal wetlands, waterways or 100-year floodplains, are:
  - On-site
  - Off-site and:
    - Identified in a comprehensive watershed management plan
    - Creates or improves waterfowl habitat as identified by plans or agreements
  - A regional need has been determined:
    - In the watershed
    - In the drainage basin
    - Outside the drainage basin
  - Within the county
- BMPs for nontidal wetlands of special state concern and expanded buffers
  - Maintain existing groundwater recharge to the wetland and its tributaries by limiting impervious surfaces
  - Use nonstructural stormwater management practices to the extent practicable
  - Manage stormwater runoff to prevent direct discharge into wetlands and waterways
  - Restrict impervious surface to 15 percent or less where practicable
  - Install sediment controls to completely surround all disturbed areas and maintain controls daily
  - Stabilize disturbed areas daily with noninvasive native species
  - Place vegetative waste outside of wetlands and wetland buffers

Montgomery County

Montgomery County Planning Board Environmental Guidelines[118]

The guidelines, which are consistent with federal, state, and local regulations for wetlands, floodplain, and forest conservation, are intended to ensure adequate consideration will be given during the development process to the following environmental elements:

- Maintenance of biologically viable and diverse streams and wetlands
- Protection and restoration of stream water quality
- Reduction in flood potential
- Protection of water supply reservoirs against sedimentation and eutrophication
- Conservation of forest and trees
- Protection of steep slopes
- Preservation/protection of wildlife habitat, wildlife corridors, and exemplary communities, including rare, threatened, and endangered species
- Protection against development hazards on areas prone to flooding, soils instability, etc.
- Provisions of visual amenities and areas for recreation and outdoor education activities
- Implementation of state and county riparian buffer programs

Pursuant to the Annotated Code of Maryland, the guidelines provide detailed criteria and methods to govern development in sensitive areas:

- Streams and their buffers
- 100-year flood plains
- Habitats of threatened and endangered species
- Steep slopes

Forest Conservation is regulated by a separate document (Trees: Approved Technical Manual)

These guidelines are developed to address the following goals:

- Stream valley and floodplain protection
- Minimizing increases in watershed increases in watershed imperviousness
- Protection of both upland and riparian forest resources
- Recognition and protection of the ecological significance and functions of headwater areas
- Need for long-term baseline stream monitoring to understand and protect the County's stream systems and development impact stream monitoring to evaluate watershed response to development
- Consideration of cumulative impacts

[118] For additional information, refer to *Environmental Guidelines: Guidelines for Environmental Management of Development in Montgomery County* (January 2000). Available at www.mcparkandplanning.org/Environment/forest/guidelines_0100/toc_environ_guide.shtm (November 2006)

Strategies to attain these goals include:

- Application of judicious land uses that allow for limiting impervious surfaces and maintaining wetlands, floodplains, seeps, springs, etc., in their natural condition
- Establishment of protected slope areas
- Use of stream and wetland buffers
    - 100-200' dependent on slope and stream classification
    - 25' minimum around wetlands, expandable to 100' adjacent to steep slopes or highly erodible soils
    - 50 – 40' minimum buffers on wetlands of headwaters of Use III and IV streams
    - 100' buffer on wetlands of special State concern
- Includes 100-year floodplain, wetlands, and steep slopes
- Provision of healthy forest and tree cover
- Adherence of land-disturbing activities to the State erosion and sediment control standards
- Provision of stormwater management devices, storm drainage systems, septic fields, and other structural facilities in a manner that respects the integrity and does not impair the natural equilibrium of stream systems
- Incorporate effective BMPs into land disturbance activities.

Guidelines for Development

- Stream Valley Protection
    - Streams, natural surface springs, and seeps will be maintained in a natural condition
    - No improvements (except necessary, unavoidable, and minimized infrastructure or recreation trails that are approved on a case by case basis) will be permitted in stream buffers
    - Erosion and sediment control facilities are allowed as a temporary use in unforested areas, with grading permitted outside 25' of stream bank and outside wetlands and their respective buffers
    - Stormwater management facilities are discouraged within stream buffers but may be allowed on a case by case determination
    - Stockpiling or deposition of materials is strongly discouraged
    - Septic fields prohibited within 25' of slopes greater than 25 percent and must be set back outside stream buffer
    - No sewage system may be located within 300' of normal high water level of a water supply reservoir or within 200' of the banks of any stream that feeds therein
    - Steep slope areas should be incorporated into the site's open space and/or remain undisturbed
    - Clearing and grading to follow current Maryland standards
    - Strongly recommended phased clearing and grading used whenever possible
    - Disturbed areas are to be revegetated as soon as possible
    - Water quality monitoring may be required in areas identified by the area master plan or county
- Wetlands and Floodplain Protection

