



Town of Norton

2022 Annual Lakes and Ponds Monitoring and Management Report

November 4, 2022

Prepared For:

Town of Norton Conservation Commission
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1.0 INTRODUCTION

TRC Companies, Inc. (TRC) was contracted by the Town of Norton (Town) to complete the monitoring and reporting required for compliance with Orders of Conditions (OOCs) issued by the Norton Conservation Commission (the Commission) for management of nuisance vegetation at Winnecunnet Pond, Norton Reservoir, and Chartley Pond.

TRC submits this annual report to the Norton Conservation Commission (the Commission) in compliance with Special Condition 52 in the Norton Reservoir Order of Conditions (OOC), Special Condition 47 in the Winnecunnet Pond OOC, and Special Condition 50 in the Chartley Pond OOC, as amended.

2.0 2022 MANAGEMENT PROGRAM

This report is divided into the following elements to address the aforementioned special conditions:

1. Description of conditions during pre-treatment surveys
2. Description of the management program undertaken
3. Areas treated and herbicides used
4. Description of conditions during post-treatment surveys
5. Recommendations for future management
6. Updated Safe Zone mapping in each of the ponds prior to initiation of the 2022 management program

2.1 Pre-treatment Surveys

TRC completed pre-treatment/early season vegetation surveys at Winnecunnet Pond, Norton Reservoir, and Chartley Pond to provide updates on the status of exotic plant infestations in each water body.

The pre-treatment survey dates and exotic plants observed are summarized in Table 1.0. These surveys were used as a baseline to compare conditions following the first season of vegetation management at each pond.

Table 1 Dates of Pre-treatment Surveys in 2022

Water Body	Survey Dates	Exotic Species Observed
Winnecunnet Pond	May 19, 2022	Fanwort Variable-leaf Milfoil Curly-leaf Pondweed*
Norton Reservoir	June 16, 2022	Fanwort Variable-leaf Milfoil Water Chestnut

Table 1 Dates of Pre-treatment Surveys in 2022

Water Body	Survey Dates	Exotic Species Observed
Chartley Pond	June 14, 2022	Fanwort Variable-leaf Milfoil Water Chestnut

*Indicates species not previously observed as part of the monitoring program.

Details on the pre-treatment condition of each pond are provided in the following sections.

Winnecunnet Pond

Three exotic species were observed in Winnecunnet Pond during the Pre-treatment survey: fanwort (*Cabomba caroliniana*), variable-leaf milfoil (*Myriophyllum heterophyllum*), and curly-leaf pondweed (*Potamogeton crispus*).

- Fanwort, covering approximately three acres, was sparse in Winnecunnet Pond (Figure 1). However, given the early timing of the survey (May), fanwort would have still been in the early growth stages at the time.
- Variable-leaf milfoil covered an estimated total of approximately 60 acres, primarily consisting of dense beds (Figure 2). This was an **increase** of two acres from conditions in May 2021.
- Curly-leaf pondweed was mapped within an area of approximately 23 acres, primarily consisting of sparse and patchy beds (Figure 3). Curly-leaf pondweed was not observed during the pre-treatment survey in 2021.

Norton Reservoir

Three exotic species were observed in Norton Reservoir during the pre-treatment surveys: variable-leaf milfoil, curly-leaf pondweed, and water chestnut (*Trapa natans*). **Eurasian milfoil, fanwort, and swollen bladderwort, each previously found at Norton Reservoir, were not observed in 2022.**

- Variable-leaf milfoil covered an estimated total of 45 acres, consisting primarily of sparse to patchy beds, with some areas of dense growth (Figure 4). This represents a **decrease** of approximately 66 acres from 2021 pre-treatment conditions.
- Sparse beds of curly-leaf pondweed were observed in the main basin, covering approximately four acres (Figure 5). This represents a **decrease** of approximately 54 acres from 2021 pre-treatment conditions.
- Water chestnut covered an estimated total of eight acres, which represents an **increase** of approximately one acre from the pre-treatment survey in 2021. The majority of this growth was sparse (Figure 6).
- Fanwort, which was observed during the 2021 pre-treatment survey, was not observed during the 2022 pre-treatment survey.

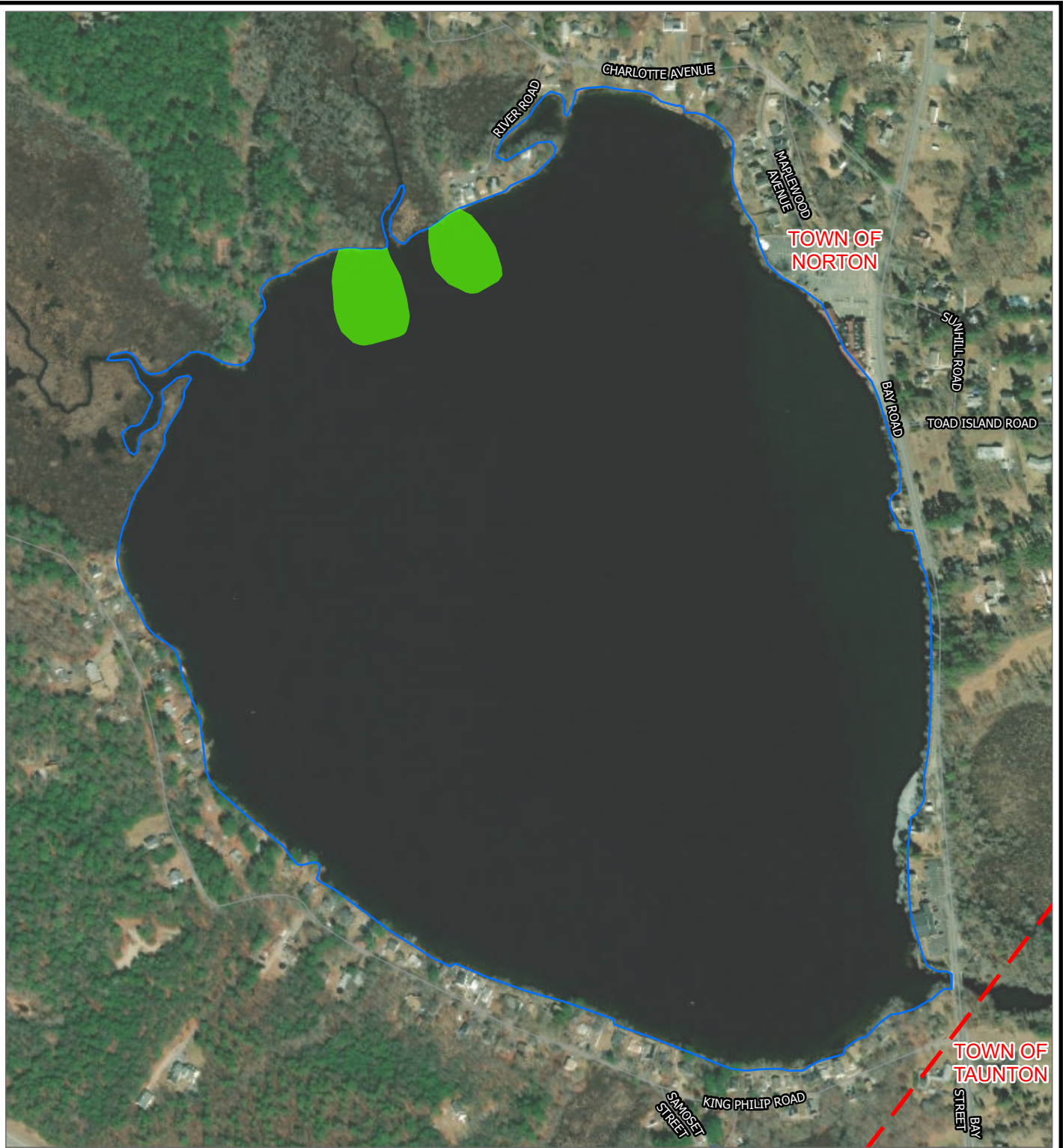


Chartley Pond

Three exotic invasive species were observed in Chartley Pond during the pre-treatment surveys: fanwort, variable-leaf milfoil, and water chestnut. ***Swollen bladderwort was not observed in 2022.***

- Fanwort covered approximately 14 acres, consisting primarily of sparse to patchy beds, with some areas of dense growth (Figure 7). This represents an **increase** of close to nine acres from early-season growth in 2021.
- Variable-leaf milfoil covered approximately nine acres, consisting of sparse to patchy growth (Figure 8). This represents a **decrease** of approximately four acres from the pre-treatment survey in 2021.
- Water chestnut covered approximately 14 acres of the pond (Figure 9). This represents an **increase** of nearly 11 acres of growth from pre-treatment conditions in 2021. Approximately 50 percent of the beds observed were dense.

COORDINATE SYSTEM: NAD 1983 2011 STATEPLANE MASSACHUSETTS MIND FIPS 2001 FTUS; MAP ROTATION: 0
 -- SAVED BY: TLATHAM ON 10/28/2022 10:17:23 AM; FILE PATH: T:\1-PROJECTS\TOWNOFNORTON\MA502041_FY2023\2-APRX\502041_WINNECUNNET.CC 20220519
 LAYOUT NAME: 502041_WINNECUNNET.CC 20220519



FANWORT COVERAGE	SHORELINE
SPARSE (2.9 ACRES)	TOWN BOUNDARY
PATCHY (0.0 ACRES)	
DENSE (0.0 ACRES)	

