

Natural Resource Management Plan

Wiggin Farm Conservation Area

(renamed from Grapevine Hill-Tuttle Swamp Conservation Area)

Grant Road
Newmarket, New Hampshire

Prepared For

Town of Newmarket
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NATURAL RESOURCE MANAGEMENT PLAN

PROPERTY DESCRIPTION

The Town of Newmarket, with assistance from a variety of funding partners, acquired and established the 160 acre Grapevine Hill-Tuttle Swamp Conservation Area in 2003. This conservation area (i.e. Newmarket Tax Map R-6, Lots 21, 21A, 21B, and 21-1) is located north of Grant Road and east of Doe Farm Road in Newmarket, New Hampshire. The Grapevine Hill-Tuttle Swamp Conservation Area contains a large field (25.6 acres) and approximately 102.6 acres of forest (upland and wetland). The soils in the uplands consist mainly of fine sandy loams and are well-suited for agricultural uses such as hay production. Approximately, 115.2 acres of the property is wetland and soils in these areas range from fine sandy loams to mucky peat (see attached “Soils Plan”).

The State of New Hampshire Land and Community Heritage Investment Program (LCHIP) Authority was granted a Deed Conveying Executory Interest and Public Access on the entire property in 2003. To maintain and enhance recreation opportunities on the property, a 2-acre lot for access and parking was established in the southeastern corner of the property. The remainder of the site is considered open space; a conservation easement held by the New Hampshire Fish and Game Department was established in this portion of the property.

The property is approximately 160 acres and includes a portion of the Tuttle Swamp wetland complex, the largest wetland system in Newmarket (see attached Site Locus). This large, diverse wetland system is a designated Prime Wetland and drains into the Lamprey River to the north and into the Piscassic River to the southeast. As a result, the property exists in the critical position between two major watersheds and serves to protect both downstream water resources. The property also exists within a large unfragmented block of land, adjacent to upland and wetland forest, as well as agricultural land. This block of land includes protected parcels to the north, east, and south (see attached “Site Overview” plan).

As a large, diverse, unfragmented block of land, the property and surrounding areas is considered a “Significant Wildlife Habitat”. The property supports rare turtle species (i.e., spotted turtle and Blanding’s turtle), as well as significant waterfowl habitat. The greater Tuttle Swamp ecosystem has also been known to support a winter deer yard. The wetlands on-site provide important functions such as flood control, sediment/toxicant retention, groundwater discharge and nutrient removal. In effect, the Tuttle Swamp complex helps to preserve water quality and quantity of downstream drinking water, as well as downstream aquatic habitats. As a result, the property has local and regional significance.

The purchase and establishment of the Grapevine Hill-Tuttle Swamp Conservation Area was the result of a cooperative effort including funding contributions, between the Town of Newmarket, LCHIP, NH Department of Environmental Services (DES), Lamprey River Advisory Committee (LRAC), and the Great Bay Resource Protection Partnership.

Historically, the hill portion of the Grapevine-Hill Tuttle Swamp Conservation Area was a farmstead. For at least the past 100 years, the southern portion of the property has been mowed and maintained as an active hay field (pers. comm., Eric Sawtelle). The property was last owned by Grant Road Realty Trust and was the site of a proposed subdivision. Previous to ownership by the Grant Road Realty Trust, the property was owned by Carlton Fisk. In recent history, the only building to be found on the property was a shed; this structure was located adjacent to Grant Road and was recently demolished by the Town of Newmarket. Throughout these ownership transfers, local residents have utilized the property for walking, snowmobiling, and hunting.

STEWARDSHIP GOALS

The management goals and general management objectives of the Grapevine Hill-Tuttle Swamp Conservation Area were established in the deeds pertaining to the properties (see Appendix I for the Conservation Easement Deed and Deed Conveying Executory Interest and Public Access). These diverse goals reflect the mission statements of the funding partners and cooperators, and reflect the intrinsic values of the Conservation Area. This management plan was prepared by NH Soil Consultants, Inc. (NHSC), at the request of the Town of Newmarket, to prioritize management objectives, identify property management needs, and provide a framework to accomplish the management objectives. The management goals of the property are summarized below (see Table 1).

Table 1. Management goals of the Grapevine Hill-Tuttle Swamp Conservation Area, as defined in property deeds.					
MANAGEMENT GOALS (as defined within conservation easement deeds)	FUNDING PARTNERS & COOPERATORS				
	LCHIP	GBRPP	Town Open Space Bond	DES	LRAC
Conserve open space	√		√		
Conserve views/visual aesthetics	√	√	√		
Maintain farmland/agriculture	√		√		
Conserve/manage wildlife species and habitat*	√	√	√		√
Maintain low-impact outdoor recreation opportunities	√	√	√		
Protect ground and surface water quality	√	√	√	√	√
Manage forest resources	√				
Provide educational opportunities	√	√	√		
Protect historical/cultural features		√			
Practice landscape management		√			
Maintain/enhance biodiversity of species & communities	√	√			

* This includes farmland/grassland habitat, waterfowl habitat, and rare species habitat.

Natural Resource Management Plan

MANAGEMENT OBJECTIVES

NHSC has considered all management goals and has identified the following five items as priority objectives that can be addressed with specific management prescriptions. These objectives are addressed specifically within the report section titled “Recommended Management Prescriptions”.

