

Town of Newmarket New Hampshire

Master Plan Chapter 2 Terrestrial Resources

This chapter updates the material presented in the 1994 Master Plan with information gathered through research from the Strafford Regional Planning Commission (SRPC) and the 2000 Master Plan Update Committee (MPUC). The new information presented in this chapter was based upon research conducted in the fall/winter of 1999/2000 and serves to supplement data previously presented in the 1994 Master Plan. This chapter should be understood to contain general principles. Specific data and inventories may be found in many databases, research studies, and other documents and publications as cited in the chapter.

In 1991 Smart Associates, Environmental Consultants Inc. were retained by the Town of Newmarket to prepare a Natural Resource Inventory and prepare a Conservation Plan. The information completed in this study, despite its date, remains valid. This report can be found in the Planning Office, Town of Newmarket Town Hall. A review of this study finds that there is little need for an update to the information, except to apply the findings to the current conditions as they have changed since the 1994 Master Plan. The Conservation Plan was developed by:

- identifying areas which contain important natural resources
- performing an evaluation of the unique characteristics of local natural resources
- identifying existing or potential sources of groundwater and/or surface contamination
- prioritizing lands for protection
- providing specific acquisition/resource management guidelines for each identified area.

In the Conservation Plan, six areas in town were identified as critical areas to protect. The criteria used to select these protection areas included:

- Diversity of wildlife habitat types and protection of threatened or endangered species
- Acreage of wetlands
- Aquifer protection
- Potential for the protection of shorelines and quality of surface water bodies
- Access to and recreational use of the area
- Historical and archeological significance of the area
- Proximity to protected lands
- Unique geological features
- Local development pressures
- Acreage of prime farm land
- Importance to community/regional/resource system
- Potential for inter-municipal coordination
- Plant/vegetative resources

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The sites selected for protection include:

- the South Bay area
- the North Bay area
- the Upper Narrows
- the Folletts Brook/ Newmarket Plains area
- the Tuttle Swamp area
- the Old Neal Mill Road area

The report, commonly referred to as the "Smart Study," serves as a long-term resource management plan for Newmarket. The resulting set of resource maps, public input and data collected should be considered as additional technical background for the basic principles and information set forth in this Chapter. Strafford Regional Planning Commission in 2000 prepared additional maps for this chapter. Full size color copies are on display in the Planning and Public Works office. Reduced versions are included for reference.

2-1. ELEVATION

Newmarket's elevation ranges from sea level on the eastern banks of Great Bay to 281 feet at the top of Bald Hill in the extreme southwest corner of the town. Generally, the majority of town land is very low, lying less than 120 feet above sea level. This is especially the case for the plains east of Route 108.

The most densely populated area, the town center along Route 108, has maximum elevations of only 60 to 100 feet while being bisected by the Lamprey River. A large area of the town falls in this river basin creating potential flood hazards and drainage problems. Other notable low-lying areas include the swamplands in the western and southwestern portions of the town. At levels of 60 to 100 feet above sea level, these open marshes and wooded marshes are quite extensive and encompass many small aquatic systems such as the Piscassic River. Most notable of the marshy area is Tuttle Swamp in the western part of town at an elevation ranging from 80 to 100 feet above sea level.

High points in the town occur on several scattered hills: Grapevine Hill at 231 feet, Great Hill at 228 feet and Bald Hill at 281 feet. The highest extensive plain is the north central Newmarket plain at 100 to 140 feet above sea level.

2-2. SLOPE

An examination of the Newmarket slope map shows that the town's terrain is relatively flat. The majority of the land area has a slope of 8 percent or less, reflective of the wetland flats on the southern coast and western inland sections. Steeper slope areas, which coincide with several

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hills and riverbank areas, cut through the town center and several densely populated areas in the NH 108 corridor south of downtown Newmarket.

Extreme slope areas with grades of greater than 25 percent are present on the immediate southern shoreline of the Lamprey River through the center district of the town and at Bald, Grapevine and Great Hills. These areas present added costs and complications for development and are resource fragile. Development restrictions in these areas are essential.

