SUSTAINABLE DEVELOPMENT of FORESTLANDS:
Subdivision Planning/Design to Protect Forest Ecosystems and Water Quality
in the Mountains of Virginia

July 12, 2005

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INTRODUCTION

Given the demand for single-family homes in scenic, rural settings that are within 30-40 minutes of growing towns, cities, and metropolitan areas, forestlands are likely to be developed or impacted in some manner. The most prominent type of residential development occurring on mountainous forestland close to urban centers is large residential lots and subdivisions.

Wear, et al. (1999) and Best & Wayburn (2001) describe how urbanization threatens forest health and integrity and the production and use of timber and non-timber resources in Virginia and the United States. These authors note the importance of private land holdings in the ongoing supply of timber and non-timber resources.

While residential forestland development near urban areas may be viewed as inevitable, the extent and type of these developments are largely determined by the knowledge, intentions, and economic interests of landowners, developers, and others who have the responsibility for obtaining legal approvals from local governments for re-zoning approvals and for approved plats, plans, designs, and engineered development scenarios. Too often, minimal attention is paid to issues concerning working forests and farmlands or to ecological functions. As a result, the loss of productive landscapes and the degradation of soils, streams, rivers, native plant and animal habitats, and other sensitive resources are common.

Planners, developers, designers, engineers, surveyors, real-estate professionals, and landowners can each play a prominent role in guiding new developments to the areas that are best suited to the infrastructural requirements of residential lots, homes, and neighborhoods - while also conserving rural landscape settings and working farms and forests.

The guidelines and model planning process presented in this document are intended to assist land development professionals as they seek to meet the needs and interests of their clients as well as the needs and interests of the larger community.

Goals of the project

This document highlights the benefits of conservation-based development and sustainable forest harvesting in the mountains of western Virginia. The project is intended to help communities sustain forestlands that might otherwise be lost or degraded due to urban development. Where applicable, associated farmland should be protected, particularly farms containing prime soils and other important resources. The project also seeks to retain connections between larger tracts of forestland, intact forest habitat, retain high-quality views and water quality, and protect valued human resources.

Specific project goals are to: 1) educate stakeholders and the public about ways to protect forestland and its associated values; 2) recommend tools and techniques that will enable developers to implement conservation-based designs in or near forested areas with minimum disturbance to forests, streams, and watersheds. Our intended audience has been local officials, administrators, planners, designers, engineers, developers, landowners, real-estate professionals, investors, and interested local residents.

Phase I deliverables accomplished with Virginia Department of Forestry – Urban and Community Forests support and in-kind/matching funds from Virginia Tech faculty/students and local project partners include: 1) a literature review and assessment of six existing subdivision developments in Montgomery and Giles counties, Virginia; 2) development of guidelines for forestlands in mountainous regions, drawing ideas from the literature and case study reviews; 3) a “model” subdivision design (including an assessment of landscape-scale parameters, the community and regulatory context, an opportunities and constraints analysis, alternative development scenarios, a discussion of design goals and objectives, a conceptual plan for two properties, and consideration of low-impact development tools); and, 4) a project website (where project documents and findings can be readily accessed, and where Phase II and other future work can be archived and shared).
Phase II allowed for the translation of Phase I efforts into *model ordinance provisions*. Examples of sustainable forestland development performance standards are provided to show how model ordinance provisions can be used by localities interested in modifying their local comprehensive plans; zoning and subdivision ordinances; and other plans, policies, and ordinances. A *regional stakeholders workshop* and *supporting documentation* were held to publicize project findings associated with Phases I and II, while encouraging the dialogue necessary for effective, local adaptation and application.

Important work beyond Phase II, could include an *economic/feasibility analyses*, the creation of a *model ordinance for forestland conservation, development, and management*, and the publication of an *educational workbook, brochure, and CD-ROM companion*. These deliverables would be of value for those involved in land use planning, design, and development as well as timber harvesting and forestland management.

**Objectives of the literature review**

The primary intent of the literature review is to draw upon the knowledge of those who have written about:

1. the ecological function and structure of forested ecosystems;
2. the potential hazards associated with developing mountainous terrain;
3. the opportunities to create highly livable and life-sustaining residential developments; and,
4. the potential to employ low-impact development techniques in new developments.

Secondary objectives of the literature review included the need to locate ordinance language that may help localities protect valued forestland resources as well as studies and projects which provide insights as to the economic viability and market attractiveness of sustainable forestland developments.

**Objectives of case study evaluations and model subdivision design**

Case studies are presented to assess the recent trends in development in relation to the greater-Blacksburg area. This area was chosen given the amount of forestland development that has occurred near Blacksburg.

Two model subdivision designs were developed, with sites chosen near Blacksburg in Montgomery County. These “models” represent the types of residential development that could take place without degrading the inherent natural ecosystems associated with these two properties. More important than the conceptual designs generated for these sites is the site planning and land development process refined during our work on these site designs.
LITERATURE REVIEW

Forests have been and always will be “in a constant stage of change wrought by forest succession, climatic change, fire, wind, insects, fungi, browsing animals, and [human] activity” (Spurr & Barnes 1980, 558). Each forested property thus has a legacy of change, which property owners would do well to learn and account for as they plan for future use and management. This literature review highlights a few of the ideas that seem most relevant to those contemplating residential development, recreational use, logging and/or harvesting of non-timber resources on the property they own or manage.

The Big Picture: Regional and Landscape Ecology

Forman (1995a) discusses 12 principles that are very helpful as one considers how to use, develop, or manage the forestland they own or are responsible for. Forman begins by discussing the interrelationships between the landscape patterns we see (landscape structure), the dynamics of ecosystems and landscapes (landscape functions), and the evolution of ecosystems and landscape over time (landscape change). Principle 3 states that large natural-vegetation patches (areas) “are the only structures in a landscape that protect aquifers and interconnected stream networks, sustain viable populations of most interior species, provide core habitat and escape cover for most large-home-range vertebrates, and permit near-natural disturbance regimes” (Forman 1995a, 15-136). This principle relates directly to forestland settings in southwest Virginia, to forests throughout the Appalachian Mountains, and in many other regions where there are large tracts of forest cover.

Forman’s last two principles (1995a, 139-140) focus on applications of earlier principles to land use planning.

**Principle 11.** Land containing humans is best arranged ecologically by aggregating land uses, yet maintaining small patches and corridors of nature throughout developed areas, as well as outliers of human activity spatially arranged along major boundaries.

**Principle 12.** Top-priority patterns for protection, with no known substitute for their ecological benefits, are a few large natural-vegetation patches, wide vegetated corridors protecting water courses, connectivity for movement of key species among large patches, and small patches and corridors providing heterogeneous bits of nature throughout developed areas.

Forman (1995a, 140) states that “these principles [are] applicable for any environmental or societal land-use objectives [and] should be applied intelligently, not blindly, to solving our land use problems. They are useful in growing wood, protecting species, locating houses, protecting soil, enhancing game, protecting water resources, providing recreation, locating roads, and creating sustainable environments. Each objective is accomplished more effectively, and for a longer time frame, using a healthy dose of landscape and regional ecology principles.”

Meeting Human Needs: Safe, Livable, Affordable Homes & Communities; Sustained Livelihoods

In America, the right of owning private property is seen as a core value. Forested private property is thus generally seen as an economic investment – a place to secure future income by selling timber or house lots, allowing for hunting, fishing and other recreational uses for a fee, or selling the land to developers or investors. Because more than half of the forests in the US are in private ownership (Best & Wayburn 2001) it is vital to encourage private landowners to meet their individual needs for adequate income (profitability) while simultaneously conserving important forest functions and values in the social and ecological realms (Stokes et al. 1989). Doing this requires seeing the forest as more than land or property (Wilson et al. 1998). Seeking to know the land and to act as a responsible steward is most helpful (Leopold 1949). Recognizing the opportunity to help create safe, livable, and affordable homes and communities (Corbett 1981), and to sustain livelihoods by conserving forest productivity (Chance 1982) provides a vision for forestland stewardship that connects the landowner to larger social and ecological values. With this vision, landowners can harness the natural capital of their forestland properties to provide vital environmental services in ways that bring substantial economic returns and meet important human needs. By acting in this way we can create integrated landscapes and greenways (Dramstad et al. 1996; Arendt 2004; Hellmund 1993), minimize or even eliminate waste, mimic sustainable natural processes, and maintain natural capital (Hawkins, Lovins & Lovins 1999).
Forest Benefits and Threats to Forest Health
Benefits of forestland protection include multiple social, economic, and environmental functions and values. Primary functions and values include a diverse set of wood products for homebuilding, furniture, tools, etc., fiber for paper and other products, non-timber products such as berries, mushrooms, medicinal herbs, places for recreation and spiritual and aesthetic renewal, climate control, air and water quality enhancement, and habitat and biodiversity conservation.

Randolph (2003, 525) and Petit (1995, 5) note the following benefits of trees and the urban forest: increased property values, decreased energy (heating/cooling) costs, improved air quality, reduced stormwater runoff, decreased soil erosion, improved water quality, wildlife habitat, increased community pride and recreational opportunities, improved health and well-being, reduced noise levels, buffer zones for visual and aesthetic relief, and increased property values and sales.

Major concerns related to the health of forest ecosystems are summarized by Randolph (2003, 524) and Sauer, et al. (1998). Concerns include increased wildfire threats due to fuel buildup and management practices such as wildfire suppression; invasion of exotic pests; tree mortality due to disease, air pollution, and the degradation of soil fertility (caused by soil compaction, loss of soil organisms, and the lack of organic matter); degradation of habitats due to tree removal and forest fragmentation, changing plant communities, and imbalanced populations (for example, overpopulation by deer and other browsers); loss of wildlife due to hunting by cats and other pets; degraded riparian corridors due to clearing, increased stormwater runoff causing erosion and sedimentation, trash buildup, etc.

