

# **Chapter 4**

# **ENVIRONMENTAL AND CULTURAL RESOURCES**

## **VISION**

The Environmental and Cultural Resources chapter is a study of Durham's environment that includes our estuarine systems, watersheds, brooks and marshes, drinking water resources, greenway system, and our built environment as it relates to these resources. In addition, it includes reference to the history and culture of Durham. This allows us to gain insight into our past structures and attitudes toward environmental resources and our past willingness to take individual and collective steps to conserve, preserve, enhance, and restore our environment, as appropriate.

Durham residents have traditionally supported strong conservation and preservation measures to protect the rich array of natural and cultural resources found in the community. This attitude continues to prevail as shown by the results of the 1998 Master Plan Survey where Durham residents identified the conservation of natural and cultural resources as the second highest priority for allocation of their tax dollars. In addition, the workshops conducted at the beginning of this Master Plan process indicated a strong desire from the community for the protection of our natural resources.

The vision established by this chapter is to continue to concentrate the growth and development in Durham within the traditional core area of Town and to interconnect the core of the community through greenways that radiate out into the more rural portions of the community. Within the rural areas, the vision is to protect and interconnect through a greenway

network tracts of land with important ecological, social, visual, and agricultural value.

To achieve the goals and recommendations of this chapter, the Town should not view this plan as a static document that lays out precisely what needs to be done for the next ten years, although in some cases we are able to do just that. But in general, this chapter is more like a lens focusing our attention on certain critical environmental and cultural resource issues that need to be monitored and that, in some cases, we need to learn more about at a fundamental level. The idea is to steadily increase our information base regarding issues which we know to be important, make that information available to the public and decision makers in an accessible, clear and consistent manner, and to use that information to refine not only management plans, but also to target and prioritize the need for additional information. It is useful to think of this chapter as adaptive in the sense it can be adjusted as we learn more about the dynamic environmental systems in which we live.

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## **SURFACE WATER AND ESTUARINE RESOURCES**

### **BACKGROUND**

The Town has an obligation to protect water quality, including freshwater resources used for public drinking water and as habitat for aquatic and shoreland wildlife. Conservation efforts in the past have helped to protect all these resource values through the Town's Wetlands, Aquifer, and Shoreland Protection Ordinances and through the acquisition of conservation land or easements. However, in the 1998 Master Plan Survey, almost one-third of Durham residents did not know whether the coastline is being adequately protected. Over half of those answering indicated that they did not feel the level of protection was adequate, due largely to the management of land by private landowners (septic systems, application of fertilizers and pesticides, and erosion). Allowing variances to Town ordinances was also seen as a threat.

As the Town grows, water resources are taking on new significance. The freshwater rivers are being hard pressed to provide public water supplies without compromising their ecological integrity. The water quality of both salt and fresh water bodies are vulnerable to degradation by residential septic systems, wastewater treatment plants, accidental spills, erosion, stormwater runoff, herbicides, fertilizers, and pesticides. Buffers are in place to prevent development from occurring too close to the water resources; however, for various reasons, numerous variances/waivers and

a lack of compliance threaten the resource. Commercial, industrial, and residential development increases the amount, rate and pollutant load of surface runoff from impervious areas. In fact, sediment from runoff into the estuary has been identified as a significant problem by the New Hampshire Estuaries Project (NHEP) and the NH Coastal Program. In addition, stormwater runoff has been found to be the largest contributor to non-point pollution in the estuary. Encroachment on shorelands by development reduces the availability of important habitats for wildlife. These changes are incremental, but in the long term they are a substantial threat.

In addition to smaller estuaries and brooks, the Town of Durham contains three primary watersheds: the Oyster River watershed, the Crommet Creek/Great Bay watershed, and the Lamprey River watershed. Durham has a major responsibility in managing these three watersheds. How the watersheds are managed defines the health of both Great and Little Bays. Stormwater runoff, wastewater management, and identification and control of point source contaminants all impact the environmental health of the Great and Little Bay estuarine systems.

Despite Durham's investment in bringing secondary treatment capability to its Wastewater Treatment Plant, the sanitary sewer system remains a significant concern with respect to the discharge of nutrients and coliform bacteria into the Oyster River. A study of the fecal coliform levels of all the tributary rivers for the Great Bay from 1993 through 1996 found that the freshwater portion of the Oyster River has the second highest coliform levels under wet conditions (300 units/100 ml), behind the Cocheco River. The levels are such that they are well in excess of the safe levels for shellfishing and also exceed the levels acceptable for State recreational waters. There are many factors that can contribute to this high level of coliform bacteria, but one of the likely sources is inflow and infiltration from sewer pipes.

Since the 1989 Master Plan, a vast array of agencies and organizations have formed with a focus on protecting the water quality, wildlife habitat, and overall environment of the Great Bay estuary. The appendix includes a list of these groups and their missions.

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## **SURFACE WATER AND ESTUARINE RESOURCES ISSUES, GOALS, AND RECOMMENDATIONS**

### **ISSUE #1:**

Septic systems and wastewater treatment plants are potential point source pollution sources for the Great and Little Bays and the tributaries that feed the bays.

#### **GOAL:**

Ensure that septic systems and the Durham wastewater treatment plant are operated and managed to minimize any and all adverse effects on the water quality of the bays and the tributaries that feed the bays.

#### **RECOMMENDATIONS:**

1. The Town should require the testing of septic systems at the time of sale of a structure so that any septic problems or failed systems can be corrected. This will not only protect the future property owner but also the water resources of the community.
2. The Town should work with landowners to find solutions for the areas along the estuary that are experiencing problems with septic system discharge into the water (e.g., Cedar Point). Funding for preliminary engineering and studies should be sought through the NH Coastal Program and other appropriate funding sources.
3. As part of the Town's renewal of the Wastewater Treatment Plant's discharge permit, improvements in the plant's technology should be made to improve the water quality in the Oyster River and Great/Little Bays. Funding for these improvements may be available through the NHEP and Coastal Program.
4. Identify and prioritize sewer lines that are suspected sources of contamination for the Great Bay estuary. Funding for this work is available through the NHEP Technical Assistance Grants and the NH Coastal Program.

### **ISSUE #2:**

Buffers adjacent to shoreland and wetlands reduce the adverse effects of human activities on these resources by protecting water quality, protecting

and providing wildlife habitat, reducing direct human disturbance, and maintaining aesthetic qualities and potential recreational value. The loss of buffers through variances/waivers and through illegal activities should be minimized.

Moreover, Durham residents are very conservation minded, as revealed in repeated surveys. However, it is evident that more public education is needed to raise awareness of the sensitivity of our waters and importance of careful land management. This is especially critical because landowner education, understanding, support and cooperation will be much more effective than the enforcement of misunderstood or unsupported regulations. In addition, a well educated constituency advocating for the appropriate development of shorelands will more likely support and adhere to the regulations made by Town decision makers.

**GOAL:**

The Town should provide for comprehensive protection of the wetlands and shoreland through regulatory, educational, and voluntary efforts.

**RECOMMENDATIONS:**

1. The Conservation Commission should publish and distribute an informational brochure for shorefront property owners to encourage voluntary shoreland protection, and conduct a workshop for realtors so that they may help educate and set appropriate expectations for new shorefront property owners. Both the brochure and workshop need to contain information regarding all applicable local, state and federal laws and regulations.
2. Realtors and Town staff should encourage new landowners to understand the importance of protecting their shoreland, setting houses back from water bodies, retaining vegetative screening, and preserving natural buffers along the water for wildlife.
3. The Town should institute an education system for owners of property with wetlands and shoreland. Under such a system, when a permit involving land disturbance (e.g., building, septic, etc.) is applied for on a property with shoreland or wetlands, the applicant would receive a packet of information that he or she must initial. The packet would include information about the Town's ordinances and State laws on wetlands and shorelands and the reasons for these protection measures.
4. The Town should revise its Shoreland Protection Ordinance and Wetlands Conservation Overlay Ordinance to incorporate, as a

minimum, protections afforded at the State level. The Wetlands Ordinance should be revised to require the use of the new high-intensity soil mapping standards. Based on scientific justification, additional levels of protection through the Wetland and Shoreland Ordinances should be considered to address the specific resources found in Durham. The careful and strict enforcement of the Wetlands and Shoreland Ordinances should be a high priority for the Town.

