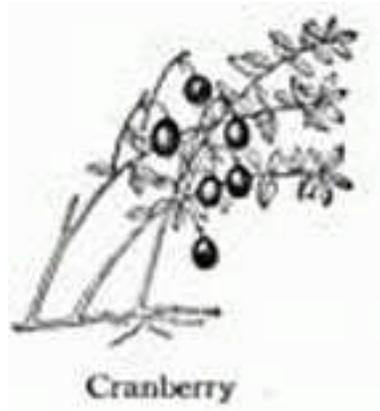


Baseline Assessment
for the
Cranberry Bog

March 2007
Revised, June 2007



Prepared by the
Land Stewardship Committee

A subcommittee of the
Carlisle Conservation Commission

Foreword

This Baseline Assessment has been prepared by the Land Stewardship Committee (LSC), a subcommittee of the Carlisle Conservation Commission (ConsCom). The LSC, which was formed in January 2006, has a number of core tasks. Two key core tasks are to:

1. Conduct Baseline Assessments of Town-owned conservation properties; and
2. Develop a Management Plan for each of these properties.

The Baseline Assessment involves the collection, evaluation and presentation of information on several topics including:

- The acquisition of the property, including reasons for purchase, costs, funding sources, and associated land use restrictions;
- A detailed description of the property (using maps and figures, where appropriate) covering such topics as: boundaries (and abutters), major features (e.g., fields, woods, ponds, wetlands), topography, agricultural use and soil quality, trails, parking, and signs and displays;
- Historic and current uses of the property;
- A description of previous planning documents or other studies of the property;
- Maintenance activities and current condition of the property; and
- A list of issues to be addressed in the formulation of a Management Plan.

The Baseline Assessment is considered a working document and not a final published report. It is primarily designed to organize important information on a Town-owned conservation parcel in preparation for the writing of a Management Plan. It is expected that most of the information in the Baseline Assessment will eventually be used in the Management Plan which – after appropriate review – will be published in both hard copy and electronically (e.g., on the Town's web site). The Baseline Assessment itself, after review and approval by the ConsCom, will be made available in electronic format to Town committees, boards, property user groups, and the public.

Because the Baseline Assessment is a working document, no attempt has been made to make it look like a formal publication. In addition, there may be a number of errors of fact, or omission, or emphasis which we hope the review process will correct prior to the writing of the more formal Management Plan.

If you have any comments on the content of this document, please send them to Warren Lyman (warrenlyman@mindspring.com) and Debby Geltner (dgeltner@hotmail.com).

Table of Contents

	Page
Foreword.....	ii
List of Tables, Figures and Exhibits.....	v
1. General Description of the Property.....	1
1.1 Introduction.....	1
1.2 Abutters.....	1
1.3 Major Features.....	4
1.4 Importance of Major Features.....	9
1.5 Signs and Displays.....	9
1.6 Regional Topography and Watershed.....	9
2. Purchase of the Cranberry Bog.....	12
2.1 Previous Owners of the Cranberry Bog.....	12
2.2 Pre-Purchase Activity.....	12
2.3 Purchase of the Bog.....	16
2.4 Request for Self-Help funds from the State.....	17
3. Historic and Current Uses.....	19
3.1 Pre-Colonial Uses.....	19
3.2 Cultural History of the Cranberry Bog Land.....	19
3.3 Current Uses of the Cranberry Bog.....	21
4. Previous Planning or Other Study Documents.....	31
4.1 Introduction.....	31
4.2 Chelmsford Carlisle Regional Conservation District – Land Use Management Plan.....	31
4.3 Conservation Plan for Cranberry Reservation – Chelmsford and Carlisle, MA.....	33
4.4 Management Plan – Carlisle Cranberries, Inc.....	38
4.5 Certified Vernal Pool.....	40
4.6 Data from Biodiversity Days Surveys.....	40
4.7 Brownrigg’s List of Birds Seen at the Bog.....	41
4.8 Core and Priority Habitats Designated by NHESP.....	41
5. Maintenance and Current Condition of the Property.....	46
5.1 Categorization of Areas in the Cranberry Bog.....	46
5.2 Agricultural Areas.....	46
5.3 Cranberry Bog House.....	48

Table of Contents (continued)

	Page
5.4 Non-Agricultural Areas.....	56
5.5 Photographic Documentation.....	60
6. Problems and Issues to be Addressed in the Management Planning Process.....	61
6.1 Past Issues and Problems.....	61
6.2 Issues to be Considered in Formulating a Management Plan.....	62

APPENDICES

- A. Copy of 1995 Lease of Bog Agricultural Area (July 1995) [Excluding Exhibit A]
- B. Management Plan – Carlisle Cranberries, Inc. (July 1995) [Exhibit A of Bog Lease]
- C. Soil Conservation Service – Narrative for Conservation Plan for Cranberry Reservation (April 1987)
- D. List of Bird Species Seen at the Bog by Tom Brownrigg
- E. Site Photographs: April – July, 2006
- F. Photo Record of Cranberry Bog House Interior

List of Tables, Figures and Exhibits

Tables	Page
2-1. A Brief History of the Cranberry Bog in Carlisle.....	13
3-1. List of Herbicides and Insecticides Used by Carlisle Cranberries, Inc.	25
3-2. Reported Yields of Cranberries from the Carlisle Cranberry Bog.....	26

Figures

1-1. Locus Map for Selected Conservation and Recreation Properties in Carlisle.....	2
1-2. Property Map for Cranberry Bog Area.....	3
1-3. Aerial Photograph of the Cranberry Bog Area.....	5
1-4. Trail Map for the Carlisle-Chelmsford Cranberry Bog.....	6
1-5. Regional Topography.....	10
3-1. Defined Agricultural Areas Leased to Carlisle Cranberries, Inc.	23
3-2. Defined Agricultural Areas Overlain on Aerial Photograph.....	24
3-3. Harvest of Wet Cranberries: 1989 – 2006.....	26
4-1. Classification of Soils for the Chelmsford-Carlisle Bog.....	35
4-2. Plant Resources for the Chelmsford-Carlisle Bog.....	36
4-3. Water Resources in the Bog Watershed Area.....	37
4-4. Conservation Plan Map Prepared by the Soil Conservation Service.....	39
4-5. Core Habitat Area Near Cranberry Bog.....	42
4-6. Priority Habitat # 874 near Cranberry Bog.....	44
5-1. Schematic Diagram of Second and Third Floors of Bog House.....	51

Exhibits

1. Management Plan Recommendations for Building and Fire Safety Inspections....	64
---	----

1. General Description of the Property

1.1 Introduction

The Cranberry Bog is a 150.7-acre conservation land purchased by the Town in 1986 from the Lowell Cranberry Co. At the same time, the remaining land of the Lowell Cranberry Co. – which was in Chelmsford (158.9 acres) - was sold to Chelmsford as conservation land. The combined conservation lands in the two Towns totals 309.6 acres. The actual cranberry growing bogs (~40 acres) lie in the Carlisle portion of the combined lands. The cranberry growing operations started in 1903 (see Section 3) and continue to this day via lease of the bog's agricultural areas to a local farmer, Mark Duffy, who is also the resident dairy farmer at Great Brook State Park in Carlisle. His cranberry operations are carried out under the name of Carlisle Cranberries, Inc. This is the northernmost commercial cranberry growing operation in Massachusetts.

The property is located in the northwest quadrant of the Town abutting the Chelmsford border (**Figure 1-1 [Locus Map]**). As shown on the Town's property map (**Figure 1-2 [Property Map]**), the Cranberry Bog has significant frontage on Curve* and Martin Streets, although the only available parking (and entrances) in Carlisle are along Curve St. One parking location (4-5 cars) is alongside the 101-year-old Bog House; a second parking area (~6-10 cars) lies amongst the trees on the north side of Curve St. just 100 yards from the Bog House. An 18-acre portion of the parcel lies on the southeast side of Curve St., across from the Bog House. The licensee farmer conducts soil composting operations on this portion. There is no frontage on Fiske St. although ConsCom is working with an abutter who may provide as easement that would allow a footpath entrance from Fiske St., but no parking. An Elm St. entrance, with parking for 3-4 cars, is available in the Chelmsford portion of the bog.

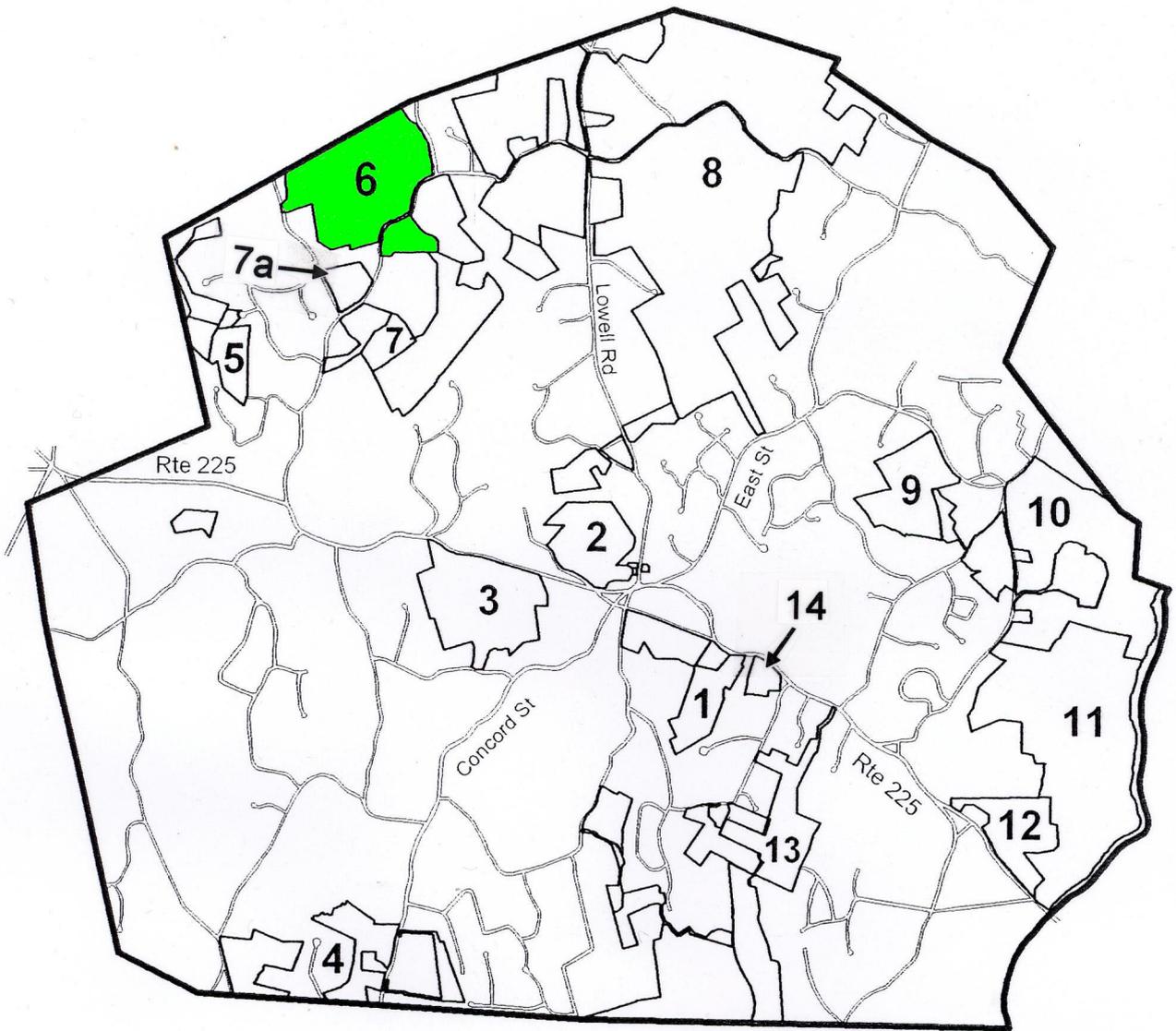
1.2 Abutters

Abutting or Nearby Conservation Lands

The Carlisle Cranberry Bog abuts four other conservation parcels (see Figures 1-1 and 1-3):

1. Chelmsford Cranberry Bog – This 158.9-acre parcel, as mentioned above, was part of the original combined holdings of the Lowell Cranberry Co. The land contains a large pond, wetlands, and woodlands with trails.
2. State Park - A portion of Great Brook State Park (~32 acres) lies to the east of Curve St. and abuts the 18-acre Town-owned portion of the Bog on the same side of the street. The State land is used by Mark Duffy as cropland.

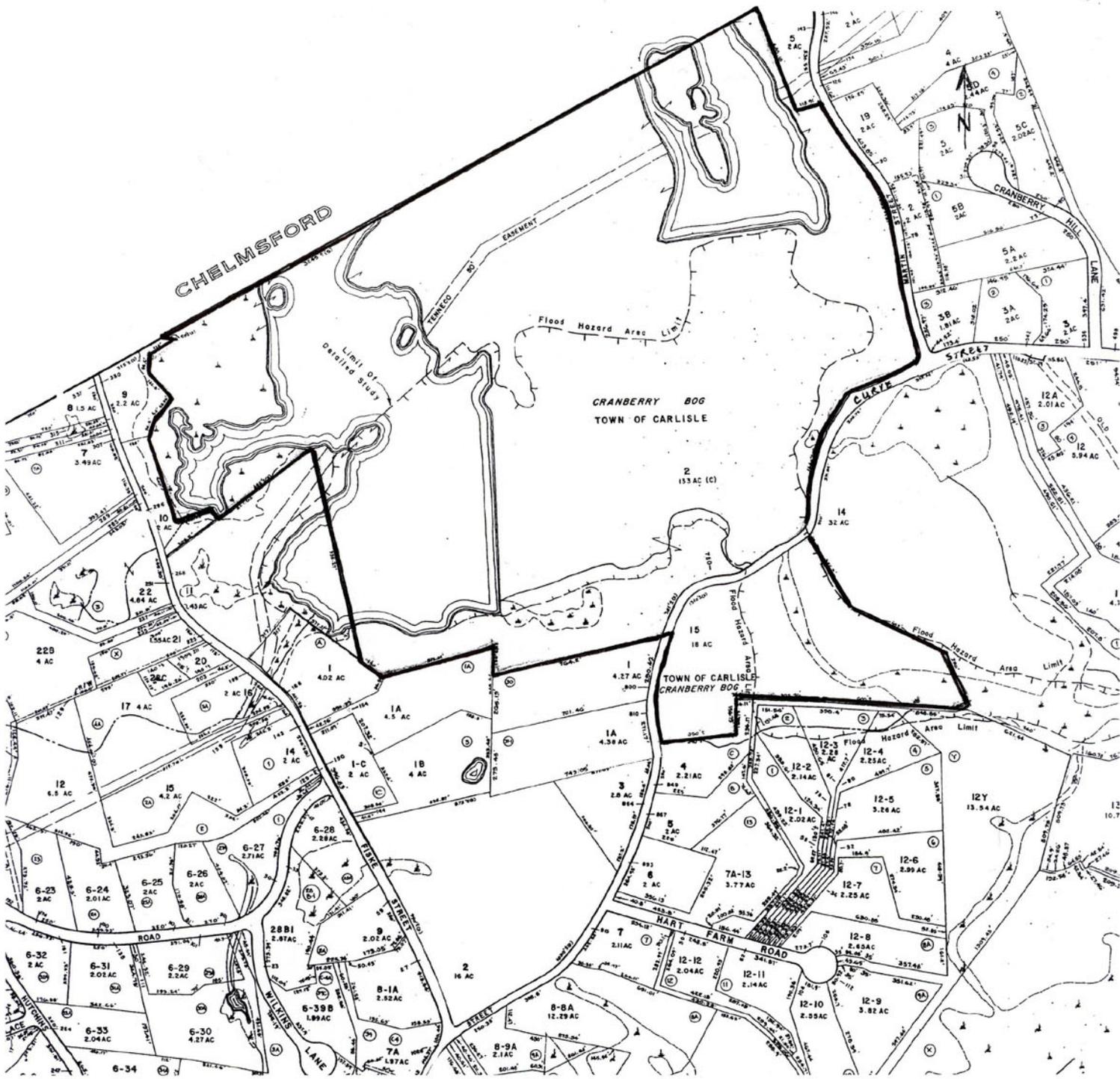
* Curve St. is listed as a Scenic Road Town zoning by-laws as authorized by MGL Chapter 40, Section 15C.



- | | |
|---|----------------------------------|
| 1 Banta Davis | 7a Hutchins Field |
| 2 Conant Land | 8 Great Brook State Park |
| 3 Towle Land | 9 Town Forest |
| 4 Bisbee and Benfield Lands,
& Spencer Brook Reservation | 10 Greenough Land |
| 5 Carlisle Pines State Forest | 11 Great Meadows NWR |
| 6 Cranberry Bog | 12 Foss Farm |
| 7 Curve St. Conservation Lands | 13 Davis Corridor & Malcolm Land |
| | 14 Fox Hill |

Source: Modified from Carlisle's 2005 Open Space and Recreation Report

Figure 1-1. Locus Map for Selected Conservation and Recreation Properties in Carlisle



GRID BASED ON MASSACHUSETTS
 COORDINATE SYSTEM, MAINLAND ZONE
 SCALE IN FEET 0 200 400
 REVISED TO JANUARY 1, 2001

Source: Property maps of Carlisle, revised to January 1, 2001

Figure 1-2. Property Map for Cranberry Bog Area

3. Hart Farm - The Hart Farm conservation land (13.54 acres), acquired by Carlisle in 2000, also abuts the 18-acre portion of the Bog that lies on the southeast side of Curve St. A trail from the Hart Farm development (Hart Farm Rd.) connects to a trail on the Bog property.
4. Ballantine Conservation Restriction - The Ballantine family, in 1996, gave a permanent conservation restriction (6 acres) to the Town on a strip of land that abuts the western portion of the Bog near Fiske St. A trail (20-foot wide easement) is included. With an anticipated revision of the conservation restriction, it will be possible to construct a foot path over the easement that will allow pedestrian access to the Bog from Fiske St.

These contiguous conservation parcels total over 361 acres.

The Carlisle Cranberry Bog is also in close proximity (≤ 0.3 miles) to three other Town-owned conservation parcels: (1) Hutchins Field (16 acres), acquired in 1999, on the west side of Curve St.; (2) Robbins Field (18.45 acres), also acquired in 1999, on the east side of Curve St; and (3) Gage Woodland (14 acres), acquired in 1994. A 2.4-acre conservation restriction given by the Senkler family is also in close proximity.

Other Abutters

There are approximately 14 privately-owned parcels of land in Carlisle that abut directly with the Cranberry Bog (see Figure 1-2). An additional 6 would be considered close neighbors. A list of direct and proximate abutters has been prepared by the LSC; it is available in Town Office.

1.3 Major Features

The major features of the Carlisle Cranberry Bog include the following:

- | | |
|-------------------------------|---|
| - An operating cranberry bog | - Wetlands |
| - A small "4-H" cranberry bog | - Woods |
| - The Bog House | - A trail system (portions on dikes & dams) |
| - Portions of two reservoirs | - A certified vernal pool |
| - River Meadow Brook | - An underground gas pipeline |
| - Vistas across the bog | (Tennessee Gas Co. easement) |

These features are described in the text below. Many are shown in either **Figure 1-3 [Aerial Photo [1981] w/ Overlay]** or **Figure 1-4 [Trails Map]**. (Additional features are shown in the figures provided in Section 3 of this Baseline Assessment.) In addition to the 1981-based aerial photo used for Figure 1-3, other historic aerial photos of the site are available. Earlier photos taken in 1971 (copy in Town Office) and 1934 (available in Gleason Library) are also available.

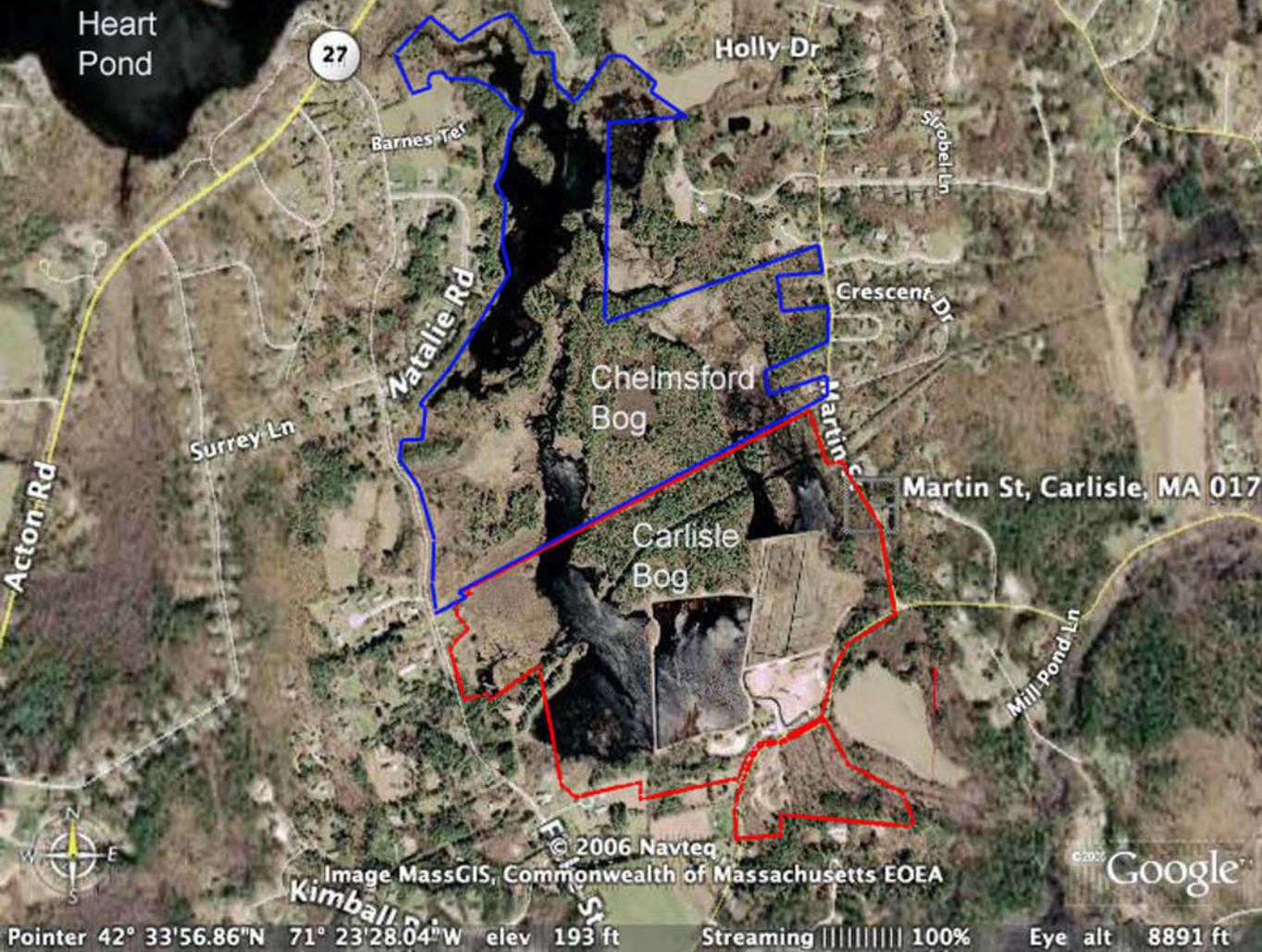
Figure 1-3

Aerial
View of
Bog
Area

Taken in
2001

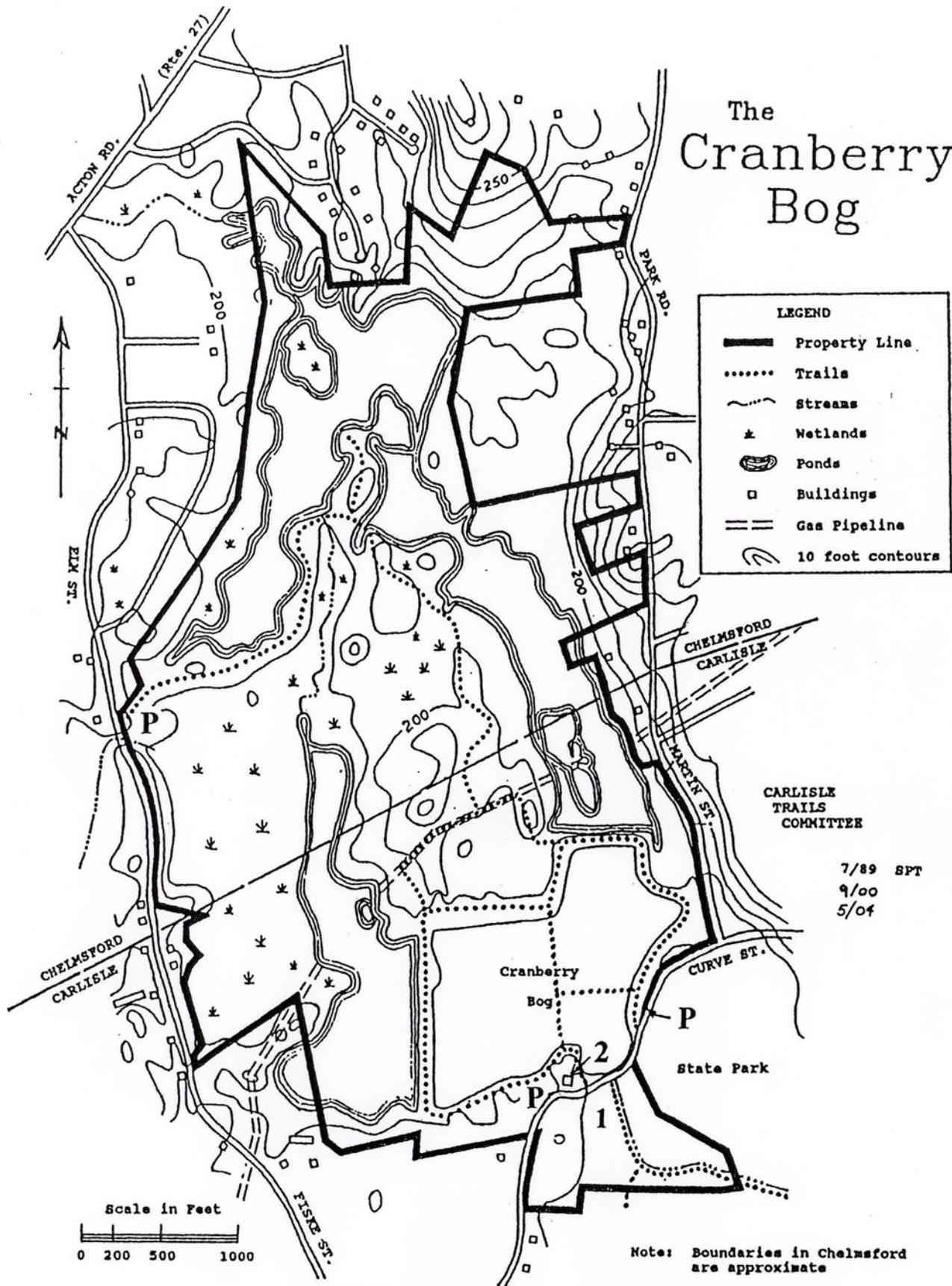
Carlisle
section
outlined
in red

Chelmsford
section
outlined
in blue



T. Fohl
May, 2006

The Cranberry Bog



Copyright © 1998 Carlisle Trails Committee

Source: *Trails in Carlisle*, Compiled by the Carlisle Trails Committee (2005 Edition)

Figure 1-4. Trail Map for the Carlisle-Chelmsford Cranberry Bog

Operating Cranberry Bog

Forty acres of the bog are devoted to cranberry growing through a lease to Carlisle Cranberries, Inc. (Mark Duffy, President) (see Appendix A). At present, 19 acres are in active production and the remaining 21 acres are in various stages of renovation. Further details on the agricultural operations are provided in Section 3.

4-H Cranberry Bog

A small circular cranberry bog, located near Curve St. and physically separated from the bog maintained by Carlisle Cranberries, was maintained for years by a local 4-H club. No maintenance has been undertaken in the last few years, and the bog is being overgrown with young trees.

Bog House

The four-story Bog House on Curve St. was constructed in 1905 by the original developers of the Cranberry Bog, Warren and James Nickles. Over the years it has been used for cranberry processing, produce storage (e.g., squash), equipment storage, housing for bog managers and other workers, and a dance hall for the workers. It remains in use today for equipment storage (lower two floors) and for housing for an agricultural employee of Carlisle Cranberries (third floor). Additional information is provided in Section 3.

Upper and Lower Reservoirs

Two reservoirs are associated with the cranberry growing operations, referred to as the upper and lower reservoirs. The downstream ends of both reservoirs are in Carlisle; the upstream ends are in Chelmsford. Associated with these reservoirs – and River Meadow Brook (described below) – are a series of dams and water control structures which allow the cranberry grower to use the water for a variety of agricultural purposes (see Section 3). The Town has secured its rights to use the water from these reservoirs, and other upstream water bodies, via registration of water rights with the State of Massachusetts. Other rights may be associated with deeded rights from the Lowell Cranberry Co.

Upstream of the ‘Upper’ and ‘Lower’ reservoirs, in Chelmsford, are an un-named impoundment (south of Route 27) and Heart Pond (north of Route 27) which feed into the reservoirs. These impoundments are also used as reservoirs to supply water – as needed – for the cranberry-growing operations.

River Meadow Brook

River Meadow Brook (formerly also known as Hale’s Brook, and now also called Great Brook in the State Park) flows through the Cranberry Bog. Its flow has been impounded in the Carlisle portion of the bog by the two above-mentioned reservoirs. A large impoundment also exists in the Chelmsford Cranberry Bog land. This Chelmsford

impoundment feeds – through two separate wetland areas - both the upper and lower reservoirs described above. A water control structure on this impoundment (replaced after a washout in 2006) allows water to be directed to the Lower Reservoir.

Upstream of the Chelmsford impoundment mentioned above, River Meadow Brook is impounded by the dam and water control structures of Heart Pond (also in Chelmsford). On rare occasions, water from this pond is released for use in the cranberry growing operations.

