A Three Infrastructures Approach to Land Use Planning in New Hampshire
It’s easy to complain about development patterns that we don’t like, but not so easy to really identify the characteristics of patterns we might like better. One vision of a process that might help to move us in the right direction involves thinking of a community as the intersection of three kinds of infrastructure: built, green, and social (see box on page 6).

At least in theory, the more effective, efficient, and integrated these three kinds of infrastructure are in a community, the higher the quality of life for its residents. Effective infrastructure is very successful in accomplishing its purpose. Efficient infrastructure accomplishes its purpose with a minimum of wasted effort and resources. Efficiency and effectiveness are common goals for infrastructure systems and have many widely recognized benefits. Integrating these infrastructures greatly enhances the benefits of each independent system by reducing potential conflicts and minimizing competition for resources.

How can a community apply these concepts to land use planning? One good starting place is the municipal master plan, the underlying document that guides growth and development in the community. By state law, the master plan includes an introductory section of objectives, principles, assumptions, policies, and standards for development, as well as sections addressing land use, housing, transportation, utilities, and public services, community facilities, recreation, conservation and preservation, and construction materials.

The introductory, section provides an opportunity to include the effectiveness, efficiency, and integration of the three infrastructures as community goals. The community facilities and recreation sections relate most directly to social infrastructure, and the conservation and preservation section relates most directly to green. These sections reflect a town’s public investment in green and social infrastructures and their contribution to local quality of life. The greatest impact, however, may come from carefully considering effects on green and social infrastructures in the built infrastructure sections that address housing, transportation, utilities, and construction materials. Built infrastructure goals can include efforts to promote social infrastructure, for example, through the layout of transportation networks and the design of new neighborhoods. They also can address efforts to minimize negative impacts on green infrastructure, such as by minimizing the fragmentation of undeveloped lands when siting new facilities. The land use section provides the opportunity to express a community vision that truly integrates the many ways in which citizens use land.

In the coming months, we will be working with several pilot communities to explore the application of three infrastructure ideas in their master planning processes. Every community’s master plan is unique, and participating local citizens will determine if or how the three infrastructure concept can be useful to them. We urge our readers, whether planning board or conservation commission members or citizens interested in the future of their towns, to consider these ideas, discuss them with neighbors and colleagues, and be actively involved in your town’s planning process.

Challenge: How do we encourage development where it makes sense and minimize it where it doesn’t?
### GREEN

**DEFINITION**
A network of interconnected lands and waters that provides ecosystem services such as clean air and water, climate mitigation, food and fiber, and waste decomposition. The human-constructed elements that transport people and goods, and provide infrastructure such as schools, roads, and community centers.

**COMPONENTS**
- Working Lands
- Conservation Lands
- Recreation Lands
- Riparian Buffers
- Urban Woodlots
- Shorelines and Yard Vegetation

**FUNCTIONS**
- Air quality, purification
- Climate moderation: shade and sunlight (cool in summer, warm in winter)
- Water flood prevention, storm water retention, groundwater recharge
- Surface water quality, purification
- Pollination and seed dispersal
- Food and fiber supply
- Waste decomposition
- Carbon sequestration
- Insect population control
- Noise reduction
- Recreation
- Spiritual connection
- Aesthetics and visual screening

### BUILT

**DEFINITION**
The framework and infrastructure that shelter, transport people, goods, and information. The opportunity within a community for organized (event-based) and informal (place-based) social interaction.

**COMPONENTS**
- Buildings
- Roads, Bridges, Rails, Trails
- Pipelines
- Paul Supply
- Sewage Treatment Facilities
- Landfills/Incineration

**FUNCTIONS**
- Mobility
- Transportation
- Water supply
- Power generation and distribution
- Communication
- Waste handling & treatment

### SOCIAL

**DEFINITION**
The social fabric of a community, including education, commerce, and governance. The recognition of those within a community for organized (event-based) and informal (place-based) social interaction.

**COMPONENTS**
- Meetings of Organizations
- Education Classes
- Cultural Events
- Religious Services
- Government Functions
- School Events

**FUNCTIONS**
- Support
- Safety
- Bonding
- Information
- Governance
- Education
- Service
- Commerce
Green Infrastructure: A Tool for Maintaining Rural Character

Green infrastructure, as defined previously, constitutes the natural life support system upon which wildlife, human life, and economic activity ultimately depend. This system is a network of interconnected lands and waters that supports native plants and animals, maintains natural ecological processes, sustains air and water resources, and contributes to human health and quality of life. Green infrastructure, with the native biodiversity it supports, provides many essential ecological services (see Box 1), and contributes to human quality of life in additional ways (see Box 2).

Box 1: Essential Ecological Services
- Groundwater recharge
- Surface water purification
- Storm water retention
- Microclimate moderation
- Air purification
- Food and fiber production
- Insect population control
- Carbon sequestration
- Waste decomposition

Box 2: Quality of Life Contributions
- Shade
- Visual screening
- Noise reduction
- Recreational opportunities
- Aesthetic appreciation
- Intellectual stimulation
- Spiritual connection

We can think of green infrastructure as a set of building blocks, sort of like tinker toys, that can fit together in various ways on the landscape. These building blocks can be separated into two broad categories: patches and connections. We have defined five different kinds of patches, based on New Hampshire's landscape and wildlife.

Superhubs are large contiguous blocks of undeveloped land, at least 35,000 acres in northern New Hampshire and at least 15,000 acres in southern New Hampshire. These areas, based on Nature Conservancy research, are believed to be large enough to sustain the full range of forest ages and the animals that depend on them at any given time, based on the natural disturbances (e.g., wind, ice, insects, fire, disease) typical of the region.