5. When updating the Town’s current ordinances with respect to wetland and shoreland buffers, the criteria established in *Buffers for Wetlands and Surface Waters: A Guidebook for New Hampshire Municipalities* should be used as a primary reference. Areas for which larger buffers may be warranted over the standard buffer recommended by the State include: Johnson Creek, Little Bay, Great Bay, Lamprey River, Oyster River, Bunker Creek, Wagon Hill/Tirrell marshes. These areas have been identified as sensitive resources through the NH Coastal Method and other studies.
6. Photo documentation should be used to document tree cover, and thus assist in enforcement of the Shoreland Protection Ordinance.
7. Durham needs to have more accurate floodplain maps, especially since many property owners within floodplain areas are required to have flood insurance. In addition, the Town should consider amending its Floodplain District to further prevent development in the 100-year floodplain (with the exclusion of downtown).

**NH COASTAL  
METHOD**

The New Hampshire Coastal Method is a systematic technique in which tidal wetlands are evaluated and scored based upon their functional values. The evaluator of the tidal wetland assigns values to various functional criteria after conducting site visits and performing research. Functional values that are evaluated include: ecological integrity, shoreline anchoring, habitat qualities, recreation potential, aesthetic qualities, and noteworthiness.

**ISSUE #3:**

The transport of sediments, pollutants, and nutrients, associated with stormwater runoff, is the largest contributor to non-point-source pollution in the Great Bay estuary.

According to the "New Hampshire Estuaries Project Draft Management Plan, 1999" the overall health and ecological integrity of an estuary can be assessed by the degree of watershed imperviousness (e.g., parking lots, roof tops, roads, etc.). The Center for Watershed Protection in Maryland indicate that watersheds with less than

10% to 15% impervious coverage do not experience adverse water quality and biological impacts, while watersheds with greater than 15% impervious coverage tend to show higher degrees of impairment and degradation.

**GOAL:**

The Town of Durham should update its ordinances and regulations to adequately address the issues of stormwater management, erosion, and sediment control. The Town should also review and upgrade its stormwater facilities to improve the water quality of the Great Bay estuary.

**RECOMMENDATIONS:**

1. The Town should integrate into its ordinances or regulations a requirement for erosion and sediment control plans and stormwater management plans for projects that involve large disturbances of land and significant increases in impervious surface. At a minimum, these ordinances/regulations should be put in place for those areas that drain directly to the Great/Little Bays or a primary stream or river for the Bays. The Best Management Practices handbooks and model ordinances prepared by the NH Association of Conservation Districts can be used for guidance.
2. The Town should make targeted improvements to its stormwater system so that stormwater is detained prior to discharge into the estuary or into the rivers and streams feeding the estuary. Discharges currently cause the growth of invasive species in addition to changing the ecology of the estuary/receiving stream. Funding for such efforts is available through the NHEP Technical Assistance Grants and the NH Coastal Program.
3. The Zoning Ordinance should strive to keep impervious surface below 15% within each of the primary estuarine tributary watersheds for the Great and Little Bays. The primary estuarine watersheds within Durham for the Great and Little Bays are as follows: Lamprey River, Crommet Creek, Several Creeks in the vicinity of Colony Cove, Oyster River, and Bellemy River.

**ISSUE #4:**

The public appears to understand the valuable resource of the Great Bay estuary; however, public awareness of the impacts of incremental changes and development within the Great Bay estuary appears to be lacking.

**GOAL:**

A greater awareness campaign regarding the impacts of incremental development, changes to the landform, and variances/waivers to regulations and ordinances needs to be conducted.

**RECOMMENDATIONS:**

1. Public awareness should be raised regarding the importance of water bodies in the Town and ways to protect them. Watershed advocacy groups should be formed to work with landowners and monitor water quality. An award-winning example in the region is the Advocates for the North Mill Pond in Portsmouth. Existing monitoring groups such as Great Bay Watch and the Lamprey River Watershed Association should be encouraged to report back to the Town when problems are found. Funding for programs such as these are available through the NHEP Local Initiative Program.
2. Educate Zoning Boards of Adjustment, Conservation Commissions, Planning Boards, and planners about the negative local impacts caused by continual incremental variances, special exceptions, and waivers to estuary and water protection ordinances/regulations. This education program should also include information about how the laws and ordinances are minimally/strictly construed and information about the reasons and justification for the estuary and water protection measures that are in place.

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## **WETLANDS**

### **BACKGROUND**

Durham has a significant number of wetlands, including one of the most productive types of wetlands, salt marshes (see Wetland and Salt Marsh map). Wetlands have a multitude of values that include flood control, wildlife habitat, fish habitat, pollutant removal, recreation, groundwater protection, and stabilization and erosion control of the shoreline. Large wetland systems that provide significant water quality and wildlife benefits can be found throughout the Town with the exception of the downtown and developed core area of the community. The wetland systems associated with Follets Brook, Crommet Creek, Johnson Creek, Bunker Creek, Lamprey River, and Horsehide Brook have all been identified as significant due to their size, interconnected nature, and wildlife habitat that they provide.



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## **WETLANDS ISSUES, GOALS, AND RECOMMENDATIONS**

### **ISSUE:**

The primary impacts facing wetlands in Durham today are the effects of development within their buffers or within the wetlands themselves, and the encroachment by invasive species such as phragmites and purple loosestrife.

### **GOAL:**

Maintain the variety and large quantity of wetlands in Durham and ensure the wetlands retain their functional values.

### **RECOMMENDATIONS:**

1. Salt marsh restoration projects, primarily through the control of invasive species, should be undertaken. The primary marshes in need of restoration as identified and delineated in the 1995 Coastal Method study for Durham are: Bunker Creek, Deer Meadow, Mathes Cove Farm, Bronson's Creek (a.k.a. Bransan's Creek), Royall's Cove, Horsehide Creek, Wagon Hill/Tirrell Marsh, Cedar Point, and Crommet Creek.
2. Pursue the recommendations under the "Surface Water and Estuarine Resources" section of this plan relating to protecting wetlands and their buffers.

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## **DRINKING WATER AND AQUIFER PROTECTION**

### **BACKGROUND**

Ten thousand years ago the rivers created by the melting waters of the retreating glacier carried sand and gravel along their courses, depositing this sand and gravel as much as 80 feet deep in a northwesterly-southeasterly direction in Durham. These deposits, which contain an aquifer of municipal quality, are in the westerly part of Durham and extend into Lee, Newmarket, and Madbury (see Stratified Drift Aquifer map). In the towns of Lee and Newmarket there are large gravel pits with

open-pit mining of these deposits. The town of Newmarket is currently proposing an effort to protect a portion of the aquifer within its borders where the sand and gravel deposits have been extensively mined.

Durham's municipal water supply comes from a combination of wells drawing from this sand and gravel aquifer and directly from the Lamprey and Oyster Rivers. A regional approach to the management of this asset is essential since activity in Lee, Madbury, and Newmarket will affect the same resource that is utilized by Durham and those communities. Lands which are presently identified as important in the 1989 Master Plan do not adequately provide drinking water resource protection. That is because there are no sand and gravel deposits in the area of the greenway, and there is no water source with the potential necessary to sustain a municipal water supply.

The aquifer in the eastern portions of Durham is not a sand and gravel aquifer but a bedrock aquifer with the water deposits located in fissures and cracks in the strata of the rock formations. The complexities of subsurface water flows within this type of aquifer cause special problems in water resource protection in that point-source contamination can appear unpredictably at distant locations. The flow of the water through a bedrock-based aquifer will depend upon the location of relatively impermeable layering in relation to more permeable layering. Only a sophisticated geological survey and programs of multiple well head testing could reliably monitor problems of point-source contamination. In a stratified drift aquifer, point-source contamination is more predictable in its diffusion through the aquifer, depending upon the pressure flow within the aquifer. The Town of Durham's municipal aquifer is vulnerable to point-source contamination not only within its own borders but also within adjacent towns upstream to the subsurface flows (see Wellhead and Potential Contamination Sources map).

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## **DRINKING WATER AND AQUIFER PROTECTION ISSUES, GOALS, AND RECOMMENDATIONS**

### **ISSUE #1:**

The notion of carrying capacity, or that environmental systems have some finite, sustainable level of population based on the availability of critical, limiting resources (food, water, space), is fundamental to an ecological

view of the world. In the case of Durham, water may well be considered such a limiting resource. Barring the introduction of new freshwater supplies, there is a limit to the sustainable levels of consumption and population size of Durham.