The primary reason for controlling development on steep slopes is to reduce the potential for increased rates of runoff. As construction takes place on steeper slopes, vegetation is cleared and more land is exposed to direct rainfall. Substantial increases in over-land flow occur when the course of runoff is changed and rainwater is no longer deflected and absorbed by vegetation. In addition, there may be a substantial increase in erosion when vegetation no longer holds the soils in place and rainfall penetrates the surface directly, loosening up the topsoil layer.

The steepness of terrain is easily calculated by determining the ratio of vertical change to horizontal change (often referred to as "rise over run"). The importance of identifying Newmarket's steep slopes are that they often are associated with thin, poorly drained soils that can cause a number of problems for development, including inadequate water supply, treatment of sewage, and erosion.

The Newmarket Slope Map (scale: 1:12000), on display in the Planning Office, was prepared in 1979 by SRPC using the Geological Survey Map as a base. Slopes are mapped according to the degree of steepness and were placed into five categories to coincide with those categories used by the U.S. Soil Conservation Service. The five categories, with their general suitability, (excluding soil conditions) are:

- Group 1: 0-3 percent - These slopes have the least restrictions, and consequently, the highest capability for development. Flat lands are suitable for all types of development including large industrial and commercial buildings, roads, highways and active recreational uses such as playing fields. However, very flat land can pose development problems that may include inadequate drainage (especially during peak storm events), inadequate drainage for sewage effluent, and monotonous views.
- Group 2: 3-8 percent - These gently sloped areas are suitable for single family housing on small and medium lots, apartment buildings and secondary roads. Most of the land uses under Group 1 are also suitable on these slopes but limitations increase at the upper end of the category.
- Group 3: 8-15 percent - Land in this category is moderately suited for development

and has certain restrictions. Development costs and the potential for runoff and erosion begin to increase in this slope range. These areas are suitable for single family housing on large lots as well as townhouse and garden apartments.

- Group 4: 15-25 percent - These areas generally have significant restrictions and a poor capability to support development. The substantial cost of site development becomes a major factor. Residential uses can be compatible if properly planned out. Townhouses with multi-level extremes, using cluster techniques, can be considered in these areas. Due to the excess amount of surface runoff created on these slopes, runoff and erosion control measures, larger minimum lot size requirements, appropriate sewage disposal techniques and special care in construction and landscaping may be required.
- Group 5: 25 percent and over - Slopes greater than 25 percent are considered critical resources and almost all types of development should be prevented. Development costs and potential environmental impacts in this group are high. Such factors as shallow to bedrock soil conditions, poor drainage, and high runoff and erosion rates are common problems in this group and may severely limit construction on these slopes. Areas in Newmarket with these slopes are best suited for wildlife habitat and passive recreational uses.

These categories are one measure of suitability for development. Further detail can be obtained from the Rockingham County Office of the Soil Conservation Service or from the Strafford Regional Planning Commission.

2-3. SOILS

There are a total of 39 soil types which occur over a variety of slopes, accounting for 54 different soil classifications in Newmarket, according to 1986 Soil Conservation Service data. Soil classifications are grouped together by common features and constraints of soil types. The term "classifications" merely takes into account the added dimension of soil type and slope present in an area.

Newmarket's soil classification groupings are based upon the standard numeric system used in Rockingham County to describe drainage capability. In Newmarket, soil classifications break down as follows: six classifications are described as excessively well drained, two as somewhat excessively well drained, fourteen as well drained, eleven as moderately well drained, six as poorly drained and fifteen as very poorly drained.

Soil Suitability for Different Land Uses

This section and accompanying soil maps that are located at the Town Hall are intended to serve as a general outline of soil classifications, locations and resource development potential for the Town of Newmarket. They were prepared from pre-existing soil surveys conducted by the Soil Conservation Service for the US Department of Agriculture and soil potential inventories published for Rockingham County and the New Hampshire seacoast area. These two publications, *Soils Potentials for Development in the New Hampshire Seacoast Area* and *Soils and Their Interpretations for Various Land Uses*, and their subsequent analysis serve as a valuable guide for planning Newmarket's future land uses.