Forestry and Urban/Residential Development
A central issue related to land use in the “urban/forest interface” includes the perceived incompatibility between timber production and urbanization (especially residential development) and between logging and non-commodity uses of forestland such as aesthetics, recreation, and habitat and watershed protection (Bradley 1989, ix). Although many non-industrial private forest landowners have no interest in logging, there are many tracts within 30-40 minutes of towns and cities in Virginia and many other states that could potentially be logged to help supply wood and fiber to local and/or international markets. Additionally, important non-timber values could be marketed for use by the larger public, or can simply be enjoyed by landowners and those who they invite to access and use their land.

Given the keen desire by people to live “near to nature”, particularly forests, it is possible that multiple uses of private forestlands can be effectively employed on a single property to meet the interests/needs of foresters and timber suppliers, landowners, developers and homebuilders, residential homeowners and those interested in forest-based recreation, and conservation-minded groups and individuals. Nevertheless, successfully planning appropriate uses for urban/forest interface lands without major conflict requires understanding and accounting for “all relevant factors and perceptions” (bio-physical, social and economic), facilitating communication and negotiated decision-making among the various stakeholders, and making these factors and perceptions “an explicit part of the strategies and policies...implemented...to achieve land use and forest resource goals” (Bradley & Bare 1993, 31).

Sustainable Use and Management of Forestlands
In order to build understanding, reduce conflict, and develop high quality solutions related to logging and development within forestland settings there is a need to ask and explore “problem-oriented questions”. For example (building upon questions asked by Maser in his book Sustainable Forestry [1994, 82]): How much organic material in the form of large woody debris must be left on site following logging or development to ensure the continued productivity of forest soils? How much room does a stream or drainageway need to adequately protect water quality due to increased stormwater runoff, especially from areas disturbed by road or home construction? Who owns private forestlands and what are their goals and interests? How do we conserve forestlands and other important ecosystems while providing pleasing places for people to live?

Examples of those seeking to ask and explore such questions include ecologists, foresters, planners, horticulturalists, landscape architects, and other researchers and professionals, including: Arendt 1996,
To both use and conserve forestlands in a truly sustainable manner we must first protect as much intact forest as possible (Dramstad, Olson & Forman 1996), locate and construct temporary and permanent roads with the minimum impact possible (Forman, et al. 2003; Wiest 1998), locate and manage home sites so as to minimize negative inputs to the forest ecosystem (Forman 1995) and groups of trees (Matheny & Clark 1998), protect the interrelated processes leading to soil fertility, watershed protection, and biological diversity (Fujimori 2001; Lindenmayer & Franklin 2002; Maser 1994), and manage forest use, including recreation, logging and non-timber harvests, wisely over time (Hobbs, et al. 2002; Kusler & Adler 2003; Maser 1994). According to Hobbs, et al. (2002, 244) four main ideas underlie the concepts of sustainability, sustainable development, and sustainable forestry:

1) Economic, social, political, and ecological factors are integral to sustaining forests and landscapes.
2) Human activities today should not limit options for future generations to sustain themselves.
3) There are limits on what forest and stream ecosystems can provide to people.
4) “There is a balance between what ecosystems can safely produce (without jeopardizing ecosystem integrity and resilience) and the demands humans make on them.”

Benefits of Cluster Development for Forestland Conservation
Small land owners (fondly referred to as Ma & Pa Kettle) and larger developers can potentially secure the following benefits by employing cluster development techniques (Kendig 1980; Porter et al. 1988; Jarvis 1993; Petit 1995; Arendt 1996, and 2004) where they intend to develop forestland properties:

Provide highly attractive (marketable) lots and homes close to conserved forestland.
Reduce design and construction costs associated with roads and utilities.
Use natural areas and grass swales to manage stormwater, reducing the volume and velocity of runoff.
Sustain forest productivity over the long term (timber and non-timber uses), providing continuing economic returns for the managing entity.
Receive tax credits through the use of conservation easements, thus easing development-related cash-flow difficulties.
Create a sense of community among residents.
Provide for larger parks/gardens/recreation areas with opportunities for extensive walking/hiking trails.
Provide opportunities to create more affordable housing.
Help maintain local rural character, thus reinforcing local comprehensive plans which call for forestland conservation.
Preserve critical forestland and provides core wildlife habitat for animals such as black bear, bobcat, tree squirrels, neo-tropical songbirds, and many other species of flora and fauna. Reduce disturbance to forest flora, fauna, and soil fertility.
Create larger, more effective environmental corridors, especially when linked to other open space.
Reduce impacts of development on watersheds by providing water infiltration into forestland soils.
Create opportunities for larger community wastewater treatment, thus protecting area waters from individual failing/leaky systems that are not properly maintained.
Cluster Development in Forestland Settings
A cluster development is a design technique that concentrates lots and buildings in specific areas of a site that are best suited to support infrastructure demands, while minimizing development impacts.

Conservation of environmentally sensitive areas and historic or cultural resources can be accomplished on a site in conjunction with residential housing. Clustering smaller home sites allows the remaining land to be used for alternatives to house lots, such as sustainable forestry and farming, recreation, common open space, and/or natural areas. The ecological and productive functions and values of such areas can be protected through the use of conservation easements, management plans, and covenants and restrictions.

The major objectives of cluster development are to:
Protect sensitive areas such as stream corridors and steep mountain slopes;
Conserve natural resources and productive land as working landscapes;
Support economic vitality and provide farm/forest products to local communities; and
Create highly attractive residential developments near conserved open space.

Other potential objectives of cluster development are to:
Provide opportunities for affordable, well designed housing, where neighbors can frequently meet;
Encourage more active living by providing places for walking/hiking and other outdoor activities;
Support transit or carpooling by bringing residents together in highly livable neighborhoods, villages and/or hamlets, thus reducing single automobile trips and reducing air & water pollution.

Obstacles to conservation design/development applied to conserve productive forestland settings include the following (Petit 1995, 67-73): political concerns (local zoning and subdivision development requirements may be too vague or too inflexible, and unnecessarily complex and lengthy reviews and permit approval processes may create disincentives to plan and implement cluster developments), socio-economic concerns (market acceptance, time for creative, integrated planning, lack of expert advice/interdisciplinary teams for most residential developments, long-term forest management typically not considered by residential developers), and education-related needs (planners/designers/engineers, developers, bankers, stakeholders, and the larger public may be unaware of the positive aspects of cluster developments and may mistakenly think of cluster development as less-livable, high-density development).

Cluster Development Concerns and Responses to Concerns
Loss of property tax revenue.
Property values may increase.
Surrounding land may benefit from preserved greenspace and increase in assessed value.

Time delay to project (lack of timely plan approvals).
If cluster development regulations are clear and well formulated there will be no time delay. Further well-written ordinances expedite approvals.

Smaller-sized lots are less private.
Well-designed, each house has retains a high level of privacy.

Local officials, developers, and the community may be predisposed toward conventional development designs because they are familiar and well understood.
Well-designed cluster developments can change this perception. Developers have found a strong market for open space / cluster development housing units. Further, if land use ordinances and subdivision regulations make compact layouts the easiest (default) option, then interest in these development types will change.

Stormwater run-off and septic management can take additional planning and management.
There is less total infrastructure to plan and manage.

How does a locality give the proper incentives for a developer to design a cluster development instead of a conventional subdivision? Regulations can make clustering mandatory, allow density bonuses, or set maximum densities in conventional subdivisions extremely low. Well formulated ordinances/regulations allow flexibility to address site and contextual needs.
Integrated Comprehensive Planning/Design at the Site, Local, Regional & Watershed Scales
According to numerous authors (including Forman 1999b; Dramstad et al. 1996; Randolph 2004; and Arendt 2004) there is a real need for integrated comprehensive planning/design at the site, local, regional, and watershed scales. At the sub-regional, county, and small watershed basin scales we need to ask: where is it appropriate to develop and what do we conserve for timber production and/or for non-timber values? At the site scale Ma and Pa Kettle, larger developers, and others considering the development of residential subdivisions in forestland settings need to identify primary and secondary conservation areas and compare these to the areas well-suited for and compatible with roads, driveways, houses, lawns (for fire protection and outdoor living/play), wastewater and stormwater treatment facilities (designed for individual homes, multiple residences, or an entire subdivision), and other utilities.

The following sections discuss ways to apply the principles gleaned from the literature during the site planning, design, development and management process.

Improving the Subdivision Review Process
If more sustainable modes of residential development are to occur in the mountains of Virginia and other locations it is critical to provide mechanisms that will encourage the conservation of working-and-living farm and forest landscapes. Localities can promote sustainable development by providing a process where "doing the right thing for the land and people" is easiest in terms of re-zoning and plat approvals and by promoting and coordinating "green infrastructure" planning/design/development at regional, county, and local levels. Landowners, developers, and the professionals who plan and design new residential subdivisions can assist by letting local officials know early in the subdivision review process that they want to help conserve working farm and forest landscapes and then creatively and rigorously explore how this can best be done.

Four Common Flaws in Subdivision Review
(adapted from Randall Arendt - http://www.plannersweb.com/wfiles/w160.html)

A) Most local ordinances fail to require applicants to submit detailed surveys or inventories of a site's features, beyond the few features which would render areas unbuildable. Similarly, most ordinances do not require maps depicting the subject parcel's surrounding context.

B) Most municipalities don't require planning board members to walk the land. Yet a group site visit, which also invites other interested parties, is essential to an understanding of any property.

C) Many local subdivision regulations require highly detailed design drawings at the "Preliminary Plan" stage. Thus, developers may spend tens of thousands of dollars in preparing a first submission. Understandably, developers are not inclined to discard such plans, even if better ways to design the development are pointed out to them by planning staff, planning board members, or others.

D) Subdivision layouts are often prepared by people trained in recording site data and in street and drainage issues (surveyors and engineers), but who have little or no expertise in the fields of landscape architecture and neighborhood design.