**GOAL:**

Establish a water management system for Durham.

**RECOMMENDATION:**

Without trying to establish precisely what the sustainable population size of Durham currently is, this chapter would be remiss not to introduce this notion into the plan and to recommend the Town carefully monitor and analyze our hydrologic balance sheet (supply and demand) in order to provide an early warning system as, over time, the Town approaches that limit.

**ISSUE #2:**

Drinking water resource protection is currently done on a community by community basis, while the resource transcends political boundaries.

**GOAL:**

Create a regional drinking water resource protection program that is adopted by all communities that share the resource.

**RECOMMENDATIONS:**

1. A regional initiative for source-water protection (aquifer and surface watersheds) should be pursued that includes partnerships with towns adjacent to Durham, the University of New Hampshire, the Department of Environmental Services, the Society for the Protection of New Hampshire's Forests, and the Nature Conservancy. This recognizes that all of these entities are sharing a common resource. This initiative should include a strategy of water resource protection utilizing scientific methods of identification of strategically located and important lands followed by appropriate protective measures, including conservation easements, which would extinguish development rights within those critical areas. Measures should also be developed to ensure development within the source-water protection areas is conducted in such a way that it protects the water resource. Because of the University of New Hampshire's dependence upon the same water resources as the municipal water supply, a cooperative partnership

is essential in establishing a sound scientific basis for management of this resource. Funds for this initiative are available through the DES. In addition, the DES has initiated a source-water protection program that provides funds for purchasing land within the watershed of surface water sources.

2. The adequacy of the drinking water resource must be assessed in reference to the regional demands on the resource. The Town of Durham's needs for this resource cannot be effectively considered in isolation to the projected demands of the adjacent towns and the University of New Hampshire. The in-flow characteristics of the Lamprey and Oyster Rivers needs to be assessed. The sovereign exemptions of the municipalities and the University must not limit protective measures.

### **ISSUE #3:**

Many of the wells for Durham, particularly in the southeastern quadrant of the Town, are bedrock-based water supplies for which little information is known.

### **GOAL:**

Improve the understanding of the bedrock geology for Durham with respect to private wells tapping this resource and ensure that the potential for point-source pollution is acceptably reduced or eliminated.

**RECOMMENDATION:**

Due to the geology of the aquifer, it is recommended that water protection plans, primarily for private wells, for the bedrock-based portion of Durham's aquifer require a different strategy than does the stratified drift water supply. Protection strategies must be based upon a study of the bedrock geology. The Durham Point landfill is a potential point source contamination which should be carefully assessed and monitored as part of the landfill capping plan. Surface flows in the area of the Town landfill do not necessarily reflect subsurface flows through the rock strata.

**ISSUE #4:**

Durham's Aquifer Protection District should be reviewed and updated.

**GOAL:**

Develop an Aquifer Protection District that provides comprehensive protection for the aquifer, is enforceable, and is reasonable.

**RECOMMENDATIONS:**

1. Durham's current Zoning Ordinance provision for the Aquifer Protection District should be reviewed to ensure it provides comprehensive protection for the aquifer resource based on scientific findings, while at the same time ensuring the provisions of the Ordinance are reasonable and enforceable.
2. If the scientific research finds that the aquifer areas in Durham are of such value that the uses should be restricted to such a degree that all economically viable uses of the land are limited, then the landowners impacted should be compensated.
3. To complement comprehensive regulatory protections, an educational approach should be undertaken using GIS to identify landowners within the Aquifer Protection District. The campaign should inform landowners that they are within this resource area and explain to them how they can manage their land to protect the resource.

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## **SAND AND GRAVEL DEPOSITS**

### **BACKGROUND**

The western areas of the Town of Durham are the location of the ice age geological feature containing both sand and gravel and the municipal drinking water quality aquifer (see map of Sand and Gravel Deposits).

The water is stored within the interstices of the sand and gravel. Storage of this water is influenced not only by gravity but also by capillary action and will follow the contours of the lands. If gravel is removed without careful study and consideration of the underlying aquifer, then there could be a loss in storage capacity for the aquifer and seasonal variations in flow will become more critical.

Programs of widening roads, new road building, road rebuilding, and residential and commercial development, which require use of this resource, are all likely to contribute to the need for the removal of sand and gravel deposits.

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## **SAND AND GRAVEL DEPOSITS ISSUES, GOALS, AND RECOMMENDATIONS**

### **ISSUE #1:**

The Town currently lacks a Sand and Gravel Ordinance. However, the Town does have an Aquifer Protection District as part of its Zoning Ordinance that addresses, to some extent, the removal of sand and gravel deposits. But the Aquifer Protection District does not overlap completely with the location of sand and gravel deposits within the Town.

### **GOAL:**

Develop a comprehensive, science-based sand and gravel ordinance that will work to protect the water quality of Durham and the region's aquifer.

### **RECOMMENDATION:**

Ideally, it is prudent for the Town of Durham to not mine sand and gravel within its borders. To cross over into adjacent towns and mine sand and

gravel within the same aquifer has the same negative potential. However, sand and gravel will continue to be needed by the community. Thus, it is recommended that the Town develop a sand and gravel removal ordinance that is based upon a geologic study to ensure that any mining that occurs will not adversely affect the aquifer. This ordinance should be imposed not only the private sector, but the Town should also voluntarily comply with such an ordinance with respect to its existing and future sand and gravel removal operations both inside and outside the Town boundaries, unless the municipality in which the operation is located has stricter requirements.

### **ISSUE #2:**

The Town owns several sand and gravel pits that will eventually need to be reclaimed once all of the financially viable deposits have been removed. One of the Town's pits in Lee is being considered for use as ball fields, where best management practices for construction and maintenance (fertilizers, pesticides, etc) should be employed.

### **GOAL:**

As part of reclamation of the Town's sand and gravel pits, develop reuse plans for the sites.

### **RECOMMENDATION:**

Any reuse of the Town's sand and gravel pits should be evaluated as to its appropriateness for the proposed activity, and best management practices should be used to prevent contamination of the aquifer.

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## **FARMLAND**

### **BACKGROUND**

Durham's agricultural heritage is no longer as prominent of a symbol of the community as it once was; however, a number of continually operating farms remain in Durham that include:

- Langley Farm – Langley Road

- Tecce Farm – Mast Road
- Beaver Dam Farm – Newmarket Road
- LaRoche Farm – Newmarket Road and Bennett Road
- Bedard Farm – Newmarket Road
- Emery Farm – Route 4
- Fogg Farm – Mill Road and Packers Falls Road
- Beaudette Farm – Bennett Road
- Mathes Garrison Farm - Langley Road

These farms still contribute significantly to the character of the community and provide an economically beneficial use of the land for both the Town and the landowner.

The northern quarter and western half of the Town have significant quantities of prime agricultural soils, as shown on the Prime Agricultural Soils map. There are three levels of prime agricultural soils: local, statewide, and national. Soils of local importance are determined by the local National Resource Conservation Service (NRCS) district. Soils of statewide importance are lands determined by the State to be nearly prime farmland and that economically produce high yields of crops. Prime soils are defined at a national level as land that has the best combination of physical and chemical characteristics for sustained high yields. Unfortunately, soils that are prime for agriculture are also, for the most part, prime for septic systems and development. Thus, these soils are some of the most threatened in Durham. Once the soil is developed into housing lots, driveways, parking lots, etc. it is essentially lost for agricultural purposes.

One of many programs available through the US Department of Agriculture is the Farmland Protection Program which provides funds to help purchase development rights to keep productive farmland in agricultural uses. Working through existing programs, USDA joins with State or local governments to acquire conservation easements or other interests from landowners. USDA provides up to 50 percent of the fair market easement value. To qualify, farmland must be part of a pending offer from a State or local farmland protection program; be privately owned; have a conservation plan; be large enough to sustain agricultural production; be accessible to markets for what the land produces; have adequate infrastructure and agricultural support services; and have surrounding parcels of land that can support long-term agricultural production.



## **FARMLAND**

### **ISSUES, GOALS, AND RECOMMENDATIONS**

#### **ISSUE:**

Durham continues to lose farms to development and an aging farming population.

#### **GOAL:**

Retain as much of the current farmland and prime agricultural soils in productive use as possible.