Readers of this chapter interested in a further explanation of these soils ratings and potential interpretations should reference the publications directly. This chapter incorporates their information by reference and is intended as a cursory review of soils in the Town of Newmarket.

Of special concern should be land specifically suited for preservation/resource protection, wetlands and developable land. Wetlands also play a very important part in the terrestrial resources of the town. Wetlands maps derived from SCS soils inventories and from LANDSAT imagery are on display at the Planning Office. The Town of Newmarket should ensure that all new or revised land use regulations be based on prudent, sustainable use of land resources.

2-4. OPEN SPACE & RECREATION INVENTORY

The Town of Newmarket has numerous open space and recreational lands and facilities. Open space can be defined as any environmentally sensitive land or water area that has ecological, recreational, or aesthetic value. Some examples include surface waters, floodplain, wetlands, aquifer recharge zones, agricultural lands and higher elevations. Many of these environmentally sensitive lands have been addressed in previous sections or were considered in the water resource section. Recreational facilities can be defined as any major public or privately owned facility, which provides public access to recreational areas or equipment. Both open space and recreational facilities are a vital contribution to a community's character and general health and well being of its population.

The Smart Study identified a composite map of "Protected Lands" which represent all land protected from development through conservation easements, publicly owned land, and lands in current use. This map also delineates between Town owned and properties currently in the LCIP program. Priority Conservation Properties from 1990 are also delineated. Within the next two years the GRANIT system will complete an update that catalogs and digitizes all protected and recreation parcels in the state. At that time, this information will be presented on an updated base map.

In the spring of 1994 the Newmarket Community Center and associated fields were opened to

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the public. It serves as a major new recreational center that links adjacent resources in the town. In 1997 Heron Point Sanctuary opened providing a riverside natural area in downtown. Additionally, the Town has acquired more conservation easements and areas of open space and recreation.

Table 2.1 presents a list of major open space and recreational facilities in Newmarket that were identified in the New Hampshire Inventory of Outdoor Recreational Facilities (OSP, 1981). This has been updated in 1994 by SRPC and in 2000 by the MPUC and SRPC. Table 2.2 is a list of Newmarket Conservation Lands that have been added since 1994.

TABLE 2.1
OPEN SPACES AND RECREATIONAL OPPORTUNITIES IN NEWMARKET¹

Facility Name	Primary Use	Ownership	Acreage
Community Center	Recreation/Social Ctr	Municipal	1
Beaulieu Field	Baseball	Municipal	5
Beanie Howcroft Ballfield	Field Sports	Municipal	10
Coastal Storage Facilities	Fishing	State	1
Great Bay Access NH Fish & Game	Fishing	State	1
Rockingham Country Club	Golf	Private/Profit	105
Great Bay Athletic Club	Gymnasium	Private/Profit	3
Leo Landroche Memorial Field	Field Sports	Municipal	11
Sliding Rock	Boat Launch	Municipal	2
Riverbend Park	Walkways	Municipal	1
Waterfront Park	Picnic Area	Municipal	2
Heron Point	Walkways, Wildlife	Municipal	32
Norton Woods	Recreation	Private/Municipal	23/29
Smas Conservation Easement	Hunting Recreation	State	29

¹ Inventory of Outdoor Recreation Facilities in NH, 1981 OSP., updated by SRPC in 1994, 2000

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Table 2.2 - Newmarket Conservation Lands Reference Guide