Developing a Better Subdivision Review Process
(adapted from Randall Arendt - http://www.plannersweb.com/wfiles/w160.html)

Three sequential steps can be taken that will dramatically improve the subdivision review process:

1. Require the applicant to prepare a Context Map of the surrounding area and a detailed Existing Resources and Site Analysis Map of the property;

2. Conduct a site walk with the applicantt, planning staff, planning board members, and adjacent landowners very early in the process;

3. Require the applicant to submit an inexpensive conceptual Sketch Plan as the first layout document, before preparing detailed layout and design drawings.
The Site Planning and Land Development Process

Sensitive Areas: goals related to protecting forests, steep slopes, soils, streams, riparian buffers, floodplains, wetlands, habitat for RT&E and interior species, viewsheds, historic sites, etc…

Site Planning: goals related to locating conservation areas, roads, lots/structures within a tract…

Sustainable Forestlands Development Planning/Design Process

1. **Identify Development Goals & Objectives with an Interdisciplinary Team.**
   Include a forester/wildlife ecologist/biologist, a planner with expertise in land-use regulations and socio-economic factors, and a designer with an understanding of ecological and recreation functions and values. Account for current and projected housing and development needs and desires in the region and locality, while recognizing opportunities to encourage development types that foster lower-impact and more livable communities. Define specific economic needs and interests. Involve local residents and those responsible for plan and code reviews early on and often enough to build understanding, trust and appropriate partnering.

2. **Select a Site that helps Minimize Impacts to Productive Forestland & Sensitive Resources.**
   Avoid developing highly productive forestland and/or prime farmland; Avoid environmentally sensitive areas; Select lands in close proximity to existing towns/cities/urban infrastructure (infill sites reduce the need for frequent single-vehicle trips to work, school, shopping, and recreation); Choose a site that has already been previously developed (either in whole or part).

3. **Delineate Productive and Sensitive Areas on the-Selected Property**
   by Evaluating the Bio-Physical and Socio-Cultural Aspects of the Site by Identifying Primary (Critical) and Secondary (Important) Resources to be Protected or Conserved on the Site.
   Delineate the following: timber and non-timber forest products that can be sustainably harvested and regenerated over time (defining the amount of forestland required to make harvests feasible); wetlands, surface-waters, and groundwater recharge areas; important wildlife habitat (including habitats for rare, threatened or endangered species); hazards (such as faults, areas of underground mining, sinkholes, highly-erodible soils, shrink-swell soils, slopes greater than 20%, and fire and flood-prone areas); historic sites or other culturally important places; special/sacred places; other important resources.
   Helpful inventory & analysis maps include: relationships to larger ecological systems and adjacent properties; land-use/land-cover and existing roads/trails/buildings on or in close proximity to the site; steep slopes/landform; geology and soils; solar aspect; wetlands, streams, surface-water features; important habitat types; known or potential hazards; groundwater recharge areas; and important visual, recreational, and historic/cultural resources & opportunities. Synthesize these inventory & analysis maps into a map that shows the relationships between ecologically sensitive areas, important areas for forest production, and road & housing suitability (which includes access to potable water & suitable sites for wastewater treatment).

4. **Design the Development to Effectively Conserve Productive and Sensitive Areas on the Selected Property while also Maximizing Energy Efficiency and Minimizing Secondary Impacts caused by Wastewater Treatment Failures, Concentrated Stormwater Runoff, Soil Loss or Compaction, Invasions by Exotic or Other Undesirable Species, and Tree Stressors.**
   Locate roads, buildings, infrastructure, and other built features to conserve critical and important vegetation and other resources; to optimize access and solar potential for homes & buildings, and to provide access for the various types of community & recreation activities envisioned.

5. **Develop a Management Plan to Effectively Conserve Productive and Sensitive Areas on the Selected Property Over the Long-Term.**
   Account for the needs and likely behaviors of people (residents and visitors); restoration & retention of soil fertility; water quality (with an emphasis on retaining intact riparian corridors & stream systems); wildlife & vegetation (with emphasis on conserving native ecosystem functions/values); and forest productiveness (sustaining healthy and accessible timber and non-timber products over the long term).

6. **Implement the Plans with an Understanding of Sustainable Materials, Tools and Techniques.**
   Use sustainable/regenerative construction materials and techniques as much as possible in order to minimize on- and off-site, direct and indirect, and short- and long-term impacts. Special care must be taken to minimize disturbance of vegetation and soils. Refer to the National Association of Home Builders "Green Home Building Guidelines" (www.nahb.org/publication_details.aspx?sectionID=231&publicationID=1994) and chapters in Sustainable Landscape Construction (Thompson & Sorvig 2000) for more details.
Inventory & Analysis Mapping:
Larger Ecological Systems & Adjacent Properties
  Identify: National Forest lands; Ag-Forest Districts, other large forested tracts; major riparian corridors; potential landscape linkages (forested and other natural areas that may serve as stepping stones, corridors and/or important habitat).

Land-Use/Land-Cover (relate to history & zoning, and identify existing roads/trails/buildings)
  Identify: vegetation types, land uses, and management (include notes about historic use and management, and expected or potential land use change per local requirements and regional growth trends); road hierarchy/types; bike, walking & hiking trails; existing residences, churches, commercial structures, barns/farm structures, and other buildings.

Geology/Soils
  Use NRCS/SCS Soil Surveys to understand the relationship between geology, soils and land use capability and suitability (particularly limitations of soils for “Building Site Development” and “Sanitary Facilities”). Compare soils maps to slopes/landform map to understand where soil boundaries may need adjusting.

Slopes/Landform
  Consider maximum slopes for roads in mountainous terrain 15-17% (12% for 20 mph roads); parking 3%; sidewalks 10%; septic drainfields 15% (special designs for slopes >12%); house sites 20-25%; lawns 25%; and other potential structures, uses & activities. Also consider stability of soils, conditionally-stable forested slopes, drainage and runoff conditions, and visually important slopes in determining allowable uses on steep slopes. Relate soils, slopes/landform, and aspect maps to determine “forest site productivity” (where harvesting is likely to bring high economic return due to good tree growth).

Aspect
  Generate aspect map for use in determining forest site productivity (see slopes/landform) and for use in locating homes and roads for passive solar and related needs/concerns.

Wetlands, Streams, Surfacewater & Habitats
  Identify wetlands, seeps, drainageways, intermittent and perennial streams, recharge zones, and unique or important habitats (including wildlife habitat for rare, threatened or endangered species). Create a Hydrology/Drainage/Recharge Areas & Habitat map.

Potential Hazards
  Identify any faults, areas of underground mining, sinkholes, highly-erodible and shrink-swell soils, slopes greater than 20%, fire and flood-prone areas, and any other hazards.

Visual, Recreational & Cultural Resources
  Identify important visual features & vistas/viewsheds (with associated viewing places). Identify prime locations for recreation activities (by type, considering potential conflicts). Identify historic, archaeological, and other important cultural sites, structures or other resources, including special or sacred places.

Synthesis Mapping:
Using GIS map analysis and/or hand-drawn overlays, define the interrelationships between ecologically sensitive areas, important areas for forest (and/or farm) production, and road/housing/development suitability (including access to potable water & wastewater treatment).

Map or otherwise document the following aspects of the property’s development potential:
  1) overall suitability of a site for buildings; 2) prime areas for locating roads, trails, and appropriate uses & activities; 3) land-use carrying capacities; 4) sensitive areas (primary & secondary conservation areas) where infrastructure/buildings and uses/activities should be limited or otherwise restricted; and 5) specific areas to be reserved for special facilities/infrastructure and harvesting forest or farm products.
Forestland Development Guidelines
In 1995 the Montreal Process Working Group (which represented ten national governments including the United States) endorsed “Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests” (see: http://www.mpci.org/rep-pub/1995/santiago_e.html#c1). This endorsement contained seven national-level criteria on what should be considered in conserving and managing forestlands and are a useful reference related to the guidelines described below.

Guidelines fall under two major categories:

**Construction & Building Guidelines:** for roads and lot development (minimize impervious surfaces, protect riparian zones, core habitats and other sensitive areas, use green building materials, choose appropriate wastewater systems, create buildings/structures to reduce energy use, etc…)

**Post-Occupancy Management & Maintenance Guidelines:** woodland management and forestry BMPs, water quality maintenance, wildfire prevention, permissible activities on private and conserved lands to protect forest soils, flora and fauna, etc...

**Locating, Planning and Creating Developments that Fit with Regional and Landscape Context**

- Focus development near existing towns and settlements in order to protect the ecological and productive functions of forestlands. Do not scatter development across the forested landscape. Rather, locate new developments that accommodate greater numbers of residents in close proximity to existing towns and settlements. To reduce the number of single-vehicle trips between home and common destinations, provide easy access to schools, work, shopping and community services within walking distance (ideally 2,000 feet or less), on bus lines (ideally with bus stops located within 1,000 feet of residences), and/or near bikeways.

- If a forested area is to be developed, identify “conservation areas” and areas with the greatest potential for “sustainable forestry practices” during the site planning and design process. If possible, cluster homes in order to protect a larger portion of the forestland and to eliminate the need for additional roads or other infrastructure, which typically have a significant impact on forest integrity. Reduce the size/length of roads and other areas of disturbance. Create a development that is consistent with regional and local ordinances or seek to improve local laws if they restrict creative design/development/construction techniques.

**Protection of Natural Resources**

**Forest Vegetation (trees, shrubs, vines, herbaceous flora and other groundcover)**

- Minimize the loss of in-tact forestland by minimizing fragmentation of large tracts of forest, particularly those connected to surrounding forest conservation areas. “Large patches of natural vegetation are the only structures in a landscape that protect aquifers and interconnected stream networks, sustain viable populations of most interior species, provide core habitat and escape cover for most large-home-range vertebrates, and permit near-natural disturbance regimes” (Dramstad, Olson & Forman 1996, 22).

- Minimize the number of large trees lost due to direct and indirect development impacts.

- Minimize disturbance to native soils, vegetation (including their roots), and other biological components.

- Prohibit the use of invasive species within forestland developments; develop a list of species that may be planted by homeowners with a focus on native plants.

**Forest Hydrology (stormwater, streams, drainageways, wetlands, floodplains, riparian corridors)**

- Conserve as much forestland and non-invasive vegetation as possible for watershed protection.

- Strictly limit clearing, construction and vehicle parking near or within riparian and wetland areas and near lakes, ponds and other surface water features.

- Minimize the number of stream crossings to reduce disturbance to streams and riparian corridors and choose stable stream crossing sites (VDOF 2002).

- Retain natural hydrologic patterns, namely stormwater collection on forest vegetation and in forest soils.