1. Manage and enhance existing wildlife species and wildlife habitats
2. Manage and enhance existing natural communities
3. Maintain the view provided by the existing field
4. Enhance low-impact outdoor recreation
5. Protect water quality and prime wetlands

ASSESSMENT METHODS

To prepare this plan, NHSC reviewed town documents pertaining to the property (see Appendix I). Additionally, NHSC held site walks and meetings with town staff, town volunteers, and project cooperators (e.g. NH Fish and Game Department, LCHIP, and The Nature Conservancy). To guide the development of management recommendations, NHSC conducted field evaluations on the property in February, March, May, and June of 2004. As part of these evaluations, habitat types were evaluated and mapped (see attached site plans). NHSC used existing data sources available through GRANIT (i.e., National Wetlands Inventory) and existing aerial photographs to determine large-scale habitat types present on the property. Random traverses were then conducted on the property to refine the habitat maps and further evaluate the cover types and communities found on the property. Additionally, the New Hampshire Natural Heritage Bureau was contacted to assess the presence of special concern species and exemplary communities on and near the site (see Appendix II; NH Fish & Game Dept. Nongame Program information is included in the Heritage database).

During July 2002, on behalf of the previous landowner, NHSC delineated the boundaries of wetlands on the property, in accordance with the 1987 Army Corps of Engineers Wetlands Delineation Manual. These wetland lines were added to the plans to enhance the accuracy of mapped wetland boundaries. National Wetlands Inventory data were utilized to determine the location of large wetland complexes and streams on nearby properties. This was done to facilitate an understanding of the landscape context of the property. The location of prime wetlands on and near the property was based on a digitized data layer provided by the town Planning Department.

During site assessments, all observed wildlife species were noted. These data, in addition to observations provided by qualified biologists, were used to develop habitat management recommendations for the property. During June 2004, a “Biothon” (i.e. an inventory of wildlife, plant, and insect species) was conducted on the site. Information from this event is provided in Appendix III. It is anticipated that further investigations will lead to observations

of additional species on the property; however, evaluations conducted during field work for this management plan provide a solid framework for evaluating habitat management needs.

EXISTING CONDITIONS AND NATURAL FEATURES

In total, the site encompasses approximately 160 acres, based on a property boundary survey conducted by Doucet Survey (see enclosed survey plan prepared by Doucet Survey and dated 9/9/04). The ownership of one lot (Tax Map R-6, Lot 21A) is being reviewed and it is anticipated that the Town of Newmarket will acquire the deed to this property. This property was sold to the Town of Newmarket, but was never properly transferred from a previous landowner. A survey of this property will be recorded after the correct ownership has been resolved.

The property contains a diverse mix of upland (approximately 48.7 acres) and wetland (approximately 115.2 acres) cover types (see attached “Cover Type Plan”). The southwestern portion of the property is a mowed field while the western and northeastern portion of the property contains a large wetland complex. This complex includes a town-designated Prime Wetland, perennial stream, emergent/scrub-shrub wetland, and forested wetland. Patches of upland forest are present along the western edge and southeastern edge of the property.

Field:

The large field located in the southern portion of the property is approximately 25.6 acres and is an important feature of the property. This area provides high visual aesthetics and significant wildlife habitat. A variety of wildlife species utilize the field for feeding and cover. For instance, red-tailed hawks (*Buteo jamaicensis*) hunt over the field for prey such as small mammals. White-tailed deer (*Odocoileus virginianus*) feed on tender grass and forbs within the field and their tracks were observed frequently on existing trails. The bobolink (*Dolichonyx oryzivorus*), a declining grassland bird, also uses this field for nesting. During early and late spring, the males of this species can be observed singing and conducting elaborate courtship displays. Importantly, a large portion of the field contains fine sandy loam soils (see attached “Soils Plan”), and dry portions of the field provide potential turtle nesting habitat. This is significant because four turtle species, including spotted turtles and Blanding’s turtles, are known to occur within the large emergent and scrub-shrub complex located within the northern portion of the property.

Wetland:

The property contains a portion of the town-designated Prime Wetland identified as “NW-01” on the plan titled “Prime Wetlands”, prepared by the Strafford Regional Planning Commission. Based on the reference plan, this wetland system is the largest Prime Wetland within the Town of Newmarket. On the property, the wetland contains a diversity of wetland cover types including marsh (29.6 acres), scrub-shrub swamp (interspersed in the marsh section), forested swamp (roughly 80.5 acres including non-prime wetland), a small pond (2.3 acres), and two perennial streams. The westerly stream drains northeast. Outside of the prime wetland boundary, the wetland transitions into a scrub-shrub drainage (1.23 acres) and

contains pockets of seasonally saturated emergent cover (1.6 acres, see attached “Wetland Classification Plan”).

The prime wetland provides an incredible number of wetland functions/values. Due to dense vegetation, very poorly drained soils, and large size, the Prime Wetland provides significant floodflow alteration, sediment/toxicant retention, and nutrient removal. Based on the presence of two perennial streams, the wetland also likely provides groundwater discharge and/or recharge. Due to high production and diversity, the wetland contributes significant production export to surrounding communities and downstream areas.

The system also provides significant wildlife habitat due to a diversity of cover types and adjacency to other undeveloped land (see attached “Site Overview” plan). On-site, the wetland contains a large emergent marsh and scrub-shrub swamp complex, as well as a pond. This complex also contains one large upland island in the northern portion of the property. Additionally, the larger complex contains dead forested swamp on the northeastern edge of the property. Of high significance, the interspersed open water, stream channels, swamp, and marsh provides high quality waterfowl habitat.

The complex supports relatively large breeding populations of wood duck (*Aix sponsa*), mallard (*Anas platyrhynchos*), American black duck (*Anas rubripes*) and Canada geese (*Branta canadensis*). The wetlands contain an abundant source of invertebrates and plant material that serve as waterfowl food sources. Scrub-shrub cover within the central portion of the complex provides valuable retreat and escape cover for wood ducks. Cavity trees within the nearby dead forested swamp provide potential nesting locations for wood duck, as well for a variety of other wildlife species. The edges of the complex on-site contain a border of grasses and shrubs; these areas provide suitable nesting locations for species such as black duck, mallard, and Canada goose. Large tussock sedge hummocks within the marsh section of the prime wetland provide nesting areas to Canada goose, as well as other species.

