Energy Efficiency Audit
of the
2000 Natural Resources Chapter of Master Plan

The ARRA Energy Efficiency Conservation Block Grant through the New Hampshire Office of Energy & Planning provided funding for this project.

In regard to energy efficiency, the audit looked at the, assessments of natural resources, historic resources, current status and needs, and recommendations contained in the 2000 Natural Resources and Historic Chapter of the Master Plan. The purpose is to provide energy efficiency recommendations to the City of Dover for use in their Sustainability Plan.

Section 1: Goals and Objectives

Add new goal – Setting model for sustainable stewardship of natural resources and historic resources through best management practices and national standards for energy use and conservation, product selection, facility upgrades, and maintenance.

Revision to Goal 1: Protect and enhance environmentally sensitive natural resources areas in order to maintain their ecological integrity, promote public health and safety, and *encourage energy efficient practices.*

Add Objective*: Conserve water usage for energy efficiency, protection of resources.*

Revision to Goal 2: Maintain the quality of Dover's living environment by encouraging the appropriate balance between protection, *conservation and stewardship* of the city's natural, cultural and historical resources.

Add Objective: *Model energy efficiency best practices in City owned properties.*

Efforts must be made to promote efficiency and conservation as priorities over the creation of new fuel sources. These measures are much more economical, and will ensure that alternative energy sources will go much further to heat and power the city's infrastructure and facilities.

Section 2: Introduction Natural Resources

Dover's Natural Resources

To use quotes from this section: *Dover's natural resources are a critical consideration in establishing a proper approach for land management. Understanding natural resource values provides a rational basis for determining which areas of the City are more appropriate for protection and open space and which areas are more suitable for development. Natural resources such as slope, soils, vegetation, wildlife and water resources add to Dover's character, provide recreational opportunities and contribute to the*

quality of life for Dover residents. These natural resources also provide both opportunities and constraints for growth. Steep slopes and wetlands, for example, are less suitable for development, while better drained, flatter areas are more suitable. On the other hand, these well-drained areas may be associated with groundwater areas that require protection. Thus, the natural resource base of Dover provides an important factor as the basis for land use decisions.

Comment: Well done.

Section 3: Natural Resources Related to Energy and Climate Preparedness

Natural resource management can play a role in the conservation and enhancement of undeveloped land and its capacity to remove and store greenhouse gases from the atmosphere and contribute to the quality of place.

Forests, farmland, and natural areas are all involved in the overall greenhouse gas footprint. According to the U.S. Environmental Protection Agency, U.S. emissions would be approximately 15 percent higher if it were not for sequestration by forests and grasslands. Additionally, soil management and alternative approaches to livestock feed can greatly reduce methane and nitrous oxide emissions.

Adaptation strategies for natural resource management should focus on two key areas: conservation of ecological areas and corridors to facilitate the ability of wildlife to migrate; and ecosystems, conservation, restoration, and potential expansion of floodplains and other natural features that will help buffer impacts of climate change.

1. Topography and Soils

Use best practices in Erosion control throughout the City. The City could do this by using the EPA model ordinances language as an example found on **http://www.epa.gov/owow/NPS/ordinance/mol2.htm.**

During the construction process, soil is highly vulnerable to erosion by wind and water. Eroded soil endangers water resources by reducing water quality and causing the siltation of aquatic habitat for fish and other desirable species. Eroded soil also necessitates repair of sewers and ditches and the dredging of lakes. In addition, clearing and grading during construction cause the loss of native vegetation necessary for terrestrial and aquatic habitat.

As a result, the purpose of this local regulation is to safeguard persons, protect property, and prevent damage to the environment in _____ (municipality). This ordinance will also promote the public welfare by guiding, regulating, and controlling the design, construction, use, and maintenance of any development or other activity that disturbs or breaks the topsoil or results in the movement of earth on land in _____ (municipality).