#### **RECOMMENDATIONS:**

1. Active farmland and prime soils should be targeted for conservation and farmland easements. The NRCS Farmland Protection Program and other programs through the USDA and the State should be promoted in the farming community as a means to continue farming operations.
2. Agricultural and livestock uses should be a permitted use in all residential zones, with clear restrictions on the agricultural/livestock uses to ensure that nuisances to the residential areas are avoided. Restrictions should include, but not be limited to, a minimum lot size established for each of the various types of agricultural and livestock uses, restrictions on the types of agricultural operations, additional setback requirements, a requirement for waste management plans, animal density restrictions, and other requirements that will serve to minimize impacts on residential neighborhoods, and yet ensure that the agricultural operations are viable. Intense corporate farming such as hog farms should be prohibited.
3. Durham should continue to offer a "current use" tax program even if the State rescinds the requirement that communities offer this program.
4. The Town should support, through zoning and possibly annual recognition programs, the farmers in the community. The Town should also encourage alternative agricultural operations (e.g., llamas) in order to encourage the preservation of farms and farmland in the community.

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## **WILDLIFE HABITAT MANAGEMENT**

## BACKGROUND

The New Hampshire Comparative Risk project prepared a report entitled “1997 Report of Ranked Environmental Risks in New Hampshire.” This report prioritized over 50 environmental risks facing New Hampshire residents today. Five out of the top ten issues concerned loss and degradation of open space, forest lands, shorelines, and aquatic habitats. Habitat loss was found to be of higher concern to New Hampshire residents than many other major issues such as Lyme disease, radon, and asbestos.

The challenge of conserving enough habitat to support healthy native wildlife populations is complicated by the varying habitat requirements of our diverse species. Some species require less than an acre of undisturbed forest, while others need territories covering more than a thousand acres. In addition, many species require several different habitat types through the course of the year. The more habitat diversity within the Town, the more likely it will support a diverse and abundant wildlife population.

A major concern for wildlife diversity is that sprawling development patterns that cover the rural landscape cause habitat fragmentation. Wildlife that are sensitive to human encroachment are restricted to these islands of undisturbed land and they may die out if the area becomes too small. The fragmentation of wildlife habitat also causes damage and loss of native plants from overgrazing, a reduced breeding gene pool, loss of natural predators, and of increase susceptibility to disease.

The Unfragmented Lands map shows the various blocks of unfragmented lands in Durham and their size. For optimum wildlife habitat, these blocks should be void of significant human activity or development. Paved roadways were used to define the outer edge of these blocks. Wildlife biologists consider 250 acres as a minimum for unfragmented habitat. Surprisingly, Durham has 9 main areas of unfragmented land greater than 250 acres in size. The majority of these areas occur south of the Oyster River, and the most significant in the areas of Crommet Creek and Folletts Brook.

Durham's shorelands have been singled out as particularly significant for their wildlife values. The Great Bay Estuarine Research Reserve receives millions of dollars for protection of open land around the Bay. Through a highly competitive national grant, the Crommet's Creek area of Durham Point has been selected to receive North American Wetland Conservation Act funds for acquiring waterfowl habitat through purchase of land and easements. The Lamprey River was designated a National Wild and

Scenic River in large part due to its valuable fish and wildlife resources. The Scenic River program has supported acquisition of easements on two riverfront properties in Lee, and some Durham properties are also eligible.

Two voluntary wildlife habitat programs that Durham landowners could use to help manage their properties include the Wildlife Habitat Incentives Program (WHIPS) and the NH Coverts Project. WHIPS participants work with the USDA Natural Resources Conservation Service to create a wildlife habitat development plan that describes the landowner's goals for improving habitat and the practices needed to install and maintain the habitat. In addition to the technical assistance, the USDA will pay for up to 75% of the cost of habitat enhancement installations. The NH Coverts Project promotes wildlife habitat conservation through volunteer education and outreach. Volunteers attend a 3.5-day seminar on topics such as habitat management and wildlife ecology. The volunteers are then trained to share the knowledge learned and motivate others to become stewards of the land.

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## **WILDLIFE HABITAT MANAGEMENT ISSUES, GOALS, AND RECOMMENDATIONS**

### **ISSUE:**

The Town should work to prevent the loss of wildlife habitat and manage properties for wildlife conservation.

### **GOAL:**

Decrease the loss of large parcels of unfragmented land in Durham and encourage more property owners, including the Town, to manage their properties for wildlife habitat

### **RECOMMENDATIONS:**

1. Develop a conservation development approach for the design of subdivisions and developments, particularly within those areas identified as unfragmented in Durham (see Chapter 9 – Land Development Regulations for additional information). A conservation development approach will recognize the right and ability of a landowner to use his/her land, but minimize the fragmentation of the habitat.
2. Develop and implement a Durham Wildlife Habitat Protection Program using the soon-to-be-published “Integrating Wildlife Habitat

into Community Planning” document by the Nongame and Endangered Wildlife Program of the NH Fish and Game Department.

3. Publicize through Town sources (e.g., Web site, newsletter, direct mailing) information to landowners about voluntary wildlife habitat conservation programs such as the NH Coverts Project and the Wildlife Habitat Incentives Program (WHIP). Encourage the Conservation Commission to participate in these programs.

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## **SPECIES OF SPECIAL CONCERN**

### **BACKGROUND**

The Natural Heritage Inventory (NHI) is a State program in the Division of Forest and Lands. The NHI finds, tracks, and facilitates the protection of New Hampshire’s plant and animal species of concern, and exemplary natural communities. Exemplary communities are distinctive communities of forests, wetlands, grasslands, etc., that are found in few other places in New Hampshire, or are communities that are very old and in good condition. Species of concern are those species listed as threatened or endangered under the NH Endangered Species Conservation Act of 1979 or under the NH Native Plant Protection Act of 1987.

The NHI data represents the best available information for locations and status of species of concern and natural communities in New Hampshire, but there are certainly occurrences that have not yet been found since a comprehensive inventory of the State or Town has not been done.

Durham does not have any known occurrences of federally listed endangered or threatened species. However, there are 12 known State-listed endangered species found in Durham and an additional 20 known State-listed threatened species (see Appendix for complete listing). In order to protect the species of concern and the rights of property owners, the NHI places an un-centered 0.75 mile buffer around known occurrences of a species, to make it more difficult to detect the exact location of the species of concern. Thus, due to the map-reporting requirements of the NHI and the number of species of concern listed for Durham, a map of the known occurrence locations is not useful since the entire map essentially turns into one large “buffer circle.”

## ~~SPECIES OF SPECIAL CONCERN~~ ISSUES, GOALS, AND RECOMMENDATIONS

### ISSUE:

Durham has a significant number of flora and fauna species of concern listed on the Natural Heritage Inventory that landowners developing or making changes to their property may not be aware of.

### GOAL:

Make landowners in Durham more aware of possible occurrences of sensitive species on their property to ensure that development projects are designed in such a way to protect the sensitive species.

### RECOMMENDATION:

As part of the Site Plan and Subdivision Regulations submission requirements, require applicants proposing construction on undeveloped properties to contact the Natural Heritage Inventory Program to find out if species of special concern are known to be located on their property. If such species are located on the site, encourage the property owner to voluntarily work with the Natural Heritage Program to help protect them.

### WHAT IS A GREENWAY?

Greenways are corridors of protected open space managed for conservation and recreation purposes. Greenways often follow natural land or water features, and link nature reserves, parks, cultural features, and historic sites with each other and with populated areas. Some greenways are publicly owned, some are privately owned, and some are the result of public/private partnerships. Some are open to visitors, other are not. Some appeal to people, others attract wildlife. In more developed areas, greenways can encompass natural or built features and can be managed primarily for resource conservation or recreation. In more rural areas, greenways are natural corridors linking large unfragmented natural areas. Rural greenways preserve wildlife habitats and migration routes.

## GREENWAYS/SCENIC AREAS

### BACKGROUND

Durham is a waterfront community and the Town owes much of its appeal to the beauty of its shorelands that include the Great and Little Bay, the Oyster River, and the Lamprey River. The Great Bay has been singled out as one of a handful of estuaries designated a National Estuarine Research Reserve. The Lamprey River is both a State Protected River and one of only two National Wild and Scenic Rivers in New Hampshire. Many streams, three watersheds, and several ponds, marshes, and wetlands are widely dispersed through the Town. All of Durham's tidal estuaries, freshwater streams, saltwater wetlands, and freshwater wetlands are vitally important greenways.