NEWMARKET CONSERVATION LANDS REFERENCE GUIDE						
Site Name	Acres	Zone	Lot	Plan	Book-Page	Notes
Schanda Farm	71.77	R-7	14	D-14233	2598-427	Managing Agency: Community Association
Route 152 Parcel	42	R-6	38		2840-2061	Town of Newmarket
	2.8	R-6	39		3150-0663	
	14	R-6	40		3150-0663	
Norton Woods	28.86	R-6	13	D-19386	2793-2266	Deeded to the Town of Newmarket.
	22.86	R-5	47-10			May be used for passive recreation by Norton Woods Condominium owners. Prevents further development.
Trotter Park/ Follet's Brook	14	R-5	16	D-16753	2825-1418	Site Plan refers to lands deeded to Town of Newmarket (Not shown on site plan)
	8.49	R-5	96			
Durrell Woods	4.8	R-5	38	D-16122	2720-1577	Durrell Woods Community Association
	31.51	R-5	40			Note 11 on site plan refers to donation of lot to the Town of Newmarket.
	37.97	R-5	130			
	5.85	R-5	143			
Sewall Farm	49	R-4	134	D-16121	2695-0359	Sewall Farm Community Association
Lita Lane	19.5	R-3	30-47	D-7938	2477-0020	Town of Newmarket
Schultz Place	22.98	R-2	19-3			
Heron Point	17.29	R-2	119	D-19531	3193-1697	Town of Newmarket Preserved as open space.
Moody Point	26.13 17.06	R-2	36-4 36-11	D-17107	2700-0367	Moody Point Community Association
Lubberland Creek	49	R-2	26		3397-2455	Lots 26 and 27 are deeded to The Nature Conservancy
	18	R-2	27			This land mass is larger than what is shown on the SPNHF map.
	7.68	R-2	28-2		2790-1744	Lots 28-1 and 28-2 are deeded to the Town of Newmarket.
	27.86	R-2	28-1			
Barberry Coast	11.46	R-1	38	D-22912	3079-1818	Not listed on SPNHF map. Protective covenants

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Doe Farm	D-19470 2798-0124	Open space easement, to remain in a natural state. Restrictive covenants.
Phase II	D-20529	Site plan refers to open space conservation easement on lot 43. Neither Doe Farm or Phase II is shown on SPNHF map. Unidentified area on SPNHF appears to be part of Doe Farm development.
Woodhaven Phase II	D-10912 2684-1722	Not shown on SPNHF map. Parks 3 and 4 on site plan set aside for recreational use only. A portion of park area 4 previously conveyed to the Town of Newmarket.
Conservation Lands		
FEE OWNERSHIP LANDS		
Follets Brook Lita Lane Parcel Route 152 Parcel		
CONSERVATION EASEMENT LANDS		
Doe Farm Lubberland Creek Norton Woods		
OPEN SPACE SET ASIDE LANDS		
Barberry Coast Durrell Woods Heron Point Moody Point Schanda Farm Schultz Place Sewall Farm Woodhaven		

In total there are 161 acres of private, 82 acres of municipal and 31 acres of state owned recreational land and open space. In addition to these lands there are also a number of "conservation lands" that are owned both privately and municipally in the town. Various types of conservation easements and protective covenants restrict these areas, which total approximately 300 acres. Lands were identified through the use of The Smart Associates Protected Lands Map and the Society for the Protection of New Hampshire Forests, Town of Newmarket Protected Lands Map (1997).

It is essential that continued public access to the Great Bay through the state owned facility and municipal access to the Lamprey River be preserved and enhanced for appropriate recreational uses. Development and future access to the Lamprey River should take into account potential impacts on the River's ecological, scenic qualities, and recreational qualities.

There are a number of Town parks and fields that are available to all residents for picnicking and sports outings. These parks include the following:

- **Leo Landroche Memorial Field** - Located behind the high school at South Main Street, this complex offers a playground and picnic area, horseshoe pits, soccer fields, baseball and softball field, shuffleboard courts and a performing stage area. At the entrance to the

park there is a basketball court and the high school tennis courts. In the winter months, the park serves as a beginner cross-country ski area.