    - Wetlands are regulated in accordance with State and Federal Wetlands Regulations
    - Minimum 25’ buffer established around non-tidal wetlands
    - Maximum 100’ buffer established around wetlands of special State concern and around wetlands with adjacent areas containing steep slopes or highly erodible soils
    - Wetlands and their associate buffer areas must be maintained in their natural condition unless the proposed disturbance is for a project determined to be necessary and unavoidable for the public good.
    - No building/structure will be permitted within the 100-year floodplain
    - Planning Board must restrict subdivision for a development of any property that lies within the 100-year floodplain
    - Floodplain district permit or exemption thereof must be obtained prior to any land-disturbing activity within the floodplain district or 25’ from its boundary.
- Forest and Tree Conservation
    - See Trees document
- Unsafe and Unsuitable Land Protection
    - A geotechnical report may be required
    - Plans proposing development on highly erodible soils are required to propose management strategies in the following order of priority:
        - Avoidance and minimization of disturbance
        - Environmentally friendly site design
        - Reforestation/afforestation and vegetative stabilization
        - BMPs
        - Innovative and stringent use of erosion and sediment control BMPs
- Danger Reach/Dam Break
    - Dwelling units are prohibited within an area potentially inundated by the Dam Break Flood (Danger Breach)
- Threatened and Endangered Species and Species in Need of Conservation
    - Applicant must protect areas identified on a development site where rare, endangered, threatened species, a species in need of conservation, or a State-identified watchlist species are present, including critical habitats and appropriate buffers
- Site Imperviousness Considerations
    - Impervious Limited (Capped) Areas
        - Special Protection Areas have impervious limits specified in either the master plan or the Council resolution designating the SPA
        - Specified areas outside of SPAs have 10 – 20 percent limitations as approved by Council
    - Minimizing Impervious Levels Outside Impervious Limited Areas
        - Implementation agencies and utilities should consider all options for minimizing impervious surfaces, particularly where sensitive water resources have been identified for special protection
    - Consideration of alternative technologies
        - Where variations are granted by the Planning Board to imperviousness caps, extra BMPs and alternative technologies are encouraged

Special Protection Areas

Special Protection Areas (SPAs) are designated to protect and maintain high-quality or sensitive water resources and related environmental features where new land uses may prove to be a threat. SPAs use the following tools to protect environmental resources:

- Designation of special protection area wetland and stream buffers
    - 25-150' buffer for a wetland determined by
        - State water use for the watershed
        - Stream order
            - 50- 150' for first or second class streams
            - 25-100' for third or higher
        - Presence of steep slopes and/or highly erodible soils
            - Greater than 15 percent
        - State designated wetland of concern
    - SPA stream buffer consists of the outermost limit of
        - 100-200' from an intermittent or perennial stream bank
        - Steep slopes of 25 percent or greater
        - 100-year floodplain
        - Standard 25' and expanded wetland buffers
- Expanded and accelerated forest conservation
    - Retain or establish forest in all buffers on a site
    - Provide five-year maintenance program, bonding remaining in place for two years.
    - Three to four foot trees and 18 to 24 inch shrubs to be used to minimize canopy closure time
- Imperviousness limitations
    - 10 – 15 percent impervious limit

Patuxent River Watershed Primary Management Area (PMA)

These guidelines are set to address the decline in the river's water quality and the need to protect this environmental resource.

- Stream buffer to be left undisturbed including:
    - 100-year floodplain
    - Wetlands
    - Slopes of 25 percent or greater abutting or adjoining the stream, 100-year floodplain, or stream-side wetlands
    - Critical habitat for rare or sensitive flora and fauna
    - 100' of forest or natural vegetation
        - 50' minimum forested
- The remaining area of the PMA is subject to:
    - An impervious limitation of 10 percent

    - Siting development to optimize existing infrastructure and soil infiltration capacities while minimizing impact to environmentally sensitive features
- Use of BMPs within the PMA
    - Locating and clustering development to maximize suitable development land while minimizing negative impacts to water quality and other environmentally sensitive features
    - Widening stream buffer to ensure increased infiltration or pollutants, nutrients, and sediments
    - Afforestation of more than the required 50 foot minimum of forest cover within the stream buffer
    - Maximize stormwater infiltration
    - Design stormwater ponds to mitigate for temperature and nutrient/sediment removal
    - Design for ten-year storm
- Septic Field Requirements within the PMA
    - No sewage disposal systems to be located within 300 horizontally measured feet of normal high water level of a water supply reservoir or within 200 horizontally measured feet of the banks of a stream that feeds therein.
    - Minimum 300 foot setback from the Patuxent and Hawlings mainstems and a minimum 200 foot setback for all other watershed tributaries
    - Septic fields prohibited within stream buffer

Forest Conservation Regulations – Montgomery County Planning Board of the Maryland-National Capital Park and Planning Commission[119]

These regulations are derived from the *Trees Technical Manual* and apply to all development approvals, special exception applications, or sediment control permit applications.

Natural Resource Inventory and Forest Stand Delineation Requirements

- An application must contain
    - A complete analysis of existing natural resources (natural resource inventory) verified by a field survey and contains the following information to cover the development site and the first 100 feet of adjoining land around the perimeter or the width of adjoining lots, whichever is less:
        - Minimum five foot contour intervals
        - Slopes 25 percent or greater and 15 percent or greater with erodible soils
        - Perennial and intermittent streams and stream buffers
        - 100-year floodplain and associated 25' building restriction lines
        - Wetlands and associated buffers
        - Soils
        - Rare, threatened or endangered plants or animals observed in the field

[119] For additional information, see "Forest Conservation Regulations, M-NCPPC Montgomery County Planning Board – No. 1-01AM (COMCOR 18-01AM)" Available at www.mcparkandplanning.org/environment/forest/forestconservation1-24.pdf (November 2006)