In total, conservation of these greenways and all of the tidal estuaries and named streams in the Town provide natural wildlife corridors penetrating into all of our neighborhoods and into the Town core. These corridors provide not only areas for maintenance of wildlife and plants, but they are also areas of recreation immediately available to those living adjacent to them. The protection of the estuarine and marine environments, Little Bay and Great Bay, depend ultimately upon the maintenance of these waterways as greenways. Natural processes will help minimize the adverse effects of contaminants as long as these greenways are not degraded.

Greenways can also serve as wildlife corridors that can be travelways and migratory routes or provide linkages between habitat areas. These wildlife corridors are often located along stream and river paths and significant geological features such as ridgelines. Greenways serving as wildlife corridors can be virtually any type of traversable land of at least 200 feet in width.

The Master Plan continues to recognize several important wildlife corridors that can also be classified as greenways, as listed in the 1989 Master Plan. The corridors included Crommet Creek and its watershed, Horsehide Brook, the Lamprey River, and Folletts Brook (See 1989 Master Plan Greenway Map). These corridors remain as important attributes for the Durham greenway system; however, this Master Plan looks to expand upon this greenway system to link the entire community.

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## **GREENWAYS**

### **ISSUES, GOALS, AND RECOMMENDATIONS**

#### **ISSUE:**

The Town has in its past Master Plans shown a linear network connecting conservation lands that this Master Plan recognizes and wishes to expand upon as Durham's greenway system. The Town needs to take a proactive approach to create this system.

#### **GOAL:**

Expand and strengthen the Durham greenway system.

**RECOMMENDATIONS:**

1. Expand and strengthen the Durham greenway system through acquisition of conservation easements on important lands either through donation, purchase, or partnership with public and private conservation groups. A conservation fund should be established to allow matching funds for Town participation as opportunities arise. It is recommended that the Town continue to contribute at least 50% of revenues from the current use change tax to this fund to be administered by the Conservation Commission.
2. For all streams and estuaries in Town, maintain wetland setbacks in the zoning ordinance and reclaim areas where setbacks have been compromised. This is important for the maintenance of this important relationship between nature and human habitation.

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**URBAN SERVICE AREA GREENWAYS**

**BACKGROUND**

The Oyster River is a historic connection with the Great Bay communities and provides a tangible physical connection to Little Bay, Great Bay, and the Piscataqua River. The Oyster River is a visible link to Durham's history as a vital colonial center and thus it is the centerpiece of the urban service area greenway.

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**URBAN SERVICE AREA GREENWAYS  
ISSUES, GOALS, AND RECOMMENDATIONS**

**ISSUE:**

Durham lacks an interconnected greenway network within the “urban service area.”

**GOAL:**

Create an urban service area greenway system that is based upon the major streams and rivers within the core – College Brook, Beards Creek, Oyster River, Littlehale Creek, Pettee Brook, and Reservoir Brook. Although the

greenway system will serve primarily as a resource protection measure, pedestrian connections should be aggressively pursued by working with willing landowners. The greenway system should also be linked by off-road bike and pedestrian trails/Class VI Highways, such as the Wagon Track Trail.

**RECOMMENDATIONS:**

1. The shoreland and wetlands protection ordinances provide for the creation of much of a greenway; however, landowners should be encouraged to donate/sell easements or fee title for pedestrian connections.
2. The banks of the tidal portion of the Oyster River should be considered a vital contiguous resource with interconnected pathways and walkways developed wherever possible with willing landowners. These pathways and walkways would allow pedestrian access from the downtown to the Durham Business Park and possibly to the Wagon Hill Farm. Connecting Wagon Hill Farm to the greenway network via Bunker Lane or through the northern 40 acres of Wagon Hill to the Wagon Track bike trail should also be considered.
3. Bunker Lane or through the northern 40 acres of Wagon Hill to the Wagon Track bike trail should also be considered.
4. College Brook should be restored in those areas where it has experienced degradation. The Mill Pond and adjacent wetlands should be enhanced as a demonstration of the importance of greenway extensions into the downtown core. Enhancement of foot paths and passive recreational use of this area should be encouraged for the benefit of those living in the immediate neighborhood and to enhance the vision of Durham's special relationship with its fresh- and saltwater bodies. Sightings of rare and endangered species have been recorded in the College Brook greenway and Mill Pond area. The fact that unusual and important wildlife sightings can take place immediately adjacent to the Town's commercial core is of great importance to the sense of the Town of Durham as a place where modern presence can exist in concert with nature.
5. Pedestrian access to the Mill Pond may be encouraged with downtown displays of footpaths such as the pedestrian path to the pond from Main Street and Mill Road through the Mill Plaza to the footpath through the woods that connects with Chesley Drive. This route should be enhanced as a pedestrian gateway to the Mill Pond. A study



of traffic flow on Mill Pond Road with consideration of alternative routes into the Mill Plaza should be considered if traffic flows can be diminished along the Mill Pond Road, thus increasing the pedestrian qualities of the area. These measures would further highlight this unique physical and cultural resource.

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## **RURAL SERVICE AREA GREENWAYS**

### **BACKGROUND**

With the work of the previous Master Plans, the rural service area greenway has begun. This greenway network is shown by the Browne-Beckwith easement, Nature Conservancy acquisitions, and Town-owned lands adjacent to and including the Town landfill.

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## **RURAL SERVICE AREA GREENWAYS ISSUES, GOALS, AND RECOMMENDATIONS**

### **ISSUE:**

Durham has the beginnings of a greenway network forming; however, the connections between large conservation parcels have not yet been made.

### **GOAL:**

Create an interconnected greenway network in the Rural Service Area of Durham that links the conservation lands owned by the Town, University, and private conservation groups via greenways that follow the streams and rivers. The greenway corridors should be along Crommet Creek, Horsehide Brook, Lamprey River, the Oyster River, and along smaller tributaries and streams..

### **RECOMMENDATIONS:**

1. The shoreland and wetlands protection ordinances provide for the creation of such greenways; however, in order to achieve value for wildlife and water resource protection, additional width is needed. Fee and easement purchases/donations should be pursued with willing landowners to achieve a greenway of at least 250 feet in width. Pedestrian and trail linkages are rural service area desirable wherever possible.

2. The effectiveness of the Crommet Creek/Horsehide Creek greenway depends upon the interconnected smaller greenways. The Town should follow its own ordinances and insist that the Town and the University not use their powers to exempt themselves in order to avoid this necessary compliance

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## SCENIC VIEWS

### BACKGROUND

The landscape of an area defines its cultural, natural, and historical heritage and thus provides the members of a community with a sense of identity. Durham’s identity is marked by the views of and from roadways, the major rivers, and the Great and Little Bays. In addition, the areas of historical and existing agricultural operations create a pastoral landscape that helps to define the community.

A scenic resource evaluation from Vermont’s “Mad River Resource Protection Plan” provides a list of key scenic attributes that transfer well to Durham. These key scenic attributes include:

#### *Physical Features*

- Hills and hillsides
- Rivers, streams, wetlands, bays, and estuaries
- Agricultural lands
- Vegetation, greenery, foliage, and wildflowers
- Elements of a working landscape such as animals, farm buildings, crops, etc
- Wildlife
- Cultural focal points where the historical setting of Durham remains intact, such as at the Oyster River or Town Pound

#### *Important Aspects of Views*

- Diversity and contrast within a view such as a patchwork of open and wooded land, location of open space adjacent to historic New England housing, hedgerows, and stone walls, etc.
- Continuous views that “follow” you as you travel along the road or are deep views.
- Lack of scattered development or other disturbances in views.

- Vantage points – the point or area that provides access to the view.

Durham has four locally designated scenic roads – Bennett Road, Packers Falls Road, Durham Point Road, and Bay Road – and a Federally designated scenic river – the Lamprey River.

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## **SCENIC VIEWS ISSUES, GOALS, AND RECOMMENDATIONS**

### **ISSUE:**

Durham has a rich diversity of scenic views and vistas, most of which are protected only by the willingness and desires of the landowners. No comprehensive inventory and analysis exists of Durham’s scenic views and vistas.

### **GOAL:**

Systematically identify, prioritize, and develop a multi-faceted protection program for the scenic viewsheds in Durham.