- Provide increased filtering and retention of stormwater in as many ways as possible (see design ideas below).

- Protect slopes adjacent to streams wherever possible. Provide adequate buffers between roads or developed areas and streams/drainageways (ideally 100 feet or more with greater buffers on slopes steeper than 20%).

- Minimize erosion and sedimentation impacts by using appropriate erosion controls (see design ideas below).

- Minimize impervious surface areas by minimizing the amount of roads, roofs, and other hard surfaces.
**Forest Soils (including organic material) & Geologic Features**
- Minimize the removal and/or compaction of forest soils to protect soil structure, biology, and fertility.
- Minimize disturbance to steep slopes (particularly slopes greater than 20%) to protect shallow, often infertile, and erosion-prone soils.
- Minimize the amount of cut and fill during the construction of roads, residences and other elements.
- Keep construction away from significant geological features (such as sinkholes, caves, mines, etc.).
- Do not redirect stormwater into caves, sinkholes or other karst features.

**Forest Fauna (native species, particularly wildlife dependent on larger core or interior habitats)**
- Do not encroach on habitats associated with forest-dependent species; rare, threatened and endangered (RT&E) species, and other “sensitive species”.
- Retain dead and downed woody material (4-5 snags/acre and approximately 20% dead material is critical for small mammals/birds); encourage the creation of brush piles to provide refuge for small mammals and birds.
- Minimize bright exterior lighting to reduce impacts to nocturnal animals.

“As forest…size decreases the relative amount of edge to area increases, thereby decreasing true forest habitat and increasing more open woodland and woodland-edge competitors. Thus the consequences of fragmentation are far-reaching and require a deep understanding of a species’ basic biology” (Steele & Koprowski 2001, 10). As one example, gray squirrels respond very poorly to forest fragmentation in which suitable patches of habitat are surrounded by unsuitable farmland or suburban development is (Steele & Koprowski 2001), especially if remaining squirrel habitat (woodlots) is not linked by fence or hedgerows. Per Nixon & Hansen (1987) core areas of at least 100-110 acres are thought to be needed to sustain gray squirrels.

**Design and Management of the Development to Reduce Future Impacts to Natural Resources**

**Creation & Enforcement of Legally-Binding Restrictions**
- Ordinances, covenants and restrictions must be written to prohibit or minimize harmful activities during construction and for the life of the development, while also promoting excellent stewardship of the land.
- Ordinances, covenants and restrictions need to be legally binding and include feasible enforcement mechanisms. Responsibility for on-going education, monitoring and enforcement must be clearly articulated.
- Establish permanent legal protection of conservation lands by using conservation easements or other appropriate land protection/conservation tools.

**Sustainable Development, Land-Use & Land Management Practices**
- Prepare a forest management plan to direct timber cutting, non-timber product harvesting, removal of invasive plants and diseased trees, seasonal mowing of meadows, etc.
- Design and implement roads that follow the contour with grades between 2-10%. In some instances, grades of up to 15% may be acceptable to reduce side grading and avoid excessive soil removal.
- Make certain that roads are stable, well-drained and properly surfaced with gravel or asphalt.
- Cross streams, “using properly designed and constructed structures installed at right angles to the road.” Culverts and other structures should not impede fish passage or stream flow (VDOF 2002, 23).
- Regularly maintain culvert inlets, outlets and drainage features to prevent sediment and debris accumulation.
- Construction access should be established in the same locations as planned permanent roadways.
- Slow, filter and hold stormwater runoff to cleanse and process runoff on-site near to where precipitation falls.
- Reduce erosion and sedimentation (E&S) during the construction process by appropriately staging construction activities and using silt fences, barrier fabrics, temporary access points, and other E&S tools. Implement oversight and regular E&S checkups for quality control and specify these in E&S control plans.
- Create porous pavements, shared driveways, green-roofs, filter-strips, soaker belts, cisterns & rain-barrels, etc. for greater groundwater recharge and reduced erosion, sedimentation, and flooding.
- Add site amenities to increase ecological functioning (for example, constructed wetlands, reforested areas, expanded riparian buffers, and plantings of native vegetation).
- Locate, design, construct and maintain wastewater treatment systems well-suited to soils, geology, forest types, drainageways and other features. Use technologies that minimize damage and capitalize on natural cleansing processes. Provide an adequate buffer (at least 150 feet) between streams and treatment systems.
- Create and/or maintain forest or woodland edges with high structural diversity, vertical and horizontal, to create richer habitats for wildlife.
- Require cats to be kept in the house, and dogs be kept in the home, within a fenced area, or leashed. Mandate that domesticated animals be kept in the home and that they should not and cannot legally be released into forests or streams.
**Fire Prevention**
- Implement fire prevention planning, design and construction (consider the proximity of structures in relation to expected fire behavior and vegetation types, especially highly flammable vegetation and materials).
- Account for upslope drafts, prevailing winds and wooded areas with high potential to ignite and burn.
- Locate homes in forest settings where wildfires will have little chance of damaging homes and property.
- Create a protective buffer of lawn or other non-flammable landscaping around each home.
- Establish a transition zone between the home site and woodland edge to create a fire deterrent buffer.
- Encourage woodland home fire prevention practices after occupancy, such as VDOF “firewise” techniques.
- Use fire resistant construction materials (typically brick, stone & fire-protected metal rather than wood, vinyl or other more readily flammable materials).

**Energy Conservation**
- Locate, design and construct homes to reduce energy consumption by using passive and active heating/cooling, selecting appropriate materials and construction techniques, and employing low-energy architectural designs and design features.

**Pollution Prevention**
- Limit the use of fertilizers and pesticides used by home/landowners; retain dead trees unless they present hazards for homes and people; do not allow grass clippings and other debris to be dumped into the forest.
- Use wildlife-proof garbage disposal containers and discourage inappropriate feeding of wildlife.
- Limit the use of leaf blowers.
- Limit motorized recreation vehicles on trails, especially motorcycles and 4-wheel ATVs.

**Protection of Cultural Resources and Local Residents**

**Preserving the Cultural Identity of the Area**
- Retain historic buildings, structures or other special cultural features.
- Account for the land-use history of the site, documenting the timing and type of timber operations and other land-use activities and why they occurred the way they did. Answer in as detailed way as possible the question, “Has the site been altered, and if so how and for how long?”
- Retain local farm structures and prime and locally important farmland soils.
- Use local materials in site and housing developments.

**Encouraging Sustainable Economic Productivity**
- Create employment opportunities related to the sustainable harvest of forest products (and/or working the land for agricultural production by using rotational grazing, crop production, etc.). Consider access and/or development of “properly scaled value-added industries [and] businesses” for local forest products (Berry 1995, 19) be they timber-related or non-timber products (refer to Utilizing Economic Values below).

**Maintaining Health, Safety & Welfare**
- Identify potential hazards and wisely account for these safety concerns (fire hazards; sinkholes; unstable slopes; floodways/floodplains; etc.).
- Assess the availability of water for fire protection and other emergency needs.
- Prepare a community emergency preparedness plan for known hazards.
- Provide VDOF “firewise” yard-and-property information for use by each resident to address recommended practices for buildings and landscaping.
- Insure that high-quality potable water can be consistently made available to residents over the long-term.
  (if private wells are proposed, how would we insure the availability of high-quality potable water?)
- Identify the source(s), quantity, quality, and cost for access/treatment/filtration. Evaluate the costs and benefits of using individual private wells versus a neighborhood or community water supply system.
- Assess the effect of existing and future wastewater treatment systems on local water supplies (including surface and groundwater systems).

**Providing for Aesthetics & Recreation**
- Conserve some forestland for recreational and educational activities. Provide opportunities for regular and meaningful interactions with diverse and dynamic forest environments.
- Conserve forestland for viewed protection. Avoid developing ridgecrests to protect views to and from ridgetops (approximately 100 feet on either side of where ridges meet mountain slopes).
- Minimize exterior lighting sources that direct light upwards to allow enjoyment of the dark night-sky. Use downward-pointing, low wattage lighting.
Utilizing Economic Values of Timber and Non-Timber Resources

- Conserve timber and non-timber forestland resources for economic values.
- Encourage long-term natural capital improvements; discourage short-term economic high-grading in forestry.
- Describe the non-consumptive forest values associated with the property proposed for residential development by type and importance to residents and others.
- Allow for the annual removal and use of wood products (timber and firewood) in a manner that preserves the integrity of the forest, ecologically and economically.
- As appropriate, allow for the removal and use of non-timber products (including plants and animals).
- Encourage employment and other opportunities for local residents related to the harvesting of forest products.

Closing thoughts for landowners: Learn what the land can sustain and how you and future residents can retain its integrity over the long-term. Create your development with the specific goal of sustaining viable forestland habitat, while minimizing negative impacts on and off the site.
SUSTAINABLE FORESTLAND DEVELOPMENT PRINCIPLES: LEARNING FROM EXISTING SITES

Assessing the Principles in Practice: Southwest Virginia Case Study Reviews
Case studies are presented to assess recent trends in residential subdivision planning and design. The case studies represent the types of residential communities that are emerging on the fringe of employment centers due to increased demand in the housing market.

Developments in the greater-Blacksburg area within Montgomery & Giles counties were chosen to illustrate housing patterns occurring on existing forestland in the mountains of southwest Virginia.

Case studies were accompanied by a brief description, an aerial map, and photo sheets. Additional maps and a summary table were linked to the project website (no longer accessible).

Conventional Developments:

Clover Springs (Giles County) - A large-lot residential development on Clover Hollow Mountain with valley views and significant native vegetation.

Coal-Bank Ridge (Blacksburg and Montgomery County) - A large-lot subdivision at the headwaters of Tom's Creek with over 40% of the land in a legally protected conservation easement.

Mountain Homeplace (Montgomery County) - A large-lot development along Lick Run with a forested greenway easement connecting the community to the National Forest.

Preston Forest (Montgomery County) - Established in 1975, this large-lot development set a local precedent with covenants that restricted the clearing of trees on private lots.

Cluster Developments:

Nanny Catch Commons (Giles County) - Designed in the style of a rural hamlet, this tight clustered development reserves 98% of the land in shared commons.