        - Critical habitat areas observed or documented by the MD Department of Natural Resources
        - Aerial extent of forest and tree cover with field verification of:
            - Forest stand and field boundaries
            - Acreage
            - Dominant and codominant tree species
            - Size class by species
            - Percent canopy closure
            - Number of canopy layers
            - Percent of forest floor covered by herbaceous native plants
            - Specimen trees by size and species
            - Champion trees
            - Individual trees with a DBH of 24" or greater
            - Acreage of forest within wetlands, 100-year floodplains, and stream buffers
        - Cultural and historic sites

Priorities for Forest Stand Retention

- The following trees, shrubs, plants, and specific areas are considered highest priority for retention and protection and must be left in an undisturbed condition unless approved otherwise:
    - Vegetation located in sensitive areas such as intermittent and perennial streams and their buffers, natural slopes over 25 percent, non-tidal wetlands and buffers, erodible slopes greater than or equal to 15 percent, 100-year floodplains, and critical habitats
    - Contiguous forest connecting the largest undeveloped or most vegetated tracts of land within and adjacent to the site
    - Forest designated as priority for retention in master or functional plans
    - In the absence of these plans, forest with the following characteristics:
        - High structural and species diversity
        - Few alien or invasive species
        - Very good overall stand health
        - High potential for significant habitat for interior dwelling plant, animal, and bird species
    - An individual tree (along with its critical root zone) with at least one of the following:
        - Part of a historic site or associated with historic structure
        - Designated national, state, or local champion tree
        - A DBH of 75 percent or more of the designated state champion tree
        - Specimen of a species
- The following should be given consideration for preservation where feasible
    - Forested area providing a minimum 300' wide corridor of mainly native vegetation between larger forested tracts
    - Forested stream buffer up to 100' on either side of a stream channel
    - Trees active as a buffer between incompatible uses and dwellings and roads

- Forest stands, or portions thereof, with good forest structural diversity
- Individual tree with DBH of 24" or greater that will significantly enhance the site through preservation

General Forest Conservation Plan Provisions

- Forest conservation plan applicant must give priority to techniques retaining existing forest on the site, maintaining the minimum percentages of forest required by the forest conservation law, and striving to eliminate or minimize the need to replant.
- If existing forest subject to the forest conservation plan cannot be retained, applicant must provide:
  - Location for onsite afforestation and reforestation will occur
- Activities impacting forested non-tidal wetlands are subject to reforestation requirements:
  - Cleared areas must be replaced
- Retention areas
  - At least 10,000 square feet and 50 feet wide or part of a larger stand extending offsite
  - Individual trees must be given retention credit equal to critical root zone protected
  - Individual trees (not of the highest priority for retention) an trees stands less than 10,000 square feet and 50 feet wide may be credited toward afforestation and reforestation requirements
- Afforestation and reforestation
  - Areas must be at least 10,000 square feet and 50 feet wide or part of a larger stand extending offsite
  - Areas given priority for afforestation and reforestation activities:
    - Establish or enhance forest buffers 50 feet wide adjacent to intermittent and perennial streams
    - Establish or enhance forest areas in 100-year floodplain
    - Establish or enhance forest corridors to facilitate wildlife movement
    - Establish or enhance forest buffers adjacent to critical habitat where appropriate
    - Stabilize natural slopes of 25 percent or greater and 15 percent or greater with erodible soils
    - Establish forest buffers adjacent to areas of incompatible lands uses, highways, or utility rights of ways, when appropriate
    - Establish forest areas adjacent to existing forests to increase overall areas of contiguous forest cover
  - Planting plans for afforestation and reforestation must include
    - Minimum of five native tree species and two native understory shrubs planted at a rate of 33 to 350 per acre
    - Survival rate of between 75 and 100 percent at the end of two growing seasons
- Tree save plans
  - Plans may be required for sites with specimen or champion trees
  - If removal of tree stands, specimen or champion trees is unavoidable, replacement procedures may include:

        - Planting or relocating large trees
        - Replacement of the function of the stand
- Credit toward afforestion and reforestation for landscaping and tree save
    - Newly planting landscape trees must be 2-3" caliper to receive credit
    - Afforestation areas may be established as tree cover if appropriate in areas such as:
        - Development in urban environments
        - Redevelopment
        - High-density residential development
        - Commercial and industrial development
        - High-density mixed-use development
        - Some institutional areas
    - Landscaping, retention of tree stands, and retention of individual trees may be credited toward a sites' reforestation requirements as follows:
        - At least 2,500 square feet and 35 feet wide (full credit)
        - Less than 2,500 square feet or 35 feet wide (one quarter credit)
        - Individual landscape trees must receive one quarter credit for their projected area of their canopy at 20 years
        - Total credit cannot exceed 20 percent of overall reforestation requirements
    - Landscaping, retention of tree stands, and retention of individual trees may be credited toward a sites' afforestation requirements as follows:
        - Landscaping area or retained tree stands of any size must receive full credit
        - Individual landscape trees must receive full credit for their projected area of their canopy at 20 years
        - The reforestation credits above also apply for site requiring afforestation and subject to forest cover requirements

Forest Conservation Plan Requirements

- Preliminary Forest Conservation Plan requires, but is not limited to:
    - Preliminary limits of disturbance of natural terrain, location of forest and tree retention areas, including acreage, with appropriate justification and proposed long-term protection methods
    - Conceptual grading plan and/or a more detailed tree survey may be required to determine the feasibility of proposed retention areas
    - Proposed afforestation and reforestation areas, including acreage
- Final Forest Conservation Plan requires, but is not limited to:
    - Must be based on final site grading
    - Must be submitted in conjunction with final approval needed as part of a development application
    - Includes a maintenance plan with provisions for watering, control of competing vegetation, protection from disease, pests, and mechanical injury, and replanting as required
    - Plan for any off-site plantings, if required