### **RECOMMENDATIONS:**

1. Critical viewsheds should be identified and protected with scenic easements. Chapter 2 – Sense of Community and Town Facilities recommends a study to produce a detailed visual resource guide that prioritizes Durham’s significant vistas. Some important viewsheds were identified and mapped based upon the views experienced from the roadway. They are listed in Table 4.1, in no order of importance, and these are in no way a comprehensive listing of all of the scenic views in Town. The protection of these viewsheds through the development review process and/or cooperatively working with the landowner is recommended. In some instances, scenic easements may be warranted.
2. To further emphasize the previous list, the following viewsheds should be protected via scenic easements: the entrance to Durham as you pass Wagon Hill Farm, Emery Farm, Johnson Creek, Old Piscataqua River, and Bunker Creek to Route 108 and to the downtown core. The protection of these viewsheds should be coordinated by working with willing landowners.
3. The Town should consider relinquishing development rights on all or part of the Durham Business Park through the sale of conservation

easements, in concurrence with the recommendations in Chapter 8 – Tax Stabilization.

4. The Wastewater Treatment Plant should be landscaped to enhance views from the river, which the plant has degraded.

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**Table 4.1. VIEWSHEDS IN DURHAM**

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*Newmarket Road*

Views of the Oyster River  
 View of the Bedard Farm  
 View toward Mill Pond Center  
 Views of the Cutter Farm  
 Views of the LaRoche Farm  
 Views of the Lamprey River

*Bennett Road*

Views of the LaRoche Farm  
 Views of the Lamprey River  
 Views of the Highland Farm

*Route 4*

Views of Johnson Creek  
 Views of Bunker Creek  
 Views of Emery Farm Fields  
 Views at Cedar Point /Back River Roads  
 Durham Business Park  
 Views from Scammell Bridge  
 Views of Wagon Hill Farm

*Mill Pond Road*

View of Mill Pond

*Durham Point Road*

View at Horsehide Brook  
 View across from Colony Cove Road  
 North side of “Crombie Curve”  
 Views at Crommet Creek

*Bay Road*

View toward the Bay at 540 Bay Rd.

*Packers Falls Road*

Views of Thompson Farm  
 N. side of Wiswall Rd.

*Mill and Packers Falls Road*

Fogg Farm

*Mast Road*

Views of Tecce Farm  
 Views of UNH Farm Fields

*Back River Road*

Views toward Bellamy River

*Dover Road*

Views of Beards Creek/Oyster Rvr.

*Old Landing Road*

View of Oyster River

*Main Street*

View of UNH horse barns  
 View of College Brook

*Adams Point Road*

View of Bay

*Langley Road*

Views to the north and south

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**LANDS IDENTIFIED FOR  
 CONSERVATION/GREENWAYS**

## **BACKGROUND**

Durham has a significant amount of conservation and public lands that afford various levels of conservation measures for the land and resources (see Existing Conservation/Public Lands map). Durham residents value their Town's natural resources. In the 1998 Master Plan Survey, when asked about their priorities for how tax dollars should be spent, more people cited “conservation of natural and cultural resources” as a high-to-moderate priority than any other category. Yet, over the past several years the Town has not aggressively pursued the purchase of conservation lands and has instead relied upon volunteer groups such as the Great Bay Partnership, The Nature Conservancy, Society for the Protection of New Hampshire Forests, and the Lamprey River Advisory Committee to purchase conservation lands. The Great Bay Partnership and The Nature Conservancy have been particularly active in purchasing property and easements within the Crommet Creek watershed. However, the efforts of these organizations do not always target lands on which the Town as a whole would place a priority (e.g., The Nature Conservancy only protects habitat for endangered species, and the Forest Society eschews plots smaller than 100 acres). Consequently with the noted exception of Wagon Hill Farm, there has been little land conserved in the past decade by Durham itself.

The deeds of “conservation” land owned by Durham were reviewed with respect to any restrictions that may be on the property and thus prevent future development. Of the properties owned by the Town, the following properties listed in Table 4.2 were found to have conservation restrictions of one type or another.

In 1995, a regional study was prepared by Society for the Protection of New Hampshire Forests that worked with municipalities to identify locally important lands that should be targeted for conservation. Durham was a part of this study area and the results of this study are shown on the map entitled Areas Identified for Conservation – 1995. These areas roughly follow the land identified in the 1989 Master Plan, but in a broader context.

**Table 4.2. RESTRICTIONS ON TOWN-OWNED CONSERVATION LANDS**

(See the map entitled "Existing Conservation/Public Lands" for these locations)

<b>PROPERTY</b>	<b>CONSERVATION RESTRICTIONS</b>
<i>Colby Marsh / Beaver Brook Conservation Area</i>	Deed restriction grants the land for conservation and requires that the land be managed and controlled by the Conservation Commission.
<i>Doe Farm</i>	Deed restriction prevents the Town from ever selling the property.
<i>Father Lawless Park</i>	Developed with Land and Water Conservation Funds which require that the property never be converted to any other use except public outdoor recreation (unless approved by National Park Service).
<i>Langmaid Farm</i>	Deed restriction prevents the property from being further subdivided and specifies that the land be only used for conservation purposes.
<i>Oyster River access parcel</i>	Given to Town under Land Conservation Investment Program. The land is managed by the Conservation Commission, and the Town must retain the parcel as undeveloped shoreline and is prohibited from selling the parcel.
<i>Packers Falls property</i>	Deed restriction to maintain, improve, protect, and limit the future use of, or otherwise conserve the property.
<i>Spruce Hole</i>	Deed restriction that allows the Conservation Commission to maintain, improve, protect, and limit the future use of, or otherwise conserve the property.
<i>Stolworthy Wildlife Sanctuary</i>	Deed restriction prohibiting any other use of the property except as a wildlife sanctuary.
<i>Williams Way boat landing</i>	Deed restriction that allows the Conservation Commission to maintain, improve, protect, and limit the future use of, or otherwise conserve the property.
<i>Durham Point Road / York Drive</i>	Scenic easement that requires the property to forever be used for open space, agriculture, forestry, and general conservation purposes.
<i>Coe Drive/Beard's Creek</i>	Scenic easement
<i>Bagdad Road</i>	Scenic easement

## **LANDS IDENTIFIED FOR CONSERVATION/GREENWAYS ISSUES, GOALS, AND RECOMMENDATIONS**

### **ISSUE:**

There must be a coordinated effort among the Town, State, and Federal agencies as well as non-profit conservation groups to initiate the acquisition of conservation lands in Durham.

**GOAL:**

A multi-agency/group effort should be undertaken to conserve areas identified by this Master Plan as having important values to the community. Highest priority should be those areas most likely to be developed in the near future.

**RECOMMENDATIONS:**

1. The Town should pursue and encourage other agencies and non-profits to pursue the acquisition of conservation easements or fee title to the properties shown on the map entitled Areas Identified for Conservation - 2000. This is a modification of the 1995 map that includes greenway linkages of the conservation lands throughout the Town, and specific areas such as Johnson Creek, the Lamprey River Corridor, and the Horsehide Creek Corridor. This map in no way indicates that all of the land within the “conservation” areas should and must be protected, nor does it prohibit or restrict development in these areas. In fact, there are many sites already developed within these areas, and more will be developed. Instead, the map is intended to provide guidance as to the areas in which conservation efforts should focus based on the many resources worthy of protection in these areas. Also note that some of the locations identified as having scenic viewsheds in this chapter may also be targeted for scenic easements or other protection measures.
2. The Town should be an active partner with The Nature Conservancy and the Society for the Protection of New Hampshire’s Forests, as well as others, in an effort to develop a scientific basis for specific recommendations for land acquisitions, with an emphasis directed toward greenway enhancement or water resource protection.
3. The University should be encouraged to conduct an inventory and assessment of all University-owned lands that is directed at assessing the levels of current conservation restrictions, including deed restrictions. The purpose of this inventory would be to identify important land holdings of the University which are in need of protective covenants.
4. Town- and University-owned lands within the areas designated for conservation in this Master Plan that are not already protected by deed restrictions or restrictions from a granting authority, should have conservation easements placed on them. On Town owned land, the Town should look to sell easements in order to generate revenue for additional conservation land purchases.