Shadowlake Village (Blacksburg) - A cohousing community with single and multi-family housing; a community center; and walking distance to shopping and public transportation.

Village at Tom's Creek (Blacksburg) - A traditional neighborhood development with vernacular architecture and community shopping to recreate an historic American village atmosphere.

Willow Springs (Montgomery County) - A clustered large-lot residential development with 85% of the land reserved for active forest and wildlife management.

Other developments of note:

Brier Patch (Giles County) - A rural six-lot subdivision on pasture and forestland.

Laurel Ridge (Montgomery County) - The oldest large-lot forested subdivision in the county.
Sustainable Development in Forestland Settings

Through this project we desire to promote more sustainable approaches to development, particularly where forest and farmland resources are involved. The following discussion briefly summarizes some important considerations related to residential developments proposed in forestland settings.

Considerations for Forestland Developments

Question: Can a sustainable forestland development plan yield a respectable profit margin in the mountains of southwest Virginia?

Response: In seeking to conserve forest and farmland resources landowners and developers should consider the wide range of potential ways to secure economic returns from the land. It is important to carefully assess the feasibility of alternative development plans in respect to the overall goals and objectives of those who own the land. The use of conservation easements and other land conservation practices which maintain a property as ag-forest land can be a significant help in reducing year-to-year tax burdens and land management costs.

Planning, Design and Management Considerations:

Planning - site analysis, surveying, soil tests, plan approval, appraisals, legal fees, and tax advice.
Management - forest management, timber harvesting, agriculture, and recreation plans.
Design - site design, road design, lot layout, and septic field siting & design.
Infrastructure - roadways (private and/or VDOT regulated, and roads/trails for timber harvesting), walking/hiking trails, wells or other potable water supply systems, stormwater management areas and/or low impact development techniques, and effluent disposal systems.
Recreational/Rental/Leased Property - bed & breakfast, cabins/cottages, trail markers, and camp sites.

Income can be derived from:
Residential lot sales.
Timber sales (when home sites are cleared and over the long-term income, based on the forest management plan).
Rental income from bed & breakfast, cabins/cottages, and campsites.
Leased income from hayfields and pasture land.
Reduced Virginia income tax liability based on tax credit certificates for approved conservation practices.
For details see Virginia Department of Taxation at http://www.tax.virginia.gov/site.cfm?alias=TaxCredit

Consider how the following impact marketability and selling price:
Lot size and density to maximize profit, while maintaining conservation goals;
Harvesting of timber and non-timber resources on land that is used or enjoyed by local residents;
Conservation and management of legally protected forest land;
Wooded residential home sites (attractiveness, accessibility, safety, etc.);
Private, unpaved roads and driveways vs. paved, VDOT-approved roadways;
Recreation amenities such as on-site trails and proximity to National Forest or other public land;
Residential (family) lots with additional lot assignments;
Proximity of rental or leased property to residential homes;
Appropriate potable water supply and wastewater treatment systems.
MODEL DEVELOPMENT

Applying Sustainable Forestland Development Principles and Criteria to the Design Process
Sustainable Forestland Development for Family and Standard Residential Subdivisions

Two model subdivision designs were prepared for sites near Blacksburg in Montgomery County. These “models” represent the types of residential development that could take place without degrading the inherent natural ecosystems associated with these two properties. Of primary concern was retaining large, intact areas of forestland where low-impact forestry and non-timber functions and values could be sustained. More important than the conceptual designs generated for these two sites is the “model plan process” derived from our work on these site designs.

Location & Context of Properties Considered during the Model Development Process:
Located in the northwest section of Montgomery County; current zoning is A1/Agricultural (sliding-scale rules apply). Both properties are within a 15 to 30-minute drive to the US 460 and I-81 interchange, the New River, the George Washington/Jefferson National Forest, the Appalachian Trail, the Town of Blacksburg, and the City of Radford.

Size of Existing Properties under Consideration*:

**Brush Mountain Property** – 595 forested acres, with one existing residential home site on 5 acres. The Brush Mountain property provides access to three perennial streams: Tom’s Creek, Poverty Creek, and Lick Run. Direct access to National Forest land is possible. 32 lots are allowed by-right under sliding-scale zoning.

**Toms Creek-Sunnyside Property** – 420 acres of mixed forest and agricultural land, with one existing farmhouse on approximately 6 acres. The Tom’s Creek-Sunnyside property provides access to Tom’s Creek and one of its tributary streams. 23 lots are allowed by-right under sliding-scale zoning.

* Lot allowances assume that each property is in one parcel, excluding the existing residential lot on each property. Combined, these two properties would allow for approximately 55 single-family lots.

Conceptual Development Features:

Development scenarios provide long-term economic value to landowners through timber harvesting on both properties, livestock production on the Tom’s Creek-Sunnyside property, and rental/lease opportunities on both properties. The sale of residential lots would likewise provide income over the shorter-term.

Accounting for Current Landowner Interests:
Discussions with current landowners associated with each property indicate a very strong interest in conservation. The current owners of the Brush Mountain property expressed the desire to conserve as much of the site as possible. However, they also wanted to know how homes and/or cabins for family members might be accommodated on the site. With nine children, the minimum number of family lots considered for the Brush Mountain property was 9. Although 32 lots are allowed by-right, the maximum number of lots considered for this family subdivision is 27 given topographic constraints and the desire for conservation by the owners. Two different concept plans show 10-18 lots, but it may be feasible to locate an additional 9 lots on the site, particularly if these were treated as cabins or small vacation homes. The representative of the Toms Creek-Sunnyside property expressed a strong desire to retain their property as ag-forest land. In order to show how this could be done – while simultaneously accommodating residential homes – a concept plan was derived showing 20, one-acre lots clustered together, with up to three rental cabins also proposed for the property.

Model Subdivision Design Decisions:
The first step taken during the conceptual planning/design process was to take a close look at the properties in order to obtain a good sense of topography (slope), landform (geology and aspect), soil types, vegetation, and hydrology (streams and drainageways). Early in the process we sought to delineate “potentially productive forestland” (on both properties) and “quality farmland” (for the Tom’s Creek-Sunnyside property). Sensitive areas including wetlands, floodplains, stream corridors, steep slopes, and sinkholes were also identified. Because soil moisture and soil depth are generally the limiting factors for tree growth, areas having both deep soils (fairly level foot-slopes, floodplains, and ridgelines)
and north/north-east aspects were viewed as the most productive forestland settings. If at all possible, productive forestland and quality farmland were to be conserved, particularly large, intact areas of forest, pasture, and hayfields. After ag-forestal resources were delineated, existing and potential roadway access and home sites were carefully considered.

**Toms Creek-Sunnyside Property**

**Energy Conservation**
Orientation of homes is North/South (roads are oriented east/west) to benefit from solar exposure of summer sun in northern and winter sun in southern hemispheres. Houses placed in alternating patterns to reduce shadowing from neighbors. Evergreen plantings placed on the West and Northwest of home site to direct winds away from the house. Deciduous plantings sited along the Southwest to shade home from hot afternoon sun in the summer but allow warmth in the winter. Solar roof panels positioned for southern exposure.

**Roads & Trails**
A paved access road is located at the site of the existing gravel road (avoids additional land disturbance). New road would need to be widened preferably to 18-20', which would be a variance from the Virginia Department of Transportation’s (VDOT) standard 24 foot width. A system of walking trails between the residential/rented dwellings, along Tom’s Creek and around the agricultural zones. Walking trails encircle the residential area, border the riparian buffer and stream corridor, and connect to Tom’s Creek with pervious material to allow filtration of stormwater runoff.

**Residential Units**
The Obenshain property includes 20 clustered single family residences on 1-acre lots with shared driveways to reduce the amount of impervious surfaces. A Bed & Breakfast establishment in a farmhouse style environment on approximately 6 acres. The clustered layout was designed to concentrate areas of land disturbance on existing hayfields. Lot sizes are based on the minimum allowed by Montgomery County within the A-1 Agricultural zoning district. The subdivision of parent properties is governed by the County’s sliding scale system for reducing development density.

**Other Features**
Two (2) rental cabins on approximately 3.5-acre lots adjacent to the Bed & Breakfast site. A clustered subdivision of twenty (20) 1-acre residential lots. Leased hayfields and pasture for food and rotational grazing of on-site cattle. Includes a fencing plan and pasture management plan.

**Brush Mountain Property on Lick Run and Poverty Creek**
Includes a forest management plan of three sensitivity zones. Recreational lodging and camping with access to Poverty Creek, a well-known trout stream and butterfly habitat (Red-spotted Purple butterfly).

**Home Sites:**
The Gaines family desires a conservation-based family subdivision with 9-18 lots for family members. Access to residences will occur along the existing roadways, although improvements such as widening may be necessary. Use of shared gravel driveways will reduce land disturbance and minimize the amount of impervious surfaces.

**Conservation Areas:**
Buffers along all major drainage ways. Minimum 400’ conservation easement along Tom’s Creek and Poverty Creek. Buffers along all property lines and new residential lots to protect views in and out of the property. Protect large stands of intact forestland, drainage ways, steep slopes and ridge lines. Timber roads are vegetated and located outside riparian buffers to avoid sedimentation in the streams. Timber roads serve dual purpose as walking trails during non-harvesting seasons.
POTENTIAL FOLLOW-UP STUDIES AND PROJECT WORK

Important future work may include an economic/feasibility analysis; the creation of a model ordinance for forestland conservation, development, and management; the publication of an educational workbook, brochure, and CD-ROM companion; and other education/outreach activities. These deliverables would be of value for those involved in land use planning, design, and development as well as timber harvesting and forestland management.
STAKEHOLDER WORKSHOP

A discussion on planning, designing, developing, and managing subdivisions to sustain forestland was held at the Montgomery County Government Center in Christiansburg, Virginia on Tuesday, June 7, 2005.

The goal of the workshop was to gather information from professionals involved in land planning, forest management, land conservation, and residential design/development - on the challenges and possible solutions to creating residential communities in or near mountainous forestlands in ways that support economic and ecological objectives.