The principal advantage of preserving natural vegetation is protecting desirable trees, vines, bushes, and grasses from damage during project development. Vegetation provides erosion control, stormwater detention, biofiltration, and aesthetic values to a site during and after construction activities. Other benefits of preserving natural areas are because natural vegetation

- Does not require time to establish
- Can process higher quantities of stormwater runoff than newly seeded areas
- Has a higher filtering capacity than newly planted vegetation because above ground and root structures are typically denser and using living root systems helps to hold soil in place
- Reduces stormwater runoff by intercepting rainfall, protecting soil surface from the impact of raindrops, holding soil particles in place, maintaining the soil's capacity to absorb water, promoting infiltration, and lowering the water table through transpiration
- Provides buffers and screens against noise and visual disturbance
- Provides a fully developed habitat for wildlife
- Usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation
- Enhances aesthetics

2. Forest Resources

A recent Natural Resource Inventory (NRI) of the Strafford Region using land cover data from 1992 and 1993 aerial photography reports that there is 7325 acres of forest cover in Dover or approximately 39%. It is likely that different criteria were used to define forest use in each of these studies. The NRI also documented valuable forest land that identified forested areas in association with soil types conducive to high timber yields. Dover has 3313 acres of such lands or approximately 18% the City. Plants remove carbon dioxide from the air through a process known as carbon sequestration. Identifying key forest in the City would be a first step, as well as looking at alternative fuel sources such as timber or wood pellets.

The Dover City Tree Program should continue with an active tree planting and enhancement program throughout the city, and in particular in the urban areas... Continue the inventory of every street tree and publicly owned shade tree in Dover using the GIS data base. Make this information available to the public so that they could “adopt a tree” or take a tour of trees in the City as a recreational, educational activity. Promote Tree City and National Tree Trust as part of the tourist destination aspects of Dover – with shady walks.

Urban forest contributes to the economic, social, and environmental health of Dover. Research has proven that trees in our cities provide extensive environmental benefits including carbon dioxide exchange, decreases in energy use and air pollution, and water quality improvements (Source: http://oregon.gov/ODF/privateforests/ucfYourForests.shtml) . Trees can also be planted in strategic locations such as tree shaded office parks. In Dover the Liberty Mutual campus is an example of the beauty of innovative landscape design.

3. Agriculture Pollution Prevention, Best Management Practices, and Conservation

Pollution prevention eliminates or minimizes pollution at the source -- so pollution isn't created in the first place and never enters into the environment. This is the most energy efficient

approach. Traditionally, most environmental protection has involved controlling, treating, or cleaning up pollution. Pollution prevention is most effective in reducing health and environmental risks, and being energy efficient, because it:

- eliminates the risks associated with any release of pollutants to the environment,
- avoids shifts of pollutants from one medium (air, water or land) to another, and
- protects natural resources for future generations, by cutting wastes and conserving resources.

4. Construction Materials

Dover has rather extensive deposits suitable for road fill. The Hinckley and Windsor soils are associated with stratified drift deposits. The City should use local excavated material whenever possible to reduce trucking cost. Only the Hinckley and Charlton soils are probable sources of gravel as well as sand and road fill. The City should also use the topsoil and gravel whenever possible.

5. Water Pollution

Objective 1: Ensure a safe and adequate water supply for all citizens through proper management of the use of land adjacent to the City's existing and potential, to the extent possible, water supply wells and potentially valuable aquifer recharge areas.

Efficient water use and conservation of water can reduce the amount of energy needed to treat wastewater, resulting in less energy demand and, therefore, fewer harmful byproducts from power plants.

- Most people realize that hot water uses up energy, but supplying and treating cold water requires a significant amount of energy too. American public water supply and treatment facilities consume about 56 billion kilowatt-hours per year—enough electricity to power more than 5 million homes for an entire year. (source: EPA)
- If one out of every 100 American homes retrofitted with water-efficient fixtures, we could save about 100 million kWh of electricity per year—avoiding 80,000 tons of greenhouse gas emissions. That is equivalent to removing nearly 15,000 automobiles from the road for one year!(Source: EPA)
- If just 1 percent of American homes replaced an older toilet with a new Water Sense labeled toilet, the country would save more than 38 million kilowatt-hours of electricity—enough electricity to supply more than 43,000 households for one month (Source: EPA)
- Letting your faucet run for five minutes uses about as much energy as letting a 60-watt light bulb run for 14 hours.(Source: EPA)