- Protection plan indicating temporary and permanent protection devices for areas where construction activities occur within 50 feet of retention boundary

Amendment to Forest Conservation Plan

- Minor amendments resulting in less than 5,000 square feet of additional forest clearing may be approved by Planning Director on a case by case basis
- Major amendments resulting in more than 5,000 square feet of additional forest clearing must be approved by the Planning Board or Planning Director and requires notice and opportunity for comment to be given to adjacent property owners

Forest Conservation Maintenance and Management Agreements

- Maintenance
  - Afforestation and reforestation activities are to be conducted by an person for a minimum of two years
  - Planning Board must not release required financial security or end monitoring without receipt of a legally binding deed, long-term lease, or conservation agreement on those lands where afforestation or reforestation will occur
- Bonding
  - Full amount must be provided before authorization is granted for clearing and grading activities
  - Planning Director must determine if a lesser amount is sufficient to cover the cost of afforestation or reforestation by considering:
    - Size of afforestation or reforestation area
    - Method to be used
    - Plant survival and overall plant health within planting areas
    - Cost of planting and replacement materials
    - Projects maintenance costs

Long-Term Protective Agreements

- Long-term protective measures must be approved to retain as forest, all land forested, afforested, or reforested consistent with forest conservation
- These measures may include:
  - Covenants
  - Deed restrictions
  - Conservation easements
  - Land trusts

Water Quality Review for Development in Designated Special Protection Areas – Department of Environmental Protection[120]

The following requirements apply to privately and publicly owned property within a special protection area (SPA).

Performance Goals

- Performance goals will be established for each development application, based on site conditions, within a SPA to:
    - Protect, maintain, and restore water quality, natural stream environments, and the ecological balance of aquatic communities within the county
    - Mimic natural watershed processes
    - Stimulate innovative and integrated applications of site plan, sediment control, and stormwater management measures to limit changes to natural hydrology, reduce on-site generation of pollutants impacting water quality, and mitigate impacts on adjacent and downstream conditions
    - Develop better measures for assessing BMP effectiveness
    - Seek improved BMP designs with higher effectiveness to protect water quality and minimize maintenance
    - Protect downstream receiving waters
- The nature of performance goals should consider:
    - Protecting stream/aquatic life habitat
    - Maintaining stream base flow
    - Protecting seeps, springs, and wetlands
    - Maintaining natural on-site stream channels
    - Minimizing increases in storm flow runoff
    - Identifying and protecting stream banks prone to erosion and slumping
    - Minimizing increases in ambient water temperatures
    - Minimizing sediment and nutrient loading
    - Controlling insecticides, pesticides, and toxic substances

Pre-Application Requirements

- Water quality inventory information required for submission:
    - Location and rating of infiltratable soils
    - Forest stand delineation and natural resources inventory
        - Stream buffer delineation
        - Erodible soils and areas of steep slopes
        - Location of all field determined intermittent and perennial springs, seeps, and wetlands
    - Drainage map showing upstream drainage area, hydrologically important features, and the location of existing developed areas and BMPs in the subwatershed

[120] For additional information, see "Water Quality Review for Development in Designated Special Protection Areas (Regulation No. 29-95)

Water Quality Inventory and Submissions

- Elements of the Water Quality Inventory
    - Stormwater management concept plan
    - Sediment control concept plan
    - Documentation of impervious areas
- Elements of Preliminary Water Quality Plan
    - Water quality inventory
    - Description of proposed development project
    - Documentation of applications to State and Federal agencies for wetlands permits
    - Description of mitigation techniques
        - Linked BMP systems to progressively minimize sediment and stormwater impacts
        - Stabilization requirements for installing vegetative stabilization of perimeter controls and other specified areas
        - Phased grading designed to minimize land disturbance
        - Open section roads
        - Stream buffers, which shall not contain stormwater and sediment control structures
        - Opportunities to provide recharge of clean stormwater into ground water supply shall be maximized
    - BMP monitoring program and timeline will be established
- Elements of Final Water Quality Plans
    - Final stormwater management concept plan
    - Final sediment control concept plan
    - Final BMP monitoring plan
    - Water quality certifications and wetlands disturbance permits

Supplemental requirements for stormwater management and erosion and sediment control concept plans for SPAs

- Purpose of these requirements is to reduce environmental impacts typically occurring during and after site construction such as:
    - The adverse affects on fish spawning areas and aquatic insect habitat as a result of sedimentation
    - Erosion within stream buffers
    - Inhibition of fish passage by installing typical culvert crossings
    - Temperature changes in streams receiving warm water runoff generated by impervious surfaces
    - Runoff of nutrients, toxics, and/or other water pollutants
    - Degradation to receiving streams from increased runoff and pollutants
- Required water resource protection measures
    - For water quantity
        - All proposed stormwater management facilities shall be located entirely outside stream buffers and outfall locations must be combined to reduce the about of disturbance to the stream buffer