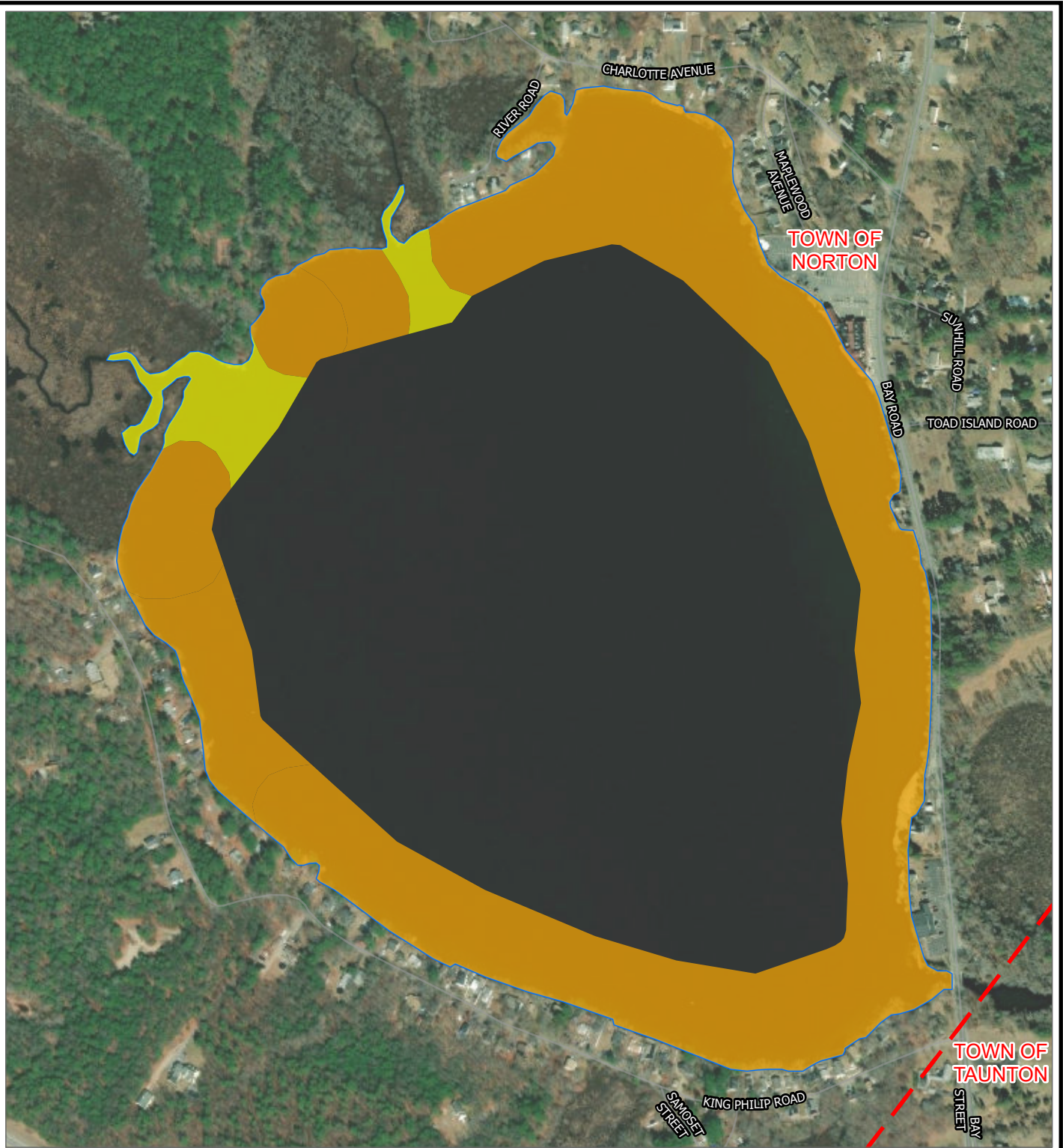
BASE MAP: ESRI, WORLD IMAGERY, 2021
 DATA SOURCES:
 TRC, GPS LOCATIONS, 05/19/22
 MASSGIS, MASSDOT ROADS, 2022

1:6,000 1" = 500'

PROJECT: LAKE MANAGEMENT SERVICES	
WINNECUNNET POND TOWN OF NORTON, MA	
TITLE: FANWORT COVERAGE MAY 19, 2022 SURVEY	
DRAWN BY: T. LATHAM	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 1
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	
FILE:	502041_WINNECUNNETFIGURES

10 HEMINGWAY DRIVE
2ND FLOOR
EAST PROVIDENCE, RI 02915
PHONE: 401.330.1236

COORDINATE SYSTEM: NAD_1983_2011_STATEPLANE_MASSACHUSETTS_MIND_FIPS_2001_FTUS; MAP ROTATION: 0
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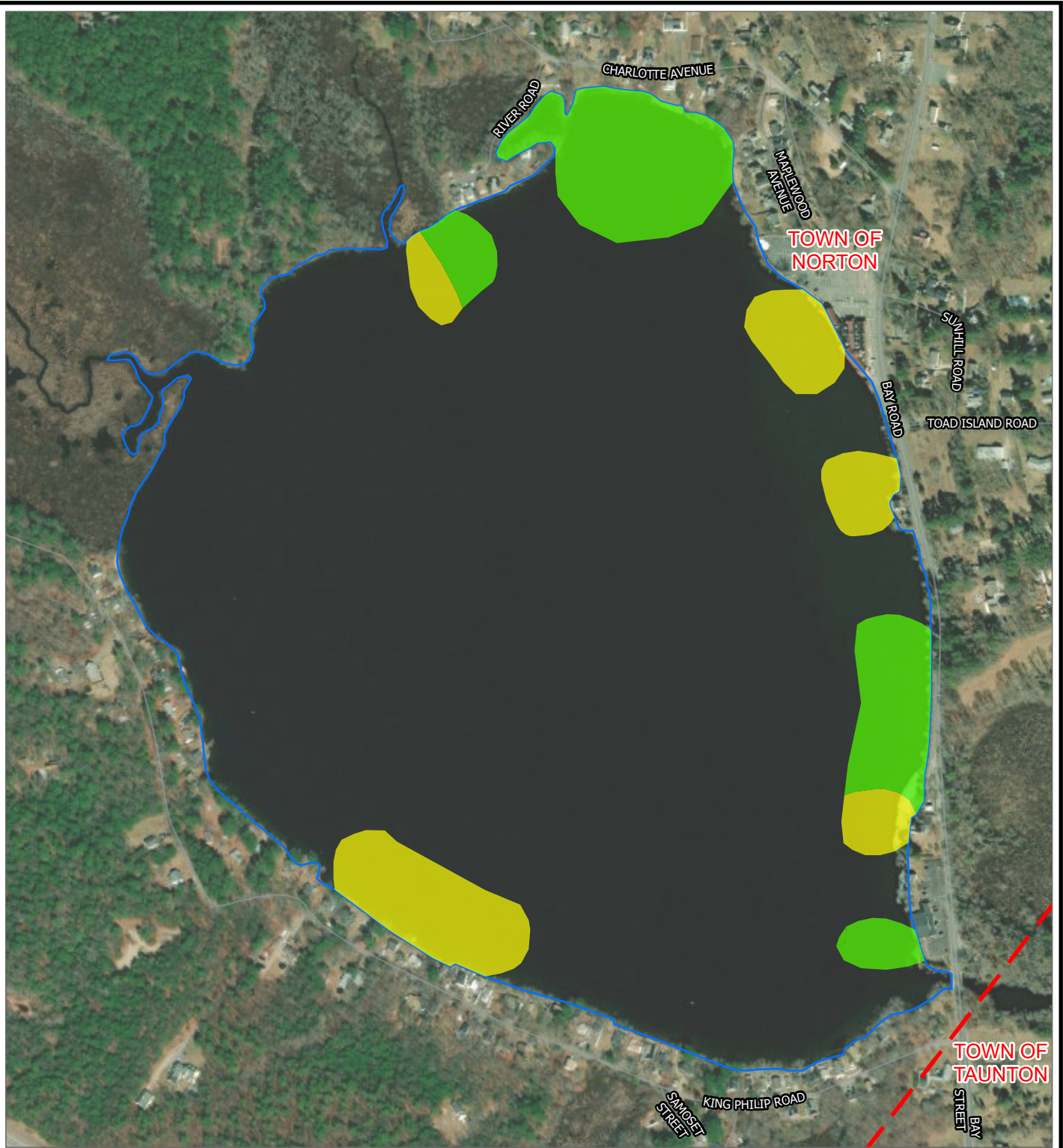
VARIABLE-LEAF MILFOIL COVERAGE		SHORELINE
SPARSE (0.0 ACRES)	TOWN BOUNDARY	
PATCHY (4.7 ACRES)		
DENSE (55.3 ACRES)		

BASE MAP: ESRI, WORLD IMAGERY, 2021
 DATA SOURCES:
 TRC, GPS LOCATIONS, 05/19/22
 MASSGIS, MASSDOT ROADS, 2022

1:6,000 1" = 500'

PROJECT: LAKE MANAGEMENT SERVICES	
WINNECUNNET POND TOWN OF NORTON, MA	
TITLE: VARIABLE-LEAF MILFOIL COVERAGE MAY 19, 2022 SURVEY	
DRAWN BY: T. LATHAM	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 2
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	
10 HEMINGWAY DRIVE 2ND FLOOR EAST PROVIDENCE, RI 02915 PHONE: 401.330.1236	
FILE:	502041_WINNECUNNETFIGURES

COORDINATE SYSTEM: NAD 1983 2011 STATEPLANE MASSACHUSETTS MIND FIPS 2001 FTUS; MAP ROTATION: 0
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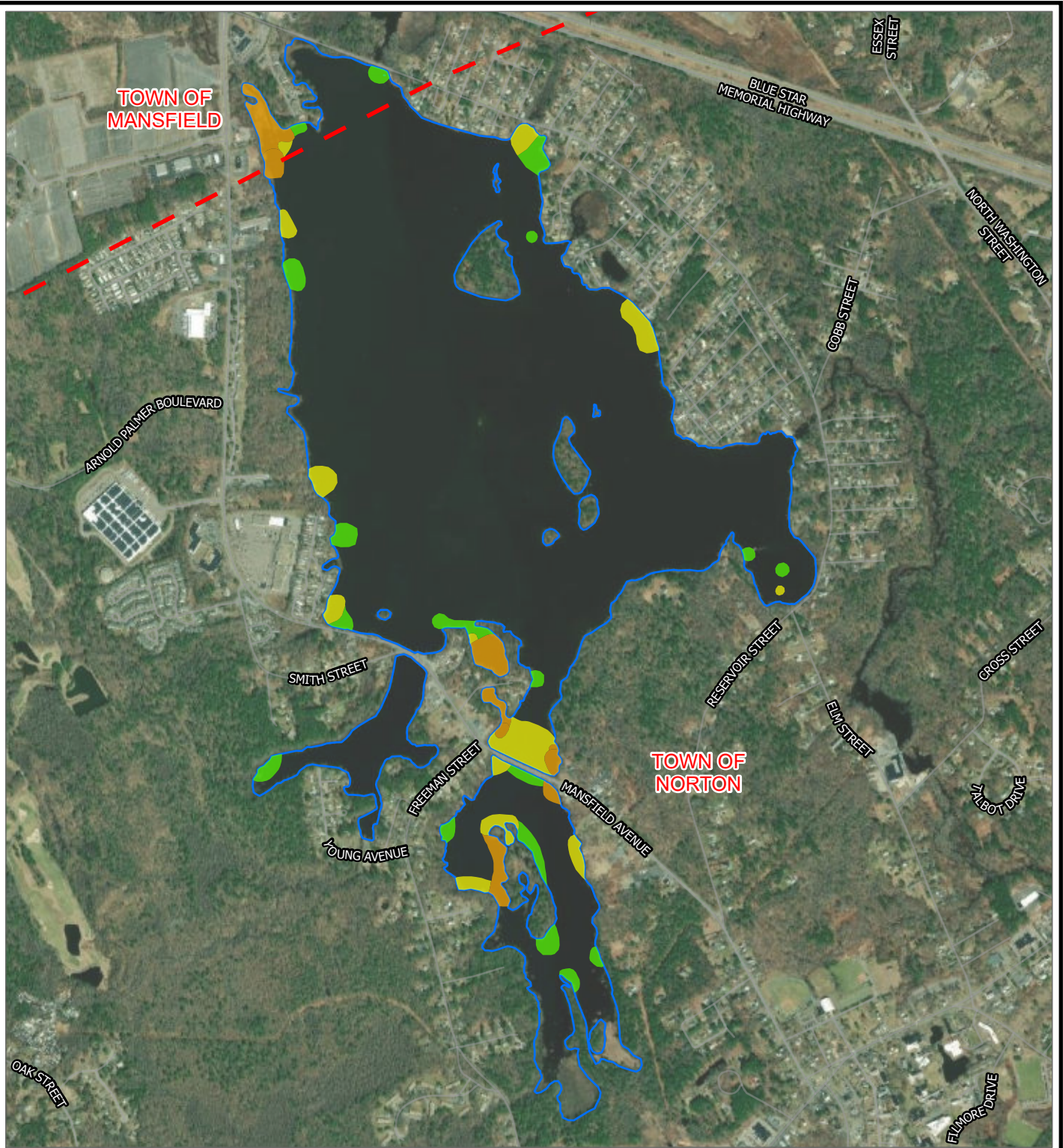
CURLY-LEAF PONDWEED COVERAGE	SHORELINE
SPARSE (12.5 ACRES)	TOWN BOUNDARY
PATCHY (10.0 ACRES)	
DENSE (0.0 ACRES)	