In addition to waterfowl habitat, the wetland complex supports a diversity of songbirds, wading birds, amphibians, reptiles, and mammals. Beaver have had a large influence on the wetland complex through damming. Damming has increased the amount of impounded water, enhanced marsh habitat, and lead to the formation of dead forested swamps. Beaver activity also maintains valuable channels within the wetland. The beaver channels are utilized by waterfowl and turtles as travel lanes for dispersal within on-site wetlands. Due to the presence of permanent marsh/scrub-shrub habitat and interspersed cover types, the Tuttle Swamp complex supports a diversity of reptile species including northern water snake (*Nerodia sipedon*), snapping turtle (*Chelydra serpentina*), painted turtle (*Chrysemys picta*), wood turtle (*Glyptemys insculpta*), spotted turtle (*Clemmys guttata*), and Blanding’s turtle (*Emydoidea blandingii*; see further discussion below). Marsh, scrub-shrub and ponded portions of the wetland provide habitat to great-blue heron (*Ardea herodias*), as well as green heron (*Butorides virescens*). The wetland also has the potential to support rare marsh birds such as Virginia rail (*Rallus limicola*).

Local residents have used the wetland for bird watching, hunting, and other types of recreation; as a result, the system provides valuable recreational opportunities. Wetlands on the property have been used as a site for scientific research (see below) and provide educational/scientific value. Exemplary natural communities have been documented within the complex (off property boundaries) and rare turtle species have been observed in the prime wetland portion located on the property. As a large, high value wetland complex that contains documented locations of rare species, this system also provides uniqueness/heritage value. In total, the Prime Wetland provides an incredible number of wetland functions and is an invaluable resource to the Town of Newmarket, as well as the larger watershed.

Field/Prime Wetland Edge:

The forest-shrub ecotone on the property is providing a valuable buffer to the Prime Wetland and additional wildlife habitat. This border of vegetation is very effective in absorbing nutrients and limiting foot traffic into the edge of the wetland. Further, certain wildlife species on the property select the forest-field edge and other shrub areas for nesting, cover, and feeding. For instance, woodcock (*Scolopax minor*) use the edges of dense brushy wetlands for diurnal cover and feeding habitat. Dense alder thickets in fertile, moist soils provide valuable foraging areas for woodcock. Males of this species also perform their courtship displays on the edges of fields, near suitable cover. Woodcock also use mid-to-late successional forests later in the season¹. Species such as yellow warbler (*Dendroica petechia*) and alder flycatcher (*Empidonax alnorum*) prefer to nest in shrub thickets along wetlands and watercourses.

Special Concern Species/Exemplary Communities:

Two Special Concern turtle species, the spotted turtle and Blanding's turtle, have been documented and studied on the property (see Appendix II for documentation). During the summer and fall of 2000 and 2001, five Blanding's turtles were tracked by the University of New Hampshire within the Tuttle Swamp wetland complex. The data from this study revealed that the core habitat of certain Blanding's turtles occurs within the Prime Wetland and that these turtles use multiple habitat types found throughout the prime wetland (see enclosed map titled "Figure 4" in Appendix II). As a result, the property and surrounding habitat provides important habitat to a documented population of Blanding's turtles. At least three spotted turtles have also been observed within the Prime Wetland, although this species was not radio-tracked during the Blanding's study.

Off-site, to the north, the Prime Wetland contains climbing hempweed (*Mikania scandens*), a State Threatened plant species. Additionally, the prime wetland contains the only known record of fen ant (*Lasius minutis*) in New Hampshire. Off-site, the Prime Wetland contains an exemplary wetland community known as a Southern New England Acidic Seepage Swamp (see Appendix II).

¹ Keppie and Whiting 1994 In Degraaf, R.M. and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, New Hampshire. 482 pp.

Soils:

There are no fragile or highly erodible soils on the property. Current uses of the property are appropriate to the soils and there are no erosion problems at this time. When considering future activities, consideration should be given to suitability of the soil for the proposed activity.

Forest Resources:

The property contains five forest cover types including White Pine-Mixed Hardwoods, Scotch Pine-Red Pine Plantation, Mixed Forest, Red Maple Swamp, and Red Maple/White Pine Swamp (see attached "Cover Type Plan"). Three of these are upland cover types and the later two are forested wetland cover types.

White Pine-Mixed Hardwoods (15.6 acres)

The White Pine-Mixed Hardwoods cover type occurs in three patches located in the western portion of the property. One of these areas is a small island located in the middle of a wetland area, in the southwesterly extent of Lot 21. The other two areas are located to the north and west of the Prime Wetland "arm" in the westerly section of the property. The site also contains an island dominated by white pine. This island totals approximately 2.5 acres in size and is located in the northeastern corner of the property, within the prime wetland. All four of these areas are isolated by wetlands on the site.

These areas contain a well-developed canopy dominated by: mature white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), red oak (*Quercus rubra*), white oak (*Quercus alba*), red maple (*Acer rubrum*), and white birch (*Betula papyrifera*). Trees within this area range in size and the largest trees measure approximately 19 inches in diameter at breast height (d.b.h.). Timber value of these trees is moderate to low and some gypsy moth damage was observed in this cover type.

Scotch Pine-Red Pine Plantation (1.6 acres)

An abandoned Scotch Pine-Red Pine plantation occurs within the southerly edge of the property, near Grant Road. This cover type measures approximately 1.6 acres and was probably originally planted as a Christmas tree farm. Currently, this cover type is comprised mainly of six to eight inch diameter scotch pine (*Pinus sylvestris*) and red pine (*Pinus resinosa*). Due to high canopy closure, this area has a poorly developed understory.