In the agricultural portion of Carlisle’s Cranberry Bog, the Brook has been channelized and an interconnecting series of irrigation ditches constructed. In the Cranberry Bog parcel to the southeast of Curve St., the Brook has also been channelized as far as Old Morse Road (a distance of about 0.4 miles). This latter part of the Brook runs through a wooded area. Flow in the Brook is year round although it can be quite small following a drought.

Wetlands

Significant wetlands exist around the edges of the above-mentioned reservoirs, and in isolated pockets in the woods. Further details on the wetlands are provided in Section 4.

Woods

Significant wooded sections exist on the Cranberry Bog, the largest being between the two above-mentioned reservoirs. This wooded area extends into the Chelmsford Cranberry bog. Further details on the woodlands are provided in Section 4.

Trail System

A trail system exists in the Carlisle and Chelmsford Cranberry Bogs as shown in Figure 1-4. In Carlisle, the most prominent and frequently used “trails” are really the farm roads and dike tops that surround and bisect the agricultural area. These trails are out in the open and provide beautiful vistas across the bogs and reservoirs. Another portion of the Carlisle trail system follows the gas pipeline right-of-way and is mostly wooded. A third portion of the Carlisle trail system follows River Meadow Brook to the southeast after it passes under Curve St. near the Bog House. This part is also wooded. The trails in Chelmsford are mostly through woodland; one portion (leading to Elm St.) follows a berm that is part of the retention system for the pond in Chelmsford. The Cranberry Bog is one of the most popular walking spots in Town, especially for dog walkers.

Certified Vernal Pool

In April 2006, the State’s Natural Heritage & Endangered Species Program (NHESP) certified a vernal pool on the Cranberry Bog based on data submitted by Tom Brownrigg, Carlisle citizen and former Conservation Commissioner. The vernal pool has approximate dimensions of 400 ft (length) × 75 ft (width) × 1 – 3 ft (depth), and is

located about 600 ft WSW of the Bog House and 350 ft west of Curve St. Further details are provided in Section 4. (Another certified vernal pool exists on State Park land directly across Curve St. The location is shown in Figure 4-5.)

Underground Gas Pipeline

The Tenneco Gas Pipeline Co. owns an easement across the Bog for its underground natural gas pipeline (see Figure 1-4). A portion of the trail system on the Bog follows this easement. The land along the easement is periodically cleared of tree growth by Tenneco. The last clearing was in the fall of 2001.

1.4 Importance of Major Features

The features described above demonstrate that the Cranberry Bog is a very significant conservation holding for Carlisle, providing:

- Preservation of agricultural land and associated cultural heritage (i.e., cranberry growing);
- Preservation of land for general conservation;
- Preservation of surface water bodies and wetlands for wildlife habitat; and
- Land for passive recreation, much of it with beautiful “big sky” vistas.

1.5 Signs and Displays

One property sign exists at the main parking lot next to the Bog House; another is along Curve St. Around the perimeter of the agricultural area is a series of five educational signs that provide information about the bog and its operations; one shows the trails on the combined Carlisle-Chelmsford Bogs. The educational signs were installed in 1996. There are two, white and green Carlisle Conservation signs, one by the Bog house parking lot and one by the gate on the other side of the Bog house. The latter alerts the public that pesticides are used at this agricultural site.

One sign - near the northernmost bee hives – warns pedestrians of the bees in the area. At least three warning signs exist along the gas pipeline that crosses the property. They are placed on erect metal poles (~ six feet high) that are mostly white with orange color and signage near the top. Two signs encourage dog cleanup.

A kiosk (more like a bulletin board) is located about 100 feet to the north of the Bog Building. It is used by Carlisle Cranberries, Inc. to post notices of pesticide applications. No other useful signs are on the kiosk.

1.6 Regional Topography and Water Shed

Figure 1-5 [Regional Topography] provides a topographic map of the Cranberry Bogs in both Carlisle and Chelmsford. Also shown is Heart Pond in Chelmsford which

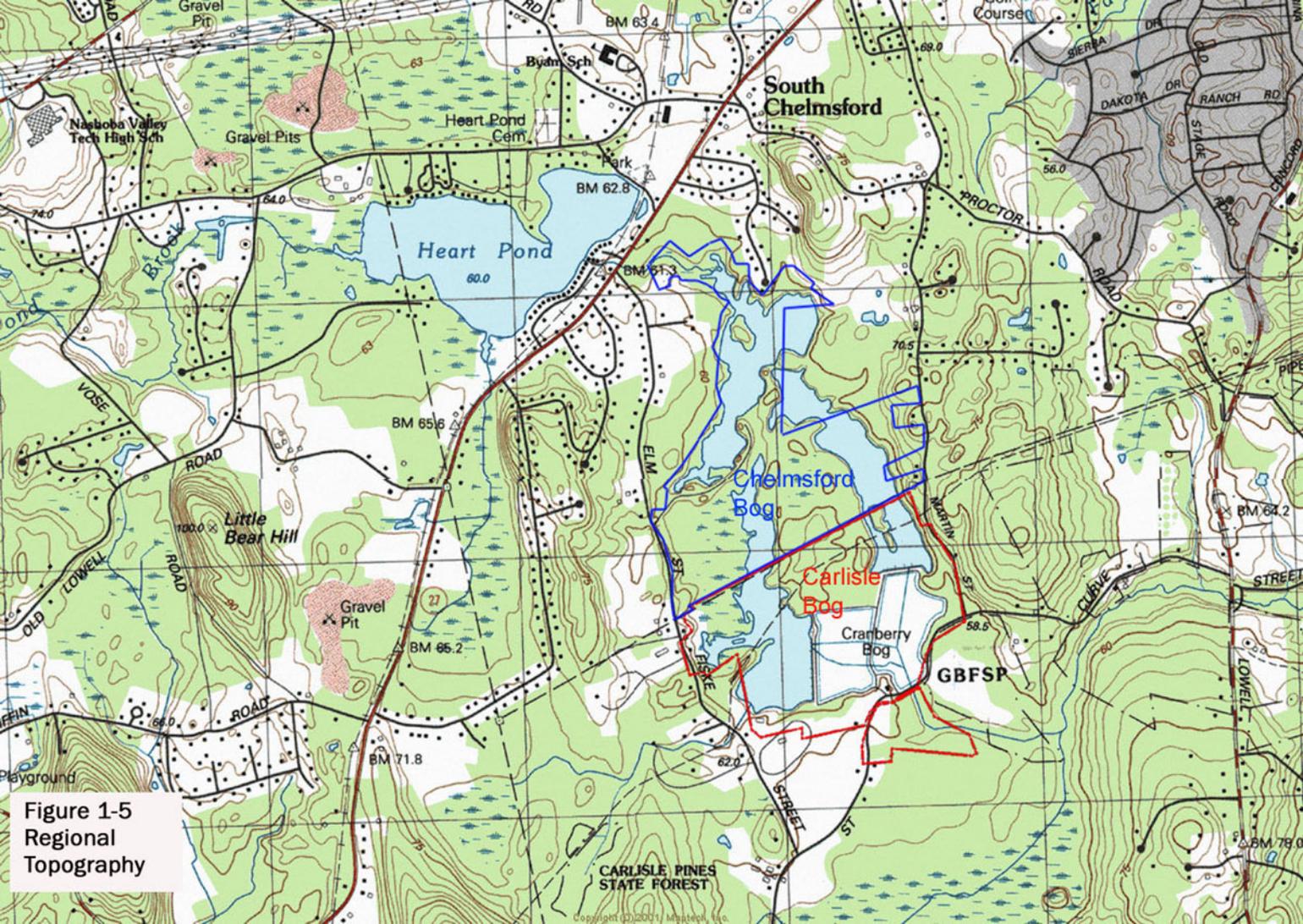


Figure 1-5
Regional
Topography

discharges to the impoundment in the Chelmsford Cranberry Bog conservation land. The water level in Heart Pond is controlled by a dam and weir at its outlet near the intersection of Rt. 27 and Elm St. The original owners of the Cranberry Bog (Nickles brothers), and all successor owners, had deeded rights to the use of water from Heart Pond for use in the cranberry growing operations. Along the shores of Heart Pond are a number of private residences and a swimming beach run by an association.

2. Purchase of the Cranberry Bog

The purchase of the Cranberry Bog was a long, time-consuming process, starting with Town interest as early as 1970 and culminating with the actual purchase in 1986. However, key issues relating to possible formation of a joint management district with Chelmsford (for the combined bog areas in the two Towns) and Carlisle's water rights to Heart Pond continued to require much attention for another five years.

Table 2-1 presents a listing of the important activities, and corresponding dates, related to the creation of the Cranberry Bog, its prior owners, the purchase by Carlisle (in 1986), and a few subsequent events.

2.1 Previous Owners of the Cranberry Bog

See Section 3 and Table 2-1.

2.2 Pre-Purchase Activity

According to Susan Pickford (*History of the Chelmsford Carlisle Cranberry Bog*, 1991), the Carlisle Conservation Commission contacted the bog owners (Dorothy and Hazel Handy) as early as April 1970. Later, contact was maintained with the subsequent owner, George Pappageorge, husband of the deceased Hazel.

In 1979, Carlisle's *Open Space and Recreation [OS&R] Target Plan* (March 1979) evaluated all large, undeveloped parcels in Town for their conservation values. Using a set of goals and objectives (with assigned quantitative values), they derived a score for each parcel. The Cranberry Bog received the fifth highest score (132) with the other 33 properties scoring between 32 and 157. The unique feature of the operating Cranberry Bog, and the conservation value and the water resources, were cited as important features.

Chelmsford was also looking closely at the bog and the benefits that might accrue to the Town if they purchased their portion. In 1983, their Conservation Commission requested a study, the result being a report by Carr Research Laboratory, Inc. (Wellesley, MA) entitled: *Environmental Analysis of Potential Purchase of the Lowell Cranberry Land, Chelmsford, Massachusetts* (May 1983). The report gave significant attention to hydrology, hydrologic controls, water rights and water supply potential.

By 1985, it was clear that Pappageorge was ready to sell the Lowell Cranberry Co. The land was removed from Chapter 61A leaving a threat that the land might be sold to a developer. ConsCom representatives met with Pappageorge to again indicate the Town's interest in purchasing the land. Two appraisals were obtained: (1) W.H. Lyon (August 1985) - \$1,500,000; and (2) T.H. Reenstierna (October 1985) - \$1,520,000. ConsCom set up a Cranberry Bog Subcommittee to press for Town purchase of the land. In 1986, detailed negotiations were held between Carlisle's Town Counsel and Pappageorge. It

Table 2-1. A Brief History of the Cranberry Bog in Carlisle

Date	Activity	Description
1903	Creation	Warren and James Nickles purchase more than 400 acres of land in Carlisle and Chelmsford to create cranberry bog.
1904	Creation	Site preparation included clearing, leveling, ditching, damming, and sanding, mostly by hand.
1905	Bog House	4-story Bog House built at cost of \$9,000. First crops harvested.
1912	Incorporation	Business incorporated as the Nickles Cranberry Co.
1922	Bog sale	Bog was sold to Arthur "Lee" Handy and Dr. Franklin for \$6,500 who formed the Lowell Cranberry Co.
1970	Purchase	ConsCom reps first contact with current owner of Lowell Cranberry Co., George Pappageorge.
1979	OS&R Report	Town's first Open Space and Recreation report gives high ranking to Bog. Recommends outright purchase. Report also suggests Regional Chelmsford-Carlisle Conservation District to support request for State and Federal partial reimbursement of cost.
1995	Purchase	ConsCom reps meet with owner to indicate Town's interest in purchase. Two appraisals obtained: W.H. Lyon (Aug. 29, 1985) - \$1,500,000; and T.H. Reenstierna (Oct. 17, 1985) - \$1,520,000. Cranberry Bog Subcommittee appointed to work on purchase. Concern over possible sale to a developer as and taken out of Chapter 61A (Agricultural land preservation).
1986	Purchase	January: Negotiations by Town Counsel begun. April: ConsCom votes to recommend taking by eminent domain, if necessary. Appraiser opinion: Appreciation rate 2% per month; rate used to calculate final price.
May 19, 1986	Purchase	Annual Town Meeting votes on: (1) Article 37 (245 YES, 9 NO) to authorize Town to purchase Carlilse portion of Bog (150.7 acres); and (2) Article 38 (220 YES, 8 NO) to appropriate \$1,816,540 for Bog purchase, and to apply to State for partial reimbursement via Self-Help Fund.
May 1986	Subcommittee	End of Cranberry Bog [purchase] Subcommittee. ConsCom appoints new management subcommittee for bog.
June 1986	Funding	Request for Self-Help Funds submitted. But no funds available at that time. Town granted \$4,160 by State's Bay Circuit Program (Dept. of Environmental Management) to develop a management plan for parcel.
July 1986	Mgmt. District	State indicates desire to have joint Chelmsford-Carlisle management district; prerequisite for Self-Help \$\$.
August 1986	Mgmt. Plan	U.S. Soil Conservation Service asked to prepare land and water resources-analysis, and make recommendations on resource protection and land use.
Sept. 1986 to	Formation of	Continuing off and on discussions, letter exchanges, meetings and negotiations between Towns and State
Sept. 1989	Mgmt. district	regarding the formation of a joint management district and its operation.
Dec. 18, 1986	Purchase	Carlisle purchases its portion of Bog (150.7 acres) from Lowell Cranberry Co. for \$1,816,540. Chelmsford purchases its portion of Bog (158.88 acres) for \$788,000.
April 6, 1987	Mgmt. District	Carlisle votes (199 - 0; Article 36) at Annual Town Meeting to form joint management district. Chelmsford also votes positive at its Town Meeting.
April 1987	Mgmt. Plan	Soil Conservation Service analysis completed.
1987	Agriculture	Town allows Feathers Farm, Inc. (Bryanyville, MA) to harvest cranberries at bog. Late harvest gave poor yield.

Table 2-1. A Brief History of the Cranberry Bog in Carlisle (cont'd.)

Date	Activity	Description
1988	Agriculture	Town signs one-year lease for operation of cranberry bog with Frank Wojtas, Jr., former bog manager.
May 3, 1988	Formation of Mgmt. District	Annual Town Meeting votes on Article 40 (181 YES, 1 NO) to reaffirm vote of 1987 Town Meeting to petition the Legislature to pass legislation to form a conservation-recreation district for management of the bog by Carlisle and Chelmsford.
May 11, 1988	Formation of Mgmt. District	State approves Carlisle's Self-Help application in the amount of \$1,000,000 (55% of purchase price) with five conditions: (1) project close out by 12-31-1988 (later waived); (2) formation of legislatively-created joint management district with Chelmsford; (3) preparation of a Cranberry Reservation Management Plan (to be approved by State); (4) establishment of off-street parking; and (5) preparation a survey of the property.
Feb+June 1988	Mgmt. Plan	Initial short drafts of Chelmsford-Carlisle Regional Conservation District plan funded by Bay Circuit Program.
March 1989	Mgmt. Plan	Initial full version of Chelmsford-Carlisle Regional Conservation District plan funded by Bay Circuit Program
May 1, 1989	Agriculture	Agricultural areas leased to Mark Duffy. Initial term was for 10 years, renewable for 10 more years.
Nov. 1989	Mgmt. District	District-forming bill passed by legislature and signed by Governor.
Jan+Apr 1990	Mgmt. Plan	Revised versions of Chelmsford-Carlisle Regional Conservation District plan submitted.
May 7, 1990	Formation of Mgmt. District	Annual Town Meeting votes on Article 10 to accept the Chelmsford-Carlisle Conservation District Management Plan dated April 1990, and to form a regional Conservation District to manage the Bog lands in the two Towns, contingent upon Town's receipt of Self-Help Grant funds totaling \$1,000,000.
Oct. 1, 1990	Formation of Mgmt. District	State (Joel Lerner) writes letter canceling Self-Help project for Carlisle. Chelmsford's approved and funded.
1990 - 1991	Water rights	Carlisle and Chelmsford exchange information to clarify the water rights that came with Carlisle's purchase of the Bog, including use of water from Heart Pond and exemptions from Wetlands Protection Act for the "normal maintenance or improvement of land in agricultural use...."
June 13, 1995	Agriculture	Town signs new lease for 'Agricultural Area' of bog with Mark Duffy (Carlisle Cranberries, Inc.). Lease runs for 10 years, and was renewed (by right) for a second 10-year period in 2005. Lease expires June 12, 2015.
1999	Water rights	Chelmsford water supply company proposes to put 6 wells on Chelmsford's portion of bog to withdraw 350,000 gallons/day. Carlisle (for Duffy) had registered a use of 357,000 gal/day for growing Cranberries.
2000	Water rights	Carlisle hires special counsel Frank DiLuna, water rights expert. Likely impacts on wetlands in both Towns cited. State reminded that Carlisle had deeded rights to "all water power, water privileges and flowage rights" from Heart Pond, and that it had registered water use rights under MGL, Chap. 21G. Chelmsford drops project.
2000	Agriculture	U.S. Department of Agriculture orders cranberry growers to cut fall crop by 15% in order to support prices.
2001	Agriculture	U.S. Department of Agriculture orders further cuts in cranberry harvests.
2001 - 2002	Bog House	Town RFP seeks renter with repairs in lieu of rent.

was agreed that an appreciation rate of 2% per month would be used to calculate the final price.

The evaluation of the bog as a site for housing was undertaken by the Bog Subcommittee just to see how many houses might be built (if the Town could not buy the land) and what a developer might have to pay. They estimated the Bog had a total of 4,374 feet of frontage on Curve and Martin Streets, and could be subdivided into as many as 26 house lots in the two Towns (no houses on the actual bogs). Based on building lot values at the time, this was the basis of an estimate of \$3,000,000 for the value of the bog (\$2,535,000 for the Carlisle portion, \$500,000 for portions in Chelmsford). The Bog Subcommittee also tried to estimate the value of cranberry harvests, knowing that some investments (perhaps \$10,000 per acre) would be required to return the bog to reasonable production levels. High-end estimates assumed that the bog could have 30-40 acres in production, that yields could be as high as 150-160 barrels per acre, and that the market would pay \$50 - \$60 per barrel (recent values have gone as low as \$8/barrel). The combination of these high estimates suggested the bog revenues could run as high as \$225,000 to \$384,000 per year. Needless to say, nothing close to this has occurred, and in some years the revenues have not covered expenses. Nevertheless, it is clear that the Town did expect some income from the cranberry growing operations.

ConsCom's Bog Subcommittee also listed the major reasons that the Town should purchase the Cranberry Bog:

1. Preservation of open space and rural character
 - Major Town goal (reaffirmed in 1985 Town survey)
 - Bog ranked high in 1979 OS&R report
 - Town not keeping pace with development
2. Preservation of agricultural land
 - Major Town goal
 - Unique: only cranberry bog in area; last one in Middlesex County.
3. Preservation of water resources
 - Major Town goal
 - Both surface and ground waters important
 - Potential future water supply source
4. Preservation of wildlife habitat
 - Important linkage to Great Brook State Park
5. Preservation of areas for passive recreation
 - Hiking, horseback riding, fishing, biking, cross county skiing, skating, wild berry and grape picking

Endorsements for Town purchase of the bog were obtained from the State's Department of Environmental Management, Department of Food and Agriculture, and Department of Environmental Quality Engineering, and from Massachusetts Audubon Society, University of Massachusetts Experimental Station, and the Massachusetts Farm Bureau Federation.

The Bog Subcommittee recognized that purchase of the bog would require more proactive management, especially if – as planned - the Cranberry Bogs were to be kept in production, and returned to good condition. They also realized that other parts of the bog would require trails, trail maintenance, mowing and other maintenance. They indicated that ConsCom would set up a bog management committee to undertake these activities.

2.3 Purchase of the Bog

On May 19, 1986, at the Annual Town Meeting (adjourned session), Carlisle voted on Article 37 (245 YES, 9 NO) to authorize the Town to purchase the Carlisle portion of the bog (150.7 acres). The Meeting also voted on Article 38 (220 YES, 8 NO) to appropriate \$1,816,540 for the purchase, and to apply to the State for partial reimbursement from the Self-Help Fund. Article 37 listed the reason for the purchase as follows:

“...for conservation purposes, as provided by Chapter 40, Section 8C of the [Massachusetts] General Laws, and/or for outdoor recreation to be managed by the Conservation Commission...”

The actual sale of the bog – for both Carlisle and Chelmsford – took place on December 18, 1986, with George Pappageorge signing the deed as both president and treasurer of the Lowell Cranberry Company. The deed grants to Carlisle:

“...for conservation purposes, as provided by General Laws c.40, Section 8c, and/or outdoor recreation to be managed by the Conservation Commission of the Town of Carlisle, ...All land presently owned by Lowell Cranberry Company...in the Town of Carlisle.”

No survey was undertaken of the property at the time of purchase (nor to this date). The deed describes the property by reference to: (1) four lots shown on the Carlisle Board of Assessors maps (revised to January 1, 1985); and (2) five deeds to grantor recorded with the Middlesex North District Registry of Deeds. Copies of all these deeds are in the files in Town Office.

The property was purchased completely with Carlisle funds (with bonding). No State or Federal funds were received. As described below, State Self-Help Funds were requested but not received.

Water Rights Referenced in Deed

One of the deeds to the grantor (Lowell Cranberry Company) that is referenced in the deed to Carlisle (Dec. 18, 1986) is called out as Book 658, page 151 of the Middlesex North District Registry of Deeds. That deed (dated March 24, 1922) covers the sale of several parcels of land – some in Carlisle and some in Chelmsford – from the Nickles Cranberry Company to the Lowell Cranberry Company. One portion of that deed, for a parcel in Chelmsford, reads as follows:

“Also, a certain strip of land situated in the southerly part of Chelmsford in said County extending across and being a part of the first parcel described in deed of Warren C. Nickles et al. to the grantor dated October 8, 1912, recorded with said Deeds in book 496, page 205. The said strip hereby conveyed extends from Hart’s [sic] Pond, at low water mark, to the highway leading from Chelmsford to Carlisle and its center line is coincident with the center line of River Meadow Brook or Hale’s Brook so called, a portion of said strip lying between said pond and the railroad is 35 [*?check*] feet wide throughout its length, and the portion lying between the railroad and said highway is 30 feet wide, excepting from this conveyance so much of said strip as was included within the location of said railroad. And also hereby conveying all the water power, water privileges and flowage rights appurtenant to said strip of land hereby conveyed or appurtenant to the said first parcel in the deed last above mentioned.” (*Emphasis added.*)

However, it should be noted that the value of these deeded water rights is – apparently – mostly superseded by water rights that may be granted by the State under the authority of the Massachusetts Water Management Act (MGL 21G) which was passed in 1985. Additional information on Carlisle’s use of this Act to protect water rights for the bog is described in Section 3 of this Baseline Assessment.

2.4 Request for Self-Help Funds from the State

In June 1986, a month after the vote to buy the bog, Carlisle submitted an application for partial reimbursement from the State’s Self-Help Fund. This started a difficult and convoluted process, lasting over four years, which at one point yielded conditional approval of \$1,000,000 in Self-Help funds, but which ended up with no State funding and feelings of disappointment and bitterness on both sides of the table (Carlisle and the State). A key requirement set by the State, first indicated in July 1986, was the formation of a joint management district with Chelmsford. At their respective 1987 Annual Town Meetings, Carlisle and Chelmsford voted to join such a district which needed to be created by the State legislature. Carlisle reaffirmed its willingness to join a joint management district at its 1988 Annual Town Meeting.

In May 1988, the State approved Carlisle’s Self-Help application in the amount of \$1,000,000 (55% of the purchase price) with five conditions:

1. Project close out by December 31, 1988 (subsequently waived);
2. Formation of a legislatively-created joint management district with Chelmsford;
3. Preparation of a Cranberry Reservation Management Plan (needing State approval);
4. Establishment of off street parking; and
5. Preparation of a survey of the property.

Regarding item #3, Carlisle had initiated efforts as early as June 1986, and later on worked with Chelmsford to create the necessary management plan for the Chelmsford-Carlisle Regional Conservation District. (Details of the contents of this plan are provided

in Section 4 of this document.) Various drafts were prepared in 1988, 1989 and 1990, with an April 1990 version being accepted by the Town (see below).

In November 1989, a district-forming bill was passed by the Massachusetts Legislature (Senate Bill No. 1867) and signed by the Governor. The act was to take effect upon favorable Town Meeting votes in both Towns. The district was to be governed by a seven-member board, three members being appointed by each Town, and one (ex-officio) by the State's Department of Environmental Management.

At the 1990 Annual Town Meeting (May 7), Carlisle voted to form a regional conservation district and to accept the Chelmsford-Carlisle Conservation District Management Plan (April 1990 version), contingent upon Carlisle's receipt of the \$1,000,000 in Self-Help Funds. However, the management plan was not acceptable to the State, and the Town was apparently reluctant to make further revisions and concessions.

In October 1990, the State informed Carlisle that it was canceling its Self-Help project. Chelmsford was given its Self-Help funds. Since Carlisle did not receive Self-Help funds, no Regional Conservation District was formed, and no District Management Plan was adopted.

[Note: The "Bog Purchase" folder in the ConsCom files in Town Office contains a two-page document ("History of the Cranberry bog Self-Help Grant") which provides more details on the history of the grant application and the apparent reasons for its eventual rejection.]

3. Historic and Current Uses

3.1 Pre-Colonial Uses

Before being settled by Europeans, Native Americans made heavy use of wetlands for food and other resources. They also built ceremonial structures in the area as part of their interaction with the land and water. The known remains of such structures on the Cranberry bog property are located between Martin Street and the water. They have not been surveyed and there may be other areas containing structures.

3.2 Cultural History of the Cranberry Bog Land: 1900 – 1986

A good description of the history of the Cranberry Bog is given by Susan Pickford in her *History of the Chelmsford Carlisle Cranberry Bog* published in 1991. Much of the information below is taken from her publication. She indicates that, before the land was converted into a cranberry bog, it was a popular grazing meadow and marsh along River Meadow Brook (formerly also called Hale's Brook). The conversion to a cranberry bog was stimulated by the great growth of cranberry production in Massachusetts in the 19th century. In the mid 1830's, Middlesex County was the leading county for cranberry production in the State. This growth attracted the attention of brothers Warren and James Nickles, Carlisle natives, whose father was a successful Carlisle farmer who sold much of his produce in Boston. The land they would choose for their venture is today the northernmost cranberry bog in Massachusetts. For a period, the Nickles brothers were also owners of the Wheat Tavern in Carlisle center, having bought it from their father.

In 1903, Warren and James Nickles started their efforts by buying more than 400 acres of land in Carlisle and Chelmsford. In 1904, after acquiring the necessary water rights from the Butler estate (in Chelmsford), they initiated work on the Cranberry Bog. Site preparation included clearing, leveling, ditching, damming, and sanding, mostly by hand. In 1905, at a cost of \$9,000, they built a 4-story structure (58' × 68') to house the cleaning, sorting and storage of cranberries and other produce. This building remains in use today and is referred to as the Bog House. Other buildings – including three summer cottages on Heart Pond - were also built to support the farming operations, but they no longer exist. By 1905, the operation was producing crops not only of cranberries (24 acres in cultivation), but also squash (15 ac), cabbage (5 ac) and pumpkins (5 ac). Two varieties of cranberries were grown: Howes and Early Blacks. In 1912, the business was incorporated as the Nickles Cranberry Company. By 1920, S.A Bull's *History of the Town of Carlisle* (Murray Printing, 1920) indicated they had 50 acres of bog "in bearing", although only 23 acres were recorded by Carlisle's valuation as being in use.

The Bog House was used as a caretaker's house from the early days, and the large upper story was used for dances for workers and pickers. The building was also known for a while as the Squash House as it was used to store winter squash.

Water control structures were important to the Cranberry Bog operation with the bog being flooded (then drained) several times in a season for purposes of watering and frost protection. The Nickles purchase of water rights from the Butler estate gave them the rights to control the discharge from Heart Pond (in Chelmsford). Several water control structures were constructed to provide the necessary water: (1) a dam – whose discharge can be adjusted - at the Heart Pond outlet; (2) a weir or dam by Elm St.; (3 & 4) dikes (or dams) for the current Upper and Lower Reservoirs; and (5) the outlet control structure on Curve St. near the Bog House. Water control structures on River Meadow Brook were not new. The first was built in the mid 1600's for a corn mill, and several others were later added for flour, saw, and clothier's mills.

In 1922, the Cranberry Bog was sold to Arthur "Lee" Handy and Dr. Franklin for \$6,500 who formed the Lowell Cranberry Co. for their operations. Dr. Franklin, a biologist, was at that time the Director of the new, State-funded Cranberry Experiment Station in East Wareham. Over the years, the Lowell Cranberry Co. expanded the bog area (to 37 acres by 1940 according to the Town of Carlisle's valuation) and added additional land that was either meadow, woodland or arable land. In 1950, the Town's valuation references a total of 174 acres. The Lowell Cranberry Co. initiated the practice of hiring a year round manager for the bog. The managers, and their families, commonly lived in the Bog House.

After the deaths of Handy and Franklin (the latter leaving no heirs), the ownership of the bog passed to Handy's two daughters, Dorothy and Hazel. After the death of the two sisters, the property passed to Hazel's husband, George Pappageorge. He remained the owner until the bog was sold to the Towns of Carlisle and Chelmsford in 1986.

Reliable data on the historic yield of cranberries from the bog are not available. It apparently went as high as 3,000 barrels (1 barrel = 100 pounds of cranberries). For a 6-year period from 1982 to 1987, according to records kept by the Cranberry Marketing Committee, the yield ranged from 88.6 to 1,303.8 barrels/year (average = 557 barrels/year). These yields are considered low on a barrels/acre basis (average for the data above is about 30 barrels/acre/year). Yields of cranberries, which can be as high as 50 – 150 barrels/acre, are commonly reduced by such things as winter kill, early frosts, insects, weeds, root fungus, and drought. Based on limited records, it is assumed that – historically – the operation of the bog used a variety of chemicals as fertilizers, insecticides and herbicides.