- **Beanie Howcroft Field** - Located off Nichols Avenue, this secluded ballfield is available for softball, baseball, soccer, and field hockey.
- **Lamprey River Waterfront Park** - This park includes a fishing area, boat launching area and picnic site on the Lower Lamprey River. This site has public access to the Lamprey River and Great Bay.
- **Upper Lamprey River Boat Launch (Sliding Rock)** - A natural two-acre parcel on the Upper Lamprey River containing a boat launch for small boats and canoes. Access is through Beech Street and Salmon Street.
- **Beaulieu Little League Park** - Found off Elm Street, the Little League Park serves the minor and major leagues.
- **Heron Point** – Located off Bay Road, on the east side of the lower Lamprey River. Walking trails and observation decks for wildlife viewing. Open to the public from dawn until dusk.

There are several areas in the surrounding region for recreation and open space, including:

- **College Woods**, on the UNH Campus in Durham - a woodland recreational area
- **Mendum's Pond**, located off Route 4 in Barrington - A UNH owned recreation area
- **Wagon Hill**, located off Route 4 in Durham - A Town recreation area on Great Bay
- **Adams Point**, located off Bay Road in Durham - Provides access to the Great Bay
- **Squamscott River Boat Launch**, in Stratham
- **Sandy Point Discovery Center** located off Route 33 in Stratham - provides nature trails, bird and wildlife viewing and information about the Great Bay estuary.
- **Rockingham Junction to Manchester (Western Branch Rail Line)** which is being converted to a trail running from Newmarket to Manchester
- **Stratham Hill Park** located off Route 33 in Stratham - A Town owned facility providing a lookout tower, picnic facilities, ballfields, ice-skating, trails and hikes.

2-5. FOREST RESOURCES

Forestlands have been depleted over the years as a result of residential and commercial development. Between 1953 and 1974, the amount of forested land in Newmarket changed only slightly from 4,630 acres to 4,415 acres. However, between 1974 and 1982 the amount of forested land in Newmarket was depleted by 1,425 acres to 2,990 acres, according to an estimate made by UNH's Department of Natural Resources. More recent estimates by SRPC, using different measurement parameters, put the estimate higher.

Currently, only a small portion of these forested lands are actively harvested. The economic value of Newmarket's forestland is hard to estimate. In 1986, timber production in Newmarket dropped off because of a downward economic shift in demand for hardwoods. The NH Department of Resources and Economic Development estimated the volume of forest products harvested (based on receipts of timber taxes) in Newmarket in past years as listed in Table II-4 below. However, these volumes of production may be off by as much as 50 percent depending on the number of people who do not record timber harvests.

TABLE 2.3

**VOLUME OF FOREST PRODUCTS GENERATED
IN NEWMARKET**

Product	FY 1982	FY 1986	FY 1992
White Pine	170,271 b.f.	22,297 b.f.	135,655 b.f.
Hemlock (large)	76,840 b.f.	6,210 b.f.	690 b.f.
All hardwoods	---	890	---
Pallets	8,155 b.f.	---	40,385 b.f.
Mixed Softwoods	---	---	---
Mixed Hardwoods	---	---	---
Fuel Woods	662 cords	71 cords	19 cords
Chips (some pulp)	---	36 cords	---
Pure pulp	---	16 cords	---

Source: New Hampshire Department of Resources and Economic Development.

2-6. SAND & GRAVEL PITS

The Town of Newmarket currently has eight gravel pits. All pits fulfill the requirements of the Town Excavation Ordinance in effect at the time of permit issuance, which is based upon New Hampshire RSA 155-E. The pits are bonded and re-permitted per regulations administered by the Planning Board and the Town Administrator. Site plans are on file for each of the pits in the Planning Office. Given the potential for substantial environmental damage if handled improperly, sand and gravel pits should be monitored carefully to ensure compliance with existing Town regulations.

2-7. WILDLIFE

Newmarket is home to a wide variety of terrestrial and marine wildlife species. Although not given much consideration in the past, preservation of these species and the various environments

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has become a concern, especially with rapidly increasing rates of development. These habitats can be the focus of recreational activity such as biking, hunting, fishing, hiking, boating, snowmobiling, camping and birdwatching. Preservation of these sensitive environmental areas is essential to the continued quality of life in the town.