BASE MAP: ESRI, WORLD IMAGERY, 2021
 DATA SOURCES:
 TRC, GPS LOCATIONS, 05/19/22
 MASSGIS, MASSDOT ROADS, 2022

1:6,000 1" = 500'

PROJECT: LAKE MANAGEMENT SERVICES	
WINNECUNNET POND TOWN OF NORTON, MA	
TITLE: CURLY-LEAF PONDWEED COVERAGE MAY 19, 2022 SURVEY	
DRAWN BY: T. LATHAM	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 3
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	
10 HEMINGWAY DRIVE 2ND FLOOR EAST PROVIDENCE, RI 02915 PHONE: 401.330.1236	
FILE:	502041_WINNECUNNETFIGURES

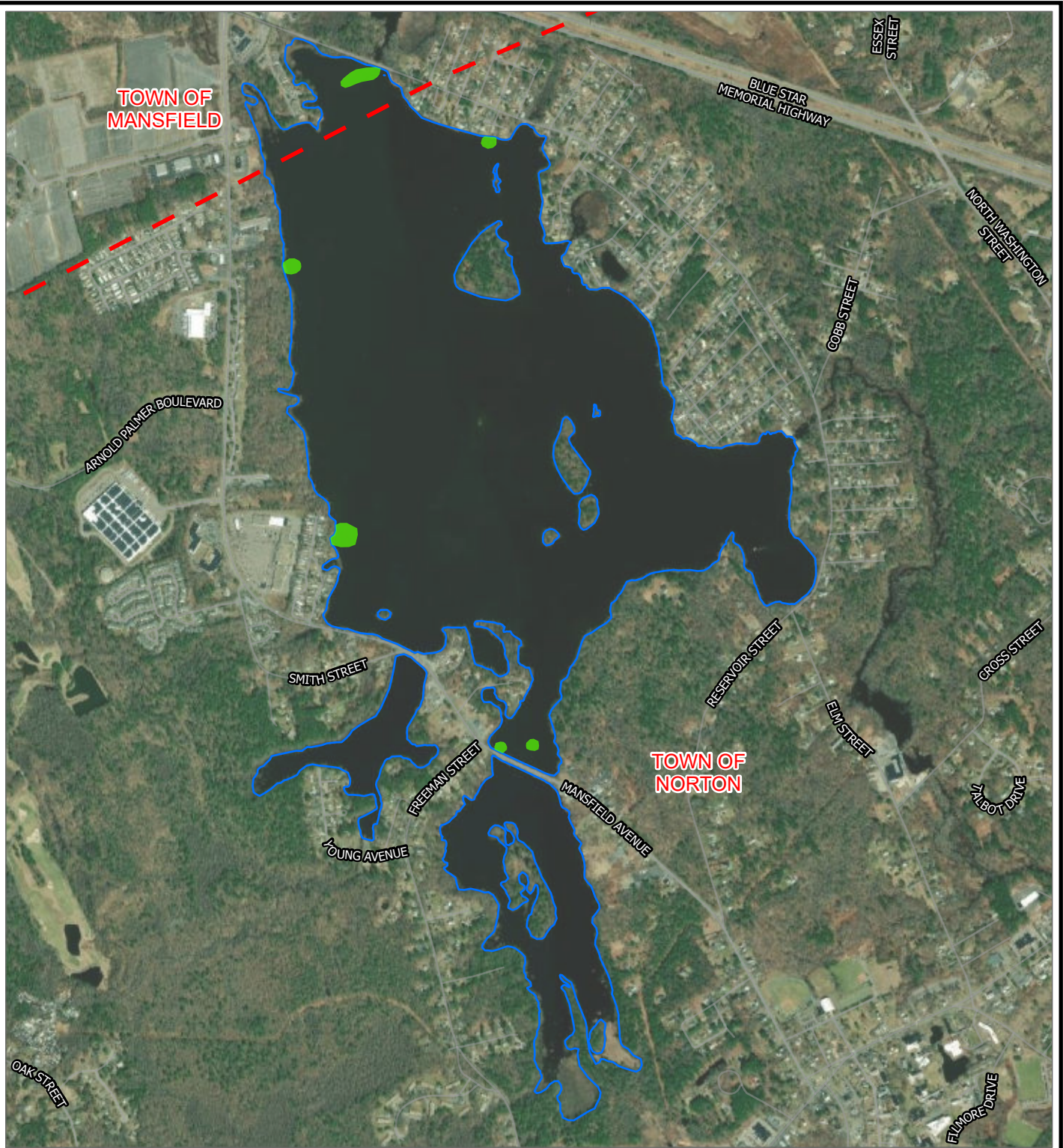
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VARIABLE-LEAF MILFOIL COVERAGE	SHORELINE
<ul style="list-style-type: none"> SPARSE (15.3 ACRES) PATCHY (17.1 ACRES) DENSE (12.8 ACRES) 	<ul style="list-style-type: none"> SHORELINE TOWN BOUNDARY
<p>BASE MAP: ESRI, WORLD IMAGERY, 2020 DATA SOURCES: TRC, GPS LOCATIONS, 06/16/22 MASSGIS, MASSDOT ROADS, 2022</p>	
<p>0 750 1,500 FEET 1:18,000 1" = 1,500'</p>	

PROJECT: LAKE MANAGEMENT SERVICES	
NORTON RESERVOIR TOWN OF NORTON, MA	
TITLE: VARIABLE-LEAF MILFOIL COVERAGE JUNE 16, 2022 SURVEY	
DRAWN BY: T. LATHAM	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 4
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	
10 HEMINGWAY DRIVE 2ND FLOOR EAST PROVIDENCE, RI 02915 PHONE: 401.330.1236	
FILE:	502041_NORTONRESERVOIRFIGURES

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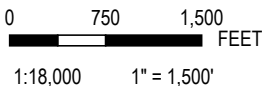
CURLY-LEAF PONDWEED COVERAGE

- SPARSE (4.1 ACRES)
- PATCHY (0.0 ACRES)
- DENSE (0.0 ACRES)

SHORELINE

TOWN BOUNDARY

BASE MAP: ESRI, WORLD IMAGERY, 2020
 DATA SOURCES:
 TRC, GPS LOCATIONS, 06/16/22
 MASSGIS, MASSDOT ROADS, 2022



PROJECT: LAKE MANAGEMENT SERVICES
NORTON RESERVOIR
TOWN OF NORTON, MA

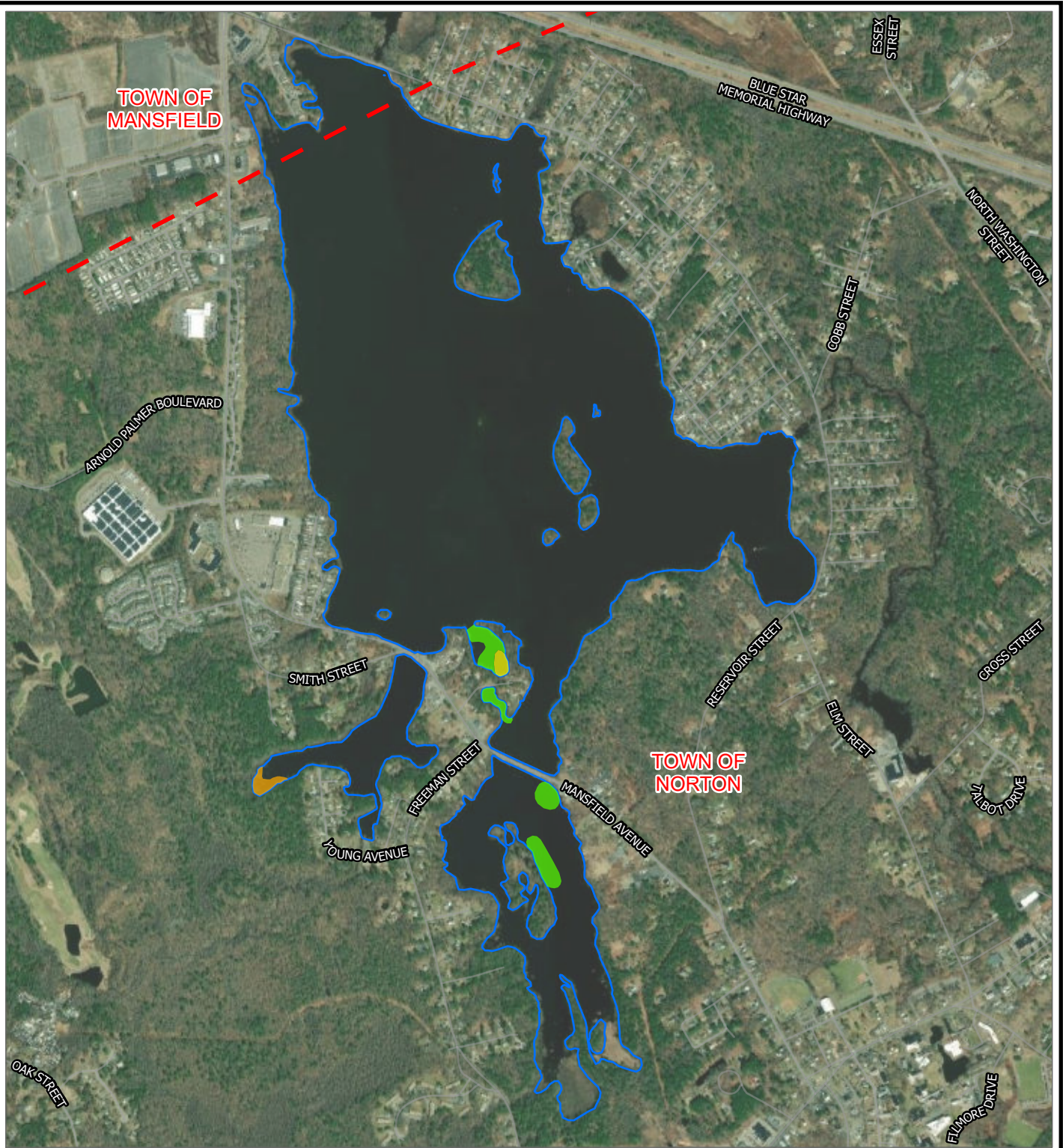
TITLE: CURLY-LEAF PONDWEED COVERAGE
JUNE 16, 2022 SURVEY