Cranberry harvesting at the bog was initially done with hand-held scoops, although some hand picking was also used. Workers were required to move through the fields on hands and knees, using an upward raking or rocking motion with the scoop. These methods, which continued until the late 1980's, produced a harvest of dry cranberries. The cranberries were taken to the Bog House where they were screened and sorted, then boxed and shipped to a wholesaler. Harvesting took four to six weeks, after which the bog was raked and trimmed. Until the 1940's, most of the labor required (crews of 25 – 30 worked one section of the bog) was locally obtained. Some workers were trucked in from Lowell. Later, migrant workers were required, with known sources including Puerto

Ricans, German prisoners of war and other prisoners (from Fort Devans), and U.S. soldiers. A bunk house for the guest workers was constructed (it appears on the 1940 and 1950 Carlisle Town valuations). According to Mark Duffy, the bunk house was located in the eaves (4th floor) of the Bog House.

In the last years of operation by the Lowell Cranberry Co., the bog fields were apparently not maintained in good condition and yields were low. According to Mark Duffy (ConsCom meeting notes of April 11, 1991), the last yield by the Lowell Cranberry Co. was only 1,000 pounds (10 barrels). It was clear that significant work would be required to return the bog to industry-standard production rates.

3.3 Current Uses of the Cranberry Bog (1986 – present)

The major uses of the Bog following purchase by the Town are for agriculture, passive recreation, and wildlife habitat. A small portion – on which Tenneco has an easement – is used for the transmission of natural gas via an underground pipeline. These are described below.

Agriculture

Currently, through a long term lease to a local farmer, Mark Duffy (operating as Carlisle Cranberries, Inc.), a major portion of the Bog remains reserved for agricultural uses. In total, there are approximately 40 bog acres associated with the cranberry growing operation. At present, one large series of beds (~19 acres) is in active cranberry production. Other portions of the leased area (~21 acres) are in renovation using a combination of mowing, sanding and weed control. Full renovation of the lower bog may not be feasible until cranberry prices – currently depressed – recover to economically attractive levels. This cranberry growing operation is the only one remaining in Middlesex County and remains the northernmost one in Massachusetts.

In 1987, the Town asked Pine duBois and Peggy Gallagher (operating as Feathers Farm, Inc., Bryantville, MA) to operate the Cranberry Bog. Their intent was to operate the bog organically. The wet harvest was started too late (November 8) and there was a heavy loss to frost as well as to pests. The distributor to whom the cranberries were sent sold the berries at a 20% discount because of the frost damage, and also assessed a \$1/barrel penalty to cover the cost of washing the berries which had not been properly detashed prior to delivery. Because of these and other problems, the Town chose not to continue its relationship with Feathers Farm.

In 1988, Carlisle signed a one-year lease for the operation of the Cranberry Bog with Frank Wojtas Jr. Mr. Wojtas had been the bog manager for many years until it was sold to the Town. His father had been the bog manager before him.

In May 1989, Carlisle signed its first long-term lease for the growing of cranberries at the bog with Mark Duffy, then and currently the lease holder of the farming operation at Great Brook State Park in Carlisle. The lease was for 10 years with Duffy having the

right to renew for an additional 10 years. The lease stipulated that, starting in 1996, the Town would receive 10% of the income from the cranberry growing operations. For technical legal reasons, this lease was considered improper, and a request for proposals for a new lease was advertised in early 1995. Carlisle Cranberries, Inc. (Mark Duffy, President) was again awarded the lease.

The current lease was initiated on June 13, 1995, and included an initial 10-year period with a right to extend the lease an additional 10 years (to June 12, 2015). A full copy of the lease is provided in **Appendix A** of this Baseline Assessment. Exhibit A of the lease is a Management Plan prepared by Carlisle Cranberries, Inc. It is provided separately in **Appendix B**. The lease defines an Agricultural Area, also called the Crop Production Area (see **Figures 3-1** and **3-2**), within which the primary farming operations may be carried on.* Within the Agricultural Area, the public is allowed use of the perimeter trails and dikes. The lease agreement does not require Carlisle Cranberries, Inc., to pay to the Town any portion of the revenues from the farming operations. Rather, it requires a payment in kind to consist of reconstructing, renovating and cultivating the Agricultural Area in accordance with an approved plan (see Appendix B), and to undertake other repairs of the Agricultural Area, including dikes and water control structures, as necessary. The lease also includes use of the ground and first floors of the Bog House. (The Town rents out the third floor to a tenant.) A security deposit of \$7,000 was also required. The lease also requires Carlisle Cranberries Inc. to report annually to the Town on chemical use and crop yields. See Appendix A for details on all these items.

Further Details on the Operations of Carlisle Cranberries, Inc.

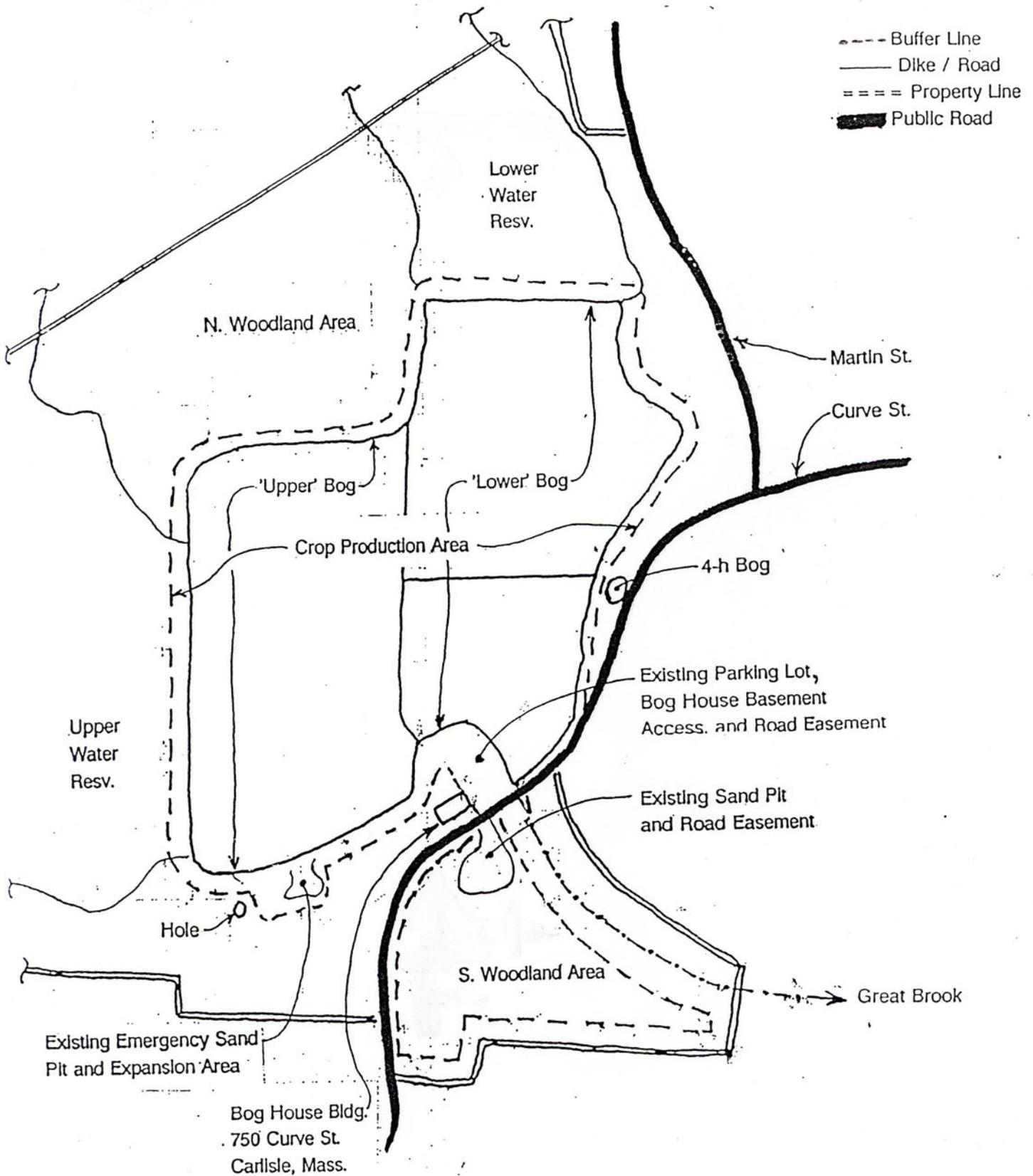
a. Methods used in growing cranberries

The upper bog currently contains two varieties of cranberries: Stevens (recently planted) and Howes (older plants). The lower bog used to have the Early Black variety. (See Figures 3-1 and 3-2 for location of bogs.) Fertilizers are applied by hand, and a variety of herbicides, fungicides and pesticides are used, with chemigation** being the most common application method (see **Table 3-1**). Integrated Pest Management techniques are used in deciding what chemicals are needed and when.

Two clusters of bee hives are kept at the bog, with the bees helping in the pollination of the cranberry flowers. The bees are kept at the bog through a cooperative arrangement with a local beekeeper.

* The lessee is allowed to use "...other adjoining land [outside the Agricultural Area] used in connection with or otherwise reasonably necessary or incidental to the maintenance, cultivation and harvesting of said bog, including existing sand pits, gravel, dikes, water supply and control structures and including the parking area northeasterly of and adjacent to the Cranberry Bog House and including so much of the Property as is reasonably necessary and incidental to provide access to the Crop Production Area for the purposes and uses which the Lessee is permitted hereunder; but specifically excluding the 4-H Bog."

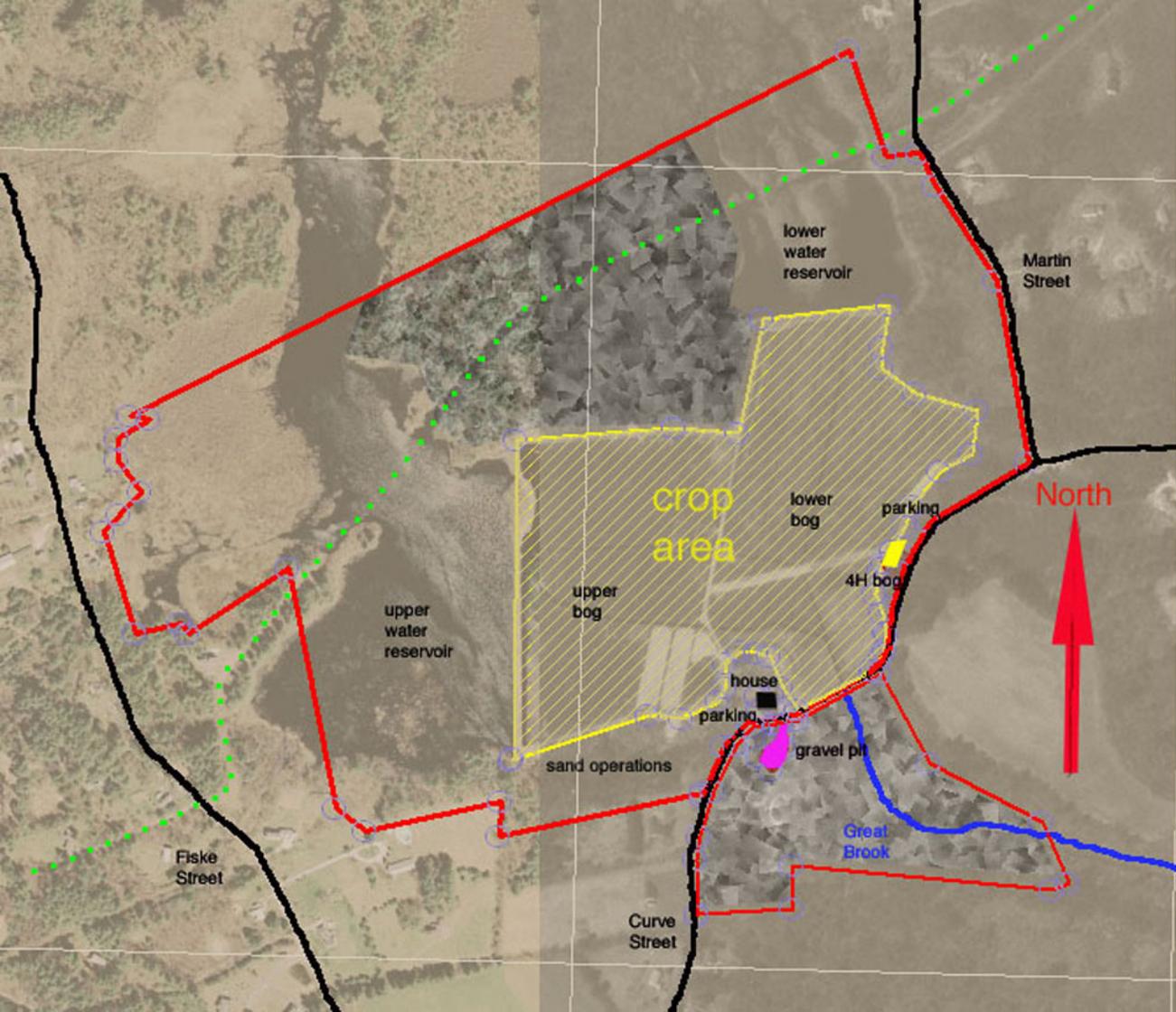
** Chemigation is the process of allying an agricultural chemical to the soil or plant surface with an irrigation system by injecting the chemical into the irrigation water. Most of the chemigation is done at night.



Source: Lease of Cranberry Bog to Carlisle Cranberries, dated June 13, 1995.

Town of Carlisle
 Bog Lease Drawing
 Steven W. Hinton
 nts 1 Jan 9, 1995

Figure 3-1. Defined Agricultural Areas Leased to Carlisle Cranberries, Inc.



Legend



wooded area



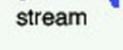
agricultural area



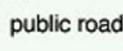
gravel pit



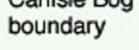
gas pipeline



stream



public road



Carlisle Bog boundary

North arrow is 1000 feet long

Carlisle Bog Use Map

Figure 3-2

T. Fohl May, 2006

Table 3-1. List of Herbicides and Insecticides Used by Carlisle Cranberries, Inc.: 2001 - 2006

Trade Name	EPA Registration Number	Purpose	Method of Application*
Bravo	50534-188-100	Fungicide	Chemigation
Devrinol 10G	10182-253-70506	Herbicide	Ground
Devrinol 50-DF	70506-36	Herbicide	Chemigation
Diazinon AG 500	34704-231	Insecticide	Chemigation
Ferbam	45728-7	Fungicide	Chemigation
Guthion	264-733	Insecticide	Chemigation
Kerb 50-W	707-159	Herbicide	Chemigation
Lorsban 4E	62719-220	Insecticide	Chemigation
Poast	7969-58-51036	Herbicide	Spot spray
Roundup	524-537	Herbicide	Wipe
Roundup Ultra	524-475	Herbicide	Wipe
Sevin	264--330	Insecticide	Chemigation
Sevin XLR Plus	264-333	Insecticide	Chemigation

* Chemigation is the process of applying an agricultural chemical (fertilizer or pesticide) to the soil or plant surface with an irrigation system by injecting the chemical into the irrigation water. "Wipe" means that the pesticide is wiped onto the target plant with an impregnated sorbent material (e.g., a sponge on the end of a stick).

Note: Not all of the chemicals listed are used every year. The chemicals used and the application rates are based on Integrated Pest Management methods.

Water is used for irrigation of the plants, chemigation, harvesting, frost protection, and winter kill protection. The latter two require flooding of the bog. As described below, the rights of Carlisle Cranberries, Inc. to use this water are legally protected.

The vast majority of the berries are harvested “wet”. This involves flooding the bog and using a special machine to beat the vines and free the berries which then float to the surface where they can be corralled with booms and collected. These berries are sold to a processor; the end products include such things as juices, jams and baked goods.

Prior to the ‘wet’ harvest, a very small amount of the best berries are usually dry harvested by hand and sold locally. Mr. Duffy has indicated that this is done mostly for “good will”, and to allow local residents to purchase part of the harvest. It is not done for economic benefit. No dry harvest was undertaken in 2006.

b. Cranberry yields

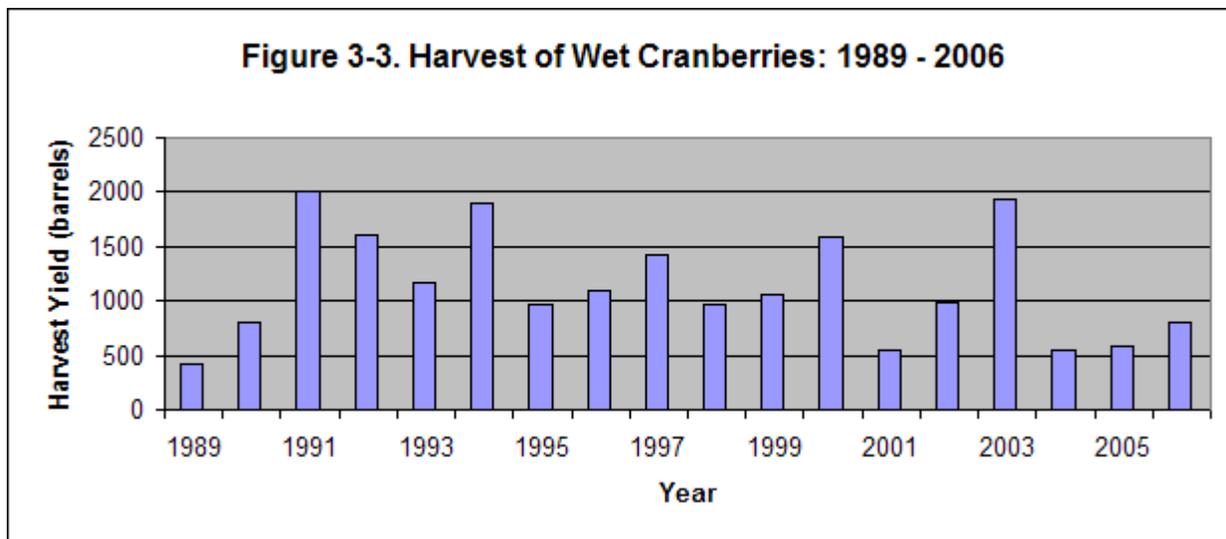
Available data on cranberry yields from the bog for the last 25 years are provided in **Table 3-2. Figure 3-3** charts the yields for the years the bog has been run by Carlisle Cranberries, Inc. The data are only for the harvest of wet cranberries. The yields of dry-harvested cranberries are not significant compared to the wet yield. Yields of wet-harvested cranberries have averaged about 1,200 barrels/year in the last sixteen years.

Table 3-2. Reported Yields of Cranberries from the Carlisle Cranberry Bog

Year	Yield (barrels)	Notes	Year	Yield (barrels)	Notes	Year	Yield (barrels)	Notes
1980	430.5	1	1990	800	2	2000	1,586.41	1
1981	88.55	1	1991	2,000	2	2001	541.56	1
1982	428.39	1	1992	1,601.07	1	2002	986.88	1
1983	1,303.76	1	1993	1,169.54	1	2003	1,937.00	1
1984	636.59	1	1994	1,901.53	1	2004	542.74	1
1985	454	1	1995	973.55	1	2005	586.79	1
1986	No data		1996	1,099.07	1	2006	798	5
1987	299.47	3	1997	1,423.84	1			
1988	10	4	1998	958.10	1			
1989	423	2	1999	1,051.45	1			
			Avg. for 1990-99	1,297.81		Avg. for 2000-06	997	

1. Source: Cranberry Marketing Committee, Wareham, MA
2. Source: Annual crop report from Carlisle Cranberries, Inc.
3. Source: Annual Report by Feather's Farm to Town
4. Source: ConsCom meeting minutes for 4-11-81
5. Source: Mark Duffy, personal communication (November 2006)

Note: Data from Cranberry Marketing Committee is for "wet" harvested cranberries.



This works out to 64.6 barrels/acre/year assuming the upper bog is 18.55 acres (USDA-GIS measurement). As can be seen in Table 3-2 and Figure 3-3, year-to-year yields can be quite variable, with the low and high yields being almost a factor of 4 apart.

On a year-by-year basis, the Cranberry Marketing Committee (an instrumentality of the U.S. Department of Agriculture) decides if restrictions need to be placed on harvests in order to support crop prices. In 2000, harvests were restricted to be 15% less than the average of the best four years in the prior six years. In 2001, the harvests were restricted to be 35% less than the average of the best four years in the prior seven years. However, due to the timing of deliveries, and tradeoffs with other growers, Carlisle Cranberries, Inc. was not required to dump any cranberries (as were some other growers). No restrictions have been set since 2001. No restrictions are expected in the future under normal conditions as a “super-majority” of the Committee’s board (vote by 11 of 14 members) is required.

The financial viability of the cranberry growing operation – while not known in detail for Carlisle – is known to be uncertain and perilous for Massachusetts growers in general. According to a spokesperson for the Cranberry Marketing Committee (April 2006), it generally costs about \$30 - \$35/barrel to grow cranberries, and recent prices have only paid the farmers \$28 - \$32/barrel. A further comment by the spokesperson (July 2006) indicated that cranberry farmers can make a profit with prices in the range of \$35 - \$40/barrel. Based on these comments, it is clear that few cranberry growers in Massachusetts are making a profit with the current prices.

c. Basic requirements of the 1995 lease

The 1995 lease to Carlisle Cranberries, Inc. has many requirements and the reader is referred to Appendices A and B for the details. Only the most basic requirements are mentioned here.

Section 4 of the lease states, in part, that: “The Lessee shall cultivate, maintain, manage and harvest cranberries from the Agricultural Area annually and shall take any and all steps necessary to maintain the status of the Agricultural Area as ‘land in agricultural use’ within the meaning of 310 CMR 10.04.”

Section 5 limits the lessees activities to the above-described Agricultural area, and requires the lessee to maintain undisturbed a buffer around the perimeter. The buffer varies in width from 20 feet to 100 feet, depending on location.

Section 6 requires rent in the form of in-kind payments. Details are given in Appendix B. Examples of the in-kind payments required are:

- Reconstruction, renovation and cultivation of the bogs in the Agricultural Area;
- Repair or replace water control structures, and maintain such;
- Improve existing dikes and install new dike to improve better water management;
- Install irrigation systems and maintain such; and

- Maintain or modify ditches, as necessary.

Section 10, covering insect, weed, disease and pest management, says: “The lessee shall use appropriate growing practices such as bog sanding, fertilization, insect, disease and weed control; and shall favor methods that minimize the use of toxic chemicals and shall use Integrated Pest Management techniques.”

Section 13 requires the lessee to provide an annual report to the Conservation Commission.

e. Other agricultural activities at bog

Carlisle Cranberries, Inc. operates a composting operation on the portion of the bog that lies on the east side of Curve St. Both manure and loam (a mixture of manure, peat and soil) are sold.

Outside of the Agricultural Area controlled by Carlisle Cranberries, Inc. is a small area (~40 – 50 foot diameter circle) that was once used by a local 4-H group for educational purposes. It has not been recently used, and is now becoming overgrown with young trees and shrubs.

f. Bog House

The lower two floors of the Bog House is used for storage of equipment used in the agricultural operations at the bog. (A small part of the second floor is used by the third floor tenants.) The third floor is used as housing under the terms of a three-year lease with the Town. Currently, the Conservation Commission is taking steps to make the apartment a permanent part of the bog lease to Carlisle Cranberries, Inc. The fourth floor (the eaves) is not used.

Water Rights

As described in Section 2, the Lowell Cranberry Co. had owned rights to waters from Heart Pond (in Chelmsford) and to control the flow of water between Heart Pond and the bog. When the bog was sold to Carlisle and Chelmsford, both Towns believed these rights were conveyed to them. However, according to the State’s Water Management Act (Massachusetts General Laws, Chapter 21G; passed in 1985) the Town must register its water use, with re-registration being required every 10 years. The current registration period expires on January 1, 2008. However, at the State’s request, the Town has already submitted (on January 30, 2007) the necessary forms to extend the coverage an additional 10 years from January 1, 2008 to January 1, 2018. The registration covers a surface water use of an average of 0.36 million gallons per day (MGD), or 131.4 million gallons per year (MGY). The registration covers water use for “cranberry production” in 40 acres of bog. According to Mark Duffy, this registration is the stronger basis for the water rights that Carlisle has for use of water at the bog. A copy of the Water Management Act

regulations is contained in the appendices to the *Chelmsford Carlisle Regional Conservation District - Land Use and Management Plan* (April 1990).

This registration is important, in part, to protect the water rights for the cranberry growing operations at the bog. In 1999, when Chelmsford proposed drilling six wells on the Chelmsford portion of the bog to extract 360,000 gallons per day for public water supply, Carlisle's registration (which had not been referenced in Chelmsford's documents) was an important factor in killing the project. The likely impacts on the wetlands and surface water flowage in both Towns were also a major factor. At the time this issue was being contested, Carlisle hired Francis A. DiLuna, Esquire, a specialist in water rights law with Roache, Carens and DeGiacomo. He submitted a memorandum report to the Carlisle Conservation Commission (April 13, 2000) which supported Carlisle's legal standing in its arguments against the proposed Chelmsford wells. However, with regard to the legal basis of the ownership of water rights from Heart Pond, he noted the following:

“On March 24, 1922, the Nickles Cranberry company, Inc. sold the Cranberry Bog land [and] other nonproductive lands to the Lowell Cranberry Company (see Book 658, Page 151). Included as part of that conveyance were ‘all water power, water privileges and flowage rights’ from Hart’s Pond. I cannot find an instrument that further terminates these rights. However, I have not conducted an extensive search to determine whether others also hold such rights making our [Carlisle’s] rights non-exclusive.”

Passive Recreation

The Cranberry Bog attracts a significant number of visitors for walking (often with their dogs), horseback riding, biking and fishing, and – in winter – cross-country skiing, snowshoeing, and skating. The trails (including dike roads) around the agricultural area afford beautiful vistas of fields, water and woods, and present a great diversity of wildlife: sun-loving wildflowers, turtles, deer, beaver and a diversity of birds that use the water, fields, wetland areas and forest habitats. The vistas during the fall cranberry harvest are especially pleasing; then, during the wet harvesting of the berries, one sees the floating mass of red berries being corralled and pushed to the conveyor which lifts them into a truck.

The trail system at the bog includes not only the dike paths and roads around the agricultural areas, but also trails through the woods, some leading into the Chelmsford portion of the bog area and some to Great Brook State Park (see Figure 1-4 in Section 1).

No estimate has been made of the number of people using the bog for passive recreation, but it is not uncommon to see all the normal parking spaces in use mid-day on a sunny weekend.

Wildlife Habitat

The bog has a great diversity of wildlife habitats available: ponds, streams, fields, woods, wetlands (woodland and marsh). The specific nature and value of these habitats have not been assessed in any rigorous manner beyond the two Biodiversity Day studies described in Section 4.6 (which involved species identification only). Two birdhouses have been placed on the property; they are maintained by Tom Brownrigg, former Conservation Commissioner. Details of the maintenance procedures used for these bird houses are provided in the Towle Land Baseline Assessment.

4-H Bog

A small bog area – separated from the Agricultural Area leased to Carlisle Cranberries Inc. – exists on the east side of the bog near Curve St. (See Figure 3-1.) It is roughly circular and about 30 – 40 feet in diameter. It is designated as the 4-H bog and was apparently used by that group in the past for educational purposes. No use has been made of this bog in recent years, and it is becoming overgrown with young trees and shrubs.

Natural Gas Pipeline

The Tenneco Gas Pipeline Co. owns a 50-foot wide easement across the Bog for its underground natural gas pipeline (see Figure 3-2). A portion of the trail system on the Bog follows this easement. The land along the easement is periodically cleared of tree growth by Tenneco. The last clearing was in the fall of 2001. Advance notice had been provided in August 2001.

If major problems arise with the pipeline, one of the following (24 hour) emergency numbers is to be called: 800-231-2800 or 713-757-4236.

4. Previous Planning or Other Study Documents

4.1 Introduction

This section presents a brief summary of other management plans, surveys, or habitat assessments that exist for the Cranberry Bog. Specifically covered are the following:

- *Chelmsford Carlisle Regional Conservation District – Land Use Management Plan* (April 1990), prepared by subcommittees from the Towns of Chelmsford and Carlisle, and funded by a grant from the State’s Executive Office of Environmental Affairs, Department of Environmental Management, Bay Circuit Program.
- *Conservation Plan for Cranberry Reservation, Chelmsford and Carlisle, MA* (April 1987), prepared by the U.S. Department of Agriculture’s Soil Conservation Service (SCS).
- *Management Plan - Carlisle Cranberries, Inc.* (June 1995), prepared by the current lessee, Mark Duffy (Carlisle Cranberries, Inc.), and made a part of the lease signed with the Town on June 13, 1995.
- Vernal pool investigation and certification (April 2006 certification)
- Biodiversity Days data (data from June 2001 and 2002 surveys)
- List of birds seen at the bog by Carlisle citizen Tom Brownrigg (1987 – 2006)
- Core Habitat and Estimated Habitat designations by the State’s Natural Heritage & Endangered Species Program (NHESP) (2001 - 2004)

4.2 Chelmsford Carlisle Regional Conservation district – Land Use Management Plan (April 1990)

Carlisle initiated work on a management plan for the bog within a month after the purchase, and it received a grant of \$4,160 from the Bay Circuit Program (in the State’s Executive Office of Environmental Affairs, Department of Environmental Management) to support the effort. Work in Carlisle was mostly undertaken by a subcommittee of the Conservation Commission. Later, after the State mandated the creation of a joint management district and the preparation of a “Cranberry Reservation Management Plan” (to be approved by the State), Carlisle’s subcommittee worked with a similar subcommittee from Chelmsford. An advisory consultant was also used.

In essence, the authors were preparing a plan for a joint district that did not yet exist, and for an agricultural operation that had fallen into some disarray and had no clear future.

Initial drafts of a Plan were issued in February and June of 1988, with more complete versions (with revisions) coming in March 1989, and January and April of 1990. The changes made between these different drafts or versions are not described here. Only the final April 1990 version, which was accepted by Carlisle at its 1990 Annual Town Meeting, is described. Because the joint management district never came into being, and because Carlisle now has a successful cranberry growing operation going, the Plan has limited value to current management issues.