The following documents introduced the workshop and summarized the results:

Workshop Announcement
Workshop Handout
Workshop Slideshow
Workshop Data/Summary Notes
REFERENCES


APPENDICES

Forestland Decision Matrix – three-page summary of planning approach and key questions

June 7, 2005 Stakeholder Workshop Meeting Notes & List of Participants

Model Ordinance Provisions (July 2005, Draft for Discussion)


Declaration of Easements, Covenants and Restrictions - Silver Lake Highlands, Pierce County, WA

Example of the Dialogue Created by the Sustainable Development in Forestlands Project

Resources for Developers
June 7, 2005 Workshop Meeting Notes – Issue Identification (Themes or Categories)

Categories of issues and obstacles to clustering identified by stakeholders include:
Profit & Sales/Economics; Education & Marketing; Site Management/Green Infrastructure; Gray Infrastructure (utilities and roads); Access & Ownership; and Planning/Design (resource protection, design and regulations, and ordinances).

Categories of barriers & solutions to clustering identified by stakeholders include:
Regulation; Feasibility; and Education.

Categories of long-term management issues identified by stakeholders include:
Management; Enforcement; Sustainability/Economics/Land-Use.

End of Workshop Discussion Notes:

Was there anything that surprised you about the issues identified?
We didn't talk much about conserving wildlife habitat or creating opportunities for recreation.

Because conserving productive forestland was the focus of the workshop, education regarding the need for and purpose of forest conservation is seen as very important. Local governments (those who review and approve proposed developments), developers, neighbors of proposed developments, and the larger public need to better understand why conserving productive forestland is so important, and how it can be integrally linked with other community goals. Policy-makers, local planning staff, and planners/designers and developers need good information to guide and support their work.

Ordinances/regulations and the planning process need to be improved to explicitly support resource conservation, working landscapes, and more compact, people-and-wildlife friendly developments. For example, conserving ag-forest resources and creating livable communities should be the default option (what developments are expected to do), not the exception to conventional practices.

Have we reflected the thoughts and sentiments of the larger public and potential homeowners?
We really cannot fully know what drives consumers (homebuyers) without asking them. We do know that different people will want to live in different types of settings and that they will want to manage their properties in the manner they see fit. We have a partial picture of what people like and where they like to live based upon the thoughts of those who typically support cluster-type developments, and from information gleaned from the literature, those we interact with, and where people buy homes. We know that many people like to be in the country – to see the beautiful views and be close to woodlands. We also know that many people (perhaps most) want privacy. A number of home buyers may not be interested in “compact development” because of the perception that it is too dense. Nevertheless, many people like the community-feel and aesthetic associated with compact traditional neighborhoods and small town settings, particularly neighborhoods with mature trees, well-landscaped yards and grounds, and well-kept homes (large or small). Additionally, many people want to take care of a very small yard and have easy access to open space for recreation, and would likely favor compact development with ready visual and physical access to conserved forestland, woods, and/or pastoral landscapes. With a high demand for homes in less-populated rural settings it is clear that many people have an interest in living “in the country” or “close to nature”. The question is: would they be amenable to occasional timber cutting near to their “home in the forest”?

What is the overall goal of cluster development?
Our goals include: Protecting resources which sustain life (retaining clean water and air and maintaining other ecological services); Providing for aesthetics, renewal, and ready access to places for recreation; Conserving farms and forests as working landscapes (large enough to remain viable in perpetuity). We are seeking to encourage a regional discussion about what lands should be protected and conserved to sustain various functions, and a site-specific assessment of what a site is best suited for. We want people to consider the potential for forestlands to be harvested in a sustainable (low-impact, sensitive, and regenerative manner). We want landowners, developers, planners and designers to really look at the functions of each site they work with – and the way it relates to its larger surroundings.
We are seeking to maintain landscapes that can continue to provide food, fiber, clean water, and healthy places to live and enjoy. We want to support traditional livelihoods, especially where farmers and landowners desire to continue farming and forest management to provide income – to help pay their taxes and meet other financial needs – and to supply locally-grown products for building, furniture, food, and aesthetics. Because farming and forestry have worth beyond their bottom-line monetary values, maintaining these activities is very much a cultural (or personal and family related) decision.

What is sellable?
Large-lot developments in forested settings will remain attractive as they are primarily what people know and want (or think they want). Most people want privacy and the freedom to modify their living environments. Cluster development, better described in lay terms as small-town or traditional neighborhood development, is appreciated by many people – as shown by those wanting to live on and care for small lots in pedestrian-friendly neighborhoods.

What advice do you have for the project team? What are the important next steps?
Both top-down and bottom-up education efforts are needed. Support for and education of those who establish policies and those who review and approve developments is needed, while political support from local residents is likewise essential. Planners/designers need to approach policy-makers and say: “We really want to do sustainable forestland developments, let’s work together to make this happen”. Developers and landowners need reasons (requirements and incentives) to create high-quality, conservation-oriented developments. Because a minimum amount of inventory/analysis/planning and creative design work is done, local governments must require “the essentials” for creating better residential developments and conserving productive farms and forestland. The Comprehensive Planning process presents an ideal venue for more in-depth discussions about specific ways to conserve working farms, woodlands, and forest landscapes.

The team is seeking to understand what is really needed – what we have learned so far is that what seems to be needed is: process changes, ordinance changes, specific education/outreach activities, technical support to assess existing policies and regulations and how these might be changed, planning support as landowners and developers and other professionals seek to create sustainable developments, and explicitness about what is meant by the terms being used, proposed conservation objectives, and methods to achieve the goals we set.

What do we do if the larger population doesn’t really want agriculture and timber management?
We need to highlight what will be lost and what affect such a loss will have – for our collective quality of life (including values related to spiritual, recreation, and aesthetic needs and interests), economically (including the costs associated with flooding, poor water quality, and restoration requirements), socially (including opportunities for neighborly associations and exchanges at farmers markets and local wood, forest, and farm businesses), and ecologically (especially for specific forest-and-stream-dependent wildlife and the tempering of adverse climatic conditions).

What educational venues would you recommend?
Board of Supervisors and Planning Commission work-sessions
Presentations at Homebuilders Association meetings
Virginia Association of Counties meeting
Displays & discussion sessions at local libraries
Booths at County Fairs
Greenways Conference
Workshop Participants:

Virginia Tech
Lee R. Skabelund (Senior Researcher & Project Manager, Landscape Architecture Dept.)
Professor Jesse Richardson (Legal Expert, Urban Affairs & Planning Dept.)
Professor Diane Zahm (Planning Expert, Urban Affairs & Planning Dept.)
Pam Daniel (Graduate Research Assistant, Landscape Architecture Dept.)
Abigail Convery (GIS Expert and Website Developer)

Partners
Joe Powers (Director, Montgomery County Planning & Zoning)
Meghan Dorsett (Comprehensive Planner, Montgomery County Planning & Zoning)
Craig Whittaker (Director, Giles County Planning & Zoning)
David Rundgren (Director, New River Valley Planning District Commission)
Britt Boucher (Professional Forester & President of Foresters Incorporated)
Gary Boring (USDA-NRCS, New River-Highlands Resource Conservation & Development)

Homebuilders Association - Real-Estate Agents, Developers & Builders/Contractors
Joyce Graham (Developer, Village at Tom’s Creek; President, New River Land Trust)
Barbara Shaver (SAS Construction)
Ed Tuckler (Shelter Alternatives)
Sam Linkenhoker (McCraw Real-Estate, Blacksburg)

Surveyors, Engineers, Planners & Designers
Meredith Tremel (Civil Engineer, Village at Tom’s Creek)
Dave Yolton (Surveyor, Newport, VA)
Michael Gay (Engineer, GKI)
Kevin Conner (Landscape Designers, GKI)
Jessica Emmitt (Engineering Intern, Anderson & Associates)
Steve Semones (Landscape Planner/Designer, Balzer Assoc.)
Mark Boenke (Engineer, Pillar Engineering & Surveying, P.C.)
Erin Craft (Engineering Intern, Pillar Engineering & Surveying, P.C)
Margaret Bryant (Assistant Professor of Landscape Architecture)
Garrett Baker (Partner/Designer, Haile Landscape Design)

Foresters, Farmers & Virginia Extension Agents
Harry Groot (Next Generation Woods / BRFL-Cooperative)
Chuck Shorter (Farm Manager, former Montgomery County Supervisor)
Jim Clark (VDOF/Forester, Christiansburg)
David Richert (VDOF/Forester, Cedar Bluff)
Bob Boeren (VDOF/Forester, Salem)
Luke Tushak VDOF Intern, Salem)
Barry Robinson (Extension/Farm Business Management Agent)
Model Ordinance Provisions (July 2005, Draft for Discussion)

The overriding goal of the Sustainable Development in Forestlands Project is to accommodate residential housing in a manner that effectively conserves an interconnected network of viable forestlands and agriculture – to continue to serve as a vital part of our rural heritage and to function as an important component in the supply of locally-grown food and fiber.

The following framework is offered to counties and other localities so that as residents, elected officials, and planning staff consider changes to existing zoning and subdivision ordinances, and as new comprehensive planning language is developed, conservation of intact forestlands can become more readily achieved. These ideas are especially relevant in locations where residential developments are occurring within forestlands, or are likely to occur in the foreseeable future.

A Framework for Forestland Conservation

Purpose: Accommodate “rural estate subdivisions” and other single-family residential types in a manner that conserves large tracts of forestland.