DRAWN BY: T. LATHAM	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 5
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	

TRC 10 HEMINGWAY DRIVE
 2ND FLOOR
 EAST PROVIDENCE, RI 02915
 PHONE: 401.330.1236

FILE: 502041_NORTONRESERVOIRFIGURES

COORDINATE SYSTEM: NAD 1983 2011 STATEPLANE MASSACHUSETTS MIND FIPS 2001 FTUS; MAP ROTATION: 0
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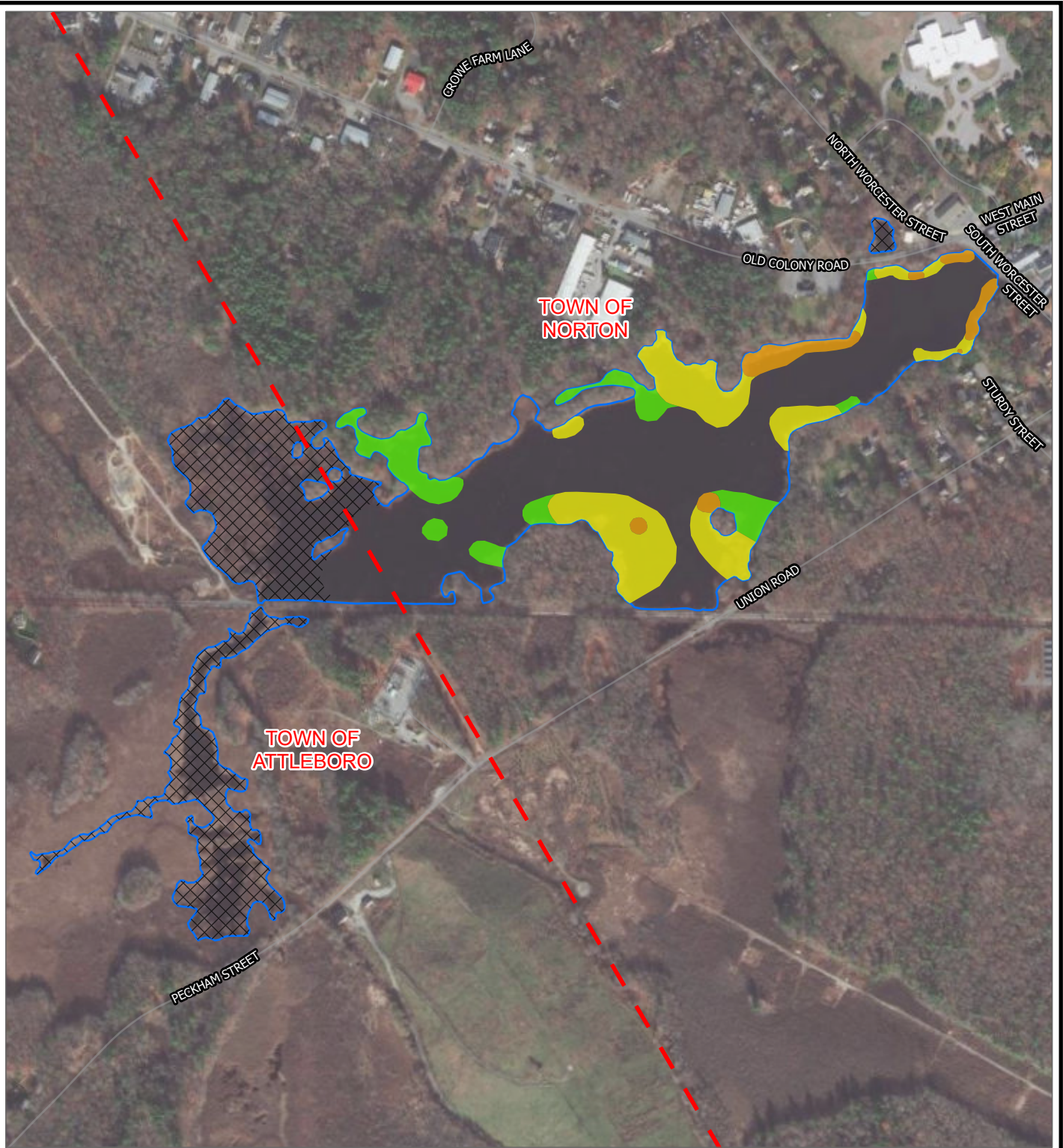
WATER CHESTNUT COVERAGE	SHORELINE
SPARSE (6.5 ACRES)	TOWN BOUNDARY
PATCHY (0.8 ACRES)	
DENSE (1.1 ACRES)	

BASE MAP: ESRI, WORLD IMAGERY, 2020
 DATA SOURCES:
 TRC, GPS LOCATIONS, 06/16/22
 MASSGIS, MASSDOT ROADS, 2022

1:18,000 1" = 1,500'

PROJECT: LAKE MANAGEMENT SERVICES NORTON RESERVOIR TOWN OF NORTON, MA	
TITLE: WATER CHESTNUT COVERAGE JUNE 16, 2022 SURVEY	
DRAWN BY: T. LATHAM	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 6
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	
FILE:	10 HEMINGWAY DRIVE 2ND FLOOR EAST PROVIDENCE, RI 02915 PHONE: 401.330.1236 502041_NORTONRESERVOIRFIGURES

COORDINATE SYSTEM: NAD 1983 2011 STATEPLANE MASSACHUSETTS MIND FIPS 2001 FTUS; MAP ROTATION: 0
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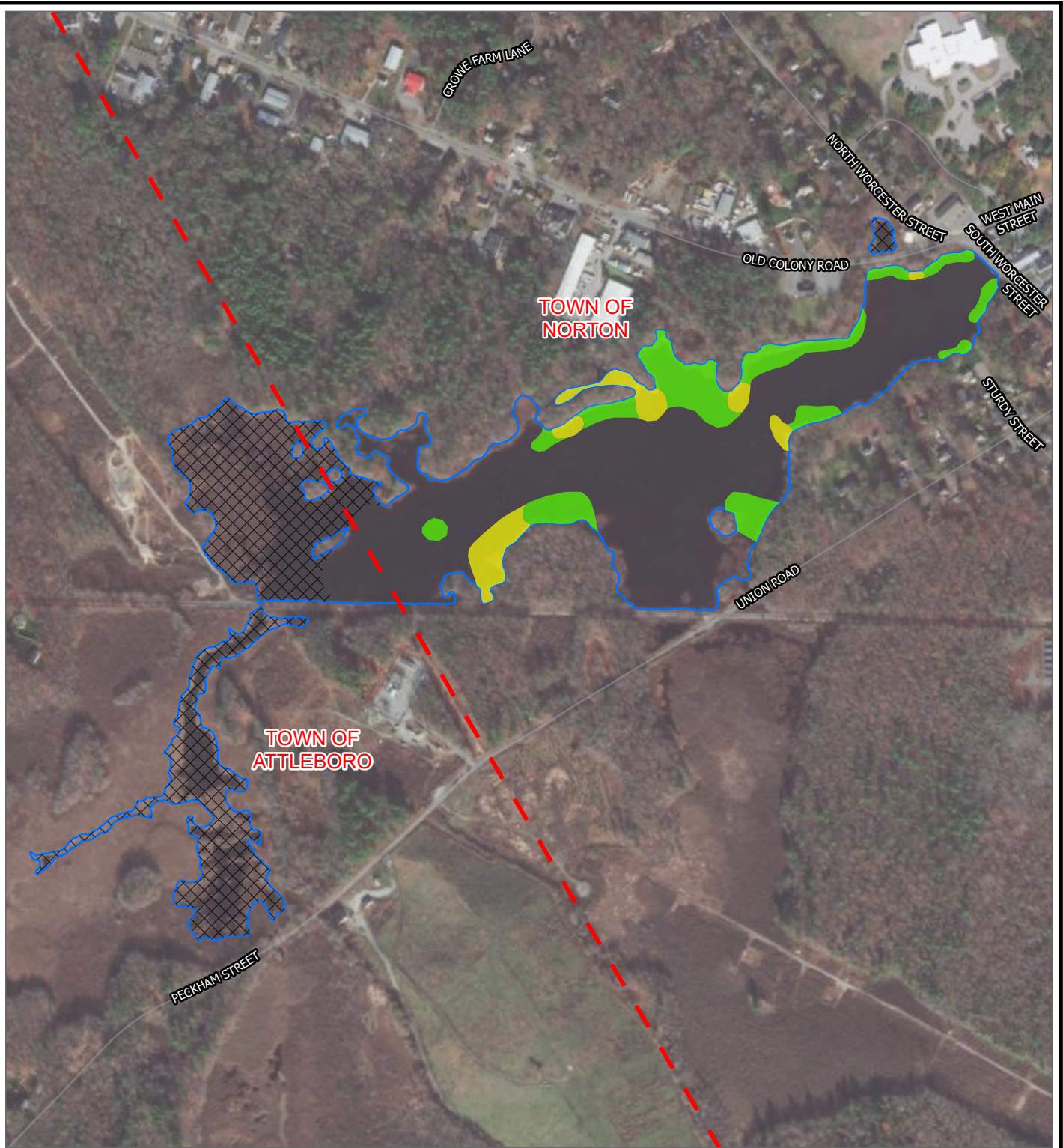
FANWORT COVERAGE	SHORELINE
SPARSE (4.30 ACRES)	TOWN BOUNDARY
PATCHY (8.31 ACRES)	
DENSE (1.76 ACRES)	
NOT SURVEYED	