The Plan's recommendations regarding the joint management district - its organization, functions and financial management - are moot and are not discussed here.

The Plan's recommendations on Maintenance are considered to be pertinent. They are summarized below (with editing to remove district-related components).

- Boundary Marking – Boundaries should be posted every three to five years.
- Trail Maintenance – The existing 8,500 linear feet of trails should be periodically inspected and maintained, as necessary.
- Trash Removal – Trash receptacles should be maintained at access points, and regular trash pickup scheduled.
- Emergency Vehicle Access – The Police and Fire Chiefs should conduct an annual trail inspection. Emergency access areas should conform to minimum public safety standards to allow for unobstructed access for emergency vehicles.
- Cranberry Bog and Water source Maintenance – Lessee to be responsible for all maintenance of the bog and waterways. Periodic inspections by Town.
- Parking Areas – Parking areas should be evaluated with recommendations for improvements.
- Woodland Areas – Consult with wildlife biologists and professional foresters, including the district forester, for the purpose of reviewing forest management practices. Management practices will be for the primary purpose of wildlife habitat maintenance and enhancement.

The Plan included a site-specific list of Rules and Regulations that incorporates many of the standard rules and regulations issued by ConsCom, but adds a few others to clearly state what public uses would (and would not) be allowed to protect the agricultural operations from damage, and to protect the public from harm.

The Plan recommended the following capital improvements (district-related items excluded):

1. Development of a new trail from the gas line in Carlisle to connect with an existing trail in Chelmsford. (Done.)
2. Improve parking at entrances using municipal work crews and equipment. Work to include grading, trimming of brush and signage. (Partially done.)
3. Install permanent signage providing information about the bog (Done.)
4. Produce trail maps to be made available to the public. (Done.)
5. Erect wood duck nesting boxes as per the SCS Conservation Plan (Not done.).

The Plan also suggested:

- Pursuing opportunities for educational programs at the bog (e.g., on cranberry production, bog wildlife and plants), and opportunities for cooperating with Great Brook State Park;
- Undertaking a thorough investigation of projected impacts of any additional uses of water, water rights, or waterways of the bog; and
- That the Bay Circuit Program acquire other properties in the area that would provide linkages between the bog (in Chelmsford and Carlisle) to support the development of a bicycle path on the so-called Lowell-Sudbury Rail Trail.

Section III of the Plan (“Cranberry Bog”) provided the following: (1) suggested procedures for entering into a lease with a private operator (to grow cranberries); (2) requirements of the grower for the operation of the bog; and (3) capital improvements to be undertaken by the lessee. This material is now moot as Carlisle has gone through this process. See Section 3 of this Baseline Assessment for details.

Appendix B of the Plan is comprised of the Soil Conservation Service “Conservation Plan” described in Section 4.3 below.

4.3 Conservation Plan for Cranberry Reservation, Chelmsford and Carlisle, MA (April 1987)

In 1986, at the request of Carlisle and Chelmsford, the U.S. Department of Agriculture’s Soil Conservation Service (SCS) undertook a study of the bog areas in Chelmsford and Carlisle. The resulting SCS Plan, delivered in 1987, presents the following:

- Inventories of the soil, plant, water, and wildlife resources;
- A conservation plan map; and

- A narrative record of the decisions made by the Bog Subcommittee regarding use, management and land treatment.

Soil, Plant, Water and Wildlife Resources

Soils found on the site were classified into four general categories; their locations are shown in **Figure 4-1**. The soil groups are defined as follows:

Yellow - Sand and Gravel: Soils formed in deep deposits of glacial outwash of sands and gravel. These areas exhibit rapid permeability and retain low amounts of water for plant growth. Slopes vary from flat to 8% over most of the property. Access roads and trails can be safely constructed in these areas. Most of these soils support a mixed stand of black and white oak and white pine.

Red – Wetland Soils: Soils formed in low areas which have a water table near or over the surface most of the year. The surface soil is mucky which may vary from one to many feet deep. Slopes vary from flat to less than 3%. Many of these areas border streams and water impoundments. Wetness limits the recreational uses of these areas. Red maple and white pine are the predominant tree species that grow on these sites.

Brown – Stony Till and Bedrock: Soils formed from very stony glacial till deposits. Areas of exposed bedrock occur throughout. These areas exhibit moderate to rapid permeability and retain low amounts of soil moisture. Slopes vary from 8 to 15 percent. Trails and access roads can be developed on these soils, but the limitations imposed by stones, bedrock and the moderately steep slopes must be overcome. Most of these soil areas support poorly developed stands of hardwood. An understory of white pine occurs throughout the area.

Blue – These are areas of open water and deep and shallow fresh marsh.

Plant resources on the site were classified into four woodland types and five wetland types; their locations are shown in **Figure 4-2**. The Plan noted the following:

“The hardwood stands are of low timber quality. Certain forestry practices could be applied to favor the growth and production of white pine and enhance upland wildlife habitat. The wetland areas support a mixed growth of trees, shrubs, forbes*, and hydrophilic plants. These areas provide food and cover for many species of birds and mammals.”

Water resources within the 2,300 acre watershed leading to the bog (Curve St. outlet) are generally described and shown in **Figure 4-3**. The watershed extends to the west-northwest as far as Routes 110 and 495 in Westford. The drainage area is quite flat and ample storage of runoff water is available in the many wetlands and depressions in the

* Forbe: any herb that is not a grass or grasslike.

Figure 4-1. Classification of Soils for the Chelmsford-Carlisle Bog

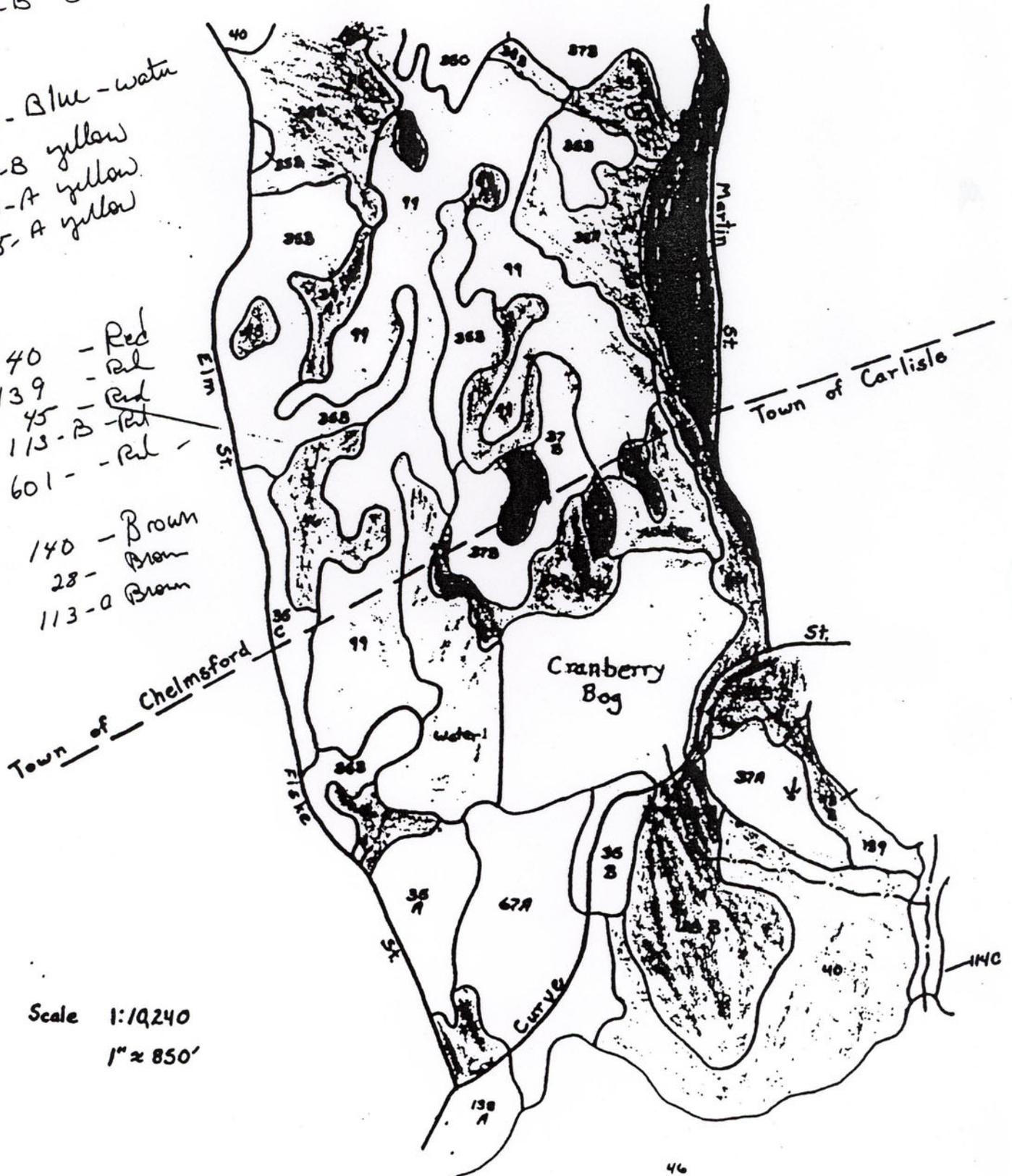
Source: Conservation Plan for Cranberry Reservation, prepared by the Soil Conservation Service, April 1987.

38-B - green
138-B - green

99 - Blue - water
35-B yellow
67-A yellow
35-A yellow

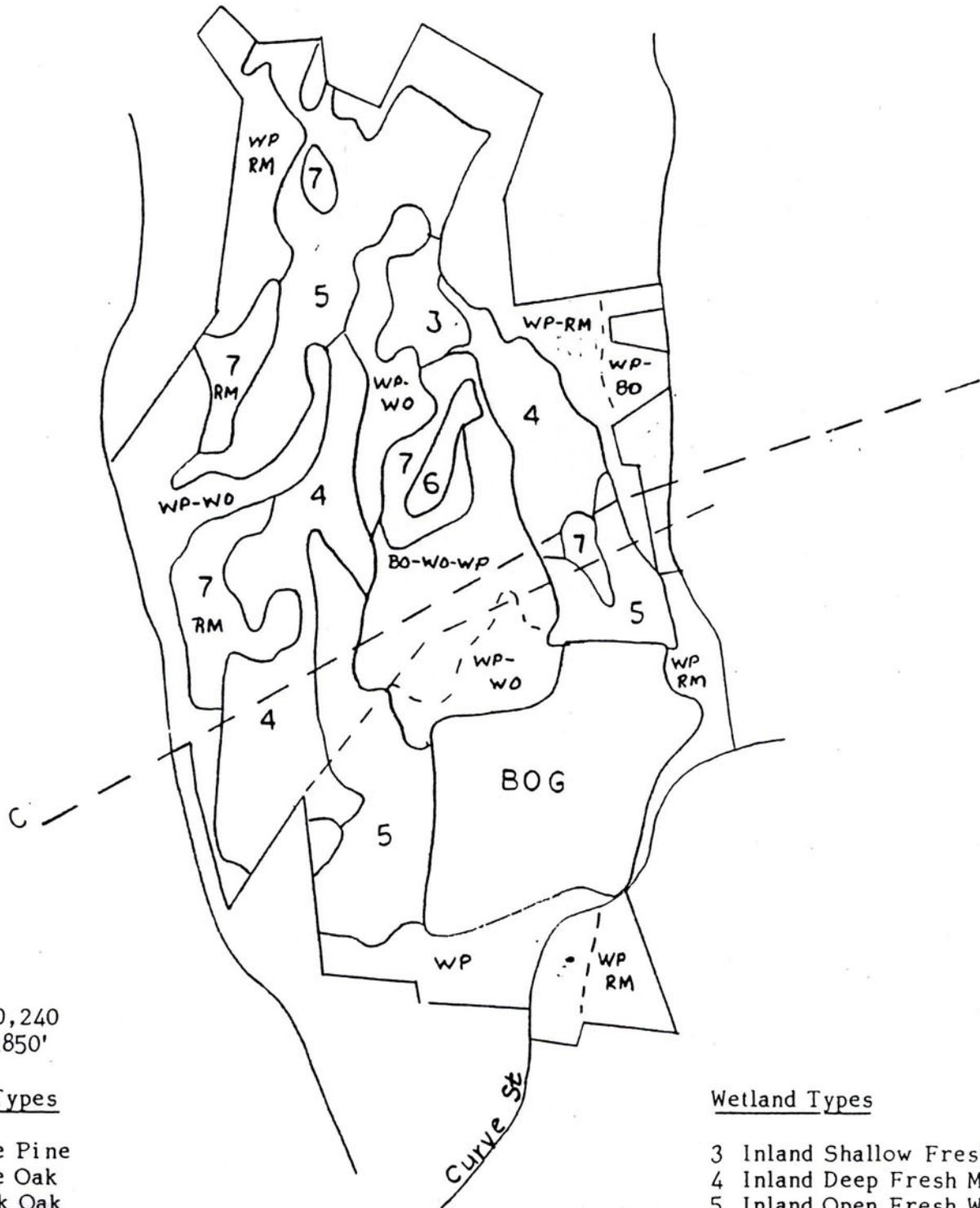
40 - Red
139 - Red
45 - Red
113-B - Red
601 - Red

140 - Brown
28 - Brown
113-a Brown



Scale 1:10240
1" = 850'

PLANT RESOURCES



Scale 1:10,240
1"=850'

Woodland Types

- WP White Pine
- WO White Oak
- BO Black Oak
- RM Red Maple

Wetland Types

- 3 Inland Shallow Fresh Marsh
- 4 Inland Deep Fresh Marsh
- 5 Inland Open Fresh Water
- 6 Shrub Swamp
- 7 Wooded Swamp

Source: Conservation Plan for Cranberry Reservation, prepared by the Soil Conservation Service, April 1987.

Figure 4-2. Plant Resources for the Chelmsford-Carlisle Bog



Source: Conservation Plan for Cranberry Reservation, prepared by the Soil Conservation Service, April 1987.

Figure 4-3. Water Resources in the Bog Watershed Area

watershed. Stream flows were said to be “quite steady and continual except during severe drought periods.” The peak 100-year storm is estimated to be less than 500 cubic feet per second.

Wildlife resources were not specifically inventoried. The Plan simply notes that a number of birds (duck, hawks, herons) and tracks of other animals (fox, deer, raccoon, rabbit and squirrel) were seen. The Plan further notes that the bog provides a good diversity of surface water, wetland, woodland and bog habitats.

Conservation Plan

As a part of the record of decisions regarding recommendations for management of the bog reservation, a conservation plan map was prepared. It is provided in **Figure 4-4**. The narrative portion of the Conservation Plan provides specific recommendations for five areas: (1) the Cranberry Bog; (2) recreation land and woodland; (3) wetland wildlife land; (4) headquarters area (i.e., the Bog house); and (5) the sand pit. The complete text of this narrative is provided in **Appendix C** of this Baseline Assessment.

Other Plan Contents

The SCS Plan also contains the following:

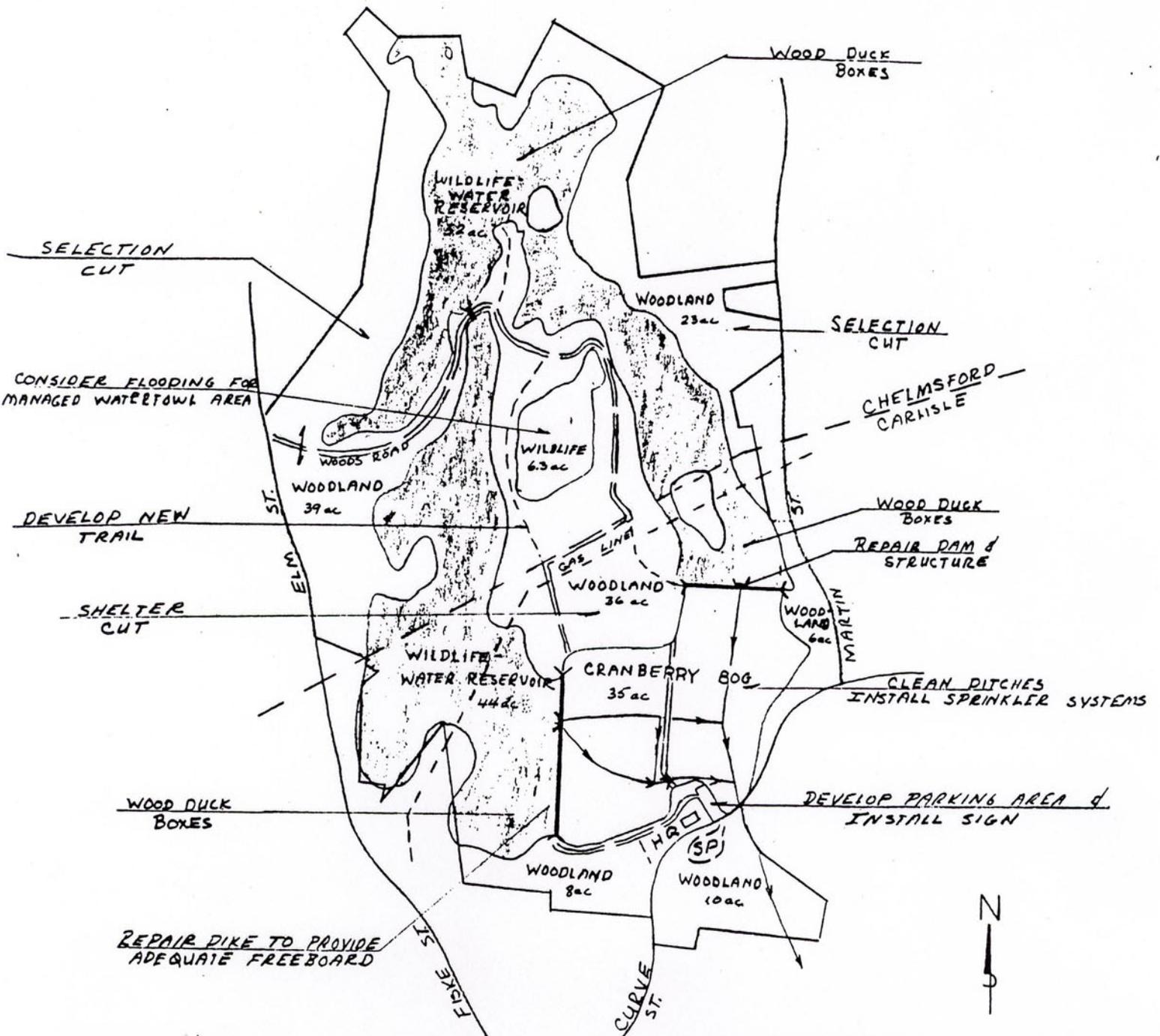
- A listing and detailed description of the types of soils found at the bog (14 p);
- Forestry practice definitions (1 p);
- A discussion of the laws affecting the control and use of water in Massachusetts (12 p); and
- Miscellaneous generic guidance documents on such topics as woodland management, soil conservation, planning and constructing trails, wildlife ponds, wood duck nesting boxes, etc. (43 p).

4.4 Management Plan – Carlisle Cranberries Inc. (June 1995)

As a requirement of obtaining a lease for the operation of the Cranberry Bog, Carlisle Cranberries, Inc. produced a Management Plan. This document became a part (Exhibit A) of the lease signed by the Town and Carlisle Cranberries, Inc. in June 1995. A complete copy of this Plan is included in **Appendix B** of this Baseline Assessment. Some details were discussed in Section 3.2.

The major portion of this Management Plan is a detailed description of the in-kind payments (e.g. repairs, improvements and maintenance of the bog) that Carlisle Cranberries, Inc. agreed to provide in lieu of any rent or percentage of revenues payments. A full copy of the Management Plan is provided in Appendix B of this Baseline Assessment. The 24 specific topics covered in the Plan are listed below.

CRANBERRY RESERVATION



SCS-CONS-16
OCTOBER 1974

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Source: Conservation Plan for Cranberry Reservation, prepared by the Soil Conservation Service, April 1987.

Figure 4-4. Conservation Plan Map Prepared by the Soil Conservation Service

- Lower Bog
- Improved Diking
- Irrigation Systems
- Water Use
- Ditches and Canals
- Flumes, Dikes and Dams
- Fertilizer, Herbicide and Pesticide Use
- Sand and Gravel
- Electricity and Telephone
- Pollination
- Rebuilding bogs
- Structures
- Vines
- Mowing
- Harvesting
- Signs and Notices
- Fencing, Gates
- Tree and Brush Removal
- Wildlife
- Operational Hours
- Equipment
- Public Access
- Bog Stripping
- Bog Management Goals
(as necessary)

4.5 Certified Vernal Pool

In February 2006, Tom Brownrigg, Carlisle citizen and former member of the Carlisle Conservation Commission, submitted a “Vernal Pool Field Observation Form” to the State’s Natural Heritage & Endangered Species Program (NHESP), Division of Fisheries and Wildlife. The observations, made in April 2002, described the aquatic species found in a vernal pool at the bog with approximate dimensions of 400 ft (length) × 75 ft (width) × 1 – 3 ft (depth), and located about 600 ft WSW of the Bog House and 350 ft west of Curve St. The location was shown in Figure 3-1 (marked as “hole”). The location is also shown on a map attached to the submittal. Also attached to the form were photographs of spotted salamander egg masses, fingernail clams, chironomid midge, planorbis snail, and an isopod that were found in the pool.

In April 2006, NHESP provided official certification of the vernal pool. It is designated as Certified Vernal Pool # 3934. This certification affords the pool special protection under the Wetlands Protection Act and other State environmental regulations. Originals of the submittal and the official certification are maintained in ConsCom’s files in Town Office.

4.6 Data from Biodiversity Days Surveys

Naturalists have surveyed the Carlisle Cranberry Bog to identify the diversity of living flora and fauna on three dates so far: June 9, 2001, June 1, 2002 and June 8, 2006. Data for the first two surveys are currently available. These efforts have been part of the Biodiversity Days Program initiated by the State’s Natural Heritage and Endangered Species Program (NHESP). Almost all cities and towns in Massachusetts participate in this volunteer effort to develop and keep an inventory of the flora and fauna in the State. All of the data on the species identified are available at the following web site: <http://maps.massgis.state.ma.us/Biodiversity/BDResults.htm>. Data from the third survey (June 8, 2006) – which was to focus on dragonflies (leader: Susan Emmons) – will be added to the data base at a later date.

A complete list of the species found at the Cranberry Bog may be found at the web site listed above. However, the site does not list the location for any species considered as Rare, Endangered, Threatened, Special Concern or Watch List. The number of species found by class is as follows:

Amphibians – 4	Grasses, Sedges & Rushes - 10
Aquatic plants – 1	Insects - 5
Bees and wasps – 2	Mammals - 3
Birds – 37	Mushrooms - 12
Butterflies – 12	Reptiles – 2
Dragonflies – 20	Spiders & ticks - 1
Ferns & fern allies – 10	Trees & shrubs - 36
Flies – 6	Wildflowers – 80

4.7 Brownrigg’s List of Birds Seen at Bog

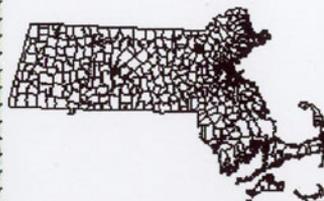
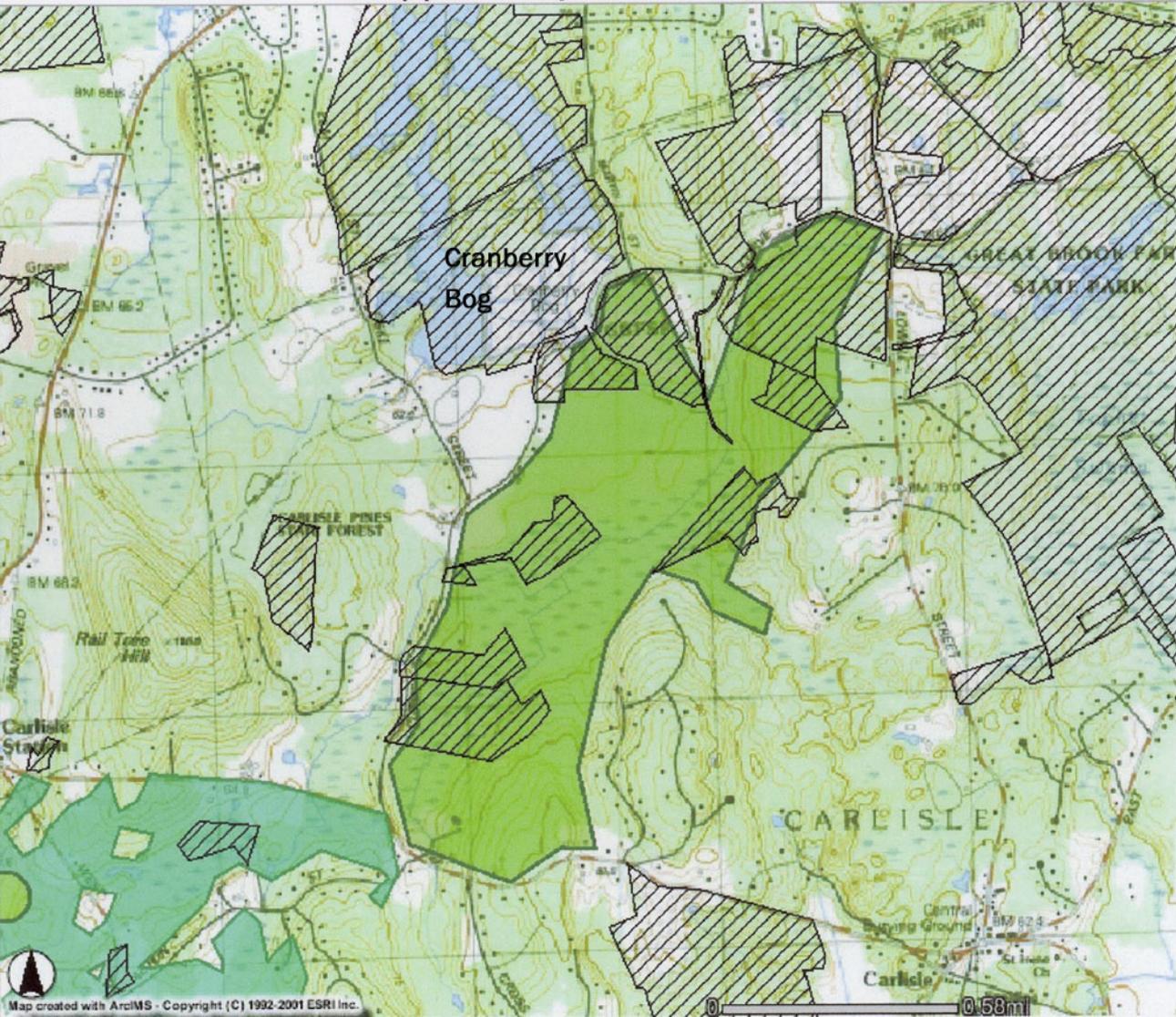
Tom Brownrigg is an avid birder who maintains a list of birds seen in Carlisle, by area or conservation parcel. The list of birds he has seen at the Cranberry Bog – covering the period from 1987 to May 2006 - is provided in **Appendix D**. Two lists are actually provided, the first covering only the Carlisle portion of the bog (129 species), and the second covering the combined Chelmsford-Carlisle bog area (138 species).

4.8 Core, Priority, and Estimated Habitats Designated by NHESP

Core Habitat

The Natural Heritage & Endangered Species Program (NHESP), a part of the Massachusetts Division of Fisheries and Wildlife, has designated one portion of land in northwestern Carlisle as a Core Habitat for two species of *Special Concern* (defined below): Blue-spotted Salamander and Spotted Turtle. The Core Habitat ID is C532; the location is shown in **Figure 4-5**. The northernmost portion of this Core Habitat includes a portion of the Cranberry Bog property that lies south of Curve Street. Nearly half of the Core Habitat area is riparian habitat, including small streams and bordering forested wetlands. A depiction of the Core Habitats in Carlisle may be found at <http://maps.massgis.state.ma.us/BIOMAP>. A general description of the NHESP may be found at <http://www.mass.gov/dfwele/dfw/nhESP/nhbiomap.htm>.

The State’s work on Core Habitats, often referred to as the BioMap project, was completed in 2001. The goal was to identify and delineate the most important areas for the long-term viability of terrestrial, wetland, and estuarine elements of biodiversity in Massachusetts. In this program, Core Habitats represent habitat for the State’s most viable rare plant and animal populations and include exemplary natural communities and aquatic habitats. In the BioMap program, rare species are categorized as either Endangered, Threatened or of Special Concern. Special Concern species have suffered a decline that could threaten the species if allowed to continue unchecked or occur in such small numbers or with such restricted distribution of specialized habitat requirements that



- Legend**
- Surrounding States
 - Permanently Protected Open Space
 - BioMap Core Habitat
 - BioMap Supporting Natural Landscapes

Figure 4-5.
Core Habitat
Area Near
Cranberry Bog

they could easily be come Threatened in Massachusetts. There are no regulatory restrictions for lands that are designated as Core Habitat.

Priority and Estimated Habitat

Figure 4-6 shows a NHESP-designated Priority Habitat (PH 874) that appears adjacent to the southern border of the Cranberry Bog property. The identical area is also a NHESP-designated Estimated Habitat (EH 258). It is assumed, but not confirmed, that the rare species of interest for this Habitat are the wood turtle and blue-spotted salamander. The habitat shown in Figure 4-6 is from the 12th edition of the Massachusetts Natural Heritage Atlas, and became effective October 1, 2006.