Primary Land Use Planning & Policy Recommendations:

- Establish districts or floating zones where “Rural Planned-Unit-Development/PUD Clusters” are the by-right development type (i.e., the default option), and where each new development will be evaluated by local administrators and code officials based upon the development’s ability to conserve intact forestland for its ecological, social, and economic values and for its ability to effectively address health, safety, and welfare needs and concerns.
- Employ “conditional rezoning” or the use of voluntary proffers (conditions, limitations, or specific conservation design features) by developers/owners (Virginia Code Ann. Sections 15.2-2296 to 15.2-2303). Provide density bonuses (increased numbers of allowable housing units per acre in exchange for utilizing cluster development, for example). Implement, incentive zoning or “the use of bonuses in the form of increased project density or other benefits to a developer in return for the developer providing certain features or amenities desired by the locality within the development” (Virginia Code Ann. Sections 15.2-2201 and 15.2-2286.A.10). Allow rezoning approvals with no relapse date to increase feasibility and reduce uncertainty. Process incentives – for example, providing technical assistance to those who choose to prepare a conservation-based development, and requiring neighborhood meetings and requesting written comments from neighbors and the public, as opposed to mandating formal public hearings – will help insure that new developments are planned, designed, and engineered in a manner that meets the purpose of the established Rural PUD Cluster districts. In addition, standard subdivision requirements can be waived if owners/developers/designers conclusively show that a property will be developed in a manner that conserves resources and addresses health, safety, and quality-of-life issues.
- Encourage the use of legally-binding conservation easements (where these are appropriate) and create subdivision covenants and conditions to establish reliable mechanisms for long-term monitoring and appropriate use/management.

Goals of Rural PUD Cluster Districts or Overlay Zones:

1) Conserve forestlands in large enough tracts to make them highly useful for protecting watersheds, providing regionally and locally appropriate habitat, offering marketable timber and non-timber products, and affording appropriate recreational uses.
2) Enable landowners to make a reasonable economic return from the use and/or future sale of their land – and for localities to offer homeowners a diversity of rural residential housing types thus helping to meet the demand for single-family housing.
3) Arrange housing in compact villages, hamlets, clusters, or farmsted-like groupings in order to: a) limit impacts to environmentally sensitive and other highly valued farm/forestland ecosystems and provide large, visually pleasing tracts of forested open space, b) reduce infrastructure demands and costs, and c) encourage neighborliness and active living (i.e., walking, running, biking, hiking, community gardening, and other outdoor activities).
4) Retain large, visually attractive and physically accessible areas of open space – farms, forestlands, and protected areas that serve as working-and-living landscapes in perpetuity.
Model Ordinance and Planning Provisions (examples):

- **Provide flexibility in setbacks and lot sizes to allow for compact village or hamlet clusters** (for example, through the use of small village or patio lots or by using zero-lot lines). Allow designers and developers to establish lot sizes as small as is necessary to create the type of high-quality residential community envisioned. In other words, there should be no minimum lot sizes and there should be incentives to promote more compact groupings of homes and neighborhoods.

- **Require that plans and designs account for the larger, off-site context as well as internal site sensitivities** by asking each owner/developer/designer to provide a context map, and an existing resources/site assessment plan (including an assessment of the current and potential value of forest and farm resources). With the context map and site assessment in hand the owner, developer and designer must then walk the site with local officials (or if this is simply not possible then to review the context map and site assessment with the locality using aerial photographs and/or GIS maps to highlight important features and relationships). In combination these actions will provide a deeper understanding of the best locations for on-site conservation and of the potential landscape linkages to nearby farms, forests, and other ecosystems.

- **Require that the first development site plan to be prepared be a preliminary sketch plan** so that a discussion of suggested changes and improvements can be made prior to the investment of substantial time and money on detailed plans/designs. This conceptual phase can typically be completed within a 30-day period and can be followed by more detailed design and engineering. Localities should require that “potential conservation areas” be identified at the outset, with the types of acceptable uses for different conservation areas noted. For example, stream corridors and steep slopes are typically two very sensitive forest resource areas and more limited access, be it for timber harvesting or recreation, should be considered for these and other sensitive resource areas. Once the location and use of conservation areas are designated then the location of house sites can be appropriately determined. If timber harvests are proposed, buffer areas between homes and timber harvest areas can be designated. Once house sites are located, road and trail alignments can be shown, integrating permanent trails and temporary timber harvesting roads where this is possible. Lot lines should be drawn last.

- **Encourage high quality design and construction by qualified professionals** to insure that compact housing and lot arrangements allow for safe, affordable and comfortable living, privacy, energy and resource efficiency, and the use of outdoor space for gardening, family use/gatherings, and other valued activities. Designers should also seek to create a development that reflects the area’s unique “sense of place” – one that fits the character of the surrounding landscape.

- **Establish private road standards that are flexible enough to accommodate different sizes and types of developments within a locality**, but which appropriately address safety and traffic demands, the limitations imposed by terrain, and low-impact stormwater management. Roads should be laid out and graded to minimize the total amount of disturbance to the land (particularly to large, unbroken areas of forestland, stream corridors, steep slopes, important habitats, and other sensitive lands), and to facilitate the collection and cleansing infiltration of stormwater into nearby soils and aquifers.

- **Indicate the specific mechanisms that will be used to collect fees and effectively maintain private roads and other infrastructure** (for example, written clauses about how community, neighborhood, or private wastewater treatment systems will be regularly monitored and maintained for the life of the development; in short, the who and how of ongoing management).

- **Require the preparation and adoption of a forest stewardship plan for effective management of conserved forestland**. This forest stewardship plan must be prepared by a professional forester or other qualified person(s).
Performance Standards (examples):

The following are examples of performance standards that could be adapted to meet local conditions, then adopted for Rural PUD Cluster districts and/or as statements contained within local comprehensive plans, and zoning and subdivision ordinances.

Developers must adequately demonstrate the viability of all development plans and associated forest, landscape, and development management plans. Viability may be demonstrated through a report prepared by a professional forester or other qualified person. In this report, developers must show how fees will be collected for ongoing monitoring, maintenance, and management activities and also explain who will be responsible for these important activities.

On sites that have 20 or more acres of forestland, the development shall retain at least half of the forest as “intact forestland” (forest that is un-fragmented by new residential lots and roads). Previously cleared or logged/timbered areas, excepting important farmland or other high-value areas/resources, should always be considered as potential locations to cluster residences and related infrastructure.

Habitats associated with forest-dependent species shall be identified early in the planning process. Habitats associated with forest-dependent species; rare, threatened and endangered (RT&E) species, and other “sensitive species” shall not be encroached upon unless no viable alternatives exist.

Conservate as much forestland and non-invasive vegetation as possible for watershed protection. Retain natural hydrologic patterns by protecting existing forest vegetation, by minimizing concentrated surface water flows, and by infiltrating stormwater flows into forest soils, rain gardens, dry wells, or other appropriately located and designed bio-retention areas.

Minimize the amount of earth moving (cut and fill) during the construction of roads, residences and other elements, and minimize the removal and compaction of forest soils in order to protect soil structure, biology, and fertility.

Trails, which may be used as temporary logging roads, may be created throughout the forest, but must be located and constructed to minimize erosion and subsequent sedimentation of streams and drainageways.

Locate, design, construct, and maintain wastewater treatment systems that are well-suited to soils, geology, forest types, drainageways and other features. Consult with wastewater treatment experts who have experience designing systems appropriate for forestland settings. Use technologies that minimize damage and capitalize on natural cleansing processes. Provide an adequate buffer (at least 150 feet) between streams and treatment systems.

Locate homes in forest settings where wildfires will have little chance of damaging homes and property. Account for upslope drafts, prevailing winds and wooded areas with high potential to ignite and burn. Establish a transition zone between the home site and woodland edge to create a fire deterrent buffer. Create a protective buffer of lawn or other non-flammable landscaping around each home. Use fire resistant construction materials - typically brick, stone and fire-protected metal rather than wood, vinyl or other more readily flammable materials. Refer to VDOF “firewise” recommendations for construction and landscaping at: http://www.dof.virginia.gov/fire/firewise-const-cklist.shtml and http://www.dof.virginia.gov/fire/firewise-land-cklist.shtml.

Use of site-appropriate native plants are highly recommended and the use of non-invasive plants required. Invasive species shall not be planted in the development. For lists of native and invasive plants refer to: http://www.dcr.virginia.gov/dnh/native.htm and http://www.dcr.virginia.gov/dnh/invinfo.htm - where information on the benefits of buying and growing native plants and of avoiding and managing invasive species can be found.
In 1992, private forests comprised approximately 58 percent of America’s forestland (roughly 430.5 million acres). Of these forestlands, over 362.5 million acres were classified as non-industrial private forests. Almost half of America’s forests were held by 9.3 million non-industrial private owners.

The majority of forestland in Virginia and Appalachia is composed of hardwoods (primarily oak-hickory). Depending on soil quality, topography, the position of trees related to landform, and micro-climate, these forests can be highly productive.

Many of these forestlands are being undermined from potential harvesting and ecological standpoints by the construction of single-family residences and subdivisions, as well as by recreational developments. Between 1978 and 1994 an average of almost 2 million acres per year were broken up into parcels smaller than 100 acres – feeding into the market for smaller residential or recreational properties.

Concerns associated with creeping urbanization is that development threatens forest health and integrity, and the production and use of timber and non-timber resources. Because smaller parcels are bought and sold as real-estate, short-term economics frequently trumps longer-term forest stewardship/management efforts. Additionally, owners of smaller, forested parcels generally view trees as visual amenities, not as vital elements of larger ecosystems or essential timber inventories. Lack of continuity in forest ownership and stewardship is likewise a significant concern because understanding how to care for forestlands takes knowledge, commitment, time, and patience.

As of 1997, non-industrial private owners held about 326.8 million acres of forestland in the U.S. Of this, 290.8 were classified as timberland. Recent trends in forest ownership include: increasing fragmentation into smaller parcels (with significant increases in the number of owners holding forestlands in the 1-99 acre range as larger parcels are subdivided); the aging of individual landowners (leading to intergenerational property transfers, the moments when tracts are generally subdivided); increasing financial ownership of forestlands (including the buying and selling of forestland as shorter-term real-estate ventures); and growing interest in sustainable forestry and forestland conservation (for example, by combining environmentally-sensitive silvicultural practices and the use of conservation easements to create working community forests).

In Virginia there are tens of thousands of owners of non-industrial private forests. Although the most effective conservation-and-stewardship efforts will occur on large parcels not facing imminent development pressures, small and medium sized patches of forestland can also be retained intact on parcels of various sizes where development is likely to occur in the near term due to rapid or incremental urban growth.