Newmarket's many swamplands and marshes are home to a variety of wildlife including wild turkey and deer. Although these areas are undesirable for development, they are affected by local development. Water flow and water quality are prime concerns to preserving these areas. The 1991 Natural Resource Inventory and Conservation Plan by The Smart Associates identifies six areas that are recommended for further consideration as protected lands due to the variety of fragile resources that they contain. The NHDES further supports protection of these environments by the identification of approximately 665 acres of wetlands in the town that are classified as "high value wetlands" based on their resource characteristics in SPNHF's "New Hampshire's Changing Landscapes" 1999 report.

The random development patterns of the region have caused sections of land to become isolated habitats. Steps are currently being taken by the Conservation Commission to work with developers and landowners to obtain conservation easements. Since the problem is a regional one, the cooperation of surrounding towns is essential. Efforts should continue to establish wildlife corridors to allow wildlife migration from one conservation property to another and to continue procurement of conservation easements.

Consideration must also be given to the town's aquatic environments. The Great Bay serves as an oyster nursery, river otter habitat, and winter roosting area for several bald eagles. The bay also is a major recreation area for the town and surrounding communities. Constant monitoring should be given to the preservation of its water quality and native animal species should be a priority, as should the protection of its immediate shores and its major tributaries, such as the Lamprey River. The Lamprey River has been classified by the National Park Service as a "Wild and Scenic River" due to its anadromous fish and the quality of its wildlife habitat. The segment in Newmarket lies between important aquatic habitats in Durham and the Great Bay.

The Smart Study contains a complete wildlife and wetlands inventory map based upon numerous sources including the New Hampshire Natural Heritage Inventory (NHNHI) and the New Hampshire Fish and Game Department. A complete list of endangered and threatened species of animals and plants is listed in that report. The New Hampshire Natural Heritage Inventory contains a complete list of the endangered and threatened species of animals and plants identified in Newmarket in the last twenty years. The New Hampshire Fish and Game Department has provided information on seven species of fishes that have passed through the Lamprey fish ladder over the past two years. The fish ladder represents an important resource in conservation and restoration efforts.

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Table 2-4

Land and Water Characteristics of Newmarket and Surrounding Towns

Municipality	Total Area in Sq Miles	Total Area	Land Area	Surface Water Area	Land Area Protected in 1998	Percent Land Area Protected
Epping	26.2	16,775.6	16,598.5	177.1	245.4	1.5%
Greenland	13.3	8,523.8	6,820.1	1,703.7	568.8	8.3%
Newfields	7.3	4,646.7	4,577.1	69.6	235.6	5.2%
Newmarket	14.2	9,080.3	8,095.6	984.7	515.7	6.4%
Stratham	15.5	9,901.6	9,715.7	185.9	666.4	6.9%
Durham	24.8	15,852.2	14,433.9	1,418.3	2,903.4	20.1%
Lee	20.2	12,927.2	12,758.1	169.2	1,089.8	8.5%
	Total Area of Water Supply Lands	Area of Water Supply Lands Protected in 1998	% Water Supply Lands Protected			
Epping	2,268.2	20.5	0.9%			
Greenland	2,682.5	333.8	12.4%			
Newfields	1,572.3	133.4	8.5%			
Newmarket	2,161.6	232.4	10.8%			
Stratham	6,282.0	386.1	6.1%			
Durham	1,013.3	99.5	9.8%			
Lee	1,748.9	112.1	6.4%			
	Area of Forest in 1992/93	Percent Area Forested in 1992/1993	Total Area of Forest Blocks > 10 Acres	% Forest Blocks > 10 Acres Protected	Number of Forest Blocks > 500 Acres	Total Area of Forest Blocks > 500 Acres
Epping	12,045.9	72.6%	11,734.7	1.6%	7	5,799.74
Greenland	3,750.7	55.0%	3,497.5	12.5%	2	1,525.47
Newfields	3,565.9	77.9%	3,520.9	6.1%	3	2,272.80
Newmarket	5,184.8	64.0%	4,964.3	6.7%	2	1,206.28
Stratham	5,920.7	60.9%	5,703.7	4.6%	5	3,739.78
Durham	10,163.3	70.4%	9,773.9	21.4%	7	6,315.82
Lee	8,946.3	70.1%	8,724.5	8.1%	3	2,041.21
	Number of Known Rare Species & Natural Communities in 1998	Total Area of EPA High Value Wetlands	Total Area of High Value Wetlands Protected	% High Value Wetland Area Protected		
Epping	14	221.2	0.0	0.0%		
Greenland	29	482.3	141.7	29.4%		
Newfields	6	111.7	6.8	6.1%		
Newmarket	34	667.9	129.0	19.3%		
Stratham	14	348.1	110.1	31.6%		
Durham	50	129.6	15.9	12.2%		
Lee	13	291.5	0.0	0.0%		