Priority Habitats are not protected under the Massachusetts Endangered Species Act, but the rare species that use the habitats are protected by that law. Priority and Estimated Habitats are defined in NHESP as follows (see: <http://mass.gov/mgis/wethab.htm> and <http://mass.gov/dfwele/dfw/nhesp/nhenvfaq/htm>):

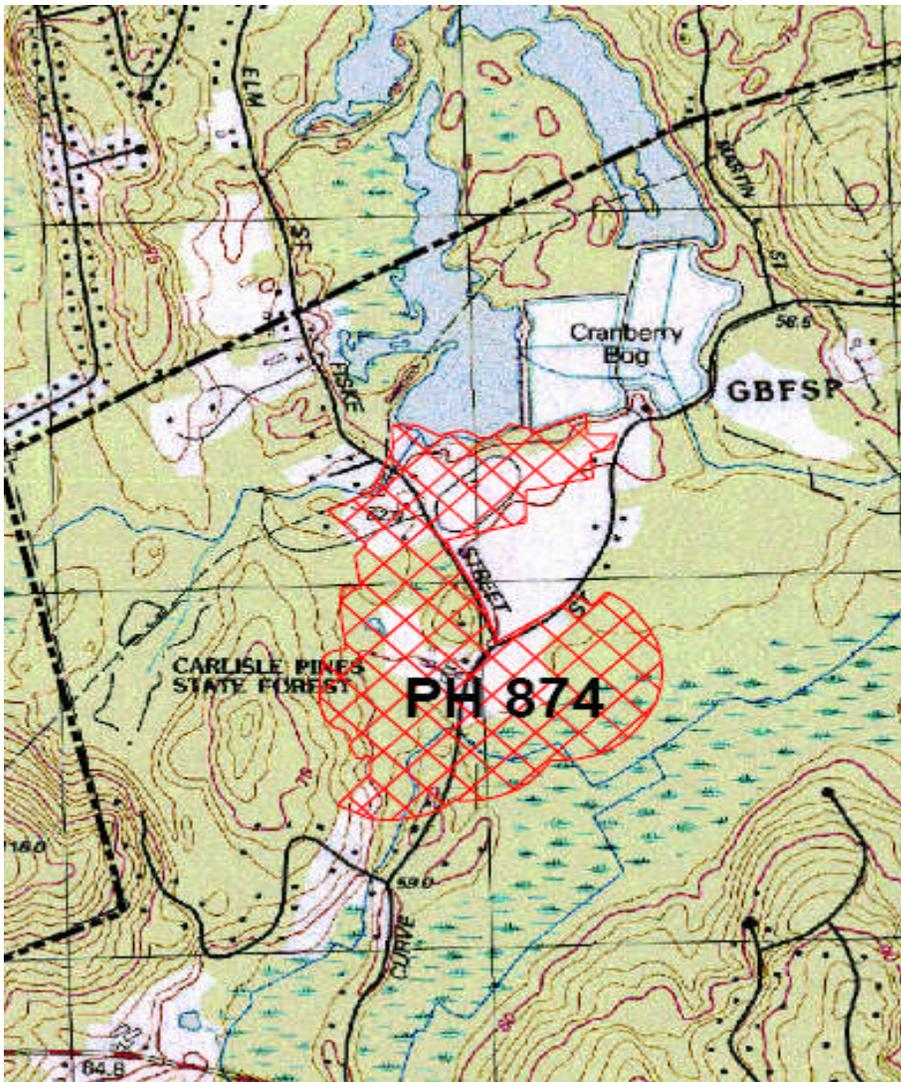
“The Wetlands Protection Act does not protect state-listed rare plants, but rare plants are protected pursuant to the MA Endangered Species Act (MESA compliance). Priority Habitat is the known geographical extent of habitat for all state-listed rare species, both plants and animals. Habitat alteration within Priority Habitats may result in a take of a state-listed species, and is subject to regulatory review by the Natural Heritage & Endangered Species Program (NHESP). Priority Habitat maps are used for determining whether or not a proposed project must be reviewed by the NHESP for MESA compliance.

Estimated Habitats are a sub-set of the Priority Habitats that show the geographical extent of state-listed rare wildlife (no plants). State listed wildlife species that use wetland habitats are protected under the Massachusetts Endangered Species Act as well as the Wetlands Protection Act.

The Estimated Habitats of Rare Wildlife datalayer consists of polygons representing estimations of the habitats of state-protected rare wildlife populations that occur in Resource Areas.* These habitats are based on rare species records maintained in the NHESP’s database.

NHESP scientists draw estimated habitats by analyzing population records, species habitat requirements, available information about the landscape (particularly from topographic maps and wetland inventory maps), as well as through personal observations. Most habitat sites are not visited prior to the drawing of these Estimated Habitats. Estimated Habitats are not equivalent to Resource Area delineation. These Estimated Habitats are designed for use with

*The definition of “Resource Area” (Area Subject to Regulation) is included in the Wetlands Protection Act Regulations (310 CMR 10.02(1)).



Legend

 NHESP Priority Habitats for Rare Species

Figure 4-6. Priority Habitat # 874 near Cranberry Bog

the Wetlands Protection Act Regulations (310 CMR 10.00). Projects that are subject to the Wetlands Protection Act and that fall within Estimated Habitats of rare wildlife require the filing of a Notice of Intent form with NHESP.”

As noted in the quotation above, there is a regulatory aspect to the designation of an area as an Estimated Habitat.

Additional NHESP Information – Blandings Turtle

In October 2006, a Carlisle citizen submitted a Rare Species Observation Form for the Blandings Turtle (*Emydoidea blandingii*) to NHESP based on observations at the Cranberry Bog in the summer of 2004. NHESP responded that the report has been accepted and will be entered into their rare species database.

5. Maintenance and Current Condition of the Property

5.1 Categorization of Areas in the Cranberry Bog

The Cranberry Bog has both working agricultural functions and passive recreation functions which impacts the conditions at the bog and are geographically intertwined. But since the agricultural activity, and portions of the Bog House, are governed by a lease that includes maintenance requirements on the part of the lessee, it would be helpful to partition the statement of conditions as much as possible along these lines. Therefore, the following categories will be used to describe the maintenance and current conditions of the Cranberry Bog:

Agricultural Areas

- Water control structures associated with the Agricultural Area including ditches, dikes, flumes, and the pump house
- Irrigation equipment
- Agricultural safety signs and structures
- Composting area

Cranberry Bog House

- Interior (First, second, third and fourth floors)
- Exterior

Non-Agricultural Areas

- Parking
- Bog road
- Woodlands
- Educational, trail and property signs
- Wildlife Habitat
- Trails

5.2 Agricultural Areas

Water Control Structures Associated with the Agricultural Area

The ditches are periodically dredged and are of sufficient depth to allow adequate flow except during the very rainy periods. At these times, portions of the cranberry beds flood. The beds in renovation are usually more prone to this than the productive beds because of the direct actions of the current lessee to protect the cranberry plants during the growing season. The extent to which the beds flood is substantially governed by the flow volume from the flumes. The natural activities of the beavers in Chelmsford, combined with the failure (Summer 2006) of the weir in Chelmsford that directly feeds the water supply to the upper reservoir in Carlisle, has impeded the lessee's efforts to control the volume of

water that passes through the upper reservoir during periods of heavy rainfall. (The wier in question was replaced in August 2006.) (See photos in Appendix E, 1.6-1.9)

The flumes that control the lower reservoir outflow are newer and are in good condition. As of the Summer of 2006, the two flumes that controlled the upper reservoir outflow which supplies the productive cranberry beds, were much older and in poorer condition. The flume closest to the pump house had deteriorated to the point of sidewall failure and – during periods of high water flow - water from the reservoir circumnavigated it and slowly drained uncontrolled, causing the collapse of the dike area around that sidewall and allowing the dike material to drain into the flume well. During the late fall of 2006, the lessee eliminated the flume closest to the pump house and replaced the 2nd flume. (see photos in Appendix E 1.1, 1.3 – 1.5 and 1.11 – 1.12)

The dikes are in relatively good condition. There are several areas that may require attention. The dike of the lower reservoir slightly seeps onto the adjacent Bog road in one spot. The dike on the east side of the productive cranberry beds near the flume, slightly slumped for a distance of approximately 35' and was overlaid with a black geotextile fabric and 5" of medium sized, round stone. One side of that same area slumped again in two small spots and has been repaired. (See photos in Appendix E, 5.1 – 5.2). The dike of the upper reservoir has several areas of erosion that have narrowed the top of the dike and exposed the underlying geotextile fabric.

The top of the dikes also serves as the Bog road and is the only means of access over land to the reservoirs and agricultural fields. This road is comprised of a combination of sand and rock in various proportions along the road. Although the grade is uneven in some areas and consequently puddles form, it is always passable for farm equipment. (See photos in Appendix E, 5.3 – 5.5)

The Bog pump is still housed in a truck box with a chain-link fence guarding the sliding trailer door. The sliding trailer door has recently been replaced because the lack of alignment between the trailer and the chain link fence caused a gap to form that was wide enough to allow access into the pump house when the sliding door was open. The pump trailer was painted a shade of green that is now peeling and totally missing in some areas. (See photos in Appendix E, 1.2 and 1.10)

Irrigation Equipment

The maintenance of this equipment is fully under the auspices of the lessee and operational control of it can only be exercised by the lessee. However, the part of the sprinkler system that abuts the Bog road incorporates diffusers to limit the reach of the spray to just the cranberry filed thus protecting passersby. These diffusers function well for the most part but are either missing or not properly adjusted in a few spots and consequently the road is doused with whatever is being ejected from the sprinkler system. Considering that various herbicides and pesticides are being used and this road is often frequented by visitors to the Bog, the proper functioning of the diffusers is important and warrants regular attention on the part of the lessee.

Agriculture Safety Signs and Structures

The one Carlisle Conservation sign that specifies the agricultural rules is at the entrance to the Cranberry Bog on the east side of the Bog house and is visible and in good condition. However, the majority of visitors to the Bog never see this sign as it is one of the lesser used entrances. (See photo in Appendix E 3.1)

Except for the above mentioned sign, there are no other permanent signs that alert the public to the fact that pesticides are used in the agricultural areas. When pesticides are used, a small, temporary (paper) notice is apparently posted on the kiosk located on site. However, since this kiosk is not at an entrance and it faces away from the nearest walkway, the notices are seen by few visitors.

The sign that identifies that there are honey bees at work is in front of the hives located on the north side of the productive cranberry field and is in good condition. The wall of green netting (electric fence) that is meant to divert the bees over the heads of people is in good condition but it is not quite high enough to totally insure that people are not stung. There are no signs to warn the public of the bee hives kept near the sand pit on the east side of the bog. (See photo in Appendix E, 3.2) This other batch of hives is also surrounded by an electric fence.

Composting Area

The composting area, which is seldom visited by the public, is an active and currently unofficially accepted part of the cranberry bog operation. The nature of producing compost requires the use of heavy equipment and some odoriferous materials. Care should be exercised to not operate the equipment at inconsiderate hours or pile the manure too closely to the surrounding residential dwellings. Another concern is the management of water run-off, especially during periods of heavy rainfall. The current retaining structure governing the main outlet to the area is in need of repair. Interestingly, this area is apparently attractive to birds because of abundant insects, seeds, berries and surrounding tree cover. On October 2, 2006, a birding group identified over 25 species of birds at this site.

5.3 Cranberry Bog House

Introduction

On March 23, 2007, an inspection of the interior of the Bog House (750 Curve St.) at the Carlisle Cranberry Bog was undertaken by three members of the Land Stewardship Committee (Debby Geltner, Lynn Knight and Warren Lyman) and the Town's Conservation Administrator, Sylvia Willard. The inspection tour was led by Mark Duffy. The inspection had been requested by the Land Stewardship Committee as part of its efforts to prepare a Baseline Assessment (BA) for the Cranberry Bog property. Previous investigations for the BA had focused on the Cranberry Bog land and the exterior of the Bog house. The material in this report will be added to the Cranberry Bog BA.

As a historical reminder, the Bog House – built in 1905 – has always been a part of the farming operations at the Cranberry Bog, with portions of the four-story building being used for the storing or processing of produce (e.g., cranberries, squash), the storing of agricultural equipment, and as living space for agricultural workers. All four floors of the building were inspected. These floors consist of the following:

First floor: Agricultural equipment storage

Second floor: Small apartment and – in separate area - agricultural equipment storage

Third floor: Apartment

Fourth floor: Unused, but contains old cranberry boxes and bed frames

Both the second and third floor apartments are currently occupied.

The exterior of the Bog House had been previously inspected. The addition of gutters along the entire roof would greatly aid in protecting the stone foundation, siding and windows. The white trim paint is flaking off and the window sills are in danger of rotting. (See photos in Appendix E, 2.1 – 2.5)

Bog House Leases and Maintenance Responsibilities

First and Second Floors

The 20-year lease of the agricultural portions of the Cranberry Bog to Carlisle Cranberries, Inc., (Mark Duffy, President), includes use of the first and second floors of the Bog House. This lease expires in June, 2015. Section 4(D) of the lease contains the following text regarding uses of the area:

“The Lessee's use of the ground and first floors of the Cranberry Bog House is limited to storage of equipment and materials and such other activities as are reasonably necessary for, or customary and usual in the conduct of the activities permitted in the Agricultural Area pursuant to this Lease.”

Section 8(D) of the lease describes the maintenance responsibilities:

“The Lessor shall be responsible for the maintenance, repair and upkeep of the Cranberry Bog House, excluding utilities; provided, however, that the Lessee shall be liable for any damages to the Cranberry Bog House caused by the Lessee, normal wear and tear excepted. The Lessor shall have reasonable access to the Cranberry Bog House for carrying out the purposes of this section.”

Carlisle Cranberries, Inc., is required by Section 6(B) of the lease to pay rent in kind by reconstructing, renovating and cultivating the agricultural area at the Cranberry Bog

Third Floor

At present, the third floor apartment is covered by a separate lease to Mark Duffy. The three-year lease technically expired on March 31, 2005. However, a one-year extension

to March 31, 2006, was verbally agreed upon. The Conservation Commission is working to revise this lease so it will, in the future, be made a part of the lease of the agricultural areas of the Cranberry Bog to Carlisle Cranberries, Inc. Section 8 of the lease for the third floor apartment says the tenant is responsible for all maintenance except for “ordinary wear and tear and damage by elements and fire...” The tenant also pays for all utilities. In lieu of rent, the tenant provides significant in-kind services related to maintenance and improvements to the interior and exterior of the Bog House. During the most recent 3-year lease period, the value of the in kind services was estimated (prior to the work) to be worth \$28,659.

Floor Plan Schematic

A schematic diagram for the second and third floors is provided in **Figure 5-1**.

Utilities

The Bog House is supplied with electric, telephone and cable service. All electric service comes from a single service (breaker) box on the second floor. (See Figure 1) Within the living areas, heat is supplied by a combination of wood pellet stoves (one per apartment) and electric baseboard heat. The storage areas of the Bog House are not heated. Water is supplied from a driven-point well in the ground floor of the building. Water going to the third floor must traverse two unheated floors which is a potential problem on very cold winter days. A septic system for the Bog House is reportedly behind the building.

Description and Condition of Bog House Interior

First Floor

Description: The first floor is below grade on the north, west and south sides. It is comprised of one room that has a dirt floor, stone-and-mortar walls that form the foundation of the building and a partially completed (approximately 60%), unpainted-drywall ceiling. At the joint between the ceiling and the uneven surface of the stone walls, there is evidence of pink insulation. There are large, wooden ceiling joists and beams running east to west. These joists and beams are supported by posts some of which have multiple knee braces. Midway along the north wall is a defunct brick chimney with a cleanout. There is an interior staircase located against the east wall that leads to the apartment on the second floor. The space is occupied by numerous pieces of past and currently used farm equipment and parts, an unusable furnace, a boat and various building materials. This room also contains a driven-point well. There are no volatile chemicals or pesticides stored in this area. There are no smoke detectors located on this floor. The access to the outside is through a wide sliding door on the east side of the building that is secured with a padlock.

Altogether, there are 12 small windows on the 1st floor. On the east side there are two glass-paned windows in the sliding door and two louvered windows in the foundation. The west side has four small windows, two of which are louvered as on the east side and

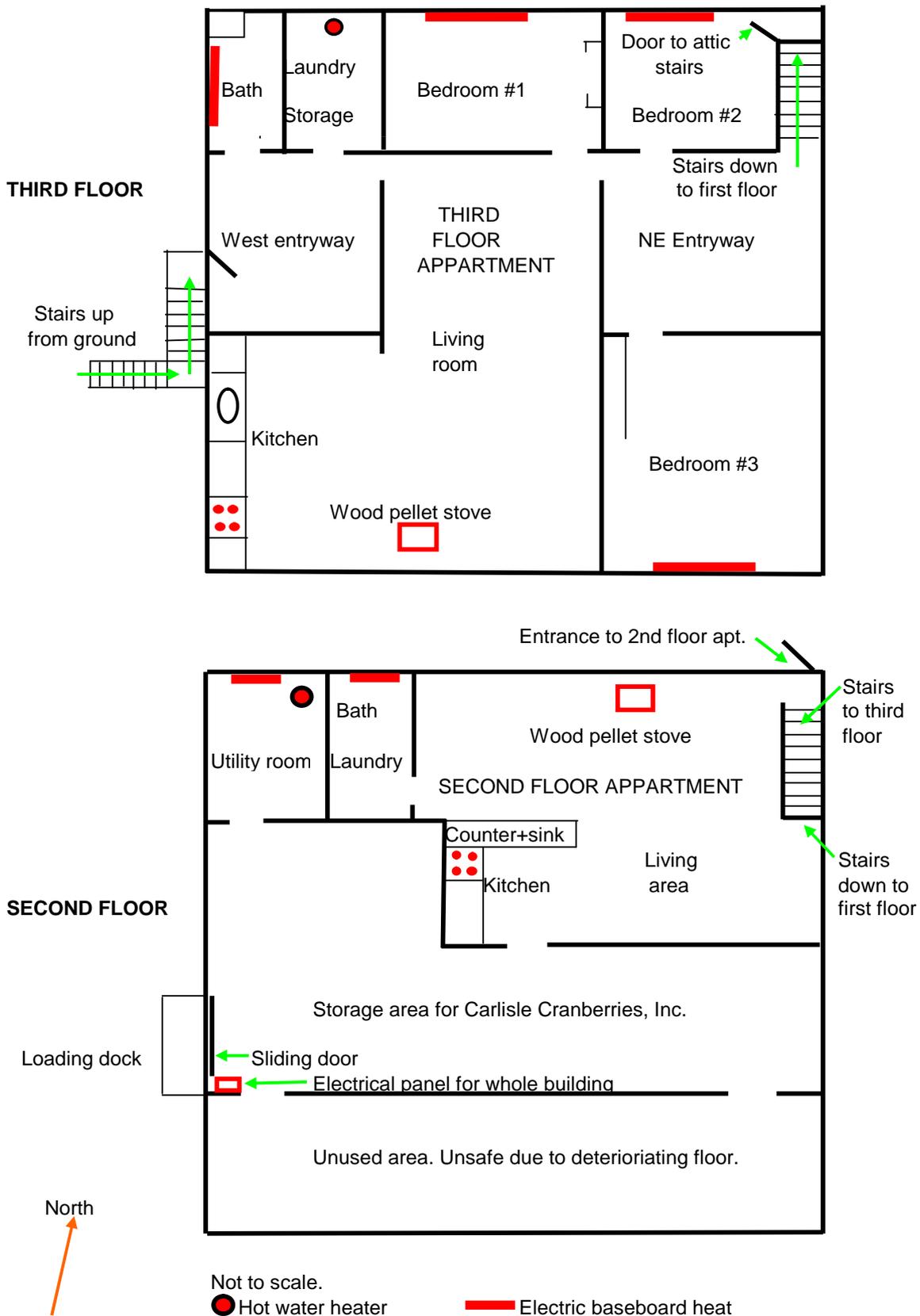


Figure 5-1. Schematic Diagram of Second and Third Floors of Bog House

two that are boarded up. The two glass-paned windows on the north side are covered with wire mesh. The three glass-paned windows on the south side are covered with metal grid-work. [Appendix F, Photos 1.1 – 2.6]

Condition: This floor is of vital importance to the lessee of the Cranberry Bog because of the storage capacity it provides for agricultural equipment. For the most part it is quite serviceable but there are several conditions that should be noted. The edge of the drywall ceiling abutting the unfinished portion is water damaged and probably the reason for the missing ceiling. There is water seepage through the stone foundation walls, especially along the western side. The chimney cleanout is rusting with visible water lines extending down the bricks. These conditions combined with a damp, dirt floor allow for excess humidity to build up in this area.

The stairs leading to the second floor do not have any railings but are probably rarely used and are close enough to the foundation wall to allow a hand hold. The glass in the windows on the south side is broken but the metal grid-work prevents intrusion by people or large animals. The only light for the room is the natural daylight from the windows which is insufficient for safely lighting the entire interior.

Second Floor

Description: The second floor houses an apartment on the north end of the building, an adjacent utility room and two storage rooms. The main storage room is in the center of the building extending east to west and the secondary storage area is on the southern end and it also extends east to west. Access to the apartment is through an exterior door on the north side, an interior door in the main storage area and stairwells from the first and third floor. The utility room can only be accessed through the main storage area. A padlocked sliding door with an imbedded swinging door is the only exterior entrance to the main storage area. The secondary storage area does not have an exterior entrance but is accessed via two interior doors in the main storage area.

The apartment has an open floor plan with two rooms. The kitchen, living/bedroom area and eating/office area are in one large room with a bath/laundry in the other smaller room. The floors are painted wooden planks or decoratively painted plywood. The walls are either painted drywall or wood paneling. The ceiling is drywall bisected in the center by a wooden beam running east to west and a post with knee braces. There are six glass-paned windows, one in the bath/laundry room, two on the north wall of the larger room and three on the east wall of the larger room. The eating area has a pellet stove on a heat-resistant platform surrounded by a metal fence. The bathroom has a fiberglass tub/shower unit, a sink set in a vanity, a toilet, an electric baseboard heater, a ventilation fan and washer/dryer hookups. There are ceiling fixtures in each of the functional areas and three task areas. The kitchen is partially separated from the eating area with a half wall and contains a sink, electric stove, a small refrigerator, a separate small freezer, and upper and lower cabinets. There is one smoke detector in the larger room. [Appendix F, Photos 3.1 – 3.9]

The utility room contains a hot water heater for the second floor apartment. The exterior walls are comprised of horizontal wooden boards and the interior walls are unpainted drywall. The floors are unfinished, wooden planks. This room has a small, electric baseboard heater under the window. Painting supplies are stored in this area to keep them from freezing.

The main storage area is contained under the third floor within the body of the four-story section of the Bog House. The ceiling is the underside of the third floor with insulation batting between the joists that run north to south between multiple beams. These beams are supported by posts with knee braces. The floor is comprised of unfinished, wide, wooden planks. The walls are both old wood-lath and plaster or horizontal, wooden boards. This area has a total of four glass-paned windows, two on the east side and two on the west side. The daylight from these windows is the only light source. The electrical panel for the entire Bog House is located next to the sliding door. This space stores old furniture, cranberry-harvesting equipment, ladders, cases of honey, beekeeper supplies and miscellaneous building materials. There are no volatile chemicals or pesticides stored in this area. There is one smoke alarm.

The secondary storage area is not contained within the main four-story structure and is under a separate, slightly-angled roof. The ceiling is exposed joists with no insulation. The walls and floor are wooden planks. This room has ten glass-paned windows with two each on the east and west sides and six on the south. This space is used to store old wooden chairs, cranberry-sorting equipment, ladders, screens, sprinkler heads, cranberry boxes and miscellaneous building supplies. There are no volatile chemicals or pesticides stored in this area. There are no smoke alarms. [Appendix F, Photos 4.1 – 4.8]

Condition: This floor provides additional essential storage facilities for the operation of the cranberry bog but is not fully usable either because of the conditions related to the structure or excess items left over from previous tenants. The restricting structural element is the secondary room floor that is dangerously rotted. Other conditions that should be mentioned are that the main storage room ceiling insulation is detached and deteriorating in numerous places and the smoke detector in the main storage area does not contain a battery.

Third Floor

Description: The third floor houses a multiple room apartment that is comprised of a west entryway, a bathroom, a laundry/storage room, a large living room/dining room/kitchen area, three bedrooms and a northeast entryway. Access to the outside is through the west entryway that leads to a new, exterior staircase, and through the interior staircase of the northeast entryway that leads to an exterior entrance on the north side of the second floor. The second floor entrance is shared with the second floor apartment.

The west entryway has an antique, wooden double-door and metal latch plus a modern deadbolt lock. The floor is unfinished sheets of a wood-chip composite. The walls are a combination of drywall and wood paneling. Light for this area comes from one window

or a single, overhead, uncovered light bulb. Next to the light is a smoke detector. This entryway leads to the bathroom, laundry room and main living area.

The bathroom occupies the northwest corner of this apartment. It has a linen closet, a fiberglass tub/shower unit, a toilet, a sink set in a vanity, and an electric baseboard heater. There is an additional, portable space heater by the toilet. Ventilation is from the two windows, one on the west wall and one on the north wall. The walls are painted drywall with a natural wood baseboard. The floors are covered with linoleum. There is task lighting over the sink and a GFCI outlet next to it.

The laundry/storage room is adjacent to the bathroom and houses an unfinished closet, a laundry tub, a washer and dryer, a hot water heater, and shelves on two of the walls. The floor is unfinished, wooden boards. Three of the walls and the ceiling are covered with painted drywall. There are plans to cover the unfinished fourth wall with pegboard. A window on the north wall provides some light during the day but there is no ceiling fixture to supplement the daylight or provide light at night.

An L-shaped area constitutes the living room/dining room/kitchen area occupying the center of the apartment and the southwest corner. The ceiling is painted drywall that is bisected in the middle with a beam and post that go from east to west in line with the edge of the dining room/kitchen section. The floor for the living room/dining room is divided along the same axis as the ceiling beam with the interior half comprised of painted sheets of a wood-chip composite and the other half of finished, wooden floorboards. The kitchen floor is covered with linoleum tiles. The walls are mostly painted drywall with a portion of the east wall in the dining area covered with wood paneling. The south wall and a small portion of the west wall also have painted, bead-board wainscoting topped with chair rail molding. All the walls and windows are trimmed out with either painted or natural wood. In the middle of the south wall on top of a stone platform, sits a pellet stove with its pipe that vents through a stone covered section of the wall to an exterior, metal chimney. A substantial amount of natural daylight comes in from three windows on the south wall and two windows on the west wall. There are three overhead, uncovered light bulbs for general, artificial illumination. There is a fluorescent fixture over the sink for task lighting. The kitchen area contains a refrigerator/freezer unit, several upper and lower cabinets, a sink, a dishwasher, a stove and a built-in corner cupboard. This room provides access to the three bedrooms and northeast entryway. There is an operating smoke detector on the support post.

The first bedroom is directly off the main living area in the middle of the north side. The walls are painted drywall and the floors are painted, composite-flake board. There is one window and one ceiling light fixture. There is an electric baseboard heater on the outside wall. There are no closets in this room.

The second bedroom is located adjacent to the east wall of the first bedroom and accessed from the northeast entryway. Access to the attic on the fourth floor is through a door in this room. The ceiling and walls are painted drywall with painted wood trim. There is a decorative border midway up on some of the walls. The floors are painted plywood.

There are no closets in this room. There is one window on the north wall with an electric baseboard heater under it. One centrally placed ceiling fixture provides additional light.

The third bedroom is also off the northeast entryway on the southeast side of the building. This room has finished hardwood floors and walls covered with a combination of painted drywall and bead-board wainscoting topped with a chair rail molding. There is a full-height, bead-board partition which creates a closet/dressing area along three-quarters of the interior north-south wall. A bare-bulb ceiling fixture provides evening illumination. Two of the three windows are on the east side and the third is on the south side. All three windows have painted wood trim. An electric baseboard heater is located under the window on the south side.

The northeast entryway is between the second and third bedrooms on the east side of the apartment with a stairwell that descends along the east wall to a second floor exterior door on the north side. There is a glass-paned door at the top of the stairwell. The floors are decoratively painted plywood with painted baseboards. The walls and ceiling are painted drywall with painted wood trim. The stair treads are also decoratively painted. Natural daylight enters the room through a single window on the east wall and through the door leading to the stairwell. There is no other form of illumination for the room. There are two smoke detectors on the ceiling. [Appendix F, Photos 5.1 – 5.13]

Condition: Given all the improvements made by the lessee over the years, the third floor apartment is a very valuable asset that enhances the lessee's ability to economically operate the Cranberry Bog. This apartment has the ability to house several people, either living as a family or as independent individuals, which gives the lessee flexibility in selecting the most suitable tenant(s). While there are still improvements to be made, this apartment makes an acceptable abode.

The list of improvements includes:

- West Entryway – air seeps through a hole in the antique door; floor is unfinished; ceiling light bulb is exposed
- Bathroom – uncovered hole in the ceiling with capped wires; loose control knob in linen closet; uncovered light bulbs over sink area
- Kitchen – stove area is not vented to the exterior; ceiling fixtures are uncovered light bulbs
- Bedroom #1 – window trim is missing; possible mildew odor
- Northeast Entryway – Stairwell door is glass-paned and can not be secured; smoke alarms do not have batteries; the stairwell does not have a railing

Fourth Floor

Description: The fourth floor or attic is the space directly under the gable roof that was originally used to house workers and consists of five rooms; four bedrooms and a central storage area. Some of the bedrooms have doors. The low-pitched ceiling is old wood-lath and plaster with exposed collar ties and purlin braces. The floor is unfinished, hardwood planks. There are a total of six windows, three in each of the end walls with two of the

three being 18” off the floor and the third one located at the top of the gable. These windows provide the only light for this floor. This space is currently occupied by old, metal bed frames, boxes of household items, old furniture, numerous wooden boxes, wooden boards, loose insulation rolls, and debris. [Appendix F, Photos 6.1 – 6.7]

Condition: The attic can only be accessed through a bedroom on the third floor and currently is not used. In general, this floor is not in good condition considering that some of the window trim is missing, the old ceiling is stained and deteriorating, the walls have multiple variable sized holes and there is a considerable amount of clutter.

Photographic Documentation

Photographs from the March 23, 2007, inspection of the Bog House are included in **Appendix F** of this Baseline Assessment.