Mixed Forest (4.9 acres)

The Scotch Pine-Red Pine Plantation is bordered by a small patch of mixed forest that is approximately 4.9 acres in size. This cover type contains a mixture of tree species and is a transitional community type between the pine plantation and adjacent Red Maple/White Pine Swamp. Tree species present include black cherry (*Prunus serotina*), American elm (*Ulmus americana*), red maple, sugar maple (*Acer saccharum*), shagbark hickory (*Carya ovata*), and red cedar (*Juniperus virginiana*). This area has been altered by previous use of the property and does not exhibit any clear dominant tree species or age classes.

Red Maple-White Pine Swamp/Red Maple Swamp (80.5 acres)

The majority of the forested cover on the property is comprised of two similar cover types; both of these cover types are classified as wetland habitat. Of these, Red Maple-White Pine Swamp totals approximately 35.8 acres and occurs in the central and eastern portions of the property, adjacent to the large field. This wetland is seasonally saturated and is dominated by moderate-sized red maple and white pine. White pine trees within this area measure upwards of 20 inches in diameter. Other tree species found in this area include white oak, black oak (*Quercus velutina*), red oak, eastern hemlock, black cherry, and bigtooth aspen (*Populus grandidentata*). This cover type contains two inclusions of white pine and eastern hemlock cover. The white pine trees in these inclusions are large and some trees measure over 29 inches in diameter.

This cover type contains an understory of saplings comprised mainly of American elm, musclewood (*Carpinus caroliniana*), American beech (*Fagus grandifolia*) and eastern hemlock. The shrub layer is relatively dense and includes shrubs such as highbush blueberry (*Vaccinium corymbosum*), winterberry holly (*Ilex verticillata*), hawthorn (*Crategeaus* spp.), white pine, and green brier (*Smilax* spp.). The herbaceous layer contains a dense layer of ferns dominated by cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*), royal fern (*Osmunda regalis*) and princess pine (*Lycopodium obscurum*). A variety of other herbaceous plants are also present (see Appendix II for the 2004 “Biothon” list).

The Red Maple-White Pine cover type shows signs of past cutting and prior to that was likely used as pasture, based on the presence of barbed wire. The Red Maple-White Pine Swamp transitions into Red Maple Swamp in the easterly portion of the property, where the wetland complex contains very poorly drained soils. This cover type boundary corresponds roughly to the boundary of the on-site Prime Wetland. Within the Prime Wetland, red maple becomes the dominant tree.

The wetland complex in the Red Maple Swamp cover type supports a higher density of wetland shrubs such as speckled alder (*Alnus incana* ssp. *rugosa*) and maleberry (*Lyonia ligustrina*). The wetland also contains pockets of persistent standing water that support a diversity of sedge species (*Carex* spp.). This wetland area is approximately 44.7 acres and contains sphagnum hummocks that create a unique microhabitat on the property. This area contains at least one vernal pool and supports wood frogs (*Rana sylvatica*) and well as four-toed salamanders (*Hemidactylium scutatum*; see attached Photo Log).

STEWARDSHIP AND MONITORING

The town (i.e. Conservation Commission) is responsible for coordinating the land stewardship and monitoring of this conservation area, although a number of volunteers and town representatives may be involved. As a result, NHSC recommends that the town establish a stewardship and monitoring committee directed by the Conservation Commission to oversee all volunteers and contractors associated with work on the property. This group would help coordinate the diverse tasks associated with management implementation and monitoring.

This group should consist of one member from all relevant town boards including the Newmarket Conservation Commission, Newmarket Open Space Commission, and Public Works Department. This group could coordinate regular stewardship activities such as trail maintenance and annual clean-ups, as well as management tasks such as invasive species management that may occur at irregular intervals. To facilitate stewardship and monitoring, NHSC recommends that the town designate one key contact person who will communicate with Fish and Game and LCHIP.

As described in the LCHIP Deed Conveying Executory Interest and Public Access, the Town of Newmarket is required to prepare and submit an annual monitoring report to LCHIP. This report will include a description of the status of the property as well as all management activities. At a minimum, the report will include:

1. a description of the results of an annual boundary inspection
2. a description of any significant changes to the property (natural disturbances or abutter encroachment)
3. a description of management concerns
4. a description of management activities implemented in the previous year
5. photographs of the property

The Fish and Game Department or its agents will contact the town annually to set up a conservation easement monitoring visit. Fish and Game is also available to provide technical assistance regarding land stewardship on the property as it relates to wildlife habitat.

RECOMMENDED MANAGEMENT PRESCRIPTIONS

Recreation:

One of the main goals of the Town and funding partners is to maintain low-impact outdoor education opportunities. Currently, the property is used for hunting, snowmobiling, hiking, and bird watching. Permitted activities are described in the deeds held by the NH Fish and Game Department and LCHIP. Any activities not clearly permitted in these deeds or described in this management plan may need to be reviewed by the NH Fish and Game Department and LCHIP. Wheeled vehicles are permitted for management purposes only and bicycles are not allowed. Traditionally, a local farmer has accessed the site from Grant Road via an unimproved farm road. A new parking lot and public access will be built off of Grant Road, in Lot 21-1 (a 2-acre parcel not covered by the Fish and Game easement) at the base of the hill.

A parking area was not established off of the existing dirt road due to the presence of a curve in the road and limited sight distance. The sight distance from the existing entry was determined to be unsafe, and a parking lot in this location was not considered to be a viable option by the Town of Newmarket Public Works Department. As a result, a gate will be installed by the Town of Newmarket Public Works at the entrance of the farm road to prevent parking at the top of the hill. The deed restrictions for the two-acre parcel dictate that the parking lot be sized for no more than 12 cars and be constructed of a permeable surface.

Temporary portable sanitary facilities may also be placed in the two-acre parcel, if deemed desirable. The exact size of the parking lot will be determined by the Town of Newmarket Public Works Department and reviewed by NHSC as necessary.