BASE MAP: ESRI, WORLD IMAGERY, 2020
 DATA SOURCES:
 TRC, GPS LOCATIONS, 06/14/22
 MASSGIS, MASSDOT ROADS, 2022

1:7,800 1" = 650'

PROJECT: LAKE MANAGEMENT SERVICES	
CHARTLEY POND TOWN OF NORTON, MA	
TITLE: FANWORT COVERAGE	
JUNE 14, 2022 SURVEY	
DRAWN BY: T. LATHAM	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 7
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	
10 HEMINGWAY DRIVE 2ND FLOOR EAST PROVIDENCE, RI 02915 PHONE: 401.330.1236	
FILE:	502041_CHARTLEYFIGURES

COORDINATE SYSTEM: NAD 1983 2011 STATEPLANE MASSACHUSETTS MIND FIPS 2001 FTUS; MAP ROTATION: 0
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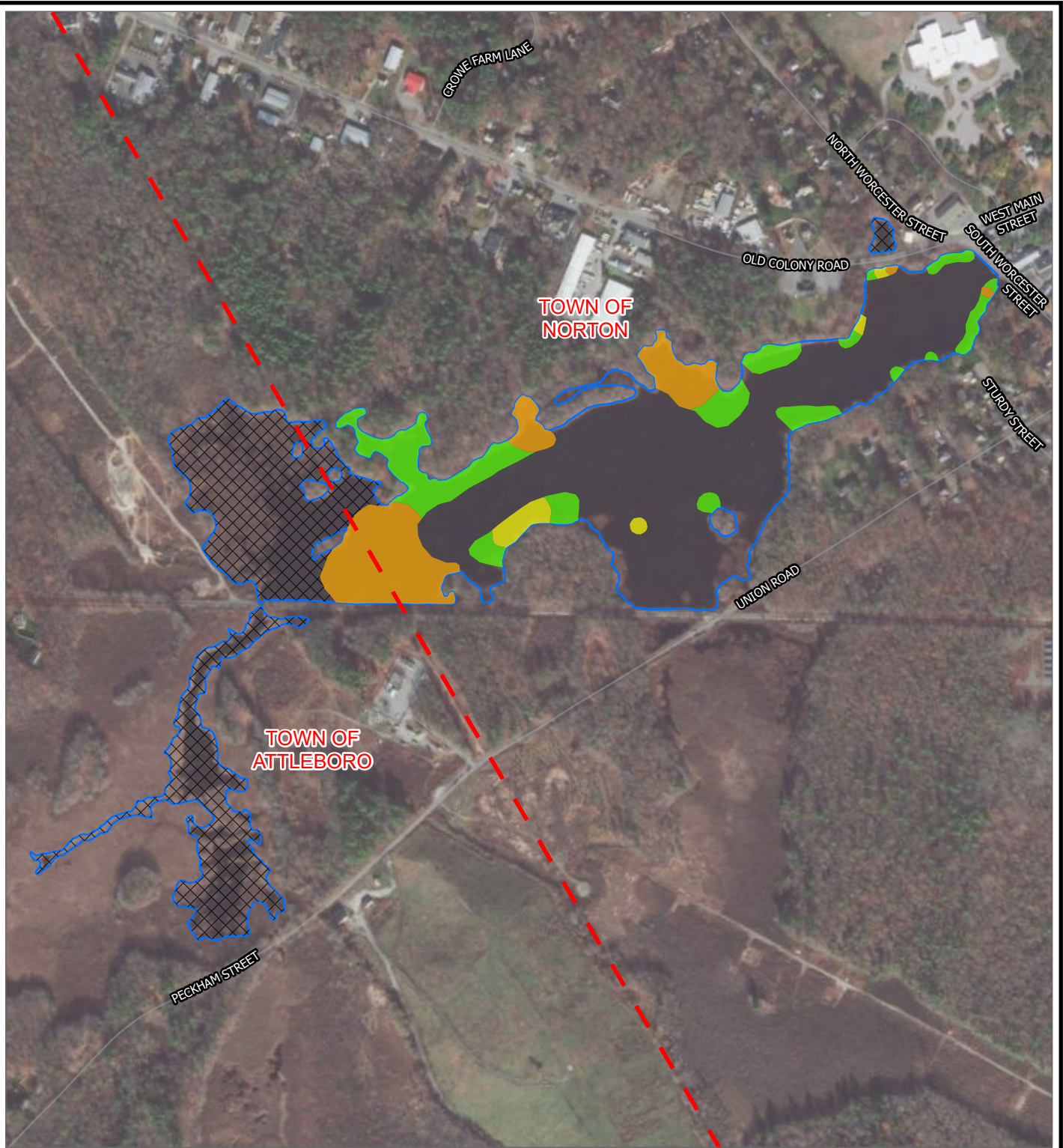
VARIABLE LEAF MILFOIL COVERAGE		SHORELINE
	SPARSE (6.65 ACRES)	TOWN BOUNDARY
	PATCHY (2.72 ACRES)	
	DENSE (0 ACRES)	
	NOT SURVEYED	

BASE MAP: ESRI, WORLD IMAGERY, 2020
 DATA SOURCES:
 TRC, GPS LOCATIONS, 06/14/22
 MASSGIS, MASSDOT ROADS, 2022

1:7,800 1" = 650'

PROJECT: LAKE MANAGEMENT SERVICES	
CHARTLEY POND TOWN OF NORTON, MA	
TITLE: VARIABLE-LEAF MILFOIL COVERAGE JUNE 14, 2022 SURVEY	
DRAWN BY: T. LATHAM	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 8
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	
10 HEMINGWAY DRIVE 2ND FLOOR EAST PROVIDENCE, RI 02915 PHONE: 401.330.1236	
FILE:	502041_CHARTLEYFIGURES

COORDINATE SYSTEM: NAD 1983 2011 STATEPLANE MASSACHUSETTS MIND FIPS 2001 FTUS; MAP ROTATION: 0
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WATER CHESTNUT COVERAGE	SHORELINE
SPARSE (6.25 ACRES)	TOWN BOUNDARY
PATCHY (0.91 ACRES)	
DENSE (6.81 ACRES)	
NOT SURVEYED	

BASE MAP: ESRI, WORLD IMAGERY, 2020
 DATA SOURCES:
 TRC, GPS LOCATIONS, 06/14/22
 MASSGIS, MASSDOT ROADS, 2022

1:7,800 1" = 650'

PROJECT: LAKE MANAGEMENT SERVICES	
CHARTLEY POND TOWN OF NORTON, MA	
TITLE: WATERCHESTNUT COVERAGE JUNE 14, 2022 SURVEY	
DRAWN BY: T. LATHAM	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 9
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	
FILE:	10 HEMINGWAY DRIVE 2ND FLOOR EAST PROVIDENCE, RI 02915 PHONE: 401.330.1236 502041_CHARTLEYFIGURES

2.2 Management Program Description

The amended vegetation management program for the three ponds is detailed in the 2015 Vegetation Management Report (ESS 2015), subject to the applicable permit conditions for each pond. The currently permitted management options for each pond are summarized in Table 2.0.

Table 2 Permitted Vegetation Management Program Summary

Action Category	Action	Water Body		
		Winneconnet Pond	Norton Reservoir	Chartley Pond
Chemical Controls	Herbicides	Yes	Yes	Yes
	Algaecides	No	Yes	Yes
Physical Controls	Hand Harvesting	Yes	Yes	Yes
	Diver/Diver Assisted Suction Harvesting	Yes	Yes	Yes
	Benthic Barriers	No	Yes	Yes

The specific elements of the vegetation management program implemented in 2022 are summarized in Table 3.0. Details on herbicide applications are provided in the next section of this report.

Table 3 Summary of Vegetation Management Actions Implemented in 2022

Action Category	Action	Water Body		
		Winneconnet Pond	Norton Reservoir	Chartley Pond
Chemical Controls	Herbicides	Yes	Yes	Yes
	Algaecides	N/A	No	No
Physical Controls	Hand Harvesting	No	Yes	Yes
	Diver/Diver Assisted Suction Harvesting	No	No	No
	Benthic Barriers	N/A	No	No

2.3 Areas Managed and Herbicides Used

2.3.1 Summary of Management Actions

The herbicides approved for use are presented in Table 4.0, along with the acreage and dates of treatment. The total area treated, and dates of non-herbicide management efforts implemented in 2022 are also included. All management actions were implemented by SOLitude Lake Management (SOLitude).

Table 4 Summary of Management Effort in 2022

Water Body	Approved Management Action	Trade Name	Used in 2022	Acreage Treated/ Days of Harvesting
Winneconnet Pond	Fluridone	Sonar One and Sonar Genesis	Yes (May, June & July)	Entire Pond
Norton Reservoir	Fluridone	Sonar One and Sonar Genesis	No	0 acres
	Diquat dibromide	Tribune/Diquat	Yes (Jun & Aug)	72 acres*
	Flumioxazin	Clipper	Yes (Jun & Aug)	72 acres*
	Imazamox	Clearcast	No	0 acres
	Hand harvesting	N/A	Yes (Aug*)	1 day*
Chartley Pond	Fluridone	Sonar One and Sonar Genesis	No	0 acres
	Diquat dibromide	Tribune/Diquat	Yes (July & Aug)	13 acres*
	Flumioxazin	Clipper	Yes (July & Aug)	13 acres*
	Imazamox	Clearcast	No	0 acres
	Hand harvesting	N/A	Yes (July)	2 days
*Estimated based on correspondence from the treatment contractor.				

2.4 Post-Treatment Surveys

TRC completed post-treatment vegetation surveys at Norton Reservoir, Chartley Pond, and Winneconnet Pond to provide updates on the status of exotic plant infestations in each water body following the completion of the 2022 management program.

The post-treatment survey dates and exotic plants observed are summarized in Table 5.0.

Table 5 Dates of Post-treatment Surveys in 2022

Water Body	Survey Dates	Exotic Species Observed
Winnecunnet Pond	September 14, 2022	Fanwort Variable-leaf Milfoil Brittle Naiad*
Norton Reservoir	September 16, 2022	Fanwort Variable-leaf Milfoil Water Chestnut
Chartley Pond	September 19, 2022	Fanwort Variable-leaf Milfoil Water Chestnut

*Indicates species not previously observed as part of the monitoring program.

Details on the post-treatment conditions of each pond are provided in the following sections.