5.4 Non-Agricultural Areas

Parking

The parking areas are not evenly graded or paved, and puddles form in many areas after rainfalls. The parking areas are not identified or well demarcated allowing visitors to creatively park however they see fit. The amount of this kind of casual parking is limited to approximately 15 cars. Due to the lack of well marked parking areas combined with the recent increased popularity of the Bog partially stimulated by the parking fees instigated by the state at Great Brook State Park, unsafe parking situations arise. (See photos in Appendix E, 4.1 – 4.5)

Bog Road

This road – on which only farm vehicles are allowed - is frequented by the public on foot at all times of the year and in all kinds of weather. It is a popular destination for dog owners, horseback riders, bicyclists, hikers, nature lovers, cross-country skiers and fishermen from Carlisle and surrounding towns. The primary means of access to all parts of the Bog is the Bog road.

The ruts in the road, combined with overflow from some of the adjacent pools, sometimes make the road slippery and difficult to navigate in some areas. The overflow from the pools causes some deterioration of the Bog road. (See photos in Appendix E, 5.3 – 5.5)

Over the past year there have been repairs to the Bog road using medium sized round stones. This material is not very conducive to foot, hoof or small-wheel traffic such as bicycles, wheelchairs and strollers because of its tendency to give way under a small amount of weight. Since the Bog road is also intended to be used by the public, a more suitable material or combination of materials needs to be used for these repairs. (See photos in Appendix E, 5.1 – 5.2)

Both the Bog road and shoulders are often littered with dog droppings, especially near the entrances along Curve Street. There are two doggy bag dispensers at the Bog that are meant to aid visitors in cleaning up after their dogs. One is located at the head of the parking lot on the west side of the Bog house near a trash can and the other is midway in the parking area along Curve Street. The addition of a second trash can this summer by the second doggy bag dispenser has alleviated the tendency of the public to leave the used doggy bags at the foot of that dispenser.

Woodlands

There are three areas of woodlands at the Bog that are accessible by foot; the woods along the northern border where the Tenneco easement runs, the woods between the lower reservoir and Martin Street, and the strip of woods between the southern border of the Bog and the southern edge of the sand pit and the newly verified vernal pool. All of the woodland areas are intersected by trails.

The woodland areas along the northern border and Martin Street are more frequently visited. The northern woods trail forms a loop and there are scenic vistas. The Martin Street woods provide access to the Bog road. There is no evidence of people leaving the trails and traversing through these woods, discarding trash along the trails, or building campfires. There are several large trees that were toppled by the harsh winter storms of 2005-06. One of these fallen trees in the northern woods now blocks an informal path out to one of the vantage points overlooking the upper reservoir. There is one very large white pine near the northern woods' upper reservoir trail entrance that is slowly splitting down the length of the tree between the two main trunks. The ultimate natural demise of this tree will impact the trail system and possibly the bee hive area. (See photo in Appendix E, 6.1) There is a natural rate of attrition of trees in both woodland areas due to normal forest progression. An above normal loss of trees is occurring within a small area of the northern woodland. In a 50' wide band along the shore of the lower reservoir, both saplings and larger caliper trees are being felled due to the constant effort of the beavers to block the lower reservoir flumes.

The southern strip of woods is closer to Carlisle dwellings and is primarily used by these inhabitants. The trail does not form a loop but serves only as access for the residents visiting the Bog. There are a few infringements by these neighbors; the creation of an opening in the stone wall on the southern Bog border, some litter, a tree house and a boat.

Educational, Trail and Property Signs

There are five permanent educational signs about the Cranberry Bog history and operations that are structurally sound but are beginning to fade from the effects of the sun. The sign on the north side of the productive cranberry field is sometimes inaccessible because it is surrounded by shallow water. (See photo in Appendix E, 7.1) During the cranberry harvest the lessee posts a temporary sign informing the public not to pick the cranberries and where they can be purchased.

There is a large bulletin board located along the Bog road next to the Bog house that is in good condition but the educational posters that were placed on it years ago have deteriorated to the point of no longer being readable. (See photos in Appendix E, 7.2 – 7.3)

There are two small signs that encourage visitors to clean up after their dogs. They are located at the parking area by the Bog house and at the beginning of the Bog road that enters from Curve Street. Both are fairly new and in good condition.

There is a blank sign at the entrance closest to Martin Street. This sign is temporary in that it is not embedded into the ground but is supported by “feet”. It is in good condition but currently serves no purpose.

There are currently no trail signs on the main portion of the Cranberry Bog (west of Curve St.). Good trail signs exist on the portion east of Curve St., e.g, the Otter Slide Trail and trails connecting with Daniel’s Lane and Hart Farm Rd. In the spring of 2007, the Carlisle Trails Committee plans on erecting a few trail signs that will direct visitors to the trails leading into Chelmsford.

There are two main property signs for the Bog. One is located at the parking area on the west side of the Bog house and the other is at the Bog road entry along Curve Street. The sign along Curve Street fell from the support posts this past spring and was temporarily repaired. The face of this sign was originally painted to cover some of the extraneous print but that paint is now peeling. A third property sign is located on the woodland trail at the Chelmsford-Carlisle boundary on the north side of the Carlisle Cranberry Bog that marks the boundary and identifies the area as Carlisle Conservation Land. This sign is bent and contains a minor typographical error. (See photos in Appendix E, 7.4 – 7.5)

Wildlife Habitat

Only modest efforts have been made to map, categorize and/or evaluate the diversity of wildlife habitats at the Bog. Included are: (1) The Conservation Plan (1986) by the Soil Conservation Service; (2) the Biodiversity Days surveys (June 2001 and 2002); (3) the bird list by Tom Brownrigg (1987 – present); (4) the investigation (2002) and certification (2006) of one vernal pool, also by Tom Brownrigg; and (5) the designation of Core Habitat and Estimated Habitat areas – for select salamanders and turtles – by the Natural Heritage and Endangered Species Program (NHESP) (2001 – 2004). No assessment has been made of invasive plant species at the Cranberry Bog.

Two birdhouses at the Bog – constructed by Tricia Smith – are currently maintained by Tom Brownrigg. Details of his maintenance activities are described in the Towle Land Baseline Assessment.

Trails

The main trails are the Bog road and the trails in the three woodland areas described above. The condition of the Bog road has been noted above. The trails in the woodlands are in good condition with the exception of a fallen tree across one of the vantage point trails in the northern woodland and the tendency of the Martin Street trails to remain muddy after it rains.

The Carlisle Trails Committee currently maintains over forty miles of trails in Carlisle, including those on the Cranberry Bog. There is no set maintenance schedule for each of the trails although they maintain a list of those sections that have been recently checked or cleared as they progress through the seasons. Members walk much of the system on a regular basis to inspect as well as enjoy the trails. Special efforts are made to check major trails after large storms. When normal trail maintenance (brush cutting and branch removal) is required for a particular area, it is scheduled at their monthly meeting. E-mail messages are sent out to their list of volunteers and notices put in the Carlisle Mosquito if time allows. On maintenance days, crews are sent out in groups to the selected areas. For a small task, members often take care of the issue themselves as the need is noticed. For a number of years, they had the benefit of having Bob Eaton, a licensed arborist and gifted ropes expert, on their team.

Each of the seasons has its share of work that fits into the Trails Committee's management schedule:

Winter: Activities include cutting and removal of trees that fall along the path to keep trails open for skiing, tobogganing heavy materials into remote sites, planning, manufacture and painting of signs for trails, mapping and charting with GPS when the foliage is out of the way, and planning for the rest of the year.

Spring: The time before the foliage and bugs arrive in mid April is the best time to do major clearing jobs that require cutting and trimming of branches along the trail.

Summer: Heavy spring rains may require trimming of new growth along trails. Mowing in sunny areas and in open fields needs to be done at this time. The Committee has purchased a DR trimmer to help with this.

Fall: Boardwalks and other major projects are completed at this time when the ground is the most stable and the bugs are not biting.

Major projects such as the creation of new trails or boardwalks require months of planning. Ideally, the Trails Committee would take over a year to plan a new trail so that it can be marked and observed through the seasons to check for optimal location. The year allows the Committee to check for land drainage, to identify particular features such as views or plants that would want to be highlighted along the trail, and to finish any permitting that may be required.

5.5 Photographic Documentation

Appendix E of this Baseline Assessment contains a number of photographs – taken between December 2005 and August 2006 – that document the current condition of the Cranberry Bog. The Cranberry Bog files in Town Office contain a few other historic photographs. Included are:

- “Bog Purchase” file – Approximately 34 photos, most undated but some dated 1985 (2 dated 1991), showing the fields, roads, dikes, building, and harvesting. Several show the site to be not well maintained.
- “Bog – Handwritten Notes” file – Eight photos from November 1985 showing the cranberry harvest.
- “Bog – Road Complaints” file – Eight photos of the newly-constructed road and dike. The illegal fill material is shown in the photos.

As mentioned above, photographs documenting the Bog House conditions (mostly the interior) in March 2007 are shown in **Appendix F**.

6. Problems and Issues to be Addressed in the Management Planning Process

6.1 Past Issues and Problems

A review of the files in Town Office identified a number of issues, large and small, which have arisen since the Town purchased the Cranberry Bog. The issue of finding a qualified and dedicated farmer to operate the Cranberry Bog is not covered here as the current lease goes until 2015.

Past problems and complaints regarding the whole bog property have covered the following:

- Farming operations, including:
 - Identification of chemicals used, water amounts used, and cranberry yields obtained;
 - Maintenance of the berms, dikes (erosion and mowing) and water control structures;
 - The use of demolition debris in the construction of a new dike (see below);
 - The placement of bee houses (too close to walkways);
 - The excavation of soils (on the east side of Curve St.) below the water table and the stockpiling of soil at that location;
 - The use of a truck body to house an irrigation pump;
 - The noise level (and time of operation) of the irrigation pump; and
 - Compliance with annual reporting requirements.
- Dog and horse residues left on walking and skiing paths;
- Beavers;
- Bog House (maintenance and leasing);
- Water rights, especially those impacting Heart Pond (Chelmsford) and Chelmsford's possible rights to use some of the water in the watershed;
- Chelmsford's use of an herbicide (Sonar®) to control invasive plants in Heart Pond in 1995 and 2005;
- Illegal use of snowmobiles; and
- Illegal night-time parties.

Many of the items listed above remain as issues or problems today. Some are discussed in Section 6.2 below.

In 1994, Carlisle Cranberries, Inc. – as part of its approved management plan – created a new dike across the lower bog. However, it was noticed that demolition debris (primarily concrete) was included in the fill in violation of State rules. In April 1994, Carlisle Cranberries, Inc. was sent a notice of possible violation of Wetlands Protection Act regulations. After protracted investigations and discussions between the Town, the State,

and Carlisle Cranberries, Inc., the State issued (in July 1996) an order for removal of the demolition debris. This work was completed by August 1996. The State further imposed a penalty of \$1,000 and required the Town to create an “outdoor environmental education program”. This latter requirement resulted in the Town designing and installing the five informational signs that currently exist along the pathways around the bog.

One issue that is beyond local control is the price of cranberries, i.e., the price paid by handlers or processors to the cranberry farmers of Massachusetts for their wet-harvested crops. Recent drops in the prices paid have put severe financial strain on many cranberry farmers, and this could result in reduced maintenance of bogs, reduced renovation of bogs, and the closing of some bogs. Carlisle needs to maintain awareness of these conditions, and be prepared to take action if the operation of its bog is threatened.

6.2 Issues to be Considered in Formulating a Management Plan

The following items or issues will need to be considered in formulating a management plan for the Cranberry Bog property:

- | | |
|-------------------------------|--|
| - Farming operations | - Invasive species |
| - Bog House | - Signs and displays |
| - Water rights | - 4-H bog |
| - Cooperation with Chelmsford | - Maintenance of woodland trails |
| - New trails | - Woodland production |
| - Parking areas | - Forest management |
| - Dog control and droppings | - Wetland management for
Wildlife habitat |
| - Beavers | - Emergency vehicle access |
| - Bird houses | |

Each of these is briefly discussed below. In addition, the Land Stewardship Committee should review and consider the several management recommendations included in the *Chelmsford Carlisle Regional Conservation District – Land Use Management Plan* (April 1990) (see description in Section 4).

Farming Operations

As noted above, there are many issues that can arise with a large, complex farming operation such as presently takes place at the bog. And aside from unanticipated events which will need attention, the lease contains a large number of requirements for the farmer, including in-kind payments (e.g., bog maintenance and improvements), which need to be monitored. The management plan needs to be clear on oversight responsibility within ConsCom and the LSC, and on appropriate means to communicate between all parties when issues or problems arise. Beyond handling *ad hoc* issues, the Town needs to consider what other proactive steps might be taken, in cooperation with the farmer:

- To make the farming operation viable for the farmer;
- To protect the bog land and structures for the future; and
- To provide enjoyment and education to the public.

As previously noted, ConsCom is currently working to incorporate the lease of the 3rd floor apartment in the bog house into the lease of the bog itself. This would transfer some additional maintenance responsibilities to the lessee, but would still – presumably - leave the Town with the responsibility for major repairs.

Also, in conjunction with the farming operations, there are a number of maintenance operations carried out by the farmer (e.g., for roads, dikes and dams) that affect public safety and public use of the land. These should be regularly monitored and – as necessary – suggestions made, or specifications written, for improved maintenance practices. This might include, for example, setting specifications for the types of materials that could be used to repair the dirt roads (e.g., maximum stone size, or use of stone and sand mixture).

Besides the cranberry growing operation, another farming operation that should be evaluated and monitored is the composting operation that takes place on the east side of Curve St. This operation apparently has not been officially documented and recognized by the Conservation Commission. Few or no restrictions have been set on the use of this part of the Bog. Proper drainage is one concern for this area.

Bog House

The Bog House is a valuable and historic building, one that is important to the current cranberry bog licensee (Carlisle Cranberries, Inc.) and likely to be important to future licensees. A more formal and rigorous maintenance program, including capital improvements, needs to be put in place. The goals of this program would be to:

- Properly maintain and protect this investment
- Protect the tenants housed there
- Protect farm workers using the building
- Reduce energy (heating) requirements, and
- Protect the environment

Initially, and perhaps on a regular basis, the Bog House should be inspected by one or more professionals (including the Town's Building Inspector) to provide a list of capital improvements and routine maintenance actions. Cost estimates for the recommended items can then be obtained. A following step would allocate some of the items to the Lessee of the building/third floor (for the in-kind rent), with the remaining being allocated to the Town. Major capital improvements might be appropriately funded with Community Preservation Act receipts.

Based on the inspection undertaken by the LSC on March 23, 2007, the management plan will include recommendations for inspection of the items listed in **Exhibit 1**. The code **CI** in Exhibit 1 implies a potential capital improvement.

Exhibit 1. Management Plan Recommendations for Building and Fire Safety Inspections

Safety Items:

Initial and then subsequent periodic inspections by the Carlisle Fire and Building Inspectors should be performed to check the adequacy of the following:

- Smoke Alarms.
- Fire Extinguishers
- General Fire Safety – presence of flammable materials
- Electrical Panel
- Exits
- Stairwell Doors
- Lighting Fixtures
- Stair Railings

Maintenance Items:

Inspection and recommendations from the Carlisle Building Inspector should be sought regarding the following:

- Vermin control
- Exposed insulation in some areas
- Unfinished floors in some residential areas
- Excess moisture on the 1st floor from the water seepage through the stone-and-mortar walls
- Need for lighting in the storage areas
- Deteriorating wood-lath and plaster on the walls and ceilings (2nd floor and 4th floor)
- Holes in the floors and walls of the residential areas
- Water Damage in the ceiling of the 1st floor
- Integrity of the exterior landing off the 2nd floor sliding door exit
- Split or broken exterior shingles (The east side was listed in the 2001 in-kind service plan but the west side is in need of repair.)

Energy Efficiency Considerations:

- Insulation – Insulation should be repaired, replaced and added where necessary to improve the energy efficiency of the residential areas. **(CI)**
- Weather Stripping – the 3rd floor apartment door to the exterior should be weather sealed to reduce energy costs.
- Energy Star Appliances – the apartment appliances should be replaced over time with more energy efficient models.
- Storm Windows – Install storm (or high insulation) windows for all heated areas. **(CI)**

Water Rights

The plan should clearly state what actions are required (annually for reporting, and every 10 years for re-registration) to protect the Town's water rights associated with registration under the Massachusetts Water Management Act of 1985. If agricultural operations at the bog cease, these rights may be lost. Registration is currently valid until January 1, 2018.

The plan should consider actions to further investigate the water rights that were deeded to the Lowell Cranberry Co. by the original owners of the bog. When the Lowell Cranberry Co. sold its lands to Chelmsford and Carlisle, the deeded water rights were not specifically mentioned. These rights specifically included the rights to flowage from Heart Pond in Chelmsford.

Cooperation with Chelmsford

The plan should propose means to cooperate with Chelmsford on management issues that are of interest for both parties for the bog as a whole. Of concern for Carlisle at the moment is the maintenance of the long berm in Chelmsford (a low earthen dam) that impounds the large pond in the Chelmsford portion of the original bog property. A portion of this berm in the northwest part of the bog (along the trail to Fiske St.) recently – after obvious erosion during the spring and early summer of 2006 - washed out. After temporary repairs were made by Mark Duffy, Chelmsford did repair the dam and replace the weir in late August, 2006. Of concern to Chelmsford are the water rights claimed by Carlisle.

Cooperation on trail signs is also a recent topic of discussion between the two towns. At Chelmsford's request, the Carlisle Trails Committee plans on installing – on the Carlisle side of the Bog – a few signs that will help hikers find their way to the Chelmsford side of the Bog.

Maintenance of Woodland Trails

It is anticipated that this will remain under the purview of the Trails Committee.

New Trails

Two new trails may be considered for the Cranberry Bog. First, on existing Bog land, it would be interesting to create a new trail that heads east out of the parking lot (by the Bog House), goes directly into the woods, passes to the south of the wetlands associated with the certified vernal pool, and then turns north to rejoin the road that goes over the earthen dam of the upper reservoir.

Second, it appears that the Town, through a new conservation restriction from a Fiske St. resident, may obtain a right-of-way from the bog to Fiske St. After the restriction is approved, ConsCom and the LSC should confer with the Trails Committee about the

creation of a trail that would use the right-of-way to allow pedestrian access from Fiske St.

Parking Areas

The plan needs to consider what improvements might be made for parking at the bog, including the placement of trash cans and dispensers of dog litter bags. Currently, the parking area available at the bog is quite limited. About 4 cars can fit in the area beside the Bog House, and perhaps another 6 – 8 cars can fit in between the trees along Curve St. on the east side of the bog. All parking areas are dirt, and susceptible to forming depressions and puddles. Overflow parking near the Bog House often involves cars parking along the side of the road where there is a blind curve. This presents a hazard to road traffic.

No trash cans or dog litter bags (free dispensers) are available at the parking areas. One dog litter dispenser has been placed near the parking along Curve St. northwest of the Bog House.

Dog Droppings

The plan should propose means to get dog owners to keep their animal droppings off the walking paths. The placement of dog litter bag dispensers at the two major parking areas should be considered along with signs to encourage owners to maintain control of their dogs.

Signs and Displays

The plan needs to evaluate the need for additional (or replacement) signs, e.g., property identification, pesticide use (notification) and trail signs. The educational display signs presently at the bog may also need occasional repairs. They also need special attention to keep the viewing side free of excessive vegetation and puddles. Additional bee warning signs may be appropriate around the two bee hive areas. The location of the bee warning signs also needs to be re-evaluated. Trail signs have been requested by Chelmsford to help Chelmsford folks find their way home. They specifically request signs at the two locations (near the bog) where the trails enter the woods and head towards the gas line. Another sign would be placed on the gas line where the trail to Chelmsford took off. The Carlisle Trails Committee has agreed to erect appropriate signs (anticipated in spring 2007).

4-H Bog

The plan should indicate whether a 4-H club, or some other organization, will take up maintenance and operation of the small “educational” cranberry bog near Curve St. If not, the plan may suggest that ConsCom and the LSC maintain it as an educational feature of the bog, one that would allow public access.

Woodland Production

The conservation plan prepared in 1986 by the Soil Conservation District (see Appendix C) had recommended that part of the forested area be managed for woodland (i.e., timber) production. White pine would be the primary target for harvesting. This issue should be considered. However, it is noted that Carlisle has no experience, and perhaps little real interest, in woodland production.

Forest Management

The conservation plan prepared in 1986 by the Soil Conservation District (see Appendix C) had recommended that part of the forested area be managed proactively to favor the growth and maintenance of a variety of healthy species of trees and to provide dens of nesting sites for wildlife will be preserved. A variety of management (cutting) practices were recommended to achieve this goal. This issue should be considered.

Wetland Management for Wildlife Habitat

The conservation plan prepared in 1986 by the Soil Conservation District (see Appendix C) had recommended management of the wetlands for wildlife habitat, specifically for nesting and migratory waterfowl, aquatic animals, and other desirable forms of wildlife. Recommended actions included maintenance of the current water levels and installation of wood duck nesting boxes.

Beavers

Recently, beaver activity has resulted in alteration of stream flows, blockage of water control structures, and felling of trees (large and small) and adding to the maintenance work load for the bog licensee. The management plan should consider what, if any, beaver control actions need to be taken.

Bird Houses

The two bird houses at the Bog are currently being adequately maintained by Tom Brownrigg. He also maintains all the birdhouses on Towle Field and at Foss Farm. At some point in the future, he may wish to have an assistant, or someone to take over.

Emergency Vehicle Access

The plan should consider if there are any hindrances to emergency vehicle access to the property.

Invasive Species

An assessment should be made to determine if there are critical invasive species (especially plants) at the Cranberry Bog. For each such species identified, control measures should be recommended.

Appendix A

Copy of 1995 Lease of Bog Agricultural Area to Carlisle Cranberries, Inc.

LEASE

THIS INDENTURE OF LEASE dated as of the 13th day of June, 1995, by and between the TOWN OF CARLISLE, a municipal corporation, duly organized by law with its usual offices at Town Offices, Carlisle, MA. 01741 (hereinafter the "Lessor"), acting by and through its Board of Selectmen with the concurrence of its Conservation Commission, and Carlisle Cranberries, Inc. with a principal place of business at 247 North Road, Carlisle, MA 01741 (hereinafter the Lessee).

WHEREAS, the land which is the subject of this Lease is a portion of the premises described in a deed dated December 18, 1986 to the Town of Carlisle recorded in the Middlesex North District Registry of Deeds in Book 3841, Page 267, acquired by the Town of Carlisle for conservation purposes as provided in Massachusetts General Laws, Chapter 40, §8C and for outdoor recreation, to be managed by the Carlisle Conservation Commission; and

WHEREAS, in furtherance of the purposes for which the aforesaid premises were acquired, the Lessor wishes to provide continued cultivation and increased harvest of Cranberries from the Agricultural Area (hereinafter defined) on the Cranberry Bog Property (hereinafter defined), while satisfying the following obligations: (1) Protection of the surrounding natural resources, including surface and ground water supplies; (2) Enhancement of the conservation values of the surrounding property; (3) Maintenance of public access to and enjoyment of the property surrounding the Agricultural Area; and (4) Provision of educational opportunities for the public; and

WHEREAS, the Lessee wishes to cultivate and manage the Agricultural Area and to assist the Lessor to protect the surrounding natural resources, enhance the conservation values of the surrounding property, allow public access and enjoyment of the property surrounding the Agricultural Area and provide educational opportunities for the public; and

WHEREAS the Lessee responded to a Request for Proposals advertised by the Town of Carlisle and was awarded the Lease on the basis of its proposal, the terms and conditions of said Request for Proposals and Lessee's proposal are incorporated herein by reference; and

WHEREAS, the Lessee has provided the Conservation Commission with a twenty (20) year Management Plan (hereinafter the "Plan") which addresses irrigation systems; ditches; dikes, dams and flumes; fertilizer, herbicide and pesticide use; sanding and gravel

materials; electricity and telephone service; pollination; water use; rebuilding bogs; structures; vines; mowing; harvesting; signs, notices and fencing; and details all methods to be employed by the Lessee for the operation, cultivation and renovation of the Agricultural Area, including but not limited to the repair, maintenance, improvement and harvesting of the Agricultural Area and establishing deadlines for the implementation of each and every aspect of the Plan, which Plan is incorporated herein by reference and attached hereto as Exhibit A; and

WHEREAS, the Conservation Commission has approved the Plan;

NOW, THEREFORE, in consideration of the in-kind services, capital improvements, rents and covenants herein and in the Plan reserved and contained, on the part of the Lessee to be paid, performed and observed, the Lessor hereby rents, leases and lets unto the Lessee the Agricultural Area, as hereinafter defined, upon the following terms and conditions:

SECTION 1 - DEFINITIONS

For the purposes of this Lease, the following terms shall have the following definitions:

A. The Cranberry Bog Property. The real property together with all improvements situated thereon described in a deed to the Town of Carlisle dated December 18, 1986 to the Town of Carlisle, recorded in the Middlesex North District Registry of Deeds in Book 3841, Page 267.

B. The Agricultural Area. That portion of the Cranberry Bog Property consisting of about forty (40) acres of actual cranberry bog, shown on the Town of Carlisle Bog Lease Drawing, attached hereto as Exhibit B, as the "Crop Production Area", plus other adjoining land used in connection with or otherwise reasonably necessary or incidental to the maintenance, cultivation and harvesting of said bog, including existing sand pits, gravel, dikes, water supply and control structures and including the lower level and street level of the Cranberry Bog House (hereinafter defined), and including the parking area northeasterly of and adjacent to the Cranberry Bog House and including so much of the Property as is reasonably necessary and incidental to provide access to the Crop Production Area for the purposes and uses which the Lessee is permitted hereunder; but specifically excluding the 4-H Bog (hereinafter defined).

C. The 4-H Bog. The bog lying on the Cranberry Bog Property between the so-called lower bog and Curve Street, operated by the Carlisle 4-H Club for educational purposes.

D. The Cranberry Bog House. The agricultural building known as the Cranberry Bog House, situated at 750 Curve Street, Carlisle, Massachusetts.

E. Multi-Use Areas. So much of the Cranberry Bog Property as is not included within the Agricultural Area, the 4-H Bog or the Cranberry Bog House.

SECTION 2 - THE LEASED PREMISES

Lessor hereby leases and lets to the Lessee, and Lessee hereby takes and hires from the Lessor upon and subject to the terms, conditions, covenants and provisions hereof, the premises situated in the Town of Carlisle, County of Middlesex and Commonwealth of Massachusetts, hereinabove described and defined as the Agricultural Area, together with the farming and berry processing equipment set forth in Exhibit C hereto.

SECTION 3 - TERM

A. The term of the Lease shall be ten (10) years commencing on June 13, 1995, and terminating at midnight June 12, 2005. Provided that the Lessee is in full compliance with all of the terms and conditions of this Lease, the Lessee shall have the sole right to extend the term of this Lease for an additional ten (10) years from June 13, 2005 to June 12, 2015, upon the same terms and conditions of the Lease and in accordance with the remaining term of the Plan. The Lessee shall notify the Lessor no less than one (1) year prior to the expiration of the first ten-year term of his intentions regarding extension of the lease.

B. Lessee shall at the expiration or other termination of this Lease remove all Lessee's effects from the premises except as set forth herein. Lessee shall deliver the premises to Lessor in the condition in which Lessee is required to maintain the same as set forth in this Lease, reasonable wear and tear excepted and other fire and casualty excepted.

SECTION 4 - USES

A. The Lessee shall cultivate, maintain, manage and harvest cranberries from the Agricultural Area annually and shall take any and all other steps necessary to maintain the status of the Agricultural Area as "land in agricultural use" within the meaning of 310 CMR 10.04. Such cultivation, maintenance, management and harvesting shall be the only activities conducted in the Agricultural Area without the prior approval of the Conservation Commission and shall be conducted according to good agricultural and business practices, consistent with the terms and provisions of this Lease.

B. Except as allowed by this Lease or set forth in the approved Plan or in cases of emergency, necessitating immediate action so as to prevent undue damage to the Agricultural Area or to protect the public health and safety, the Lessee shall not alter or install any structures, including water control structures, or facilities on the Agricultural Area without the prior written approval of the Conservation Commission. Such written approval of the Conservation Commission shall not relieve the Lessee's obligation to comply with all applicable local, state and federal rules and regulations.

C. The Lessor reserves for the benefit of the public the right to use the dikes and perimeter trails within the Agricultural Area for the purpose of providing non-motorized access by the public to and from the Multi-Use Areas and the 4-H Bog. The Lessee shall conduct all activities under this Lease so as not to interfere with such access to and public use and enjoyment of the 4-H Bog and the Multi-Use Areas. The Lessee may post the Agricultural Area to prohibit or limit entry by the public into the Agricultural Area, when necessary for public safety purposes. The Lessee shall promptly notify the Conservation Commission and the Carlisle Chief of Police when the area is so posted. The Lessee may post other non-commercial instructional or advisory signs not otherwise required by local, state or federal law or this Lease, for public safety or public education at any time.

D. The Lessee's use of the ground and first floors of the Cranberry Bog House is limited to storage of equipment and materials and such other activities as are reasonably necessary for, or customary and usual in the conduct of the activities permitted in the Agricultural Area pursuant to this Lease.

E. All of the Lessee's activities pursuant to this Lease shall be conducted in accordance with all applicable Federal, State and local laws, rules and regulations. The Lessee's violation of any applicable Federal, State or local laws, rule or regulations shall be an event of default for the purposes of Section 17 hereof.

SECTION 5 - LIMITS OF LESSEE'S ACTIVITIES

Except as otherwise permitted by the Conservation Commission, the limits of the Lessee's activities pursuant to this Lease shall be as follows:

A. Within that portion of the Agricultural Area southerly and easterly of Curve Street, shown on the attached map as "S. Woodland Area", except as necessary to provide access through the existing entrance from Curve Street, the Lessee shall maintain undisturbed a buffer around the perimeter which shall be a minimum of twenty (20') feet wide along Curve Street and forty (40') feet wide along the southerly and easterly boundaries. Notwithstanding anything herein contained to the contrary, the Lessee shall maintain undisturbed a buffer to the stream on said portion of the Agricultural area which shall be a minimum of One Hundred (100') feet.