This parking configuration will require one wetland crossing as part of trail design. A bridge is proposed over a stream in the easterly edge of the two-acre parcel for foot traffic. A bridge crossing is recommended in this section to maintain current hydrology of the stream and minimize impact to the stream bed. This bridge will not be used for snowmobile or other vehicle use. Off-road vehicles are prohibited on the property. Before any bridge work begins, the Town should secure all necessary local, state, and federal permits. Currently, the proposed project as shown on the attached plans requires a permit from the Wetlands Bureau and qualifies for a Notification of Trail Development application. NHSC submitted a notification application request to the Wetlands Bureau in June 2004 and this request was approved in July of 2004. As stipulated within the Trail Notification and easement, all trail work should be done in accordance with practices outlined in the Trails Bureau manual titled, "Best Management Practices for Erosion Control During Trail Maintenance and Construction" (see Appendix IV).

There is a traditional snowmobile trail corridor that bisects the property (see maps). However, there is no parking access for snowmobiles on this property. According to Jason Brindamour, President of the "Sno-rollers" snowmobile club, this trail is considered a through trail and is part of what is known as the Tuttle Swamp Trail. Currently, parking for snowmobile users is available at the Lamprey River Boat Launch. As a result, there is no need for snowmobile parking on the Grapevine Hill-Tuttle Swamp Conservation Area. The Sno-rollers have historically received verbal permission from landowners to maintain the Tuttle Swamp Trail. Further, according to Mr. Brindamour, this main trail is covered by the state insurance policy. As a result, there appears to be no conflict with the town allowing snowmobile access on the main trail. However, because the snowmobile corridor overlaps private land, the town should consider contacting the sno-rollers on an annual basis, to ensure that permission has been granted to access these private lands. If access is not granted by abutting landowners or any conflicts arise with current uses of the property, the town may wish to discontinue the snowmobile corridor on the property. However, at the current time, the trail does not conflict with proposed uses or resource management on the property.

To enhance recreation and protect on-site resources, NHSC recommends the establishment of a loop trail (for pedestrian traffic only) design as shown on the attached site plans (see "Trail and Habitat Management Plan"). The proposed trail takes advantage of existing trails and was specifically sited out of wetlands and other sensitive areas, where possible. This trail is proposed on the edge of the field, rather than through the center of it, to minimize disturbance to grassland nesting birds and other wildlife in the field. A loop trail is suggested because it provides for a longer, more interesting hike, as compared to a linear trail system. NHSC also recommends that the town establish one spur from the northern edge of the trail loop; this spur would take advantage of an existing trail and lead to the edge of the pond located within the on-site prime wetland. The apex of the proposed spur is an excellent location for a wildlife viewing blind, as permitted in the conservation easement. A viewing blind in this

location could be used to provide wildlife viewing opportunities and minimize potential disturbance to wildlife such as waterfowl, which are seen commonly in the pond.

Based on current site conditions, NHSC recommends that the trail be established with regular mowing of the path. The majority of the trail is located in existing field and does not require tree removal or other significant site alteration. This trail should be marked with small signs to assist trail users and the maintenance crew. The town could also incorporate educational signs into the trail markers, to enhance education of trail users. However, the signs/markers should be installed on the edges of the trail, in locations that do not interfere with regular maintenance of the trail and field.

Table 2. List of activities and their status (allowed versus not allowed).

<u>Activity</u>	<u>Allowed</u>	<u>Not Allowed</u>	<u>Condition of Use</u>
Sledding	X		
Picnicing	X		
Hunting	X		
Fishing	X		
Wildlife viewing	X		
Pets (under control)	X		
Camping		X	
Overnight use		X	
Nighttime use		X	Except for hunting purposes, as allowed by law
Swimming		X	
All-terrain vehicles		X	
Snowmobiles	X		Allowed only in the designated corridor.
Bicycles		X	
Wheeled vehicles	X		Allowed for management purposes only.

The town will want to evaluate public uses each year during the annual monitoring to ensure that the uses continue to be consistent with the provisions of the Fish and Game easement and LCHIP deed.

Field Maintenance (Management Area A):

To maintain the existing habitat conditions, the upland portions of the field should be mowed on an annual basis. The field could be mowed every two to three years, although this practice might allow woody vegetation to colonize the field, and this is not desired, except in certain locations (see “Prime Wetland Buffer Enhancement” section). Although mowing is an important management tool, bobolinks nest on the ground and are sensitive to mowing during their nesting period. Mowing equipment can kill chicks and mowing early in the season can reduce important cover for nestlings. If financially feasible, NHSC recommends that mowing be conducted once a year after August 1st. This will allow the majority of bobolink chicks

(and other grassland birds) to successfully fledge. After mowing, the hay should be removed from the field in some years to prevent thatch build up. Bobolinks prefer to nest in fields that lack a dense thatch layer². If the town opts to remove hay on a regular basis, the field will need to be fertilized to maintain soil productivity as required in the easement. Before any fertilizers are applied, a Nutrient Management Plan should be developed with the assistance of UNH Cooperative Extension.

Unfortunately, late mowing can reduce hay quality and profit associated with haying. As a result, it may be difficult to find a farmer that will mow the field for free, given the reduced overall yield (due to one rather than two haying events) and reduced hay quality. As an alternative, the Town might consider paying for yearly mowing or limiting early mowing to a portion of the field. The town can also apply for a Small Habitats Grant from the NH Fish and Game Department, to offset the costs of mowing. Currently, the department offers up to \$2000.00 per year to successful applicants (not to exceed \$6000.00 over a ten year period). Other programs such as the Wildlife Habitat Incentives Program (WHIP) are available through the Natural Resource Conservation Service.

Prime Wetland Buffer Enhancement and Scrub-Shrub Habitat Management (Management Area B):

Currently, the property contains borders of wet shrub thickets within the southeastern and central portions of the property. Due to vegetation management by a previous owner, the forest-field ecotone can be described as a “hard edge”. To improve the buffering capacity of this vegetation and habitat value of this area, the edge should be allowed to grow into a “soft edge”. Soft edges are those field borders that have a mix of vegetation heights and variable width. As recommended by the NH Fish and Game Department during a site walk (pers. comm., 2/24/04), a soft edge could be created by mowing/cutting select areas (see attached “Trail and Habitat Management Plan”) on a three to five year cycle to increase the diversity in vegetative stages.