Retaining intact forestland is important for future timber supply (Wear, et. al. 1999 – The effects of population growth on timber management and inventories in Virginia), high water quality and groundwater recharge, and for multiple ecological and quality of life functions and values.
Private forestland owners can be categorized by type/size as follows:

Residential Forest Owners (1-9 acres)
Characteristics of forestland: dominated by residential uses (including roads, buildings, and lawns), and strongly influenced by domestic animals and exotic (non-native) vegetation; provide minimal ecological functionality & timber productivity (following clearing for homes, roads, lawns, and septic fields these forestlands may only allow cutting of trees for safety [hazard removal], disease control, and firewood use); prime locations for wildlife adapted to humans and their pets (for example deer, squirrels, and raccoons); depending on how much impervious surfaces are created and how stormwater is managed, these forests may have greatly reduced capacities to hold and infiltrate precipitation, a vital function of intact forests and well developed forest soils.

Small Forest Owners (10-49 acres)
Characteristics of forestland: may be physically isolated or well-connected to other forestlands; may provide a number of important forest functions and values (including water quality protection, carbon sequestration and tempering of local climatic conditions, habitat for native plant and animal species, supply of wood for fuel, building materials, paper, and other products; production of foods, medicinals, and decorative florals, storage of genetic wealth; provision of recreation and aesthetic enjoyment; can be managed for periodic timber or other forest-based revenue – providing small storehouses for economic capital, employment, and non-economic benefits, although economic returns may be modest, depending on forest and species types.

Medium to Large Forest Owners (50-999 acres)
Characteristics of forestland: may be physically isolated or well-connected to other forestlands; typically provide major forest functions and values (including water quality protection, carbon sequestration and tempering of local climatic conditions, habitat for a diversity of native plant and animal species, supply of wood for fuel, building materials, paper, and other products; production of foods, medicinals, and decorative florals, storage of genetic wealth; provision of recreation and aesthetic enjoyment; can be managed for regular timber or other forest-based revenue – providing well-functioning storehouses for economic capital, employment, and non-economic benefits.

Very Large Forest Owners (1000+ acres)
Characteristics of forestland: typically held for commercial (industrial) timber production; decisions regarding forest management are likely driven by financial considerations (much more than for the smaller tracts of forestland discussed above).
Declaration of Easements, Covenants and Restrictions
Silver Lake Highlands Primary Road Association (Pierce County, Washington State)

Source: http://mckennacouncil.org/HomeOwnersAssociation/Silver_Lake_Highlands_CCandRs.pdf

Timber Management. All harvesting of timber shall only be conducted with approved harvesting permits issued by Pierce County or Washington State Department of Natural Resources.

A. All limbs and slash, within one hundred feet (100') of adjoining property lines, shall be removed and fire danger abated within ninety (90) days of harvesting.

B. Any or all damage done to the Primary Road, as a result of timber harvesting, shall be the sole obligation of the Owner doing said harvesting and shall be repaired to a condition no less than that prior to the harvesting operation. Said repair shall be completed no less than fifteen (15) days after the end of harvesting activities. A security deposit shall be required prior to commencing. (Refer to Extraordinary Use & Cost.)

C. All Owners shall be responsible for periodic inspection of their forestland to prevent and control insect infestation, root rot, or other forest diseases. Any parcel that shall become infested shall be treated immediately at the expense of the Owner.

D. All logging landings shall be set back a minimum of one hundred (100) feet from the Primary Road. Any damage to Primary Road, ditches or shoulders of the Primary Road, or to the flow of draining water along the Primary Road caused by landings placed in violation of such setback requirement shall be repaired at the expense of the Lot owner responsible for the placement of such landings.

Extraordinary Use and Cost. Due to the extraordinary use on the Primary Road due to heavy truck traffic during logging, land clearing, and home/building construction activities, all Owners are required to notify the Board in writing of what activity they wish to commence and to deposit security with the Board prior to commencing such activity. The Board will determine the amount of said security based on the details of said activity. If, during the performance of said activity, the Board determines that the related usage is causing damage to the Primary Road in excess of the initial estimate, the Board may require the Owner conducting the activity to deposit additional security pending the completion of the activity. Upon completion of said activity the Owner of the lot or lots subjecting the Primary Road to such use shall have the obligation to prove that said use has not caused damage to said Primary Road and that the condition is consistent with the condition prior to the commencement of the activity. The Board shall have the right but not obligation to return all or a portion of said security. If such proof cannot be given the security will be put into the Maintenance Account to be used to repair the Primary Road. If the costs of said repairs exceed said security as determined by the Board, said Owner shall be obligated to pay the additional repair costs. If unpaid, the obligation shall become a lien on such Owner’s Lot, which may be foreclosed by the Association.

Assignment of Rights and Second Amendment to The Declaration of Easements, Covenants and Restrictions Silver Lake Highlands Primary Road Association

http://mckennacouncil.org/HomeOwnersAssociation/Silver_Lake_Highlands_CCandRs_Amend2a.pdf

Timber Restriction. No trees shall be removed or cut by Lot Owners or Occupants within the sixty foot (60') Primary Road Easement as legally described in Exhibit D, as shown on survey recorded under Auditor’s File No. 200104205002, in records of Pierce County, Washington, with the exception of a driveway to a home site. The driveway may not be any wider than fifteen feet (15') wide. The Association shall have the right to remove trees pursuant to Article 2, Paragraph 2.1.B and Article 4, Paragraph 4.1.

For more detailed information on the McKenna Forest Reserve Communities see: http://mckennacouncil.org/Forestry.aspx and http://mckennacouncil.org/mckennamap.pdf
...I've been through the website you set up and want to offer the following experiences as I have been involved in many of these subdivisions.

Septic regulations are transforming what is possible with woodland development. I assume this has come out clearly in your workshop or through others experience. Preston Forest had mostly conventional gravity low-tech drainfields but all those lots have been purchased and I don’t see the day when those drainfield types will be approved again for woodland development unless soil conditions are ideal. In addition, these conventional systems required removal of substantial tree cover for field installation and operation. These mini-meadows are likely a major contributor to deer overpopulation in these areas.

Today, the reality for septic system treatment options is heading toward what has been approved at Coal Bank ridge and Brush Mountain - high cost, high tech, high maintenance drainfields on marginal soils.

Progress Street Builders, Inc. has finished one house in Coal Bank, has one house under construction and owns 2 more lots. The first house was delayed substantially by the drainfield installation and the homeowner has become quite sensitized to the complex nature of the system employed.

For myself, I continue to see a low pressure collection and pretreatment system to a sand filter type treatment facility (STEG/STEP) as the future for forest land development. The lines are small and can run at grade and around sensitive features, trees, etc. The total system is no less complex than the drip systems now being employed in Coal Bank and elsewhere, but it would likely be only one complex system per subdivision instead of one complex system per house. No mini meadows, minimized loss of tree canopy, on site treatment in one location, lower total cost and risk for the owners.

If you are working up some metrics to judge these different development types it would be well to look at area of pavement or impervious surface per resident and tree canopy area loss per resident, etc. This may help show the positives of higher density developments like The Village as an alternative to large lot developments like Coal Bank.

Thanks again

Eric Sallee
Resources for Developers

Forests & Forest Management

Getting Help from a Consulting Forester

Virginia Department of Forestry: Forestry Statistics for Montgomery County

Sustainable Forestry: Guidance for Virginia Forest Landowners
http://www.ext.vt.edu/pubs/forestry/420-139/420-139.html
http://www.ext.vt.edu/pubs/forestry/420-144/420-144.pdf
USDA National Report on Sustainable Forests: Criteria and Indicators PDF

Harvesting Your Timber & Principles of Regeneration Silviculture in Virginia
http://www.ruralheritage.com/logging_camp/index.htm#start

Forest Resource Information Mapper & GIS Links
http://www.forestrim.org/

Southern Regional Extension Forestry
http://sref.info/

Private Forest Management Team
http://www.pfmt.org/

Urban and Community Forests
http://www.americanforests.org/resources/urbanforests/

Forest Stewardship Program
http://www.fs.fed.us/spf/coop/programs/loa/fsp.shtml
http://www.ridgerunnerforestry.com/Stewardship.htm

Next Generation Woods, Inc. and Blue Ridge Forest Landowner Cooperative.
http://nextgenwoods.com/about-us.html
http://nextgenwoods.com/blue_ridge_forest_landowner_coop.htm

Appalachian Sustainable Development
http://www.appsusdev.org/
http://www.appsusdev.org/sustainable_woods.html

USDA Forest Service - Forest Farming PDF
National Arbor Day Foundation - Forest Products PDF

Land Trust and Conservation Easement Information

VDOF Conservation Easements and Forest Legacy Links
http://www.dof.virginia.gov/resources/pub-mgt-00-Forest-Legacy-Prog.pdf
New River Valley Land Trust
http://www.newriverlandtrust.org/
Conservation Easement Fact Sheets

West Virginia Land Trust
http://www.wvlandtrust.org/

Conservation Planning & Design

Conservation Subdivision Design - Randall Arendt/Natural Lands Trust
http://www.natlands.org/home/default.asp
http://www.natlands.org/categories/subcategory.asp?fldSubCategoryId=43
Growing Greener: Conservation by Design PDF

Conservation Subdivision Design - Town of Cary, North Carolina
http://www.townofcary.org/boards/pzboard/staffrpt/conservationsub.htm
http://www.townofcary.org/depts/dsdept/CSD.pdf

Better Site Design - Chesapeake Bay Local Assistance Department
Better Site Design Principles for Communities - Overview (PDF)
An Assement of Better Site Design Principles - PDF

Community Green Laws and Model Tree & Landscape Ordinances
Landscape Ordinances Research Site

Tree Conservation during Development - Arbor Day Foundation
Tips for Building with Trees and Awards of Excellence PDF

Low Impact Development & Energy Efficient Planning/Design
LEED - Leadership in Energy & Environmental Design
Low Impact Development Technologies

Water Quality

Virginia's Forestry Best Management Practices for Water Quality

Understanding the Science Behind Riparian Forest Buffers: Landowner Resources

Wildlife

A Landowner's Guide to Wildlife Abundance through Forestry

Fire

Firewise Virginia - Partners in Prevention

NAHB's Model Green Home Building Guidelines

National Association of Home Builders

Home Builders Technical Information Resources - Toolbase Services