Winnecunnet Pond

Two exotic species were observed in Winnecunnet Pond during the post-treatment surveys: variable-leaf milfoil and brittle naiad (*Najas minor*). Curly-leaf pondweed, observed during the pre-treatment survey, was not observed following treatment. However, this annual species typically completes its life cycle by early to mid-summer and can be difficult to detect later in the year.

- Variable-leaf milfoil covered an estimated 22 acres (Figure 10), a **decrease of approximately 38 acres from pre-treatment conditions and a year-over-year decrease of 20 acres**. A nearly equal distribution of sparse, patchy, and dense beds were observed primarily along the western and southern shorelines, with a minor incursion of sparse growth in deeper waters.
- Brittle naiad, which was not observed in previous years or during the pre-treatment survey, covered approximately three acres (Figure 11).
- Fanwort, which was observed during the pre-treatment survey, was not observed during the post-treatment survey.

Norton Reservoir

Three exotic species were observed in Norton Reservoir during the post-treatment survey: variable-leaf milfoil, water chestnut, and fanwort. Curly-leaf pondweed, observed during the pre-treatment survey, was not observed following treatment. However, this annual species typically completes its life cycle by early to mid-summer and can be difficult to detect later in the year.

- Variable-leaf milfoil covered an estimated 17 acres (Figure 12), a **decrease of approximately 28 acres from pre-treatment conditions and a year-over-year decrease of 36 acres**. Coverage and density of variable-leaf milfoil in the main basin and the two sub-basins south of Route 140 were substantially reduced compared to previous years.
- Water chestnut covered an estimated three tenths of an acre (Figure 13), a **decrease of approximately eight acres from pre-treatment conditions and a year-over-year decrease of less than one acre**.
- Fanwort covered an estimated 23 acres (Figure 14), an **increase of approximately 23 acres from pre-treatment conditions but a year-over-year decrease of approximately 28 acres**. Density was mostly sparse to patchy and limited to the main basin, although some areas of dense coverage were observed. Where widespread fanwort beds of varying densities were observed in the sub-basin south of Route 140 during the post-treatment survey in 2021, none were observed during the 2022 post-treatment survey.



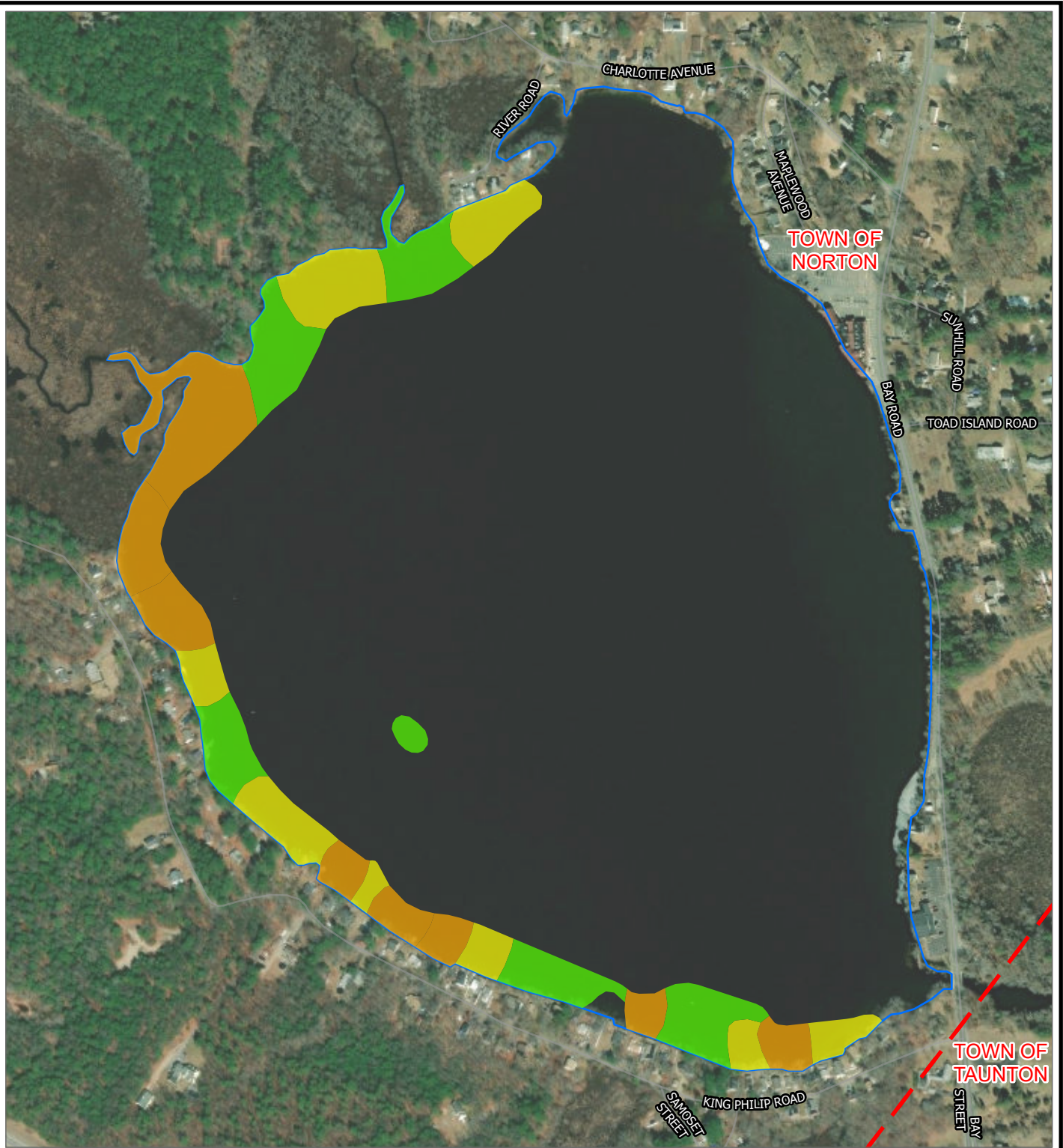
Variable-leaf milfoil (bright green) and senescing water chestnut (yellow) in Norton Reservoir were observed during the September 2022 post-treatment survey.

Chartley Pond

Two exotic species were observed in Chartley Pond during the post-treatment surveys: variable-leaf milfoil and water chestnut. Curly-leaf pondweed, observed during the pre-treatment survey, was not observed following treatment. However, this annual species typically completes its life cycle by early to mid-summer and can be difficult to detect later in the year.

- Variable-leaf milfoil covered an estimated one acre (Figure 15), a **reduction of approximately nine acres from pre-treatment conditions and a year-over-year decrease of approximately 11 acres**.
- Water chestnut covered an estimated four acres (Figure 16), a **decrease of approximately 10 acres from pre-treatment conditions and a year-over-year increase of approximately four acres**.

COORDINATE SYSTEM: NAD_1983_2011_STATEPLANE_MASSACHUSETTS_MIND_FIPS_2001_FTUS; MAP ROTATION: 0
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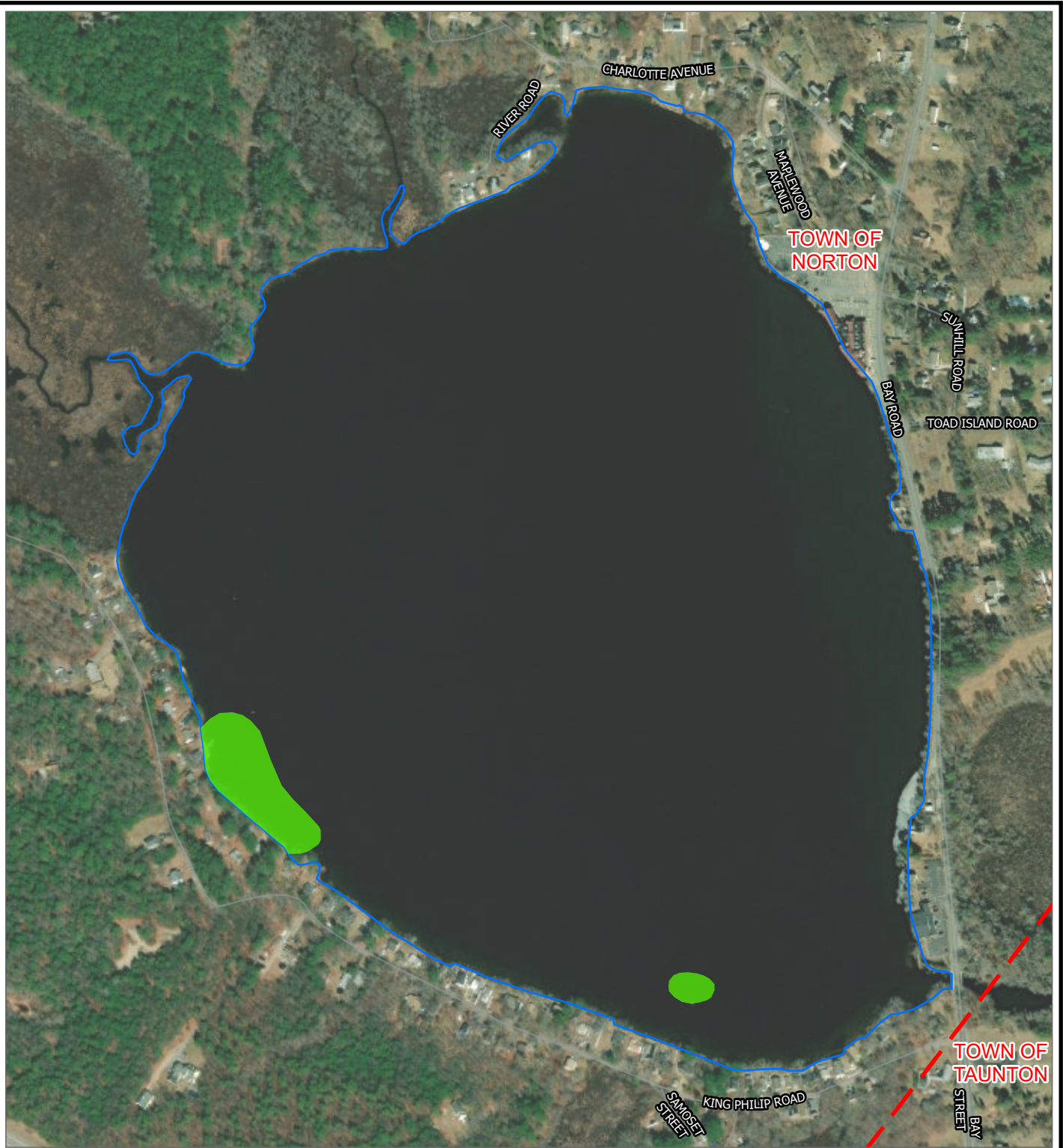
VARIABLE LEAF MILFOIL COVERAGE	SHORELINE
SPARSE (7.1 ACRES)	TOWN BOUNDARY
PATCHY (6.5 ACRES)	
DENSE (8.0 ACRES)	