B. With respect to that portion of the Agricultural Area shown on the attached map as "Crop Production Area", the Lessee's activities pursuant to this Lease shall be limited to extend beyond the Crop Production Area a distance of twenty (20') feet beyond the road encircling the Crop Production Area, except as follows: (a) Where the Crop Production Area abuts the area shown on the attached map as "Existing Emergency Sand Pit and Expansion Area", northerly and westerly of Curve Street, the limit of activity shall include the existing sand pit and an expansion area to the south and west thereof, bounded by the existing trail and hole; (b) Where the Crop Production Area abuts the area shown on the attached map as "Upper Water Resv.", the Lessee's activities shall not extend more than ten (10') feet westerly beyond the edge of the road, except as necessary for irrigation pump

intake requirements; (c) Where the Crop Production Area abuts the area shown on the attached map as "Lower Water Resv.", the Lessee's activities shall not extend more than ten (10') feet northerly beyond the edge of the northernmost dike, except as necessary for irrigation pump intake requirements or to unblock water flow from up stream; and (d) where the Crop Production Area is adjacent to the 4-H Bog and the distance between the Crop Production Area and the 4-H Bog is less than twenty (20') feet, the Lessee's activities shall not extend more than one-half the distance between the road and the 4-H Bog.

C. Subject to consultation with the Conservation Commission, bees may be kept in any location on the Cranberry Bog Property which is appropriate for pollination of the cranberry vines.

SECTION 6 - RENT, IN-KIND PAYMENTS AND SECURITY DEPOSIT

A. The Lessee shall return to the Lessor annually zero percent of the gross revenue from the sale of cranberries. The Lessee shall make payment within thirty (30) days of Lessee's receipt of said proceeds.

B. The Lessee shall additionally pay rent in kind by reconstructing, renovating and cultivating the Agricultural Area, in accordance with the Plan attached hereto as Exhibit A.

C. The Lessee shall, within 90 days of the first crop harvest, post a security deposit with the Lessor in the amount of Seven Thousand (\$7,000.00) Dollars, to secure performance of the work required by the Plan in the event of default by the Lessee. The security deposit shall be held in a separate interest bearing account and the interest thereon shall be paid to the Lessee annually.

SECTION 7 - COSTS AND EXPENSES

A. The Lessee shall bear the expense and make all financial disbursements for the cost of running the Agricultural Area, including utilities, and shall be responsible for any damage caused by the Lessee, his employees, agents, assigns or invitees, to the land and structures in and on the Agricultural Area.

B. The Lessee shall be responsible for all real estate taxes assessed to the Lessee pursuant to the provisions of G. L. c.59, §2B on the Crop Production Area.

SECTION 8 - MAINTENANCE AND REPAIRS

A. The Lessee shall be responsible for the normal maintenance and operation and timely repair of all water control structures associated with the Agricultural Area, including ditches, dikes, and flumes and shall at all times maintain same in good working order, in accordance with the approved Plan. Subject to the provisions of Section 4 B, the Lessee shall have the right to construct and install appropriate water control structures, including ditches, dikes and flumes and a pump house or houses, as necessary, which,

when installed, shall become the property of the Lessor. No water control structure may be modified or adjusted without written permission of the Lessee.

B. Subject to and in compliance with any and all applicable local, state and federal laws, rules and regulations, the Lessee may:

(a) Use sand, gravel and other earth materials within the Agricultural Area to repair and maintain the Agricultural Area and bog structures, provided that on-site excavation in the sand pits shall not be any deeper than the average stream depth of the adjacent brook;

(b) Use sand, gravel, other earth materials and fill obtained from off-site as reasonably necessary and incidental to the maintenance, repair and renovation of the Agricultural Area; provided, however, that except in case of emergency necessitating immediate action so as to prevent undue damage to the Agricultural Area or to protect the public health and safety, no such off-site materials shall be brought on-site without the prior approval of the Conservation Commission. Nothing herein contained shall be construed to allow the Lessee to excavate materials from the Multi-Use Areas or the 4-H Bog, without the prior written approval of the Conservation Commission; and

(c) Remove from the Agricultural Area ditch cleanings and bog scrapings and dispose of said materials off-site; provided, however, that nothing herein contained shall be deemed to permit the Lessee to stockpile such materials on the Multi-Use Areas or the 4-H Bog.

C. At least once a year the Lessee shall mow the trail around the perimeter of the bog, along the dikes, and between the trail and the bank of the ponds.

D. The Lessor shall be responsible for the maintenance, repair and upkeep of the Cranberry Bog House, excluding utilities; provided, however, that the Lessee shall be liable for any damages to the Cranberry Bog House caused by the Lessee, normal wear and tear excepted. The Lessor shall have reasonable access to the Cranberry Bog House for carrying out the purposes of this section.

SECTION 9 - EQUIPMENT AND CAPITAL IMPROVEMENTS

A. The Lessee has the right to install appropriate irrigation equipment, pumps, ditches, dikes and flumes as allowed by and provided for in the Plan, and to repair, replace, maintain or remove such. The installation, maintenance, repair, removal or operation of such equipment or structures shall be under the sole control of the Lessee. The Lessee shall employ all necessary safety procedures to protect the public from injury due to any work or activity conducted in connection with this system. All underground irrigation equipment, all water control structures and all other structures and cranberry vines provided or installed by the Lessee shall become the property of the Lessor subject to any lender's security interest. Notwithstanding the Lessee's rights under this paragraph, upon

termination of this agreement the Lessor shall have the option to purchase any other equipment at a price mutually agreeable.

B. The Lessee has the right to install or have installed telephone and electric lines, subject to prior written approval by the Conservation Commission.

SECTION 10 - INSECT, WEED, DISEASE AND PEST MANAGEMENT

A. The Lessee shall use appropriate growing practices such as bog sanding, fertilization, insect, disease, and weed control; and shall favor methods that minimize the use of toxic chemicals and shall use Integrated Pest Management techniques. Techniques such as the use of spot applicators and wipers for weed control shall be utilized to further reduce the possibility of undesirable environmental impacts.

B. Regulated pesticides, herbicides, fungicides and fertilizers applied to the bogs will be exclusively from the current list of those chemicals and by the most recent methods approved by the Massachusetts Department of Agriculture, and shall be consistent with an integrated pest management (IPM) program as approved by the University of Massachusetts Cooperative Extension Service Cranberry Experiment Station, so long as it remains operational. No other such chemicals will be allowed without the prior written approval of the Conservation Commission. No aerial spraying will be allowed. Adjustable spray nozzles shall be required where necessary to limit the spray to the crop production area. All applications of pesticides must be performed under the direct supervision of a licensed pesticide applicator.

C. The Lessee shall observe all local, state and federal laws, rules and regulations regarding the posting of the Agricultural Area at times when pesticides or herbicides are applied to the bogs; and regarding the handling, storage and mixing practices associated with applications. The Lessee shall use best management practices to minimize inadvertent chemical releases.

D. The Lessee shall not use chemicals, pesticides or application procedures which are prohibited by local, county, state or federal laws or regulations.

E. The Lessee shall provide and maintain either (a) a telephone answering service or (b) a permanent bulletin board at an entrance to the Agricultural Area, on either of which information is updated weekly, stating what chemicals have been applied during the previous seven (7) days and what chemicals the Lessee anticipates applying during the next seven (7) days.

SECTION 11 - PUBLIC EDUCATION

The Lessee shall from time to time advise, assist and cooperate with the Conservation Commission or its designee to provide public education programs or services concerning the cultivation, maintenance, or management of cranberry bogs, such provisions or services to be sponsored jointly or solely by the Lessee, the Conservation

Commission, and/or a designee as shall be mutually agreeable. Without limiting the generality of the foregoing, the Lessee shall annually provide up to eight (8) hours of consultation with the 4-H club relative to the cultivation and maintenance of the 4-H Bog.

SECTION 12 - INDEMINIFICATION, LIABILITY INSURANCE

A. The Lessee shall indemnify and hold the Lessor harmless from and against any and all claims, demands, suits, actions, costs and judgments, whatsoever, including reasonable attorney's fees, which may be imposed upon, incurred by, or asserted against the Town by reason of (a) any failure on the part of the Lessee to comply with any provision or term required to be performed or complied with by the Lessee under this Agreement, or (b) for the death, injury or property damage suffered by any person on account of or based upon the act, omission, fault, negligence or misconduct of the Lessee, its employees, agents, assigns or invitees.

B. The Lessee shall obtain and maintain in full force and effect the following insurance: (i) comprehensive Commercial General Liability insurance with a minimum combined single limit of One Million (\$1,000,000.00) Dollars, which shall include Pesticide or Herbicide Applicator Coverage per ISO form CG 22 64 11 85, and which shall name the Town of Carlisle as an Additional Insured; (ii) Automobile Liability insurance with a minimum combined single limit of One Million (\$1,000,000.00) Dollars, which shall name the Town of Carlisle as an Additional Insured; and (iii) statutory Worker's Compensation insurance. The Lessee shall provide Certificate(s) of Insurance to the Lessor at least annually, indicating compliance with this section.

SECTION 13 - LIAISON

A. The Conservation Commission or its designee shall act as a liaison between the Lessor and Lessee for purposes of facilitating communications. Not less than once annually, the Lessee shall meet with the Conservation Commission or its designee for the purpose of reviewing the status of compliance with the Plan, the annual operational plan, and to engage in problem solving and discuss any activity relating to the Agricultural Area.

B. The Lessee shall annually, by December 31, provide the Conservation Commission with a report on the extent of the previous year's harvest, substantiated by the U.S.D.A. crop report, and discussing the projected yield for the upcoming year.

C. The Lessee shall provide annually by December 31, a list of any pesticides, herbicides and fertilizers applied during the previous 12 month period, including the name of the substance, the date it was applied, the amount used, and the method used to apply it.

D. The Lessee shall submit an annual operating plan on the management of the Agricultural Area every year in January to the Conservation Commission for review. This operational plan must include the guidelines from the most recent annual Cranberry Chart Book, or most recent management guide for Massachusetts bogs distributed by the University of Massachusetts, in cooperation with the Cranberry Experiment Station in

Wareham, Ma. Without limiting the generality of the foregoing, this plan must also include a list of all proposed chemicals to be used on the bogs and a description of any major maintenance or reconstruction projects for that year.

SECTION 14 - ASSIGNMENT AND SUBLETTING

The Lessee shall not encumber, assign or otherwise transfer this Lease, or any right or interest in this Lease, without the express written consent of the Lessor, which consent shall not be unreasonably withheld. A consent by the Lessor to one assignment or use by another person shall not be deemed to be a consent to any subsequent assignment or use by another person. Any encumbrance, assignment or transfer without the prior written consent of the Lessor, whether it be voluntary or involuntary, by operation of law or otherwise, is void and shall, at the option of the Lessor, terminate this Lease.

SECTION 15 - NOTICES

All notices required or permitted under this Lease shall be in writing and mailed, postage prepaid to the Lessor at c/o Carlisle Conservation Commission, Box 827, Carlisle, Massachusetts 01741, and to Lessee at 247 North Rd., Carlisle, MA 01741, until and unless either party shall notify the other of a change of address.

SECTION 16 - EMINENT DOMAIN

A. If the whole or any part of the Agricultural Area shall be taken for any public or quasi-public use inconsistent with the uses permitted in this Lease and such as to render the uses described in this Lease impractical or impossible, under any statute or by right of eminent domain or by private purchase in lieu thereof, then this Lease shall automatically terminate as of the date possession has been taken and, except as in this Section provided, shall be without further recourse.

B. The Lessor shall be entitled to all compensation awarded or paid upon such a total or partial taking of the premises, provided that nothing herein shall be construed to preclude Lessee from prosecuting any claim directly against the condemning authority in such condemnation proceedings for depreciation to, damage to and/or cost of removal of, and/or for the value of stock and/or trade fixtures, furniture and other personal property belonging to Lessee; provided, however, that no such claim shall diminish or otherwise adversely affect Lessor's award or the award(s).

SECTION 17 - QUIET ENJOYMENT

Lessee, observing and keeping all covenants, warranties, agreements and conditions of this Lease on its part to be kept, shall quietly have and enjoy the Agricultural Area during those designated years of the term of and subject to the conditions of this Lease.

SECTION 18 - DEFAULTS

A. In the event any one or more of the following events have occurred and shall not have been remedied as hereinafter provided: (1) Lessee's failure to perform any of the covenants, conditions and agreements, on Lessee's part to be kept or performed and the continuance of such failure without curing the same for a period of thirty (30) days after notice of such failure, and provided Lessee shall not cure said failure as provided in Paragraph B of this Section; then Lessor shall have those rights set forth in Paragraph C hereof.

B. In the event of a default of such a nature that it cannot be cured within such thirty (30) day period then such default shall not be deemed to continue so long as Lessee proceeds to cure the default as soon as reasonably possible and continues to take all steps necessary to complete the same within a period of time which, under all prevailing circumstances, shall be reasonable. No default shall be deemed to continue so long as Lessee shall be so proceeding to cure the same in good faith or be delayed in or prevented from curing the same by fault of the Lessor.

C. In case of any event of default as hereinbefore provided, the Lessor shall have the immediate right of re-entry and may remove all persons and property from the premises by summary proceedings. In addition, in the event of default (whether or not Lessor shall elect to re-enter or take possession pursuant to legal proceedings or pursuant to any notice provided for by Law) Lessor shall have the right, at its option, to terminate this Lease on thirty (30) days notice to Lessee. Should Lessor at any time terminate this Lease for any breach, all costs incurred including the cost of recovering the premises, and reasonable attorneys fees, shall be immediately due and payable from Lessee to Lessor. In the event of a breach or a threatened breach by Lessee of any of its obligations under this Lease, the Lessor shall also have the right to appropriate injunctive relief. The rights and remedies, whether herein or anywhere else in this Lease provided shall be cumulative and the exercise of any one shall not preclude the exercise or act as a waiver of any other right or remedy of Lessor hereunder, or which may be existing at law or in equity or by statute.

SECTION 19 - ATTORNEY'S FEES AND PENALTIES

The Lessee agrees to pay all reasonable attorney's fees and expenses incurred as a result of any default by it under the terms of this Lease.

SECTION 20 - WAIVERS

Failure of the Lessor or Lessee to complain of any act or omission on the part of the other party no matter how long same may continue, shall not be deemed to be a waiver by said party of any of its rights hereunder. No waiver by Lessor or Lessee at any time, express or implied, of any breach of any provision of this Lease shall be deemed a waiver of a breach of any other provision of this Lease or a consent to any subsequent breach of the same or any other provision. No acceptance by Lessor of any partial payment shall constitute an accord or satisfaction but shall only be deemed a part payment on account.

SECTION 21 - GOVERNING LAW

This Lease and the performance thereof shall be governed, interpreted, construed and regulated by the laws of the Commonwealth of Massachusetts.

SECTION 22 - SEVERABILITY

If any term, covenant, condition or provision of this Lease or application thereof to any person or circumstance shall, at any time or to any extent, be invalid or unenforceable, the remainder of this Lease or the application of such term or provision to persons or circumstances other than those as to which it is held invalid or unenforceable, shall not be affected thereby, and each term, covenant, condition and provision of this Lease shall be valid and enforced to the fullest extent permitted by law.

SECTION 23 - INTERPRETATION

The section headings used herein are for reference and convenience only and shall not enter into the interpretation hereof. This Lease may be executed in several counterparts, each of which shall be an original, but all of which shall constitute one and the same instrument.

SECTION 24 - ENTIRE AGREEMENT

No oral statement or prior written matter shall have any force or effect. Lessee agrees that it is not relying on any representations or agreements other than those contained in this Lease. This Lease shall not be modified or cancelled except by a writing executed by all parties. Except as otherwise expressly provided herein, the covenants, conditions and agreements contained in this Lease shall bind and inure to the benefit of the Lessor and Lessee and their respective heirs, successors, administrators and assigns.

SECTION 25 - BINDING EFFECT

All covenants, agreements, conditions, and undertakings in this Lease shall extend to and be binding upon the legal representatives, successors, and assigns of the respective parties hereto the same as if they were in every case named and expressed.

SECTION 26 - NOTICE OF LEASE

Upon request of the Lessor, Lessee shall execute and deliver a recordable notice of this Lease.

SECTION 27 - EXHIBITS AND RIDERS

The Exhibits and Riders attached hereto are made a part of this Lease for all purposes.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals the date and year first written above.

[Signed by Mark G. Duffy, President Carlisle Cranberries, Inc.
LESSEE

LESSOR
TOWN OF CARLISLE BY ITS BOARD OF SELECTMEN
[Signed by David E. Watson and Michael E. Fitzgerald]

[Exhibit A – Management Plan of Carlisle Cranberries, Inc. See Appendix B of this
Baseline Assessment]

[Exhibit B – Bog Lease Drawing. See Figure 3-1 of this Baseline Assessment]

[Exhibit C – Farming and Berry Processing Equipment Inventory. Not included here.]

Appendix B

Management Plan - Carlisle Cranberries, Inc.

[Note: This document is called out as Exhibit A to the lease of the Cranberry Bog by the Town of Carlisle to Carlisle Cranberries, Inc. The text of the lease is provided in Appendix A of this Baseline Assessment.]

By approving this management plan, the lessee is not relieved of any requirements of the lease to obtain any approval of the Conservation Commission including, without limitation, any approvals required under Section 4B of the lease.

All management shall be consistent with the terms and provisions of the lease and all applicable laws. Wherever and whenever the management plan is or may be inconsistent with or contrary to the lease and/or minimum specifications in the Request for Proposal (RFP) or "Carlisle Cranberries, Inc. Preferences for the RFP", then the lease, RFP or Preferences, as the case maybe, shall take precedence over the management plan.

The cultural practices used, the necessity of doing any particular practice and the timing and method of implementation shall be solely determined by the lessee, Carlisle Cranberries, Incorporated. Carlisle Cranberries, Incorporated shall have the right to use any cultural practice or management tool generally accepted or used in the operation of a cranberry bog as long as it is not specifically prohibited by this lease.

LOWER BOG

The existing main water control structure at the lower water reservoir is scheduled to be replaced because it leaks and is constructed of wood. The wood shows signs of frequent repair and damage. Sediment has accumulated against the structure so that it impounds only about 2 to 3 feet of water. It is advisable to replace the old structure with a new one and fill the void with well compacted material. The wood must be removed to prevent future water piping, as the wood has decayed. If feasible a new structure will be installed in the same location. A temporary dam will be necessary to stop the flow during construction.

West of the current water control structure a second water control structure will be constructed to pass storm flow and to route normal flow through the bog. It will outlet into the bog ditch on the west side of the bog.

A culvert will be installed in the new dike to allow the water flow to pass through the dike. The current ditch will be enlarged and graded to meet the expected flow during storm events. A dike will be constructed to the east of the ditch to separate the bog from the ditch. This will allow water to be stored on the bog for pesticide degradation while passing normal flow through the perimeter ditch.

The newly constructed dike extends across the bog without water control structures at the present time. The dike will require work to seal the flow once a water control structure is installed. A water control structure will be installed in the new dike at the junction of the main water channel. This structure will be used to flood the upper bog or store water for pesticide degradation. The structure will be open during most of the growing season.

A water control structure is at the outlet of the bog. This structure will require maintenance to reduce leakage. A new set of channels will be incorporated into the existing structure. Additional work will be required around the structure to assure that the foundation and walls are sound and water tight. This structure will be used to flood the lower bog for harvest and winter protection and for other management practices.

The upper portion of the bog shall be graded and revined once the water control structures are in place. The grading will be accomplished so that the bog is leveled for water conservation and improved management.

The growing areas south of the new dike will be graded to promote water conservation and management.

IMPROVED DIKING

As mentioned above, the dikes will be improved and/or constructed within the bog to provide better water management and water quality benefits. The dikes will be adequate to hold water to conduct harvest operations and winter flood storage. The size of the dikes will be determined following a topographic survey to assess the planned level of the bog. The expected dike construction will be on the west side of the bog along a newly regraded ditch and the main channels in the lower sections of the bog.

IRRIGATION SYSTEMS

On the lower bog a diesel powered irrigation system shall be designed and installed. Surface water from either the lower water reservoir, the crop production area or a constructed pond within the crop production area will be used. This pump may also be used to apply water to an adjacent upland area, provided it is used solely to promote the growing of cranberries.

The current irrigation system on the upper bog will be maintained and operated. Irrigation systems will be run whenever necessary for the purpose of frost protection, drought prevention, chemigation or any other crop production purpose. Intake pipes, uprights, laterals and mainlines will be installed, removed, replace and maintained as necessary. The irrigation pump or pumps will be removed, replaced, repaired, maintained, installed and fueled as needed. The irrigation pump enclosures will be removed, replaced, repaired, maintained or installed as needed for proper agricultural crop production. New irrigation systems, either temporary or permanent, will be constructed to serve areas of new or existing plantings. Irrigation system components will be located both on or buried

in the bog and on or buried under other adjoining land, within the limits of activities of the lease. High lift or low lift, high pressure or low pressure pumps may be used. Irrigation pumps and engines will be both portable and installed. All above ground irrigation equipment including all pumps and pump engines will be the property of Carlisle Cranberries, Inc. or its lenders.

WATER USE

Water will be pumped, conveyed or otherwise used from the reservoirs, the ditches, the streams and the bog surfaces. Water may be used for harvesting, vine protection, frost protection, drought prevention, cooling, chemigation, trash flows, weed prevention, sanding or any other crop production use. Water will be pumped, conveyed or flow into and out of the reservoirs and bog or bogs. Water will be held, released, diverted and channeled. Water may be pumped or conveyed off site for agricultural purposes, provided this occurs solely to promote the growing of cranberries. Water may be pumped onto adjacent crop land not part of this lease, for agricultural production. Water levels in reservoirs, streams, ditches and on the bog surface will be adjusted as necessary.

DITCHES AND CANALS

Ditches will be cleaned when necessary. Ditch cleanings will be stockpiled on site, removed or used on site. Cleanings may be screened, composted or mixed on site. Cleanings may be removed off site after screening, composting, drying, stockpiling or mixing. Pre-existing ditch cleanings may be stockpiled, composted or removed off site. Ditch cleanings will be byproducts of an agricultural activity. New ditches may be filled in or modified. A bypass canal or canals may be constructed in accordance with the terms of the lease. The excavated material from canal construction will be treated as ditch cleanings.

FLUMES, DIKES, DAMS

Existing flumes may be replaced, repaired, removed and adjusted as necessary. New flumes, either temporary or permanent, will be constructed as necessary to facilitate crop production and bog management. Dikes will be constructed both on site and off site material as permitted by this lease. On site materials may include tailings, gravel, sand, rock, bog scrapings and ditch cleanings. Dikes may be constructed for vehicular farm traffic or with no provision for vehicular farm traffic. Dike construction may include membranes or geotextile mats. Existing dikes may be modified in dimension or location. Existing dikes may be removed if necessary in conformance with the lease. Dikes will be maintained or may be modified using on site or off site materials, as permitted by this lease. Existing dams will be maintained by Carlisle Cranberries, Inc. when and if Carlisle Cranberries, Inc. considers such maintenance normal or minor. Dikes and dams will be mowed, and trees, shrubs and woody vegetation will be cut on dams and dikes as necessary.

FERTILIZER, HERBICIDE, AND PESTICIDE USE

All application of fertilizer, herbicide, and pesticide shall be applied in accordance with the lease.

Fertilizer will be applied to the cranberry bogs as necessary. Fertilizer may be applied by hand, with equipment or through chemigation. Timing, rates and analysis will be determined by Carlisle Cranberries, Inc. Any fertilizer or soil amendment may be used whether organic or inorganic.

Herbicide will be applied to the cranberry bogs as deemed necessary by Carlisle Cranberries, Inc. Herbicide may be applied by hand or with equipment. Any legal herbicide may be applied to the cranberry bogs and adjacent land which is part of this lease.

Pesticide will be applied as deemed necessary by Carlisle Cranberries, Inc. Any legal pesticide may be applied to the cranberry bogs and adjacent land which is part of this lease. Pesticide application may be done by hand or with equipment (including pressure sprayers and must blowers or through chemigation).

SAND AND GRAVEL

All sanding and gravel handling activities shall be in accordance with the lease.

Sand will be screened using one or both existing sand pits. Equipment will be used to screen sand. Trees and shrubs will be cut or removed prior to or during screening. Sand, tailings and gravel will be stockpiled. Stockpiles may be in pits, adjacent to the bogs and/or on the bogs. Sand will be used for renovating bogs, leveling areas, and applied to plants, and for other purposes as necessary. Gravel and tailings will be used for dike and dam maintenance and construction, and for other purposes, as necessary.

ELECTRICITY AND TELEPHONE

Electrical service will be used in the lower two floors of the cranberry bog house as necessary. Electrical service to other areas under this lease, such as pump houses and other structures, may be constructed in the future. Carlisle Cranberries, Inc. reserves the right to expand electrical service in accordance with the lease. Carlisle Cranberries, Inc. shall not provide or pay for electrical service to any other occupants of the cranberry bog house. The existing electrical service to the lower two floors of the cranberry bog house will be used exclusively by Carlisle Cranberries, Inc. and its employees and subcontractors. The lessor shall maintain the existing electrical service. The bog house second floor telephone service will be used by Carlisle Cranberries, Inc. Existing and new monitoring lines, cables and devices shall be installed and used as necessary for cranberry production. When necessary, these lines may be buried between the bog house and sites on or adjacent to the bog. Lines may be run above ground when necessary.

POLLINATION

Bees will be provided for pollination. Hives will be located where necessary in accordance with the lease. Bees may be migratory or permanent. Hives may be owned, rented or subcontracted.

REBUILDING BOGS

Bogs will be rebuilt following the in-kind service plan. Bogs will be stripped if deemed necessary. Strippings will be removed if deemed necessary. Ditches will be reconstructed if deemed necessary. Weeds will be killed if deemed necessary. Sand will be spread if deemed necessary. Irrigation systems will be installed if deemed necessary. Vines will be installed as deemed necessary. Vines will be tended to, as deemed necessary. All of the above will take place in accordance with the minimum specifications in the RFP, the terms of the lease, and the "Carlisle Cranberries, Inc Preferences for Request for Proposal."

STRUCTURES

The bottom two floors of the cranberry bog house will be used for storing equipment, materials, berries, and performing necessary repairs, cultural harvesting, processing and operations. No repairs or maintenance of the bog house will be done as part of this lease. Pump houses will be purchased or constructed and put on site. The lessee may construct additional equipment, storage and crop production structures on land covered by this lease. Water control structures will also be constructed. Structures may be temporary or permanent. All of the above will take place in accordance with the lease.

VINES

Vines will be cultivated, removed, replaced, pruned, bought, and taken as cuttings as deemed necessary. Cuttings may be sold.

MOWING

Mowing for weed control and other cultural practices will take place as deemed necessary.

HARVESTING

Cranberry harvesting will be either wet or dry picked. The public will not be allowed to harvest cranberries. All cranberries will be the property of Carlisle Cranberries, Inc.

SIGNS AND NOTICES

Signs and notices will be posted as per requirements in the lease. Signs will be used for public information.

FENCING, GATES

Fences will be installed around the irrigation pumps and/or water control structures as deemed necessary. Fences and gates will be used to prevent vehicular access as deemed necessary.

TREE AND BRUSH REMOVAL

Trees, brush and weeds may be trimmed, cut or removed from the leased area as necessary for proper crop production. Trees and brush may be removed from the perimeter of the agricultural area and ditches and streams as needed.

WILDLIFE

Wildlife doing damage to the crop production area or leased area may be controlled following federal and state requirements as necessary.

OPERATIONAL HOURS

The cranberry bog will be operated 24 hours per day, 365(6) days per year as necessary.

EQUIPMENT

Equipment will be used for cranberry bog operation and will often be located in the leased area.

PUBLIC ACCESS

The public and their pets shall not be permitted to enter onto the growing area, the interior waterways or any agricultural structures (houses, sheds, flumes and water control structures). The public will not be permitted to enter the lease area after dusk or before dawn.

BOG STRIPPING

Areas of the bog may be stripped to remove weeds, to level, or for any other agricultural purpose. Strippings may be stockpiled, composted, mixed, screened or removed off site. Material stripped from the bog surface shall be a by-product of an agricultural activity. Strippings may be mixed with lime, topsoil, or other materials and fertilizer, either organic or inorganic, including manure.

BOG MANAGEMENT GOALS - AS NECESSARY

Upper Bog - Repair or replace flume, maintain dikes, put in new vines, improve drainage, level some sections, build bypass canal, reduce weeds, and maintain or improve yields through cultural practices.

Lower Bog - Renovate as necessary. Install new water control structures. Install irrigation systems, build tail water recovery system if necessary. Install water holding pond if necessary. Reduce weeds, maintain or improve yields through cultural practices. Finish construction of the new dike.

Appendix C

Narrative Record of Decisions for Use, Management, and Treatment of the Cranberry Reservation

[**Note:** This text is taken verbatim from Section E of the Soil Conservation Service report entitled *Conservation Plan for Cranberry Reservation, Chelmsford and Carlisle, MA* (April 1987)]

1. Cranberry Bog

The thirty-five acres of cranberry bog will be used for the commercial production of cranberries. Cultural management of the water control management will be upgraded to increase production to maintain economic viability.

The following engineering practices, and treatments, will be implemented over a 5 to 10 year period of time.

a. Engineering Practices

1. Maintenance of approximately 20,000 linear feet of bog ditch and removal of accumulated sediment. Ditches parallel to farm roads may be cleaned using a hydraulic excavator. Most interior ditches will require hand labor.
2. Install tow separate sprinkler systems, for frost protection, irrigation, and depending upon management methods and policies adopted, the application of pesticides and fertilizers. Estimated cost \$70,000.
3. Repair of approximately 1,700 feet of dams which impound water for use in the bogs. The east dam needs to be increased in height to provide adequate freeboard and prevent its being overtopped during high intensity storms. The north dam and spillway need to be repaired to reduce seepage and insure structural stability. A hydraulic analysis will be performed to determine the adequacy of the spillways to carry the 50 year storm. These structures plus the impoundment dikes and spillway located along the walking trails in Chelmsford will be periodically inspected, and repairs or replacement will be made when needed. It will be the cranberry grower's responsibility to perform normal repairs and maintenance and to install or remove the water control flashboards as conditions require.

b. Cultural Treatments

The cranberry grower shall prepare, and submit to the Reservation Committee for approval, a plan for operation and maintenance of the bog. The plan shall outline the management systems and cultural treatments scheduled to be implemented.