5. As part of Durham’s stated policy efforts to stabilize the tax base, the Town should encourage keeping open or in agricultural use land that has the potential to develop into residences. Analyses done for communities throughout New Hampshire consistently show that open space is a net positive tax revenue generator, versus the alternative typical housing development which creates a net cost to the community.
6. The Conservation Commission should establish a stewardship program to monitor all of the existing and future conservation and scenic easements held by the Town. The stewardship program should be a part of the Conservation Commission’s budget and the funding required for stewardship should be evaluated for each easement under consideration by the Commission.

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## **CONSERVATION FUNDING OPTIONS ISSUES, GOALS, AND RECOMMENDATIONS**

### **ISSUE:**

Financial constraints will continue to limit all conservation initiatives except for donated conservation easements. It has been shown through various studies that there are long-term benefits to the tax base when land zoned for residential development is placed in conservation. Thus, the Town should continue to pursue the purchase of conservation land and easements and work cooperatively with other agencies/non-profits that are doing the same.

In the coming years, opportunities will arise for Durham to cost-share the acquisition of land and easements along water bodies. The Federal Land and Water Conservation Fund and the State Land and Community Heritage program would require matching funds from the Town. On the Lamprey River, matching funds are available through the National Park Service and from foundations through the Lamprey River Advisory Committee. Currently, funds available through the Conservation Commission are inadequate to meet the needs for matching these sources.



**GOAL:**

Conserve land identified as having conservation values through a variety of funding mechanisms and agencies/groups.

**RECOMMENDATIONS:**

1. The Town should increase the funding of the conservation account from the current level of funding via 50% of the land-use-change tax to use 100% of the land-use change tax.
2. The Town should consider funding a capital reserve account through the Capital Improvements Plan to fund the acquisition of easements and conservation lands. These funds could also be used for match requirements when opportunities arise in which other agencies are funding much of the cost.
3. An additional funding source for a variety of activities, such as greenway acquisition, easement acquisition, and creating bike trails and sidewalks, is the use of a “round up” program for tax bills, utility bills, and registration fees. Under such a program, the taxpayer could voluntarily round his/her bill payment up to a designated amount above the actual bill and designate it to any of the desired programs listed.
4. The Town should support the creation of a non-profit local land trust that accepts and pursues property and easements for land of local concern that would not generally be deemed significant by larger regional, statewide, or national trusts.
5. A brochure should be developed focusing on landowners with large acreage or acreage containing critical resources. The brochure will provide information on the advantages to the landowner and to the community of conserving the land and the opportunities available for property owners to conserve the property via conservation easements or sale. This brochure could be developed by the Conservation Commission.
6. All sources of funding should be pursued to finance the acquisition of conservation lands in Durham. Potential funding sources identified by the Society for the Protection of New Hampshire Forest listed by general entity are as follows:

### **Municipal**

- General fund
- Bonding
- Exchange of non-conservation real estate acquired for back taxes
- Income from timber cutting on Town land
- Real Estate transfer tax (if permitted)
- Dedication as part of development

### **State**

- Drinking water protection grants
- State low-interest loans/revolving loans

### **Federal**

- Land & Water Conservation Fund
- Forest Legacy
- Farmland Protection Program
- Access to Public Waters
- National Recreational Trails Fund
- North America Wetlands Conservation Fund
- Waterfowl Habitat Fund

### **Foundations**

- NH Charitable Foundation
- National Fish & Wildlife Foundation
- Sweet Water Trust

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## **HISTORIC AND ARCHEOLOGICAL RESOURCES**

### **BACKGROUND**

Durham has a complex past with nearly four hundred years of predominantly Western European settlement, preceded by thousands of years of an aboriginal presence. The pre-historic antecedent to the European presence extends to the last ice age, but is now present only in the archeological record. There is a great deal of documentation of the relationships between the European settlers and the Native American population. The very earliest Western European visitation to the area was

part of the search for the cod fisheries and exploitation of the cod fisheries of the North Atlantic. The entire period of Western European and subsequent European settlement has been associated with massive environmental and ecological changes. An awareness of these changes will heighten a contemporary commitment to conservation.

The earliest periods of Durham's European settlements were characterized by initial decades of cooperation with the Algonquin American Indians. The settlers were exposed to raids from the Malocote and Saco Indians, and individuals were captured, abducted, and taken to Canada; but for the most part, there were several generations of peaceful co-existence. This more peaceful period was followed by a turbulent period, culminating in the King Philip's War. The King Philip's War incurred the highest percentage of civilian and military losses in reference to the size of the warring populations of any American war. In Durham great losses were incurred on both sides. The end of the war saw the end of any hope for cooperative peaceful coexistence and probably established a pattern of a hostile warring relationship which was repeated over and over again as the European presence expanded to the West.

A reason for the relative peacefulness of the earliest colonial period was a mutual dependence on renewable natural resources. The American Indians' migratory patterns of land use and reliance on natural resources at first were not in conflict with the settlers' use of the lands. Later, the keeping of livestock and the more permanent European land use patterns led to conflict. The American Indian land use included active manipulation of the forests through seasonal burning of undergrowth. Some of the European settlers tried to use this manipulation of the land by the Indians as a defense of the Indians' property rights to the lands, but this argument did not hold sway and over time the Indian settlements were displaced and their lands were taken.

The earliest European settlements clustered along the banks of our streams and rivers for the reasons of transportation, the development of power from mills, and the use of salt marshes for the feeding of livestock. The elimination of the old growth forest began in earnest in the seventeenth century with the harvesting of the King's pines. Deforestation continued into the eighteenth century for the clearing of farm land and reached a peak in the nineteenth and early twentieth centuries. In the age of sail, the old growth pines provided the masts carrying the sails powering Britain's commercial and military fleets; and after the Revolution the old growth forests remained vital to the shipbuilding of the entire seacoast.

The social history of Durham as an important seacoast town with the connections to all of the neighboring seacoast towns, includes involvement in two important eighteenth and nineteenth century social and cultural events—slavery and the slave trade and the China trade, or the opium trade. Many New England families have roots in these economic activities either through shipbuilding or through direct participation. While slavery was not widespread, there were slaves in Durham. Durham did not have soils to support plantation-style agriculture. The slaves of Durham were domestic slaves and lived and worked with the families who owned them.

The social history of Durham encompasses the full breadth of military actions including King Philip’s War, the War of 1812, the Civil War, the Spanish American War, World Wars I and II, the Korean War, the Vietnam War, and the Gulf War. Durham’s involvement has been both through direct military service of its citizens, and through the substantial regional efforts in the eighteenth, nineteenth, and twentieth centuries at the Portsmouth Naval Shipyard, and in the twentieth century at Pease Air Force Base. Durham’s social history has been deeply influenced by the development of the University of New Hampshire both through the continuing presence of its students and staff, and the choice of much of the faculty to live in the area after retirement.

In understanding our contemporary commitment to conservation, knowledge of our present environment and how it has evolved is essential to an ongoing conservation commitment. While the return of the great forest following the collapse of nineteenth-century farming has been accompanied by the return of a more natural landscape, knowledge of the history of land use and changes in land use enhances our understanding that nearly every aspect of our natural environment in Durham represents an altered state. The eighteenth and nineteenth centuries emphasized further deforestation through the expansion of agriculture. The late nineteenth and early twentieth centuries led to even more deforestation through the mining of clay and the firing of bricks. Dover Point and Durham Point brick works provided the building materials for much of the development of Beacon Hill in Boston and operated well into the beginning of the twentieth century. This industry was responsible for deforestation until the brickworks were converted to oil firing. The collapse of farming in New England allowed the return of the great forest. Our twentieth century history has been no less turbulent. Although the return of the great forest is reassuring, knowing that the Town of Durham at one time was targeted for massive industrial development through the Onassis oil refinery proposal is less reassuring due to how quickly things can change.

Durham’s abundant history is shown by the numerous historic sites and markers present within the community (see Table 4.3). An archeological inventory of Durham exists at the Division of Historical Resources (DHR) in Concord; however, the DHR has a policy of not releasing this information to protect landowners from trespassing and the resources from illegal takings.