To maintain this buffer and habitat area in a dense condition, the town will need to cut portions of the buffer on a regular basis, starting in 2007. As shrubs such as speckled alder age, they grow and reach a size at which they are no longer favorable as diurnal woodcock cover. NHSC recommends cutting the buffer (roughly 100 feet wide) in 70-foot wide strips perpendicular to the wetland edge, on a three to five year rotation schedule³. In other words, a 70-foot strip of vegetation will be cut approximately every four years. In year 1 (i.e. 2007) the first strip will be cut; the second strip will then be cut in Year 2010 to 2012. New Hampshire Fish and Game Department is available to provide input regarding the exact year,

² Jones, A.L. and P.D. Vickery. No publication date. Conserving grassland birds: Managing agricultural lands including hayfields, crop fields, and pastures for grassland birds. Department of the Interior, U.S. Fish & Wildlife Service. 17 pp.

³ Sepik, G.F., R.B. Owen, Jr., and M.W. Coulter. July 1981. A Landowner’s Guide to Woodcock Management in the Northeast. Life Sciences and Agricultural Experiment Station, University of Maine at Orono, Miscellaneous Report 253. Moosehorn National Wildlife Refuge, U.S. Fish and Wildlife Service.

based on the relative rate of shrub growth. This management regime will provide a diversity of growth stages suitable for woodcock and songbird species such as common yellowthroat.

To ensure that management is conducted, the approved Trail and Habitat Management Plan should be provided to Public Works (or other relevant department) and a Maintenance Manager should be designated to oversee mowing, vegetation clearing, and trail maintenance. This person should be well versed in current NH Wetlands Bureau policies; relevant information can be obtained from the Bureau's website (<http://www.des.state.nh.us/wetlands/>). Further, all management activities should be conducted according to practices outlined in the manual titled, "Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire"⁴. The Maintenance Manager and/or designated town contact person should review the management of the prime wetland buffer enhancement with the NH Fish & Game Department on a yearly basis, before any work is conducted.

If heavy equipment is used for vegetation clearing, buffer maintenance should not be conducted in wetlands during wet periods when rutting is most likely to occur. If vegetation is piled, all piles should be placed in areas outside of NHDES Wetlands Bureau jurisdiction. On the property, jurisdictional areas include those areas shown as wetland and any perennial stream banks (see "Trail and Habitat Management Plan").

The Buffer Enhancement Areas also fall within the Town setback to Prime Wetlands (see 5.03, Wetland Protection Overlay District). Currently, town regulations allow for vegetation clearing that is considered agriculturally or forestry based, if these activities are carried out in accordance with current Best Management Practices (see Appendix IV).

Old Field Habitat (Management Area C):

Management Area C is located on the northeasterly edge of the on-site hay field. A prominent stone wall and tree line dominated by juniper trees marks the southwesterly edge of this management area. This area has high value as early successional habitat due to the interspersion of grasses, shrub clumps, and juniper trees. During site assessments, NHSC observed a ruffed grouse (*Bonasa umbellus*) nest and brood in a clump of dense juniper cover on the edge of the old field, near the pond edge. This cover type provides valuable ruffed grouse nesting habitat as grouse often nest on the edge of a clearing, near water⁵. If managed properly, this area will continue to provide valuable nesting areas to species species such as ruffed grouse and feeding areas to species such as eastern cottontail (*Sylvilagus floridanus*). However, if no management occurs here, the old field habitat will mature into forested cover that does not provide the same types of food and cover.

To maintain this cover type, NHSC recommends that the town cut the shrub vegetation in this management unit on a three-year cycle. Under this scenario, cutting would occur within a

⁴ Cullen, J.B. Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire. Department of Resources and Economic Development, Concord, New Hampshire.

⁵ Storm and Scott 1989 *In* Degraaf, R.M. and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, New Hampshire. 482 pp.

third of the rotation cut area in Year 1, followed by the middle third portion in Year 2, ending with the last remaining area in Year 3. This would be a repeating cycle with cutting occurring in a portion of the rotation cut every year. Conducting a regular cycle will help the town maintenance crew schedule and plan work. However, none of the junipers on the edges of this old field should be cut. These trees provide valuable winter cover to resident birds, increase the vertical stratification of vegetation within the management area, and add to the visual aesthetics of the tree line.

Similar to other management areas, the Trail and Habitat Management Plan should be provided to Public Works (or other relevant department) and a Maintenance Manager should be designated to coordinate vegetation clearing. Further, all management activities should be conducted according to practices outlined in the manual titled, “Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire”. NH Fish & Game Department is available to confer with the Maintenance Manager and/or designated town contact person to review the management of the old field with the each year.

Viewshed Maintenance (Management Area D):

The large field on the property provides an important viewshed to local residents. The fields provide an important vista that enhances the visual aesthetics of the road. To maintain this value, the town should conduct field maintenance as discussed above and clear select vegetation along the road. Clearing a portion of the underbrush adjacent to Grant Road will maintain the view to the field (see the “Trail and Habitat Management Plan” for proposed cutting area). Brush that is approximately three feet or taller (excluding existing trees) can be cut or trimmed with a hand saw on an annual basis. Cutting should be conducted in a manner to maintain a line of sight through the road edge to the field.

Forest Management:

The conservation easement deed held by the NH Fish and Game Department stipulates that trees and other vegetation may only be cut or removed for the purpose of permitted wildlife habitat management, forestry, limited non-commercial outdoor recreation management, boundary maintenance, or for public safety. Due to site constraints and proximity to prime wetlands, no forestry operations, other than what is described above, is recommended at this time.