        - Provide measures to increase the flow length and reduce temperature impacts to the stream,
        - All on-site areas must have stormwater management controls to convey all runoff from developed areas to proposed stormwater management facilities
    - For water quality
        - Infiltration trenches should be used whenever possible and enhanced with additional measures such as surface sand filters
        - Water quality structures must be located outside of stream buffers
        - For ease of maintenance, infiltration trenches shall be shallow and receive surface runoff only, with the sand filter underdrain outletting onto the surface of the trench
        - Designs must provide safe, non-erosive overflow or any proposed water quality structures
    - Thermal impact reduction
        - Shade all rip rap outfalls, infiltration trenches, and sand filter surfaces
        - Provide a low flow channel in any proposed pond bottom lined with turf reinforcement mat. The pond should also be reforested with wetness tolerant tree and shrub species
        - Reforest disturbance from any pond barrel and pond outfall
        - Prevent warming of the ground water by avoiding excavation into the ground water table. If unavoidable, install drain tile to immediately convey groundwater seeps out of the pond to keep it cool
    - Sediment control requirements
        - Minimum sediment trap should be sized to accept 3,600 cubic feet of storage per acre of drainage area.
        - Ponds and traps must be dewatered prior to the water warming up, removing fine particulate matter in the process
        - Redundant structures may be used to improve sediment removal efficiency
        - If pond size is not sufficient for double the sediment storage, a trap must be added. The pond cannot be enlarged
        - The amount of disturbance shall be reduced by developing and implementing a phased grading and stabilization plan
        - Sediment controls must be located outside of the stream buffers
        - Super silt fence shall be required for all areas where silt fence is necessary

Montgomery County Sediment Control Permit[121]

The purpose of the Sediment Control Permit is to prevent excessive erosion and sedimentation as a result of land disturbing activities from causing siltation and degradation of streams and waterways. Approval of erosion, sediment control, and stormwater management plans before construction may begin. Engineered plans must be prepared and certified by a professional engineer, land surveyor, landscape architect, or architect.

[121] For additional information, see http://permittingservices.montgomerycountymd.gov/dpstmpl.asp?url=/permitting/wr/nfsc.asp (July, 2006)

A permit is required for any land disturbing activity that:

- Disturbs 5,000 square feet or more of land
- Results in 100 cubic yards or more of earth movement
- Is for the construction of a new residential or commercial building

Code of Montgomery County Regulations – Chapter 19. Erosion, Sediment Control, and Stormwater Management - Regulations[122]

19.00.01 Stormwater

C. Specific Design Considerations

1. Water quality. The design of best management practices must consider - the thermal effects of the development on receiving streams. The applicant must mitigate these effects if the Director determines that mitigation is necessary to preserve the water quality of the receiving streams.
2. Recharge. If the delineation is unclear in the Soil Survey or if a hydrologic soil group is not assigned to a specific soil, then the default hydrologic soil group for recharge design is "B."[1] There are no recharge requirements for redevelopment project sites or for sites identified as hotspots.
3. Channel protection. All surface ponds in Use III, Use IV, and high quality Use I watersheds must be designed to provide 12-hour extended detention of the one-year, 24-hour storm event. All other surface ponds and all underground structures must be designed to provide 24-hour extended detention of the one-year, 24-hour storm event.

   [1]Soil types are grouped hydrologic ally in the Soil Survey.
4. Flood protection.
   a) Overbank flood protection may only be required if the Director determines that the receiving floodplain, flow path, or storm drain system is insufficient to handle the flow from a 10-year storm. In such cases, the stormwater management concept plan must show how the peak discharge of the predeveloped 10-year, 24hour storm is maintained.

   b) Management of the 100-year storm is required only when the department determines that controls are necessary to protect existing buildings.

5. Nonstructural best management practices. The Director may accept nonstructural management practices to help satisfy the minimum stormwater control requirements when the Director is reasonably certain that the nonstructural management practices will remain functional after construction of the development is complete.

19.10.02.04 Erosion and Sediment Control

[122] For additional information, see www.amlegal.com/nxt/gateway.dll?f=templates&fn=default.htm&vid=amlegal:montgomeryco_md_mc (November 2006)

A. The permittee must notify the Department 48 hours before commencing any land disturbing activity and, unless waived by the Department, is required to hold a pre-construction meeting between the permittee or representative and an authorized representative of the Department.

B. The permittee must:

(1) construct all erosion and sediment control measures as per the approved plan;

(2) have them inspected by the Department prior to beginning any other land disturbances;

(3) ensure that all runoff from disturbed areas is directed to the sediment control devices; and

(4) obtain permission from the department prior to removal of any erosion or sediment control measure.

C. The permittee must direct water run-off from any land disturbing activity through an approved sediment control measure.

D. The permittee must protect all points of construction ingress and egress to prevent the deposition of materials onto traversed public thoroughfare(s). This may be accomplished by installing and maintaining a stabilized construction entrance, or by washing all vehicle wheels in a safe disposal area. All materials deposited onto public thoroughfare(s) must be removed immediately.

E. The permittee must periodically inspect and maintain all erosion and sediment control measures in continuously effective condition until they are removed with permission from the Department.

F. The permittee must fence the perimeter of all temporary sediment basins or traps, which pond water in a pool greater than nine (9) feet in width or eighteen (18) inches in depth, with a safety fence greater than forty-two (42) inches in height and openings no greater than three (3) inches in width. The fence must be firmly anchored to posts no more than eight (8) feet apart and be constructed to prevent sagging.

G. All slopes steeper than 3:1, basin or trap embankments, and perimeter dikes must be stabilized with sod, seed and anchored straw mulch, or other approved stabilization measures, within seven (7) calendar days of establishment. Areas disturbed outside of the perimeter sediment control system must be minimized and immediately stabilized. Maintenance must be performed as necessary to ensure continued stabilization.