BASE MAP: ESRI, WORLD IMAGERY, 2021
 DATA SOURCES:
 TRC, GPS LOCATIONS, 09/14/22
 MASSGIS, MASSDOT ROADS, 2022

0 250 500 FEET
 1:6,000 1" = 500'

PROJECT: LAKE MANAGEMENT SERVICES	
WINNECUNNET POND TOWN OF NORTON, MA	
TITLE: VARIABLE-LEAF MILFOIL COVERAGE SEPTEMBER 14, 2022 SURVEY	
DRAWN BY: T. LATHAM	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 10
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	
10 HEMINGWAY DRIVE 2ND FLOOR EAST PROVIDENCE, RI 02915 PHONE: 401.330.1236	
FILE:	502041_WINNECUNNETFIGURES

COORDINATE SYSTEM: NAD_1983_2011_STATEPLANE_MASSACHUSETTS_MIND_FIPS_2001_FTUS; MAP_ROTATION: 0
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 LAYOUT NAME: 502041_WINNECUNNET.NM_20220914



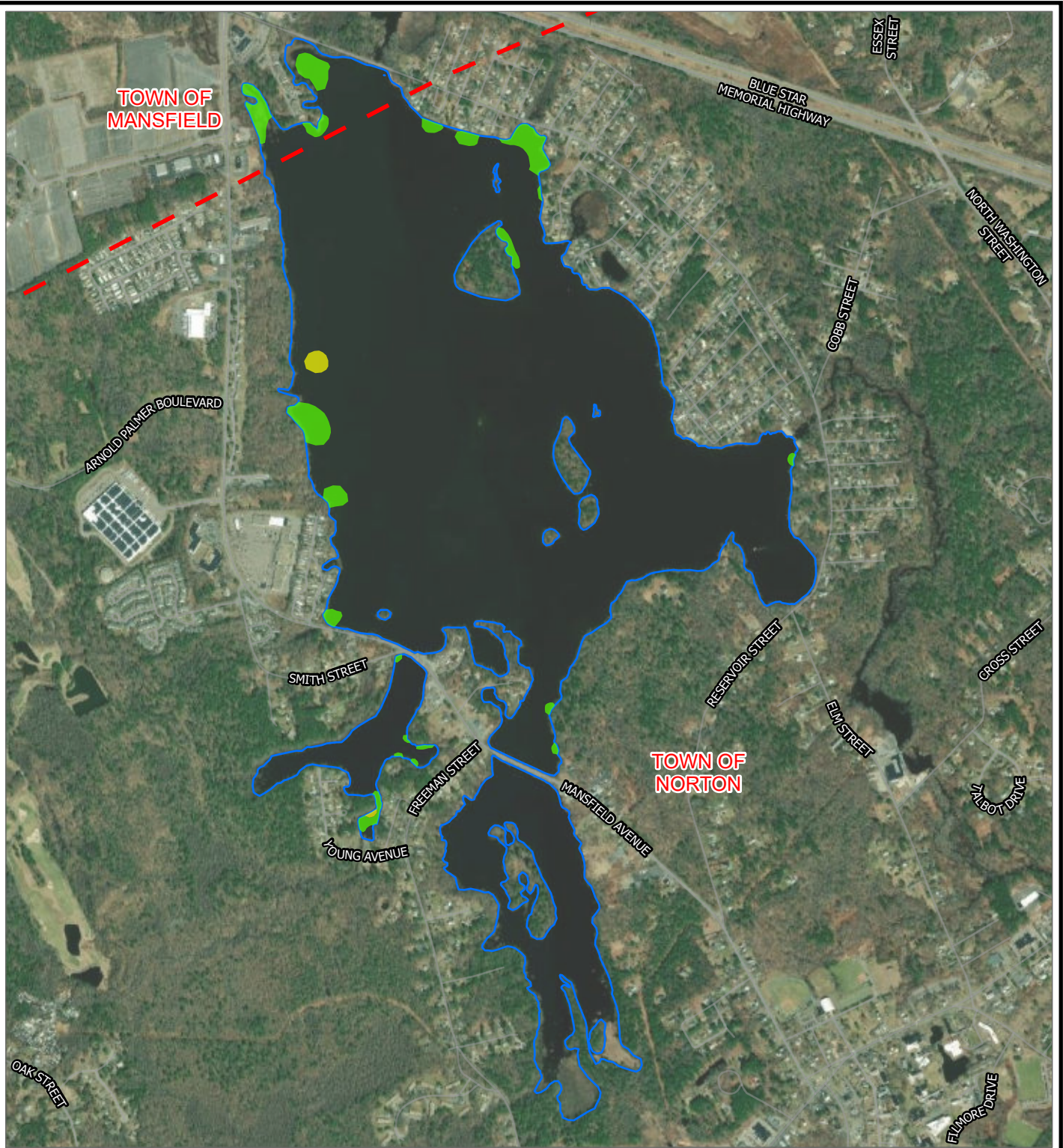
BRITTLE NAIAD COVERAGE	SHORELINE
SPARSE (2.57 ACRES)	TOWN BOUNDARY
PATCHY (0.0 ACRES)	
DENSE (0.0 ACRES)	

BASE MAP: ESRI, WORLD IMAGERY, 2021
 DATA SOURCES:
 TRC, GPS LOCATIONS, 09/14/22
 MASSGIS, MASSDOT ROADS, 2022

1:6,000 1" = 500'

PROJECT: LAKE MANAGEMENT SERVICES	
WINNECUNNET POND TOWN OF NORTON, MA	
TITLE: BRITTLE NAIAD COVERAGE SEPTEMBER 14, 2022 SURVEY	
DRAWN BY: T. LATHAM	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 11
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	
10 HEMINGWAY DRIVE 2ND FLOOR EAST PROVIDENCE, RI 02915 PHONE: 401.330.1236	
FILE:	502041_WINNECUNNETFIGURES

COORDINATE SYSTEM: NAD 1983 STATEPLANE MASSACHUSETTS MAINLAND FIPS 2001; MAP ROTATION: 0
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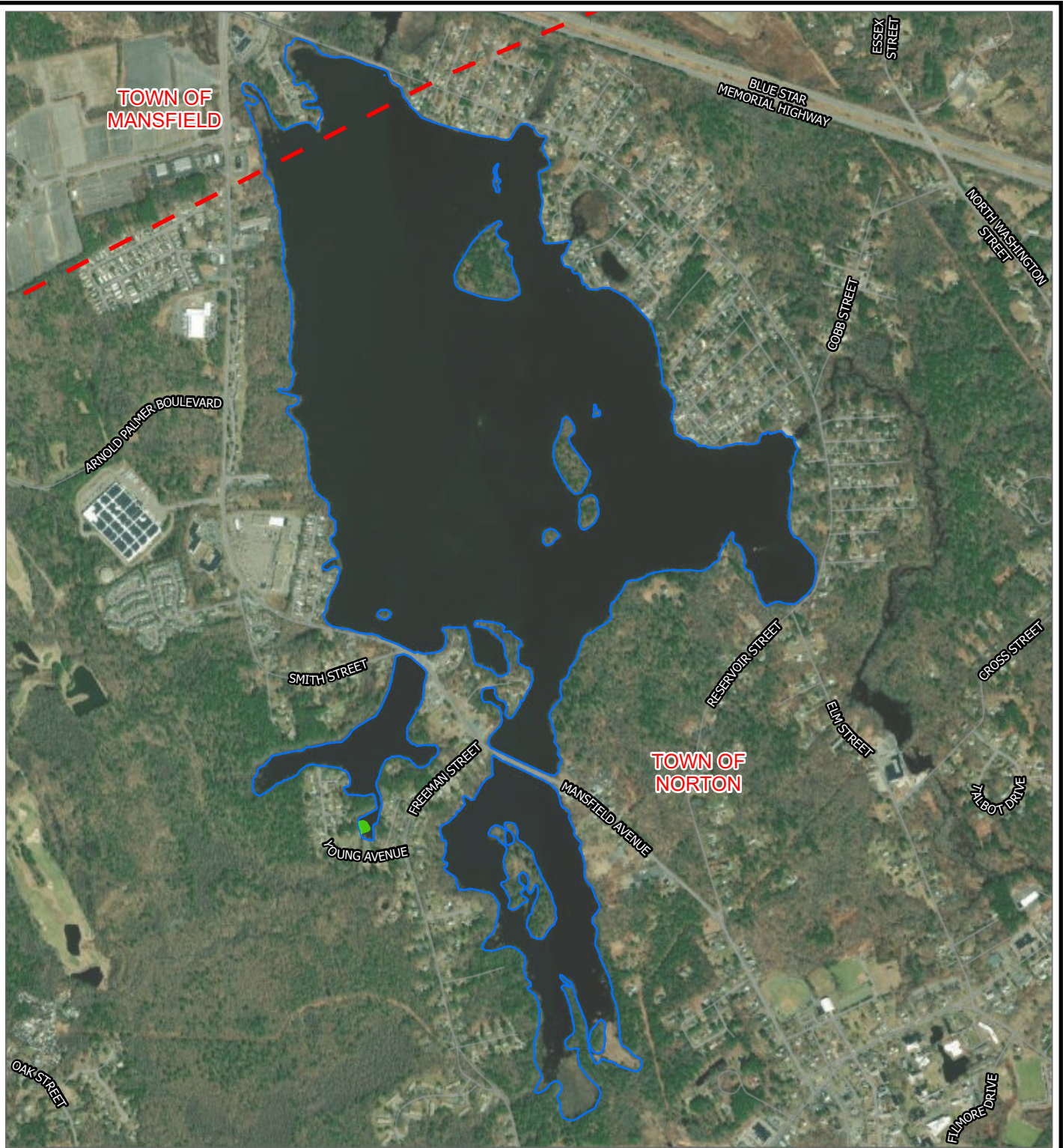
VARIABLE-LEAF MILFOIL COVERAGE	SHORELINE
SPARSE (16.1 ACRES)	TOWN BOUNDARY
PATCHY (1.2 ACRES)	
DENSE (0.0 ACRES)	

BASE MAP: ESRI, WORLD IMAGERY, 2021
 DATA SOURCES:
 TRC, GPS LOCATIONS, 09/16/22
 MASSGIS, MASSDOT ROADS, 2022

1:18,000 1" = 1,500'