**Table 4.3. HISTORIC LISTINGS AND MARKERS**

<b>National Register Listings</b>	<b>Location</b>
John Sullivan House	23 Newmarket Road
Wiswall Falls Mill Site	Wiswall Road
Durham Historic District	Church Hill Area
Thompson Hall	Main Street
<b>Historic American Building / Engineering Listing</b>	<b>Location</b>
Ebenezer Smith House	20 Main Street
John Sullivan House	23 Newmarket Road
Courthouse (Old Town Hall)	Corner of Route 108/Main Street
Town Pound	Newmarket Road/Durham Pt. Road
Woodman Garrison (destroyed)	Garrison Ave. near Madbury Road
Pendergast Garrison	Packers Falls
<b>Historic Markers</b>	<b>Location</b>
Major General John Sullivan	Newmarket Road at Oyster River
Oyster River Massacre	Newmarket Road at Oyster River
Packers Falls	Bennett Road and Newmarket Road
Alexander Scammell Bridge	Route 4 at Cedar Point Road
<b>Other Markers/Plaques</b>	<b>Location</b>
200 <sup>th</sup> Anniversary of first fight of Revolution	Dover Road and Route 4
Coos Road 1764 Southern Terminal	Newmarket Road and Main Street
Durham Veterans Monument	Main Street and Mill Road
John Sullivan Monument	Newmarket Road at Oyster River
Site of Bickford Garrison 1694	Dover Point Road and Langley Road
<b>Historic Bridges</b>	<b>Location</b>
Concrete Arch	Packers Falls Road over Lamprey River
Reinforced Concrete Rigid Frame	Main Street over Railroad

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## **HISTORIC AND ARCHEOLOGICAL RESOURCES ISSUES, GOALS, AND RECOMMENDATIONS**

### **ISSUE:**

There is a lack of information readily available to Durham residents about pre-Colonial history and archeology.

### **GOAL:**

Provide Durham residents with a broader historical knowledge of their community to include pre-Colonial history and the archeological resources in the community.

### **RECOMMENDATIONS:**

1. Archeological sites providing evidence of pre-Colonial aboriginal presence should be identified and protected.
2. The history of land use from the Native American periods and the colonial and post-colonial periods should be emphasized in an analysis of Durham's history. Awareness of slavery in Durham's history should be made part of our knowledge.
3. An oral history should be utilized to document Durham's twentieth century historical changes, and planning should take place for the collection of oral history, to include documentation of the physical and cultural changes associated with the changing farm community. A separate historical project documenting Durham's role in the Onassis refinery proposal should also be undertaken.
4. Durham's historic orientation to the Oyster River, Great Bay, and Little Bay should be emphasized to highlight the vital importance of these waterways in the development of commerce and transportation and the present-day importance of these waterways with our relationship to our sister seacoast communities. This could be done through both a pamphlet and historic marker signs.
5. In order to make members of the community aware of the Town's history, the Historic District Commission or Historic Association should initiate a placard program working in conjunction with private landowners. This program would identify a site/building by its historic name and give a brief history of the site/building.

6. Durham should take a leadership role in the community by managing and maintaining its historic properties such as the Courthouse, Grange, Wiswall Dam site, etc. to the maximum extent possible and also inform people of the historic importance of these properties.
7. The “Historic Walking Tour” pamphlet for the Durham Historic District should be updated and reprinted. Furthermore, the next version, or another pamphlet, should be created for sites outside the Historic District such as the Wiswall Dam, UNH buildings, and Adams Point.
8. Landowners should be encouraged, particularly during the development review process, to contact the DHR to find out if there are known archeological sites on their property. If possible, landowners should design any development or changes to their property in such a way as to minimize impact on the resource. The DHR releases this archeological information only to landowners, and not to the Town or general public.

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## **MANAGEMENT OF IMPOUNDED WATER RESOURCES MILL POND ISSUES, GOALS, AND RECOMMENDATIONS**

### **ISSUE:**

The Mill Pond has been an altered man-made feature of Durham's townscape for centuries. In earlier years active management was an accepted part of the function of the mill. Problems of sedimentation and eutrophication have more recently raised the issue of the need for active management. Similar issues are being faced with respect to the impoundment managed by the NHDOT for Beard's Creek, which is not owned by the Town.

### **GOAL:**

Manage the Mill Pond and Beard's Creek impoundments so that they remain areas for recreation, a refuge for plants and animals, and in general a healthy part of the Town's ecosystem.

### **RECOMMENDATIONS:**

1. A program of active management of these impoundments should be developed. Specifics of such a management program are complex. As a natural resource, Mill Pond demands special consideration and analysis. The Mill Pond is the dominant feature of an intimate urban park. The Mill Pond impoundment provides a unique area for recreation and a refuge for plants and animals immediately adjacent by foot to the downtown core.
2. A thoughtful approach should be developed toward management of eutrofication. This management program should be appropriate to not only a beautiful resource but a resource which has been for hundreds of years altered from its natural state.

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## **INFORMATION AND MAPPING**

### **BACKGROUND**

At the time of the 1989 Master Plan there was a lack of availability of digital mapping in the form of Geographic Information Systems (GIS). Since that time, significant advances have been made in computer and software technology that allows for the use of GIS on a desktop computer. In addition, much of the mapping for the Town and region have been converted to GIS format by the Strafford Regional Planning Commission (SRPC) and a the New Hampshire Geographically Referenced Analysis and Information Transfer System (GRANIT). GRANIT is a cooperative project to create, maintain, and make available a statewide geographic database serving the information needs of State, regional, and local government decision-makers.

Using the information available through SRPC and GRANIT, a comprehensive natural resource inventory was prepared for the Town. The mapping from this inventory is a part of various portions of this chapter; however, a complete list of the GIS layers inventoried and available is contained in Table 4.4.



**Table 4.4. GEOGRAPHIC INFORMATION SYSTEMS LAYERS FOR NATURAL RESOURCE INVENTORY**

Floodplains	Land Use
Stratified Drift Aquifers	Shoreland Buffers
Sand and Gravel Deposits	Scenic Roads & Rivers
Conservation/Public Lands	Poorly and Very Poorly Drained Soils
Developed Lands	Unfragmented Lands
Source Water Protection Areas	NHI Mapping (endangered & threatened species)
Steep Slopes (> 25%)	Prime Agricultural Soils
Watershed Boundaries	Wellhead Locations/Public Drinking Water Supplies
Significant Wildlife Habitat Areas	Durham Historic District and Markers
Salt Marshes	Streams & Rivers
Water Bodies	Potential Groundwater Hazards
Zoning Districts	Soil Potential Rating for Development
Roads	Contour Map (25-foot interval)

**INFORMATION AND MAPPING  
ISSUES, GOALS, AND RECOMMENDATIONS**

**ISSUE:**

The Town lacks a complete and cohesive database of information and mapping of natural features that is readily available for use by Town employees, Town boards and committees, and the general public.

**GOAL #1:**

Develop a comprehensive GIS and information system that allows for the rapid and efficient communication of complex environmental information for use by Town employees, Town boards and committees, and the general public.

**RECOMMENDATIONS:**

1. Continuously update, develop, and analyze the natural resource inventory for the Town, using the GIS. This includes acquiring digital aerial photography of the Town that will show locations of buildings and topography.

2. The Town boards and the public should have access to GIS mapping. This access should ensure that the GIS is used on matters of planning and decision making for all Town boards. In addition, the checklist of items reviewed for every development application should include a review of the GIS natural resource inventory mapping.
3. Provision should also be made that the public have access to the GIS system information in the same spirit as John Hatch's relief map displayed in the Town Hall. An interactive mapping center should be developed with educational and informational goals. The Town's Web site can be used for the broadest access, in addition to the Town library.
4. The most important GIS data layers should be displayed for convenient reference where public meetings and board meetings are scheduled. The displays should be both town wide and regional. The use of the GIS system is anticipated to strengthen a regional approach in critical areas of management, including water resource protection and watershed protection.
5. The Town should support the efforts of the SRPC and GRANIT in the development of additional GIS data layers and the maintenance of current data layers. Additional data layers identified that are not currently available or not available at an appropriate level of detail for the Town include: land use and land cover, vegetative communities, tax parcels, digital orthophotographs, historic and archeological resources, scenic vistas, and water and sewer lines.

**GOAL#2:**

Better utilize the results of base research being conducted in the Town and Great Bay area for use in local decision making processes, particularly land use decisions.

**RECOMMENDATION:**

The Town should encourage efforts to better disseminate practical applications of the base research performed by the multitude of State, Federal, and private agencies and programs (e.g., Jackson Lab, CICEET, NHEP, Coastal Program, etc.) that relate to the Great Bay estuary, so as to better assist local decision making.