The property contains areas of low to moderate timber value. The White Pine-Mixed Hardwoods cover type is located in the northwestern corner of the property. Although some low to moderate-value timber is present in this cover type, the area is relatively inaccessible to machinery. A stream and associated prime wetland bisect the property east of this cover type. In addition, the area is providing a valuable upland buffer to Town-designated Prime Wetland. As a result, no management activities are warranted or recommended in this area.

The highest value timber, based on size, is located in the white pine inclusions located within the Red Maple White Pine Swamp. White pine trees within this area are large and measure greater than 29 inches in d.b.h. in some instances. However, due to the direct adjacency of prime wetlands and desire to minimize disturbance to sensitive communities, NHSC does not

recommend timber harvesting in this area. These areas provide valuable winter cover to resident wildlife and help to protect water quality of the prime wetlands by stabilizing soils in the vicinity of the Prime Wetland boundary.

Invasive Species:

The property supports a diversity of plants, including some referred to as invasive species. Invasive plants are non-native plants that are aggressive colonizers. Invasive species are problematic because they have the potential to outcompete native plants and create monocultures. Although invasive shrubs may be utilized by wildlife, many of these plants have lower quality fruits (due to reduced fat content) as compared to native shrub species. In addition, some birds experience higher levels of predation in non-native shrubs (e.g. common buckthorn) as compared to non-invasive species such as hawthorn⁶. As a result, it is highly recommended to prevent the establishment and proliferation of invasive plant species on properties managed for wildlife.

Currently, invasive plants are only located in scattered, small patches of the Grapevine-Tuttle Swamp Conservation Area. As a result, there is a good opportunity to control the invasive species before they spread further. For instance, purple loosestrife (*Lythrum salicaria*) occurs in low abundance within the prime wetland complex. Also, shrubs such as European barberry (*Berberis vulgaris*) and glossy buckthorn (*Rhamnus frangula*) are growing on top of the hill, within the field area adjacent to Grant Road, and on the edge of the woods, within the tree line. Because these plants are found in isolated patches, rather than large areas of the property, NHSC recommends active invasive species management to prevent the spread of invasive species on the property. Although such management will not completely eradicate all invasive species on the site, this work will help to maintain high plant diversity on the property and help to prevent the further spread of invasive species.

Based on current site conditions, NHSC recommends the use of both mechanical control and chemical control of invasive species. Select shrubs on the hill can be killed with the careful use of herbicides (i.e. chemical control). Specifically, the target species should be cut and the stumps should be treated with glyphosate (a.k.a. Round Up). Herbicide application is generally the most effective method of invasive species control, although care needs to be taken to ensure that pesticide is applied only to target species. Herbicides should not be applied near wetlands, where there is an opportunity for herbicides to runoff into sensitive areas.

In New Hampshire, a person applying regulated herbicides and pesticides should possess a pesticide applicators license. Additionally, all farmers and foresters who use pesticides on a crop for resale must have a general or restricted use license. Further, all applicators that apply pesticides as part of their job on land owned by others must have a commercial license. Even if none of the above scenarios apply, the Town of Newmarket should consider hiring or engaging a person that has successfully completed the New Hampshire Pesticide Applicator Training Program (PAT). The town should contact Rachel Maccini, Pesticide Education

⁶ see Review in: Covell, D. Winter 2002. "Wildlife and Invasive Plants" *In* Habitats. Vol. XVIII, no. 1. University of New Hampshire Cooperative Extension.

Coordinator (603-629-9494, ext. 130) or local county agricultural educator for more information on the PAT program.

In all cases, the chosen herbicide applicator should follow all safety precautions. At a minimum, the applicator/s should read all directions carefully and wear proper safety equipment including safety glasses, appropriate mask, long sleeve shirt, boots, chaps, and pesticide gloves. It is also recommended that the applicator carry eye wash and a first aid kit. The applicator should also be familiar with the target plants or obtain assistance from a person familiar with plant identification. It may be useful for a town representative and person knowledgeable in plant identification to flag the target plants in advance of herbicide application.

Purple loosestrife was observed within the prime wetlands and should be hand-pulled in the spring before flowering (see Appendix IV; “Element Stewardship Abstract for *Lythrum salicaria*”). This species is very prolific and all parts of the plant, including the fine roots, need to be completely removed to prevent re-growth. All plants should be collected in garbage bags and either incinerated or placed into a waste receptacle. To ensure long-term invasive species management on the property, it may be useful to coordinate a small volunteer “invasive species watch group”, to monitor invasive species on the property and to organize purple loosestrife removal.

Landscape Open Space Management:

In the future, the town may wish to manage the Grapevine-Tuttle Swamp Conservation Area in combination with other publicly owned land. The property is bordered by other land owned by the Town of Newmarket, as well as land owned by a GBRPP partner (see attached “Site Overview” plan). This landscape context provides an opportunity to cooperatively manage one of the largest open space blocks within the town. In particular, it would be helpful to generate existing conditions information and management recommendations for all adjacent Town of Newmarket land, especially for properties with overlapping trails and recreation uses.

Education Opportunities/Future Studies:

This management plan provides baseline information to conduct short-term and long-term management activities on the property. However, it should be noted that further studies could be conducted to complement the information provided within this report and enhance future management of resources on the property. Below is a list of potential future studies that would enhance knowledge of the property.

1. Survey for climbing hempweed (*Mikania scandens*)

Climbing hempweed is a State Threatened plant species known to occur on an adjacent property. The town may wish to conduct a detailed investigation for this species within marsh portions of the conservation area to better understand the distribution of this threatened species within the Tuttle Swamp complex.

2. Survey for turtle nests

The town may wish to have a qualified professional survey the field for nesting turtles during May, June, and July, if early mowing is deemed necessary. Haying equipment has the potential to crush turtle nests and affect the survival of hatchling turtles. As a result, it would be helpful to know if the field is used commonly by the turtles on the property. The field provides potential nesting habitat to all of the turtle species known to occur on the site and most nesting occurs in May, June, and early July. This information is less critical to management if late haying is pursued as suggested above under “Field Maintenance”.