Source: Society for the Protection of NH Forests
"New Hampshire's Changing Landscape"

Table 2.4 provides information on land area, water area, wetlands, forested land, protected lands, for Newmarket and neighboring towns.

2-8. CONCLUSIONS

The loss or degradation of habitat is a detriment to Newmarket's wildlife populations. Those areas that are already established as forest and wildlife habitat or are best suited for forest and wildlife habitat and only marginally suited for residential and commercial development, should be protected and managed for their natural resource values. Proposed developments should adequately address natural resource protection with respect to the goals and intent of the Master Plan prior to receiving approval by the Planning Board and/or Conservation Commission. New developments should be reviewed for their impacts on "Free Ecological Services" provided by open space, including flood control, sediment and pollutant filtration, air and water quality protection and for their impacts on habitat fragmentation and loss of habitat connectivity between other open spaces.

The Conservation Commission should research residents' acceptance of further increases in the allocation of the Current Use tax from 50% to reach targeted Conservation Commission goals. This effort should include sufficient information to insure that residents are making an informed decision, including any potential negative tax impact.

Newmarket land use regulations (i.e., zoning ordinance, subdivision regulations and site plan review regulations) should recognize the need for the protection of open space and recreational use areas on residentially developed land. Flexible requirements should be implemented that would provide residential and commercial/industrial developers with options such as dedication of open space easements, off-site improvements, assistance in other protection efforts, or monetary contributions to the Town conservation funds. The Planning Board should establish procedures requiring the developer to mitigate impacts on open space for proposed developments that will reduce open space, or impact terrestrial resources. This includes the creation of additional recreational uses or contributions to the conservation fund. The mitigation measures could also include monetary gifts, land easements, land grants or other forms of aid to ongoing open space protection efforts.

A strong Conservation Commission is essential for ongoing preservation and protection of Town resources. The Commission and Town Council should work with the Planning Board on important issues and assist in the promotion of common Town goals. With current high growth demands and limited open space, these goals should include the continued protection and/or acquisition of open spaces through both public and privately funded initiatives. Both the Town Council and the Planning Board, in conjunction with the Conservation Commission, should also further efforts and sponsor initiatives to encourage residents to establish conservation easements. Development of raw land and open spaces should be carefully considered by the Planning Board

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and Conservation Commission with respect to impacts on wildlife habitats, open space, aesthetics and other terrestrial resource concerns of the Town to ensure that the development meets with the intent, purpose, and conditions of the Master Plan. The Planning Board has the right to enforce modifications, improvements, or deny proposed developments if, in the Board's decision, the proposed development does not meet with the intent, purpose, vision, and goal of the Master Plan, and its related land use regulations.

The Town Council and Planning Board should sponsor and promote responsible redevelopment efforts in the community to further enhance protection efforts. The Planning Board should give preference and encourage redevelopment efforts over new development efforts that will have direct impacts on open spaces, wildlife habitats, or other terrestrial resources. Furthermore, responsible redevelopment serves to protect, beautify, and increase safety in properties that may have been underutilized.

The Board should research innovative land use controls promoting this type of redevelopment. It would be linked to the existing provision of infrastructure and may include possible negative incentives for less desired development locations and positive incentives for preferred development. These policies should be developed and disseminated to the Town officials and staff to encourage a more cohesive approach to policy decisions. The Future Land Use Chapter describes and recommends potential approaches to this issue.