Hubs are contiguous blocks of at least 5,000 acres and preferably more than 10,000 acres. These blocks should be large enough to support medium-sized predatory mammals, such as fishers and bobcats.

Nubs are blocks of 500 to 5,000 acres, preferably at least 1,000 acres, and should be large enough to support somewhat smaller predators, such as Barred Owls and long-tailed weasels.

Subnubs are blocks of less than 500 acres that are large enough to support forest interior birds, such as Ovenbirds and Scarlet Tanagers. Research is underway in southern New Hampshire this summer to help determine the lower size limit of these blocks.

Interspersion areas are areas in which green and built infrastructures are interwoven at a fine scale. They range from downtown areas with very few trees to large lot subdivisions with patches of natural vegetation. Their common characteristic is a lack of ground-nesting and other interior forest birds.

Connections come in two broad categories: links and corridors. Links are broad connections between patches that include some scattered development but enough undeveloped land for wildlife to move safely from one patch to another over a variety of routes. You can picture them as a braided river, where a canoe could take any number of routes down interconnected channels, but numerous islands require some careful navigation. Corridors are narrow connections between patches, similar to canals, though which wildlife can move from one patch to another over a single, well-defined route, with impassable terrain on either side. A riparian corridor through a developed area is one example of a corridor.

New Hampshire's rural character has long enabled communities to take green infrastructure for granted. However, an increasing proportion of land is being converted from natural systems to developed landscapes. Municipalities now need to plan for green infrastructure as an integrated system, rather than as isolated patches of protected land.
Minimum Impact Development at the Landscape Scale: Maintaining Choices in Community Character

The interaction of built, green, and social infrastructures helps to define community character. The mix of land uses over New Hampshire's landscape creates a diversity of human densities, with open spaces between developed places. Our state offers residents a wide range of choices in community character along a gradient from rural to urban. This diversity of community character helps to make New Hampshire a special place to live.

Each of New Hampshire's 259 municipalities and unincorporated places can be categorized as one of ten community types (see sidebar).

The Wild Land category encompasses unincorporated places with no housing units and no active forest management and includes nine unincorporated places located at high elevations within the White Mountain National Forest. Built infrastructure is limited to trails and other recreational facilities, and these places are within the state's largest green infrastructure superhubs. Social infrastructure is associated with recreational activities. These places also are important components of green infrastructure superhubs.

Rural Communities are municipalities or unincorporated places with fewer than 2,000 housing units and no municipal water supply. Their undeveloped lands may be either "wild" or "working" and contribute to hubs and superhubs. Built infrastructure is limited and includes roads, buildings, and utility lines. Social infrastructure is largely informal and may or may not include local government, schools, and religious institutions.

Villages are municipalities with fewer than 2,000 housing units and a municipal water supply. The availability of a public water system enables compact development in a village center. Villages are distributed throughout New Hampshire, but only two remain in Strafford County. Built infrastructure is somewhat more extensive than in Rural Communities, including a water system and, in some cases, a sewer system. Social infrastructure is limited, but it is likely to include local government, schools, stores, and at least one religious institution. Green infrastructure includes a small interspersion area and contributions to hubs or superhubs.

Riparian Communities have 2,000 to 9,999 housing units, many of which are second homes, and no municipal water supply. These communities occur in the White Mountain and Lakes Regions. Built infrastructure is moderately extensive and may be focused around a particular recreational activity (e.g., downhill skiing or golf). Social infrastructure may exist as two largely separate systems, one involving seasonal residents and the other year-round residents, with local commerce serving as the primary link between the two. Green infrastructure may include portions of hubs and superhubs, as well as smaller components.

Small Towns have 2,000 to 9,999 housing units, most of which are primary residences, and no municipal water supply. Suburbs are...
**What is Social Infrastructure?**

Until recently, social infrastructure has received relatively little attention as an important contributor to quality of life. Defined as the opportunities within a community for organized and informal social interaction, social infrastructure can be considered at multiple scales. Organized social infrastructure tends to be event-based, with people coming together for a specific, planned activity. Informal social infrastructure tends to be more place-based, involving chance encounters at locations where many people come independently to conduct various activities.

Social infrastructure exists at the site scale both in buildings (primarily work places) and on their grounds. Organized opportunities may include meetings, workshops, and presentations; informal opportunities exist in break rooms and cafeterias, lobbies and waiting rooms, at mailboxes, bulletin boards, and water coolers. On the grounds, organized opportunities include group picnics and organized recreation, such as softball games, while informal opportunities exist on trails and sidewalks and at benches and picnic tables.

Organized opportunities are relatively uncommon at the neighborhood scale, but may include neighborhood meetings, block parties, cookie swaps, trick-or-treating, and Christmas caroling. Informal opportunities, including sidewalks and trails, playgrounds and parks, backyards, and sledding hills and skating rinks, are more typical of the neighborhood scale.

Organized opportunities abound at the community scale as government functions, such as town meetings and various public hearings, school events, educational classes, religious services, organization meetings, cultural events, and celebrations, such as Old Home Day, Memorial Day parades, and Fourth of July fireworks. Informal opportunities at this scale can be grouped roughly into two broad categories: recreational and business-related. The recreational category includes community centers, sidewalks and trails, restaurants, athletic facilities, bandstands, pools, parks, and beaches. The business-related category includes libraries, town halls, transfer stations, stores, post offices, and waiting rooms.

Incorporating social infrastructure considerations into site and neighborhood design is a worthwhile investment that promotes public health, safety, and general quality of life. As communities grow and live become busier, diverse opportunities to interact with neighbors and fellow citizens become more valuable for social capital (see www.bettertogethernh.org).