3. Fish community assessment

The property is known to support a variety of fish species. NHSC observed minnows in the prime wetland during site assessments and other biologists have documented fish on the site. However, formal seine or electrofishing surveys should be conducted if the town is interested in determining the full complement of fish species that utilize the property.

4. Marsh bird assessment

The Tuttle Swamp wetland complex contains habitat suitable for a variety of marsh birds. The town may wish to consider conducting a broadcast call survey for uncommon marsh birds such as American bittern and Virginia rail (*Rallus limicola*). NHSC has observed American bittern in an adjacent wetland complex and it is possible that other rare marsh birds are utilizing the on-site marsh/scrub-shrub complex.

5. Water Quality/Wetland Plant Monitoring

The town may wish to consider conducting long-term water quality monitoring within prime wetlands located on the property. The conservation area is located near a town landfill, and is downstream of light residential development. As a result, it would be helpful to obtain more information on long-term water quality of wetlands on the site and within adjacent wetlands. The town could coordinate volunteer water quality monitoring or engage a local school, if funds are available for training and equipment.

6. Educational Programs

The property is an invaluable educational resource. The town could solicit volunteer professionals and teachers to develop and coordinate educational walks on the property. For instance, the property would be an excellent site for programs on wildlife habitat, wetland functions, vernal pool ecology, and plant identification.

7. Nest Boxes

The wetland can be enhanced for nesting wood ducks and osprey by installing nest boxes and an osprey platform. The Boy Scout troop in Newmarket has for many years volunteered to check and clean-out wood duck boxes throughout Newmarket. This provides an excellent opportunity to combine their volunteer efforts with management goals on this property. Public Service of New Hampshire (PSNH) has joined with NH Fish and Game at other sites to install an osprey-nesting platform.

RECOMMENDED MANAGEMENT SCHEDULE

Before any management implementation takes place, the town will need to obtain formal approval of all management activities outlined in this management plan from the easement holders (NH Fish & Game Department and LCHIP). Below is a list of major items that should be implemented after approval is granted (see Table 3 for a complete list).

1. The town should permanently mark property boundaries as soon as possible. Currently, boundaries are well marked with flagging established by Doucet Survey, Inc. However, over time, this flagging will degrade. As a result, the town should have the boundaries marked with permanent blazing to help avoid potential boundary disputes and associated re-surveying costs. Additional information on marking is provided in an attached fact sheet (see Appendix IV, "Woodlot Boundary Line Marking").
2. The town should establish a sub-committee responsible for the stewardship and monitoring of the property. This sub-committee could coordinate contractors and monitoring activities and work with easement holding organizations.
3. The town should acquire a contractor for the proposed bridge/trail crossing and determine bridge installation costs. A revised Trail Notification should be submitted immediately if any changes in the initial bridge design are required.
4. The town should consider temporarily marking the trail location in October 2004. After the exact location of the trail is determined in the field, the trail should be permanently marked with staked trail signs and mowed.
5. After trails are marked with signs, the trails should be mowed at least three times a year (more often as necessary).
6. The town should conduct a strip cut in Management Area B during the winter of 2007, when wetland soils are frozen. Before any work begins, the town should conduct a site walk with the NH Fish and Game Department to review details of this management practice.
7. The town should cut shrubs within one-third of Management Area C, starting in 2005.
8. The town should have a qualified professional review and update this management plan at least once every ten years, to re-examine management prescriptions for the property.

Table 3. Recommended schedule of management activities for the next 10 years (2004-2014).

<u>Management Action</u>	<u>Time Line</u>	<u>Comments</u>
Blaze the property boundaries	2004	See Appendix IV
Establish a prime town contact person	2004	This should be done immediately.
Establish the Stewardship Subcommittee	2004	
Acquire a contractor to install the trail bridge	Fall 2004	The contractor should review the trail notification.
Amend the trail notification if necessary	Fall 2004	This should be completed before work begins.
Install the trail bridge	Fall/winter 2004	Review the trail notification application first.
Finalize the kiosk and parking lot design	Fall 2004	These items should be reviewed by Public Works.
Mark the trail location	Fall 2004	Mark with stakes and signs.
Develop/acquire trail signs	Fall/winter 2004	
Mow the trails	3 times annually	This task should be done more often if necessary.
Mow the field (Management Area A)	Annually	Mow after August 1st each year.
Begin vegetation clearing in Management Area B	2007, 2011	Contact Fish and Game in advance for a site visit.
Prepare a Nutrient Management Plan if necessary	N/A	Do this in advance of fertilizer use or if removing hay crops
Conduct vegetation clearing in Management Area C	2005, 2008, 2011, 2014	Contact Fish and Game in advance for a site visit.
Remove/treat invasive species	2004/2005	
Assess the condition of the trail bridge	Annually	Evaluate the status of erosion at the bridge.
Conduct monitoring and prepare a report	Annually (by Nov. 15)	See the "Stewardship and Monitoring" section.
Conduct a volunteer clean up on the property	Annually	
Have a qualified professional review the Plan	2014	The plan should be reviewed every 10 years.

CONCLUSION

The Grapevine-Tuttle Swamp Conservation Area contains a diversity of natural resources including Prime Wetlands, significant wildlife habitats, special concern species, and valuable low-impact recreational opportunities. The site is located adjacent to other large blocks of existing conservation and town-owned property. As a result, the conservation area is part of a larger block of land that has both local and regional significance.

This plan provides management recommendations and prescriptions to maintain existing views, enhance wildlife habitats, protect sensitive areas, and foster low-impact recreational opportunities. To further the conservation goals of the property, this plan should be reviewed and updated by a qualified professional, at least every ten years.

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