Since Newmarket lies on the Lamprey River, contaminants emitted from spills and leaks, especially in the downtown district, can readily migrate to the Lamprey and ultimately the Great Bay. Therefore, the Town Council should promote, further publicize, and sponsor activities that support State efforts to protect terrestrial resources, water supplies, and the environment. While the last two decades enabled the Town to work with the big polluters, such as the industrial manufacturers, widespread smaller-scale pollution, such as that by the residents, has not been fully addressed at the local level. Non-point source pollution continues to represent environmental risk to habitats. The Town Council should actively promote and create public awareness of "Best Management Practices" for handling oil or hazardous substances. "Best Management Practices" are outlined in New Hampshire Code of Administrative Rules Part Env-Ws 421. The regulation promotes the proper storage, handling, and disposal of oil and/or hazardous materials.

Furthermore, existing developed areas should be reviewed with respect to current regulations to ensure that Newmarket's terrestrial resources are adequately protected with regard to potential contaminant releases to the environment. The Town Council should promote continued upgrades or replacements in above ground and underground storage tanks systems that contain oil or hazardous materials. Additionally, the Town should require strong spill prevention control and countermeasure plans on record with the Fire Department for businesses that handle, store, or use significant quantities of oil or hazardous materials. In the coming years, additional risks to terrestrial ecosystems will also come from outdated residential home heating oil systems. The combi-

nation of many small capacity oil systems at risk of leaking is an equal threat to that of one large system leaking. The Town should work closely with new State-funded, low income grant programs for the upgrading of residential home heating oil systems to help reduce the likelihood of spills and/or leaks. While these programs are currently in their infancy, Newmarket can be a leader in establishing strong pollution prevention and environmental protection efforts by promoting and helping implement these State efforts. The Town Council should direct these efforts with direct oversight by the Town Administrator, Code Enforcement Officer, and/or Fire Chief. Furthermore, consideration should be given by the Town Council to developing additional pollution prevention programs or matching grants on a sliding scale to promote protection of the Town's habitats and environment.

RECOMMENDATIONS

The Town of Newmarket has experienced high growth and an associated demise of its terrestrial and aquatic resources.

- Consider innovative ways to supplement volunteer labor through a relationship with the University of New Hampshire for federal work-study positions and student assignments that may relate to natural resource issues.
- Actively and quickly research innovative zoning and regulatory controls to protect these resources from development pressure.
- Actively pursue innovative funding sources for protection of natural resources.
- Promote the preservation of habitat for wildlife wherever possible.

Once terrestrial and aquatic resources are lost to development, there is virtually no possible way to resurrect these resources and the value and importance of existing resources increases.

- Consider more flexible methods of protection other than outright and total protection of all resources. Such techniques may include partial development easements, public private partnerships for conservation development design, and public-private partnerships for leveraging grant funds for land conservation and protection.
- Consider allocating a higher percentage of the land use change tax to the Conservation Commission for pursuing these efforts.
- Consider partial development easements as a protective device that rewards landowners that are unable to afford total protection of entire parcels and be willing to work with

landowners that choose these methods.

- Consider a graduated approach to resource protection based upon a list of priorities identified as part of this Master Plan linking development of lower priority resources in exchange for protection of higher priority resources.
- Enact a comprehensive approach to open space protection and develop a separate Open Space Plan that includes the necessary components for a comprehensive approach to open space planning as follows:
 - Vision – supplies all aspects of support and guidance to Town Boards and Officials in responding the threatened losses of open space and assistance in pursuing fund resources from various entities, private and public.
 - Education – provides the framework for an outreach effort to landowners, developers, citizens, and governmental officials at all levels on the benefits and costs of open space protection and the opportunities and techniques for open space protection.
 - Action – identifies responsible parties for completing the tasks called for in the Open Space Plan and assists in the formulation of action plans and support for funding these responsibilities.