Practices such as bog sanding, fertilization, insect, disease, and weed control will be reviewed in detail. It shall be the policy of the Committee to favor practices and management techniques that eliminate or limit the use of toxic chemicals. When it is necessary to use pesticides, the grower will use integrated pest management, and other advanced technological systems which insure the applications are done in the most efficient and scientific manner. Other techniques such as the use of spot applicators and wipers for weed control will be utilized to further reduce the possibility of environmental contamination. Consideration will be given to construction a low dike along each side of the main drainage channels so the bog can be sectionalized into closed systems. This will increase the management options and reduce water pollution.

The grower and Committee will annually review and revise as needed the management plan for the bog. They will also review in detail progress made in upgrading the bog facilities and cultural treatments and practices performed. A memorandum of understanding concerning the use of pesticides and the responsibility assumed by the grower and the Committee will be developed. This includes posting of the bog area to prohibit entry during times when harvesting operations or pesticides present potential safety hazard.

2. Recreation Land and Woodland

The forested areas will provide opportunities for passive recreation such as walking, cross-country skiing, nature study and observation. The existing trail system will be maintained and kept accessible for four wheel drive maintenance, emergency, and forest fighting equipment. All other motorized vehicles will be prevented from entering the reservation. One additional walking trail will be developed as shown on the plan map to provide a looped system accessible from either entrance point.

Specific areas will be managed for woodland production. Conservation of upland wildlife habitat, aesthetics, buffer areas near properties, etc., will be taken into account prior to development of a forest management plan. All forestry measures implemented will comply to appropriate state laws such as the Massachusetts Wetlands Protection Act, and the Forest Cutting Practices Act. The services of the District Forester and those of a competent practicing consulting forester will be used to assist the Committee in preparing a woodland management plan. The following practices and treatments will be implemented over an unspecified period of time.

a. Practices

- 1) Approximately 8,500 feet of existing recreation trails and walkways will be maintained for public use. A minimum width of twelve feet and ten feet of overhead clearance will be maintained so emergency vehicles will have unobstructed access to the reservation. Trails will be periodically inspected and ruts, depressions, and eroded areas repaired as needed. Trail use by equestrians will be scheduled and controlled to reduce trail wear and competition with walkers and cross-country skiers. Trails and paths suitable for handicapped persons will be marked and maintained. Horses will be prohibited from these trails. Fallen trees and other hazards and obstructions to the trail will be removed as soon as possible after being observed.
- 2) A new walking trail approximately 1,200 feet long will be constructed as shown on the plan map. One short log or plank bridge will be required to provide access across a small stream. The minimum cleared trail width shall be four feet.
- 3) Good forest management will be applied throughout the reservation. All areas will receive treatment to favor the growth and maintenance of a variety of healthy species of trees. Selected trees which provide dens of nesting sites for wildlife will be preserved. Those areas identified for recreation-woodland use, will in addition, be managed for the production and harvest of timber. In general, white pine is the tree species to favor as the soils have a low site index for black and white oak in comparison to white pine. Management practices are contained in Appendix 2:
 - a) Shelterwood Cuts
 - b) Selection Cuts
 - c) Intermediate Cuts
- 4) The three sections of dikes and the one water control structure will be maintained. Adequate freeboard will be provided to prevent overtopping during high intensity storms.
- 5) A limited access point will be developed along Elm Street. An approved sign will be erected which describes reservation rules and regulations.

3. Wetland Wildlife Land

The 96 acres of wetland will be protected and managed for nesting and migratory waterfowl, aquatic animals, and other desirable forms of wildlife. Present water levels of the impoundment areas will be maintained. Wood duck nesting boxes will be erected with the assistance of the District Headquarters, Massachusetts Division of Fisheries and Wildlife. Hunting and the discharge of firearms will not be allowed. Consideration will be given to determining the feasibility and value of developing and managing the type 6 wetland (shrub swamp) as a managed shallow fresh marsh area for migratory waterfowl.

4. Headquarters Area

The grounds area of the farm homestead will be maintained by the tenant and grower. The public will be excluded from the grounds and buildings. A parking area for cars will be prepared and properly marked to identify its location. An approved sign will be installed which provides a brief history of the reservation, a trail map and rules and regulations for its use.

5. Sand Pit

This area may be considered for a source of sand for use on the cranberry bog and as a source of sand and gravel for maintenance of dikes, farm roads and recreation trails. Any excavation will be visually screened from view by maintaining a diagonal and curved access from Curve Street and by maintaining the shrub cover around its perimeter. The excavation depth will be limited to no more than two feet below road level at the access point. All runoff water will be directed to flow into the sand pit area. Working slopes will be graded to 2:1 or flatter for public safety reasons. The public will be kept from this area by proper signing.

Appendix D

List of Bird Species Seen at the Bog by Tom Brownrigg

The following two tables list the species of birds seen at the Cranberry Bog between 1987 and May 2006 by Carlisle citizen and former Conservation Commissioner Tom Brownrigg.

Table 1. Species seen on the Carlisle portion of the Cranberry Bog.

Table 2. Species seen on the Combined Carlisle-Chelmsford Bog Land

Table 1. Species seen on the Carlisle portion of the Cranberry Bog

SPECIES SEEN		
All Dates ~ in Cranberry Bog Carl ~ 127 seen		
GREBES	GULLS AND TERNS	WRENS
Pied-billed Grebe	Great Black-backed Gull	Marsh Wren
CORMORANTS	PIGEONS AND DOVES	Carolina Wren
Double-crested Cormorant	Rock Dove	House Wren
DUCKS, SWANS, GEESE	Mourning Dove	SWALLOWS
Greater White-fronted Goose	NEW WORLD CUCKOOS	Tree Swallow
Snow Goose	Black-billed Cuckoo	Northern Rough-winged Swallow
Canada Goose	OWLS <i>Yellow-billed Cuckoo</i>	Bank Swallow
Wood Duck	Eastern Screech-Owl	Barn Swallow
Green-winged Teal	Great Horned Owl	KINGLETS
Mallard	SWIFTS	Ruby-crowned Kinglet
American Black Duck	Chimney Swift	Golden-crowned Kinglet
Northern Pintail	KINGFISHERS	CHICKADEES, TITS
Blue-winged Teal	Belted Kingfisher	Black-capped Chickadee
Ring-necked Duck	WOODPECKERS	Tufted Titmouse
Common Merganser	Red-bellied Woodpecker	OLD WORLD SPARROWS
HERONS, EGRETS AND BITTERNS	Yellow-bellied Sapsucker	House Sparrow
Snowy Egret	Downy Woodpecker	WAGTAILS AND PIPITS
Great Blue Heron	Hairy Woodpecker	American Pipit
Great Egret	Northern Flicker	SISKINS, CROSSBILLS AND ALLIES
Green Heron	TYRANT FLYCATCHERS	American Goldfinch
NEW WORLD VULTURES	Eastern Wood-Pewee	Purple Finch
Turkey Vulture	Least Flycatcher	House Finch
OSPREY	Eastern Phoebe	NEW WORLD WARBLERS
Osprey	Great Crested Flycatcher	Northern Parula
HAWKS, EAGLES AND KITES	Eastern Kingbird	Yellow Warbler
Northern Harrier	CROWS AND JAYS	Black-throated Blue Warbler
Sharp-shinned Hawk	Blue Jay	Yellow-rumped Warbler
Cooper's Hawk	American Crow	Black-throated Green Warbler
Northern Goshawk	VIREOS AND ALLIES	Pine Warbler
Red-shouldered Hawk	Solitary Vireo	Palm Warbler
Broad-winged Hawk	Yellow-throated Vireo	Blackpoll Warbler
Red-tailed Hawk	Red-eyed Vireo	Black-and-white Warbler
FALCONS AND CARACARAS	Warbling Vireo	American Redstart
American Kestrel	SHRIKES	Common Yellowthroat
Merlin	Northern Shrike	Canada Warbler
Peregrine Falcon	WAXWINGS AND SILKY-FLYCATCHERS	BUNTINGS, SPARROWS, TANAGERS
PHEASANTS, GROUSE, QUAIL AND TURKEYS	Cedar Waxwing	ALLIES
Ruffed Grouse	THRUSHES	Snow Bunting
WOOD-PARTRIDGES	Eastern Bluebird	Song Sparrow
Northern Bobwhite	Veery	Lincoln's Sparrow
RAILS AND COOTS	Hermit Thrush	Swamp Sparrow
Virginia Rail	Wood Thrush	White-crowned Sparrow
SANDPIPERS	American Robin	White-throated Sparrow
American Woodcock	MOCKINGBIRDS AND THRASHERS	Dark-eyed Junco
Common Snipe	Gray Catbird	Savannah Sparrow
Greater Yellowlegs	Northern Mockingbird	American Tree Sparrow
Lesser Yellowlegs	STARLINGS	Chipping Sparrow
Solitary Sandpiper	European Starling	Field Sparrow
Spotted Sandpiper	NUTHATCHES	Eastern Towhee
Least Sandpiper	Red-breasted Nuthatch	Scarlet Tanager <i>Rose-breasted</i>
Pectoral Sandpiper	White-breasted Nuthatch	Northern Cardinal <i>Grosbeak</i>
PLOVERS AND LAPWINGS	CREEPERS	Indigo Bunting
Killdeer	Brown Creeper	BLACKBIRDS, GRACKLES, ORIOLES

Table 1. Species seen on the Carlisle portion of the Cranberry Bog (cont'd.)

SPECIES SEEN
All Dates ~ in Cranberry Bog Carl ~ 127 seen

Baltimore Oriole
Red-winged Blackbird
Common Grackle
Rusty Blackbird
Brown-headed Cowbird
Bobolink

///----- STATISTICS -----///

Species seen - 127

Table 2. Species seen on the Combined Carlisle-Chelmsford Bog Land

SPECIES SEEN		
All Dates ~ in Z-LIST ~ 136 seen		
	<i>Cranberry Bog</i>	
	<i>Carlisle + Chelmsford</i>	
GREBES	Least Sandpiper	NUTHATCHES
Pied-billed Grebe	White-rumped Sandpiper	Red-breasted Nuthatch
CORMORANTS	Pectoral Sandpiper	White-breasted Nuthatch
Double-crested Cormorant	PLOVERS AND LAPWINGS	CREEPERS
DUCKS, SWANS, GEESE	Killdeer	Brown Creeper
Greater White-fronted Goose	GULLS AND TERNS	WRENS
Snow Goose	Ring-billed Gull	Marsh Wren
Canada Goose	Great Black-backed Gull	Carolina Wren
Wood Duck	PIGEONS AND DOVES	House Wren
Green-winged Teal	Rock Dove	SWALLOWS
Mallard	Mourning Dove	Tree Swallow
American Black Duck	NEW WORLD CUCKOOS	Northern Rough-winged Swallow
Northern Pintail	Black-billed Cuckoo	Bank Swallow
Blue-winged Teal	OWLS <i>Yellow-billed Cuckoo</i>	Barn Swallow
Ring-necked Duck	Eastern Screech-Owl	KINGLETS
Greater Scaup	Great Horned Owl	Ruby-crowned Kinglet
Common Goldeneye	SWIFTS	Golden-crowned Kinglet
Bufflehead	Chimney Swift	CHICKADEES, TITS
Common Merganser	KINGFISHERS	Black-capped Chickadee
HERONS, EGRETS AND BITTERNS	Belted Kingfisher	Tufted Titmouse
Snowy Egret	WOODPECKERS	OLD WORLD SPARROWS
Great Blue Heron	Red-bellied Woodpecker	House Sparrow
Great Egret	Yellow-bellied Sapsucker	WAGTAILS AND PIPITS
Green Heron	Downy Woodpecker	American Pipit
NEW WORLD VULTURES	Hairy Woodpecker	SISKINS, CROSSBILLS AND
Turkey Vulture	Northern Flicker	ALLIES
OSPREY	TYRANT FLYCATCHERS	American Goldfinch
Osprey	Eastern Wood-Pewee	Purple Finch
HAWKS, EAGLES AND KITES	Least Flycatcher	House Finch
Northern Harrier	Eastern Phoebe	NEW WORLD WARBLERS
Sharp-shinned Hawk	Great Crested Flycatcher	Northern Parula
Cooper's Hawk	Eastern Kingbird	Yellow Warbler
Northern Goshawk	CROWS AND JAYS	Magnolia Warbler
Red-shouldered Hawk	Blue Jay	Black-throated Blue Warbler
Broad-winged Hawk	American Crow	Yellow-rumped Warbler
Red-tailed Hawk	VIREOS AND ALLIES	Black-throated Green Warbler
FALCONS AND CARACARAS	Solitary Vireo	Pine Warbler
American Kestrel	Yellow-throated Vireo	Palm Warbler
Merlin	Red-eyed Vireo	Blackpoll Warbler
Peregrine Falcon	Warbling Vireo	Black-and-white Warbler
PHEASANTS, GROUSE, QUAIL AND	SHRIKES	American Redstart
TURKEYS	Northern Shrike	Ovenbird
Ruffed Grouse	WAXWINGS AND	Common Yellowthroat
WOOD-PARTRIDGES	SILKY-FLYCATCHERS	Canada Warbler
Northern Bobwhite	Cedar Waxwing	BUNTINGS, SPARROWS, TANAGERS
RAILS AND COOTS	THRUSHES	ALLIES
Virginia Rail	Eastern Bluebird	Snow Bunting
American Coot	Veery	Song Sparrow
SANDPIPERS	Hermit Thrush	Lincoln's Sparrow
American Woodcock	Wood Thrush	Swamp Sparrow
Common Snipe	American Robin	White-crowned Sparrow
Greater Yellowlegs	MOCKINGBIRDS AND THRASHERS	White-throated Sparrow
Lesser Yellowlegs	Gray Catbird	Dark-eyed Junco
Solitary Sandpiper	Northern Mockingbird	Savannah Sparrow
Spotted Sandpiper	STARLINGS	American Tree Sparrow
Semipalmated Sandpiper	European Starling	Chipping Sparrow

Table 2. Species seen on the Combined Carlisle-Chelmsford Bog Land
(cont'd.)

SPECIES SEEN
All Dates ~ in Z-LIST ~ 136 seen

Field Sparrow
Eastern Towhee
Scarlet Tanager
Northern Cardinal *Rose-breasted Grosbeak*
Indigo Bunting

**BLACKBIRDS, GRACKLES,
ORIOLES**

Baltimore Oriole
Red-winged Blackbird
Common Grackle
Rusty Blackbird
Brown-headed Cowbird
Bobolink

////----- STATISTICS -----////

Species seen - 136

Appendix E

Site Photographs: April – July, 2006

Note: Appendix E is in a separate file.

APPENDIX E

Photo Record of Cranberry Bog Conditions

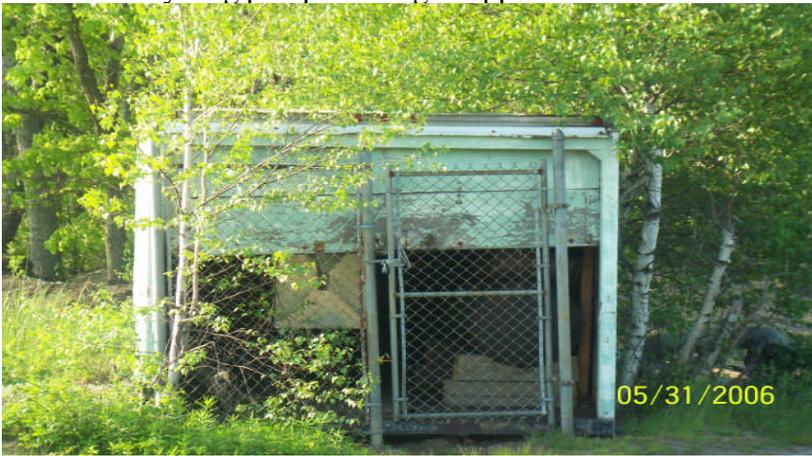
Contents	Date of Photo
1. Water Control Structures	
1.1 Cranberry Bog upper reservoir flume interior condition	5-25-06
1.2 Cranberry Bog pump housing at upper reservoir	5-31-06
1.3 Cranberry Bog upper reservoir flume exterior condition	5-25-06
1.4 Cranberry Bog upper reservoir flume functioning with high water	5-30-06
1.5 Cranberry Bog upper reservoir flume with exterior area repaired	7-05-06
1.6 Cranberry Bog dam in Chelmsford before breach	5-15-06
1.7 Cranberry Bog dam breach repair in Chelmsford looking SW	6-28-06
1.8 Cranberry Bog dam breach repair in Chelmsford looking NE	6-28-06
1.9 Cranberry Bog flume in Chelmsford after breach repair flowing uncontrolled	6-27-06
1.10 Cranberry Bog pump house repair	8-30-06
2. Cranberry Bog House	
2.1 Cranberry Bog House stair repair	12-6-05
2.2 Cranberry Bog House east side	5-17-06
2.3 Cranberry Bog House eaves	7-07-06
2.4 Cranberry Bog House foundation	7-13-06
2.5 Cranberry Bog House windows	7-13-06
3. Agricultural Safety Signs and Structures	
3.1 Cranberry Bog entrance sign on east side of Cranberry Bog House	5-17-06
3.2 Cranberry Bog bee sign on north side of productive cranberry field	6-05-06
4. Parking	
4.1 Parking area west of Cranberry Bog House on Curve Street	5-17-06
4.2 Parking areas along Curve Street near Martin Street looking SW	5-17-06
4.3 Parking areas along Curve Street near Martin Street looking NE	5-17-06
4.4 Parking along Curve Street between bog farm roads looking NE	5-17-06
4.5 Parking on curve in road west of Cranberry Bog House	2-26-06
5. Cranberry Bog Road	
5.1 Cranberry Bog Road before repair of slumping	2-26-06
5.2 Cranberry Bog Road after repair of slumping	7-05-06
5.3 Cranberry Bog Road puddles	5-17-06
5.4 Cranberry Bog Road overflow from woodland near Curve Street	5-17-06
5.5 Cranberry Bog Road overflow from woodland near lower reservoir	5-17-06
6. Woodlands	
6.1 Cranberry Bog northern woods white pine deterioration	6-05-06
7. Educational, Trail, and Property Signs	
7.1 Cranberry Bog educational sign made inaccessible by water	5-17-06
7.2 Cranberry Bog bulletin board	5-17-06
7.3 Cranberry Bog bulletin board poster deterioration	5-17-06
7.4 Cranberry Bog property sign along Curve Street in need of repair	5-17-06
7.5 Cranberry Bog property sign with typographical error	5-17-06

1. Water Control Structures

1.1 Cranberry Bog upper reservoir flume interior condition 5/25/06



1.2 Cranberry Bog pump housing at upper reservoir



1.3 Cranberry Bog upper reservoir flume exterior condition



1.4 Cranberry Bog upper reservoir flume functioning with high water



1.5 Cranberry Bog upper reservoir flume with exterior area repaired



1.6 Cranberry Bog dam in Chelmsford before breach



1.7 Cranberry Bog dam breach repair in Chelmsford looking southwest



1.8 Cranberry Bog dam breach repair in Chelmsford looking northeast



1.9 Cranberry Bog flume in Chelmsford after breach repair flowing uncontrolled



1.10 Cranberry Bog Pump House Repair



2. Cranberry Bog House

2.1 Cranberry Bog House stair repair 4/3/06



2.2 Cranberry Bog House - east side



2.3 Cranberry Bog House eaves



2.4 Cranberry Bog House Foundation



2.5 Cranberry Bog House Window



3. Agricultural Safety Signs and Structures

3.1 Cranberry Bog entrance sign on east side of Cranberry Bog House



3.2 Cranberry Bog bee sign on north side of productive cranberry field



4. Cranberry Bog Parking

4.1 Parking area west of Cranberry Bog House on Curve Street



4.2 Parking areas along Curve Street near Martin Street looking SW



4.3 Parking areas along Curve Street near Martin Street looking NE



4.4 Parking along Curve Street between bog farm roads looking NE



4.5 Parking on curve in road west of Cranberry Bog House 2-26-06



5. Cranberry Bog Road

5.1 Cranberry Bog Road before repair of slumping 2-26-06



5.2 Cranberry Bog Road after repair of slumping



5.3 Cranberry Bog Road puddles



5.4 Cranberry Bog Road overflow from woodland near Curve Street



5.5 Cranberry Bog Road overflow from woodland near lower reservoir



6. Woodlands

6.1 Cranberry Bog northern woods white pine deterioration



7. Educational, Trail and Property Signs

7.1 Cranberry Bog educational sign made inaccessible by water



7.2 Cranberry Bog bulletin board



7.3 Cranberry Bog bulletin board poster deterioration



7.4 Cranberry Bog property sign along Curve Street in need of repair



7.5 Cranberry Bog property sign with typographical error



Appendix F

Photo Record of Cranberry Bog House Interior

Contents	Date of Photo
1. Exterior Elevations	
1.1 East Side of the Cranberry Bog House	4-04-07
1.2 North Side of the Cranberry Bog House	4-04-07
1.3 West Side of the Cranberry Bog House	4-04-07
1.4 South Side of the Cranberry Bog House	4-04-07
2. First Floor	
2.1 First Floor Sliding Door Entrance with Padlock	4-04-07
2.2 First Floor Interior Facing North Wall	3-23-07
2.3 First Floor Interior Facing Southwest Corner	3-23-07
2.4 First Floor Interior Facing Northwest Corner	3-23-07
2.5 First Floor Interior Facing West Wall	3-23-07
2.6 First Floor Interior Staircase in Northeast Corner	3-23-07
3. Second Floor Apartment	
3.1 Second Floor Apartment Exit to Exterior	3-23-07
3.2 Second Floor Apartment Bathroom/Laundry Area	3-29-07
3.3 Second Floor Apartment Bathroom View 1	3-23-07
3.4 Second Floor Apartment Bathroom View 2	3-23-07
3.5 Second Floor Apartment Bathroom Floor	3-23-07
3.6 Second Floor Apartment Pellet Stove	3-23-07
3.7 Second Floor Apartment Living Area	3-23-07
3.8 Second Floor Apartment Kitchen	3-23-07
3.9 Second Floor Apartment Dining/Office Area	3-23-07
4. Second Floor Storage Area	
4.1 Second Floor Main Storage Area Exterior Door	4-04-07
4.2 Second Floor Main Storage Area View 1	3-23-07
4.3 Second Floor Main Storage Area View 2	3-23-07
4.4 Second Floor Main Storage Area Smoke Detector	3-23-07
4.5 Second Floor Main Storage Area Electrical Panel	3-23-07
4.6 Second Floor Main Storage Area Hot Water Heater	3-23-07
4.7 Second Floor Main Storage Area Exterior Door Platform	3-23-07
4.8 Second Floor Secondary Storage Room	3-23-07
5. Third Floor Apartment	
5.1 Third Floor Apartment West Exit to the Exterior	3-29-07
5.2 Third Floor Apartment Bathroom View 1	3-23-07
5.3 Third Floor Apartment Bathroom View 2	3-23-07

5.4 Third Floor Apartment Laundry/Storage Room	3-23-07
5.5 Third Floor Apartment Kitchen	3-23-07
5.6 Third Floor Apartment Dining Area with Pellet Stove	3-23-07
5.7 Third Floor Apartment Living Area	3-23-07
5.8 Third Floor Apartment Bedroom #1	3-23-07
5.9 Third Floor Apartment Bedroom #2	3-23-07
5.10 Third Floor Apartment Bedroom #3 View 1	3-23-07
5.11 Third Floor Apartment Bedroom #3 View 2	3-23-07
5.12 Third Floor Apartment Northeast Entryway	3-23-07
5.13 Third Floor Apartment Northeast Entryway Stairwell	3-23-07
6. Fourth Floor	
6.1 Fourth Floor Stairwell	3-23-07
6.2 Fourth Floor Bedroom #1	3-23-07
6.3 Fourth Floor Bedroom #2	3-23-07
6.4 Fourth Floor Bedroom #3	3-23-07
6.5 Fourth Floor Bedroom #4 and Ceiling	3-23-07
6.6 Fourth Floor Storage Area View 1	3-23-07
6.7 Fourth Floor Storage Area View 2	3-23-07

Appendix F

Photo Record of Cranberry Bog House Interior

1. Exterior Elevations

1.1 East Side of the Cranberry Bog House



1.2 North Side of the Cranberry Bog House



1.3 West Side of the Cranberry Bog House



1.4 South Side of the Cranberry Bog House



2. First Floor

2.1 First Floor Sliding Door Entrance with Padlock



2.2 First Floor Interior Facing North Wall



2.3 First Floor Interior Facing Southwest Corner



2.4 First Floor Interior Facing Northwest Corner



2.5 First Floor Interior Facing West Wall



2.6 First Floor Interior Staircase in Northeast Corner

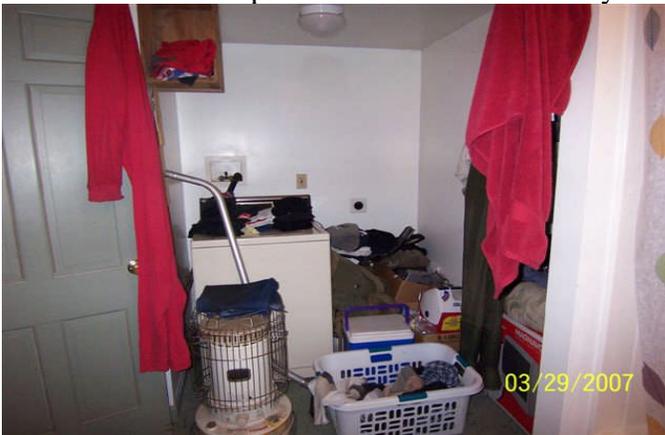


3. Second Floor Apartment

3.1 Second Floor Apartment Exit to Exterior



3.2 Second Floor Apartment Bathroom/Laundry Area



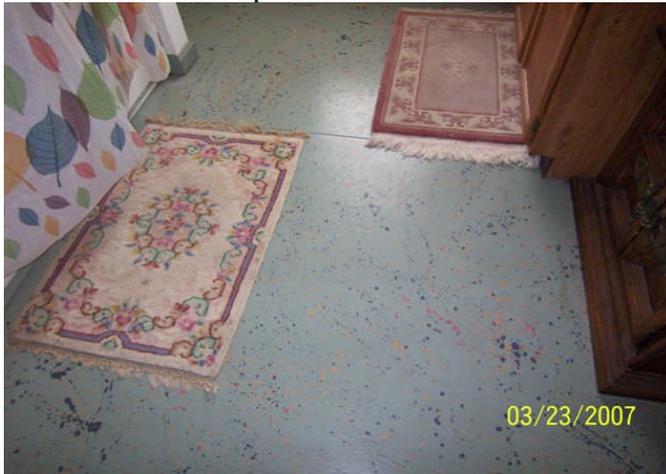
3.3 Second Floor Apartment Bathroom View 1



3.4 Second Floor Apartment Bathroom View 2



3.5 Second Floor Apartment Bathroom Floor



3.6 Second Floor Apartment Pellet Stove



3.7 Second Floor Apartment Living Area



3.8 Second Floor Apartment Kitchen



3.9 Second Floor Apartment Dining/ Office Area



4. Second Floor Storage Areas

4.1 Second Floor Main Storage Area Exterior Door



4.2 Second Floor Main Storage Area View 1



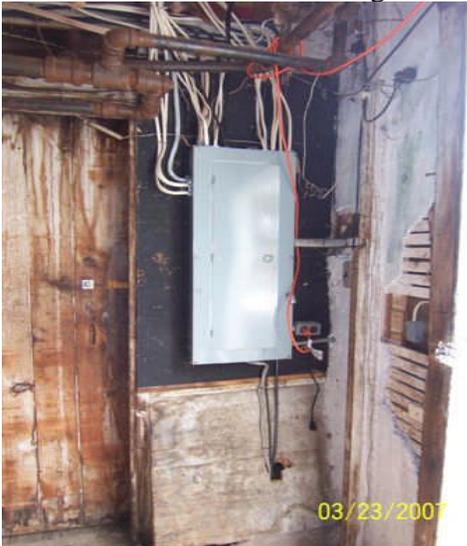
4.3 Second Floor Main Storage Area View 2



4.4 Second Floor Main Storage Area Smoke Detector



4.5 Second Floor Main Storage Area Electrical Panel



4.6 Second Floor Main Storage Area Hot Water Heater



4.7 Second Floor Main Storage Area Exterior Door Platform



4.8 Second Floor Secondary Storage Room



5. Third Floor Apartment

5.1 Third Floor Apartment West Exit to the Exterior



5.2 Third Floor Apartment Bathroom View 1



5.3 Third Floor Apartment Bathroom View 2



5.4 Third Floor Apartment Laundry/Storage Room



5.5 Third Floor Apartment Kitchen



5.6 Third Floor Apartment Dining Area with Pellet Stove



5.7 Third Floor Apartment Living Area



5.8 Third Floor Apartment Bedroom #1



5.9 Third Floor Apartment Bedroom #2



5.10 Third Floor Apartment Bedroom #3 View 1



5.11 Third Floor Apartment Bedroom #3 View 2



5.12 Third Floor Apartment Northeast Entryway



5.13 Third Floor Apartment Northeast Entryway Stairwell



6. Fourth Floor

6.1 Fourth Floor Stairwell



6.2 Fourth Floor Bedroom #1



6.3 Fourth Floor Bedroom #2



6.4 Fourth Floor Bedroom #3



6.5 Fourth Floor Bedroom #4 and Ceiling



6.6 Fourth Floor Storage Area View 1



6.7 Fourth Floor Storage Area View 2