H. The permittee must apply sod, seed and anchored straw mulch, or other approved stabilization measures to all disturbed areas within fourteen (14) calendar days after stripping and grading activities have ceased on that area. Maintenance must be performed as necessary to ensure continued stabilization. Active construction areas, such as borrow or stockpile

areas, roadway improvements, and areas within fifty (50) feet of a building under construction, may be exempted from this requirement, provided that erosion and sediment control measures are installed and maintained to protect those areas. During the months of November through February, when seeding and sodding are found to be impractical, an approved anchored mulch must be applied. In these cases, seeding must be completed prior to the following April 15.

I. Prior to removal of sediment control measures, the permittee must stabilize all contributory disturbed areas using sod or an approved permanent seed mixture with required soil amendments and an approved anchored mulch. Wood fiber mulch may only be used in seeding season where the slope does not exceed 10 percent and grading has been done to promote sheet flow drainage. Areas brought to finished grade during the seeding season must be permanently stabilized within fourteen (14) calendar days of establishment. When property is brought to finished grade during the months of November through February, and seeding and sodding is found to be impractical, an approved anchored mulch must be applied to critical areas. The final permanent stabilization must be completed prior to the following April 15.

J. The Department must inspect all permitted land disturbing activity, except where waived under Chapter 19, Subsection 19-12(g), and may require the permittee to obtain testing, special inspections, and professional certification, and/or to submit "as-built" plans to ensure that construction has been done in conformance with provisions of the approved plan and applicable standards and specifications. Where testing, special inspections, and professional certification, or "as-built" plans are required, reports documenting acceptability of the work must be submitted to the Department within a specified time.

K. The Department must withhold issuance of a completion certificate for release of the performance bond or other instrument for those projects requiring testing, special inspection, professional certification, and "as-built" plans until all of the above have been accepted by the Department.

L. When the approved erosion and sediment control plans include sediment basins, inspection is required at the following stages of construction:

1. Stripping of area under embankment;

2. Core trench excavation;

3. Installation of riser and pipe spillway;

4. Backfill of riser and pipe spillway;

5. Emergency spillway construction;

6. Outlet protection; and

7. Final stabilization.

Additional inspections may be required if needed to assure compliance with the approved plan and specifications. Construction must not proceed to the next stage until each inspection has been made and approved by this Department or inspected and certified as provided for in Chapter 19, Subsection 12(g). In either case, this Department must be notified twenty-four (24) hours prior to each required inspection.

M. The site, work, materials, plans, and test reports must be available at all times for inspection by duly authorized officials of Montgomery County.

N. Surface flows over cut and fill slopes must be controlled by either re-directing flows from traversing the slopes or by installing mechanical devices to lower the water downslope without causing erosion. Dikes must be installed and maintained at the top of cut or fill slopes until the slope and drainage area are fully stabilized.

O. Permanent swales or other points of concentrated water flow must be stabilized with sod, or seed with an approved erosion control matting.

P. Temporary sediment trapping devices must be removed within thirty (30) calendar days following establishment of permanent stabilization in all contributory drainage areas. Stormwater management structures used temporarily for sediment control must be converted to the permanent configuration within this time period as well.

19.10.02.05 Grading Control

A. No permanent cut or fill slope with a gradient steeper than 3:1 is permitted in lawn maintenance areas. A slope gradient of up to 2:1 is permitted in low maintenance areas provided that those areas are indicated on the erosion and sediment control plan with a low-maintenance ground cover specified. Slope gradient steeper than 2:1 is not permitted with vegetative stabilization.

B. The permittee must provide transition into the grade of the adjoining property at or before the boundary line. An exception may be given where a retaining wall is properly designed and built entirely on the property of the owner who creates the grading, or where that owner has a letter of authorization from the adjoining property owner to extend the slope into the adjoining property.

19.10.02.06 Drainage Control

A. The permittee must not create a fill which causes water to pond on off-site or adjacent property, unless the fill is associated with an approved temporary sediment control structure, permanent stormwater management structure, or planned landscape structure. The permittee must first obtain ownership or easement for that use from the owner of the off-site or adjacent property.

B. The permittee must install a splashblock at the bottom of each downspout unless the downspout is connected by a drain line to an acceptable outlet.

C. For finished grading, the permittee must provide adequate gradients so as to: (1) prevent water from standing on the surface of lawns more than twenty-four (24) hours after the end of a rainfall, except in swale flow areas which may drain as long as forty-eight (48) hours after the end of a rainfall, and (2) provide positive drainage away from all building foundations or openings

19.10.02.07 Design Criteria

The following design criteria are acceptable for use, and must be referenced or shown on plans submitted to the Department:

A. The "1983 Maryland Standards and Specifications for Soil Erosion and Sediment Control," or any subsequent revisions;

B. Storm Drain Design Standards and Specifications, by the Washington Suburban Sanitary Commission;

C. Interim Storm Drain Design Criteria, by the Montgomery County Department of Transportation;

D. SCS, Maryland Standards and Specifications for Ponds, Practice Code 378, revised;

E. SCS Technical Release No. 55, Urban Hydrology for Small Watersheds;

F. SCS Engineering Field Manual; and

G. Interim Hydraulic Criteria for Design of Highways, by the Maryland State Highway Administration.

19.45.01 Floodplain

19.45.01.04 Development Regulations

In order to prevent excessive damage to buildings and structures, the following restrictions will apply to all new construction and substantial improvements to existing structures and filling occurring in the Floodplain District. In the event a proposed building, structure, or substantial improvement is sited in two different subdistricts or in a subdistrict with two different one Hundred (100) Year Flood elevations the most restrictive regulation and/or higher flood elevation will prevail.