- Reduced need to construct additional dams and reservoirs or otherwise regulate the natural flow of streams, thus preserving their free flow and retaining the value of stream and river systems as wildlife habitats and recreational areas. (Source: EPA)
- Reduced need to construct additional water and wastewater treatment facilities.(Source: EPA)

Residential water saving strategies

Outdoors

- Water lawns and landscapes in the early morning or late evening significant amounts of water can be lost due to evaporation at other times of day.
- Inspect irrigation systems checking for leaks and broken or clogged sprinkler heads. Fix sprinkler heads that are broken or spraying on the street or driveway

Indoors

New and improved Water Sense labeled toilet models use less than 1.28 gallons per flush—that is at least 60 percent less than their older, less efficient counterparts. Compared to 3.5 gallons per flush toilet, a Water Sense labeled toilet could save a family of four more than $90 annually on their water bill, and $2,000 over the lifetime of the toilet.

Fix That Leak!

Challenge: Leaky faucets that drip at the rate of one drip per second can waste more than 3,000 gallons of water each year.
Solution: If you're unsure whether you have a leak, read your water meter before and after a two-hour period when no water is being used. If the meter does not read exactly the same, you probably have a leak.

Challenge: A leaky toilet can waste about 200 gallons of water every day.
Solution: To tell if your toilet has a leak, place a drop of food coloring in the tank; if the color shows in the bowl without flushing, you have a leak.

Section 4: Recommendations

The Natural Resources Chapter identifies many places and resources of significance in the city. A next step would be to continue the protection, restoration, and stewardship of these special places as a legacy for future generations.

- Identify, protect, and restore special places that continue to define Dover and attracted the first settlers, preserving the legacy for future generations. The energy efficiency aspect is recognizing inherent values of built and natural environment and providing adequate stewardship.
- "Re-nature" neighborhoods by increasing the presence and function of ecological processes.
- "Re-green" urban neighborhoods to enrich peoples' experience of nature and help strengthen a physical connection to the region's ecology.

- Demonstrate multiple benefits for people and natural systems.
- Demonstrate cost-efficient ecological design solutions.
- Increase the region's fish and wildlife inventory.
    - Restore and/or improve habitats of concern.
- Provide universal access to the public.
- Green the Spaulding Turnpike through the City with pedestrian and bike paths linkages and conduits, and by planting native trees and shrubs
- Conduct plant and animal surveys within City, continue testing waterways for chemicals and bacteria teaming up with the University of New Hampshire, and monitor changes that occur and assess if surface waters need to be restored
- Create an interactive map so residents and visitors can explore natural areas such as habitat, forest, wetlands, community projects, public access, rives and stream using City natural areas (as example www.ournature.oregonmetro.gov/)
- Water resources and public waters supplies of Dover should be protected and conserved
- Emphasize the use of native trees, shrubs and perennial plants as a policy standard.
- Emphasize the use of passive cooling at parks, fields, facilities (shade trees).
- Undertake a City-wide education program aimed at informing Dover citizens about the importance of protecting and managing the City's natural and cultural resources.

Water Saving Policy and Actions

From public and economic health, to recreation and overall quality of life, water plays a major role in the growth and success of a community. It is a shared responsibility to develop and implement sustainable water management programs that meet the water needs of residents and businesses—both for today and tomorrow.

These steps, developed by EPA, may help manage water in any city:

- Help children learn about the importance of water efficiency with interactive websites and games.
- Encourage City leaders and civic organizations to support water efficiency by becoming a Water Sense partner.
- Promote Fix a Leak Week in Dover annually.
- Encourage Water Sense Partners and City leaders to develop conservation plans, which promote more efficient use of water and energy in Dover.
- Read the Using Water Efficiently: Ideas for Communities fact sheet for ideas on how to help Dover reduce its water use.