A. In the One Hundred Year floodplain the following regulations will apply:

1. All new residential development is prohibited.

2. No development will be permitted unless it complies with Section 8-29 (a) of the Code and except where the effect of such development on flood heights is fully offset by accompanying stream modification and the development is approved by all appropriate State and Federal authorities. These developments must be placed outside of the Floodway Limits.

3. All proposals to offset the effects of development in the Floodplain by construction of stream modifications must be documented by an engineering study prepared by a Registered Professional Engineer registered in the state of Maryland and which fully evaluates the effects of such development and must be submitted with the application for a Building Permit. The report must use the One Hundred (100) Year Flood and Floodplain data as prepared by the Federal Emergency Management Agency or M-NCPPC, whichever is more restrictive and adopted as the basis of the analysis.

4. Existing non-conforming structures and/or development may not be substantially improved unless the effect of the proposed improvement on flood heights is fully offset by accompanying stream modifications and the improvement is approved by Maryland Water Resources Administration and the Department of Environmental Protection.

    a. Substantial improvement of a non-conforming structure and/or development regardless of location must be constructed in full compliance with the provisions of this and any other applicable Regulation.

    b. The modification, alteration, repair, reconstruction or improvement of any kind of a non-conforming structure and/or development to an extent or amount of less than fifty (50) percent of its fair market value, must be elevated and/or floodproofed to the greatest extent possible.

5. The following must not be placed or caused to be placed in the one Hundred Year floodplain: All structures, materials, fences or enclosures which may impede, retard or change the direction of the flow of water or that will catch or collect debris carried by such water, or that is placed where the natural flow of the stream or flood waters would carry the debris downstream and cause damage or detriment of either public or private property in or adjacent to the floodplain. Fences with height 42" or lower with stationary openings greater than 24 square inches will be permitted within the Flood Fringe area.

6. Developments when approved, must have the elevation of the lowest floor, as defined in the Code, of all new or substantially improved structures at or above one (1) foot above the elevation of the One Hundred (100) Year Flood. Basements, as defined in the Code, are prohibited in the One Hundred (100) Year Floodplain.

7. Design, Anchoring, and Materials - All construction when approved, including substantial improvements, must be:

    a. Designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure;

b. Constructed and placed on the lot so as to offer the minimum obstruction to the flow and height of the flood water;

c. Constructed with materials and utility equipment resistant to flood damage; and

d. Constructed by methods and practices that minimize flood damage.

8. Landscape Design

a. Adequate ground cover must be provided for soil stabilization within the Floodplain District.

b. Design of land contours and choice of plant materials must direct surface runoff away from structures and must not increase surface runoff onto neighboring properties.

9. Electrical Systems

a. All electric water heaters, electric furnaces, generators, heat pumps, air conditioners, and other permanent electrical installations must be located one (1) foot or higher above the elevation of the one Hundred (100) Year Flood.

b. No electrical distribution panels are permitted at an elevation less than three (3) feet above the elevation of the One Hundred (100) Year Flood.

10. Mechanical Equipment - water heaters, furnaces and other permanent mechanical installations, excluding submersible pumps, must be located one (1) foot or higher above the level of the One Hundred (100) Year Flood.

11. Storage - Materials that in time of flooding could be injurious to human, animal or plant life must be stored one (1) foot or higher above the level of the one Hundred (100) Year Flood.

12. Fill - As a general practice, filling within the Floodplain District is discouraged; however, where allowed, fill material must meet the following additional requirements:

a. Fill must consist of soil or rock materials only. Landfills, dumps, and sanitary soil fills are not permitted;

b. Fill material must be compacted in accordance with the Standard Proctor Test method issued by the American Society for Testing and Materials (ASTM Standard D-698) to provide the necessary stability and resistance to erosion, scouring or settling;

c. Fill slopes must be no steeper than one (1) vertical to three (3) horizontal, unless substantiating data justifying steeper slopes are submitted to and approved by the DEP; and

d. Fill must be used only to the extent to which it does not adversely affect adjacent properties.

13. Manufactured Homes and Buildings are not permitted in the Floodplain District.

14. Accessory/Appurtenant Structures - These structures, including but not limited to detached garages and storage structures, may be permitted within the Floodplain District provided that:

    a. The structure is designed and constructed to withstand hydrostatic flood forces and must be constructed with water equalizing vents.

    b. The applicant/owner of the structure signs a nonconversion agreement stating that the structure will never be converted to habitable space, and has it recorded in the land records of Montgomery County.

    c. The structure must be constructed and placed on the site so as to offer the minimum resistance to the flow of floodwaters.

    d. Any mechanical, electrical, heating and other utility equipment must be elevated to or above the level of the One Hundred (100) Year Flood or floodproofed.

    e. The structure must meet the provisions of Article I, Section 4.A.15[123] of this Regulation.

    f. The structure must not be constructed and placed on the site in such a manner that will cause an increase in the upstream and downstream elevation.

15. Enclosures Below Lowest floor - Fully enclosed areas below the lowest floor, including but not limited to crawl spaces, solid footings, and continuous foundations, must be designed and constructed to withstand hydrostatic flood forces and meet or exceed the following minimum criteria:

    a. A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding must be provided.

    b. The bottom of all openings must be no higher than one foot above grade.

    c. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they cause minimal restriction to the entry and exit of floodwaters.

16. Stream Valley Protection Setback Requirement - A minimum 100 foot stream valley setback shall be maintained from the edge of the banks of any watercourse delineated as

[123] **Editor's note**—see 19.45.01.04.A.15

having a floodplain on the official floodplain maps except where the floodplain limit is less than 100 feet from the banks, then the minimum stream valley protection setback must be the floodplain limits. To prevent erosion, natural vegetation must be maintained in this area. Where natural vegetation does not exist along the watercourse, and conditions for replanting are suitable, high priority must be given to planting trees in the setback area to stabilize banks and to enhance aquatic resources.

19.67.01.05 Process to Develop an SPA Conservation Plan

A. Applicability. A SPA conservation plan will be developed by the Department for each area designated as a SPA. The plan will be based upon the baseline and reference stream monitoring conducted by the Department in accordance with the stream monitoring program, and, as appropriate, upon the Department's review of other data derived from previously conducted water quality inventories, technical studies, and functional master plans which contain credible information on water quality, aquatic life, hydrology, and riparian habitat conditions. The SPA conservation plan will be used as guidance to develop site specific performance goals, and best management practices (BMP) performance goals.

B. Stream monitoring priorities. The Director, where possible, will establish priorities for monitoring subwatershed areas before development, based on the anticipated timing of development within a two year period, as indicated by the Planning Director. The Planning Director must notify the Director in writing at the time of initial designation of each SPA, and, on or around November I of each calendar year, indicate when development is anticipated, including its staging, within each SPA within the succeeding two years. Notification is intended to allow for the necessary time required to establish average baseline conditions supported by a minimum of two years of monitoring data prior to start of construction.

C. Stream monitoring program design.

1. The objective of the stream monitoring program is to determine the biological condition and stream channel characteristics of the watershed. Monitoring the development site during and after development activities enables the Department to link changes in the biological condition and stream channel characteristics to the performance of BMPs.

2. Stream monitoring protocols for each special protection area will be designed and developed by the Department to be as comparable as possible with other State, County, and Federal assessments of surface waters in the northern piedmont and coastal plain eco-regions in and around the County.

3. The stream monitoring program will include assessments of freshwater fish, benthic macro-invertebrates, aquatic habitat, stream channel characteristics, riparian habitat conditions, and other appropriate physical/chemical measurements.

4. Analysis of data by the Department will be based on comparisons to the set of minimally impaired streams (reference conditions) within the County or within adjacent areas of the same eco-region.

D. Baseline monitoring and development Impact monitoring implementation.

1. Baseline monitoring data must be collected by the Department in anticipation of development within a special protection area subwatershed. Site selection for baseline information will be determined so that subwatershed water quality can be assessed.

2. When the precise locations of specific development projects are identified within a subwatershed, the Department will conduct development impact monitoring during and after development. Locations and number of monitoring stations will be contingent upon the size of the development, the location of the development in the subwatershed, and the anticipated location of structural and nonstructural BMPs. Development impact monitoring will commence after the final water quality plan is approved and prior to sediment control permit issuance.

19.67.01.06 Performance goals

A. Purpose. Performance goals will be established for each development application within a special protection area. Performance goals will be developed to implement the SPA conservation plan. Performance goals will be established to:

1. Protect, maintain, and restore water quality, natural stream environments, and the ecological balance of aquatic communities within the County;

2. Mimic natural watershed processes:

3. Stimulate innovative and integrated applications of site plan, sediment control, and stormwater management measures to limit changes to natural hydrology, reduce the on-site generation of pollutants that impact water quality, and mitigate impacts on adjacent and downstream conditions;

4. Develop better measures of assessing BMP effectiveness:

5. Seek improved best management practice designs with higher effectiveness to protect water quality and minimize maintenance; and

6. Protect downstream receiving waters.

Montgomery County Zoning Ordinance Chapter 59 Zoning[124]

59-G-1.26. Exterior appearance in residential zones.

A structure to be constructed, reconstructed or altered pursuant to a special exception in a residential zone must, whenever practicable, have the exterior appearance of a residential building of the type otherwise permitted and must have suitable landscaping, streetscaping, pedestrian circulation and screening consisting of planting or fencing whenever deemed necessary and to the extent required by the Board, the Hearing Examiner or the District Council. Noise mitigation measures must be provided as necessary.

Montgomery County Code – Chapter 31B. Noise Control[125]

Sec. 31B-5. Noise level and noise disturbance violations.

(a) *Maximum allowable noise levels.*

(1) Except as otherwise provided in Sections 31B-6(a) and 31B-8, a person must not cause or permit noise levels that exceed the following levels:

Maximum Allowable Noise Levels (dBA) for Receiving Noise Areas		
	Daytime	*Nighttime*
Non-residential noise area	67	62
Residential noise area	65	55

[124] For additional information , see www.amlegal.com/nxt/gateway.dll?f=templates&fn=default.htm&vid=amlegal:montgomeryco_md_mc (November 2006)

[125] For additional information, see www.amlegal.com/nxt/gateway.dll?f=templates&fn=default.htm&vid=amlegal:montgomeryco_md_mc (November 2006)

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