PROJECT: LAKE MANAGEMENT SERVICES	
NORTON RESERVOIR TOWN OF NORTON, MA	
TITLE: VARIABLE-LEAF MILFOIL COVERAGE SEPTEMBER 16, 2022 SURVEY	
DRAWN BY: J. BERTHERMAN	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 12
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	
FILE:	10 HEMINGWAY DRIVE 2ND FLOOR EAST PROVIDENCE, RI 02915 PHONE: 401.330.1236 502041_NORTONRESERVOIRFIGURES

COORDINATE SYSTEM: NAD 1983 STATEPLANE MASSACHUSETTS MAINLAND FIPS 2001; MAP ROTATION: 0
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WATER CHESTNUT COVERAGE	SHORELINE
SPARSE (0.3 ACRES)	TOWN BOUNDARY
PATCHY (0.0 ACRES)	
DENSE (0.0 ACRES)	

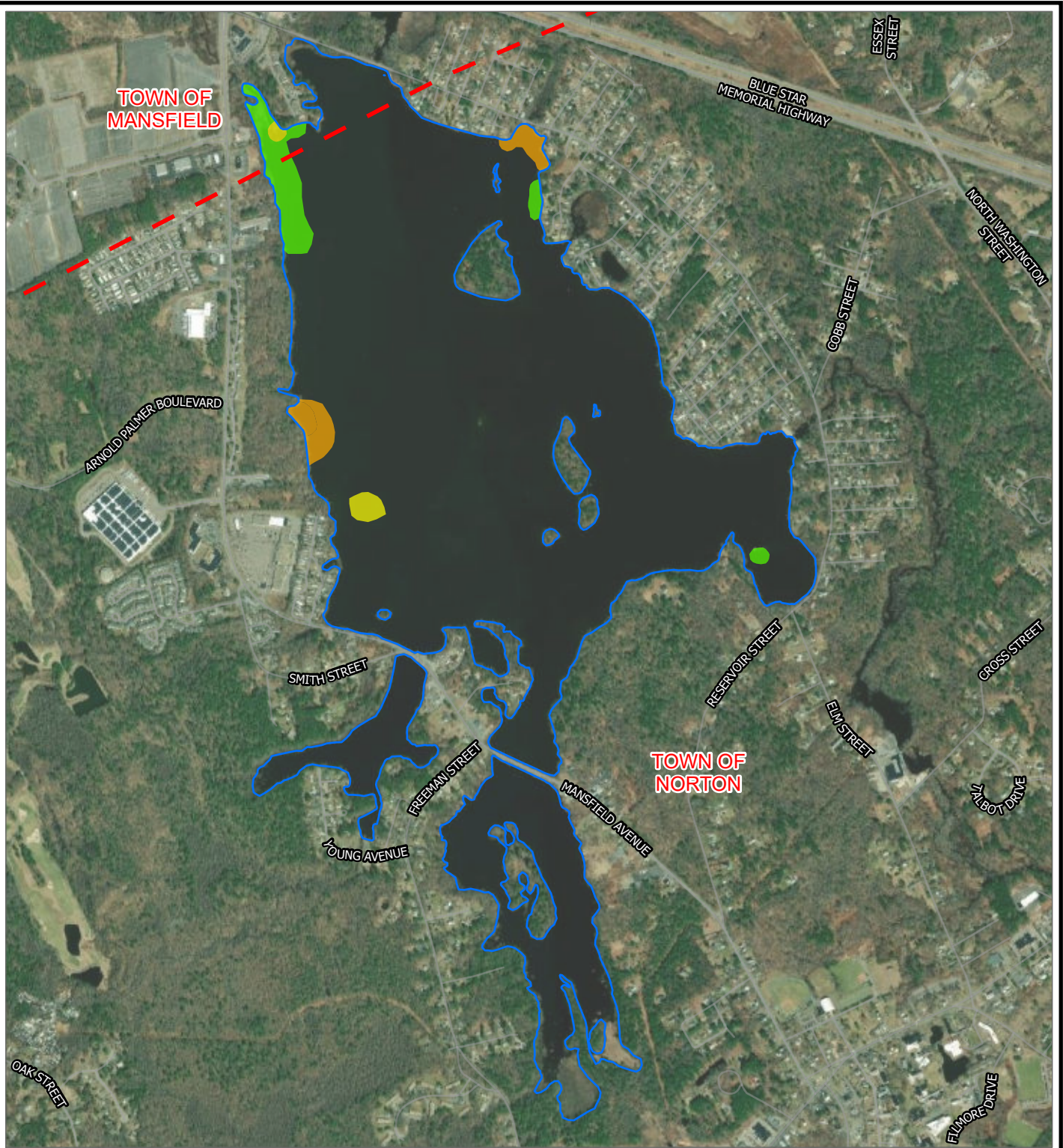
BASE MAP: ESRI, WORLD IMAGERY, 2021
 DATA SOURCES:
 TRC, GPS LOCATIONS, 09/16/22
 MASSGIS, MASSDOT ROADS, 2022

1:18,000 1" = 1,500'

PROJECT: LAKE MANAGEMENT SERVICES	
NORTON RESERVOIR TOWN OF NORTON, MA	
TITLE: WATER CHESTNUT COVERAGE SEPTEMBER 16, 2022 SURVEY	
DRAWN BY: J. BERTHERMAN	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 13
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	
FILE:	502041_NORTONRESERVOIRFIGURES

10 HEMINGWAY DRIVE
2ND FLOOR
EAST PROVIDENCE, RI 02915
PHONE: 401.330.1236

COORDINATE SYSTEM: NAD 1983 STATEPLANE MASSACHUSETTS MAINLAND FIPS 2001; MAP ROTATION: 0
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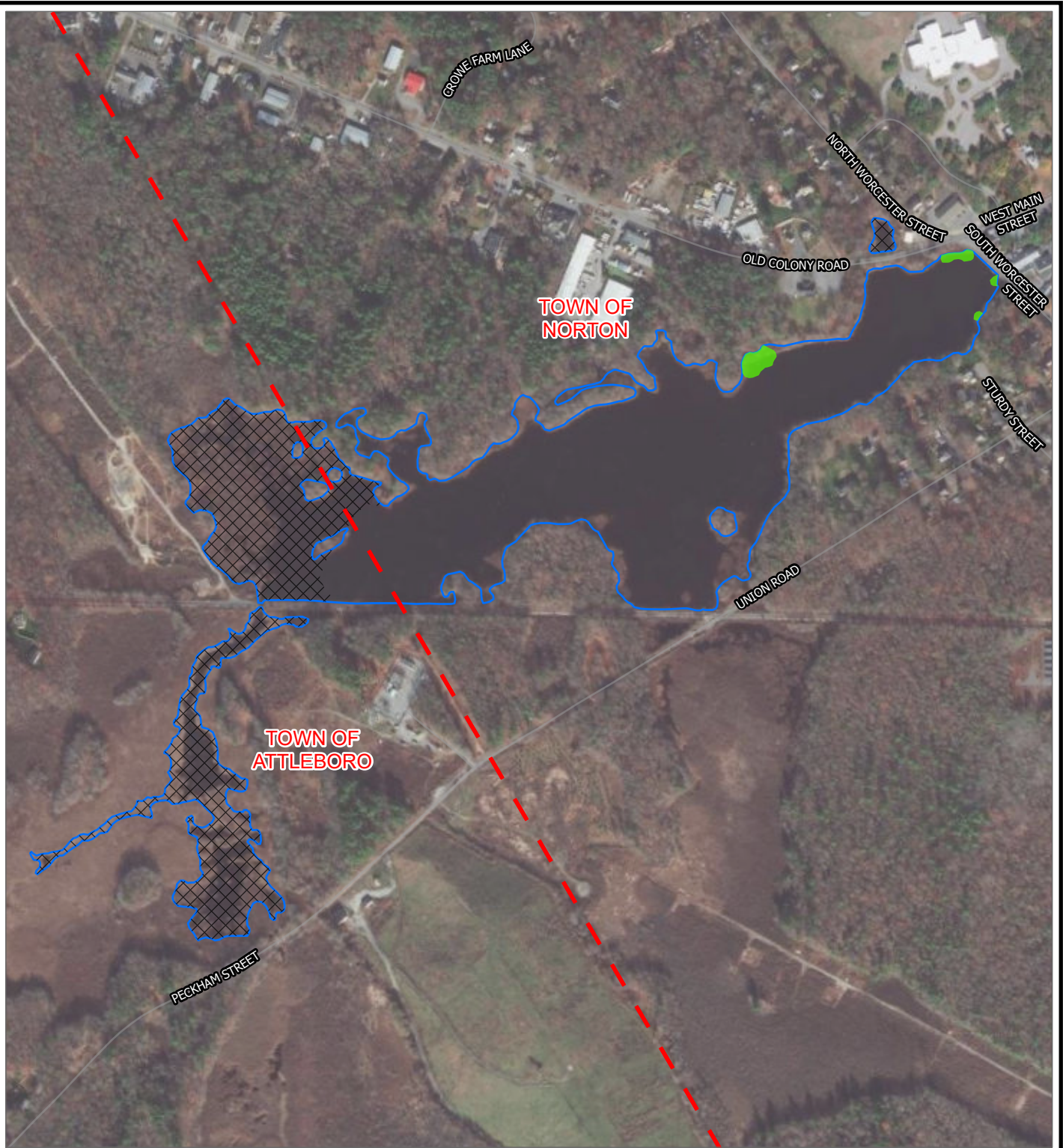
FANWORT COVERAGE	SHORELINE
SPARSE (13.3 ACRES)	TOWN BOUNDARY
PATCHY (2.7 ACRES)	
DENSE (7.3 ACRES)	

BASE MAP: ESRI, WORLD IMAGERY, 2021
 DATA SOURCES:
 TRC, GPS LOCATIONS, 09/16/22
 MASSGIS, MASSDOT ROADS, 2022

1:18,000 1" = 1,500'

PROJECT: LAKE MANAGEMENT SERVICES	
NORTON RESERVOIR TOWN OF NORTON, MA	
TITLE: FANWORT COVERAGE	
SEPTEMBER 16, 2022 SURVEY	
DRAWN BY: J. BERTHERMAN	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 14
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	
10 HEMINGWAY DRIVE 2ND FLOOR EAST PROVIDENCE, RI 02915 PHONE: 401.330.1236	
FILE:	502041_NORTONRESERVOIRFIGURES

COORDINATE SYSTEM: NAD 1983 2011 STATEPLANE MASSACHUSETTS MIND FIPS 2001 FTUS; MAP ROTATION: 0
 -- SAVED BY: TLATHAM ON 10/27/2022, 17:09:15 PM; FILE PATH: T:\1-PROJECTS\TOWNOFNORTON\MA\502041_FY2023\2-APRX\502041_CHARTLEY\FIGURES\APRX_LAYOUT\NAME: 502041_CHARTLEY.MH, 20220919



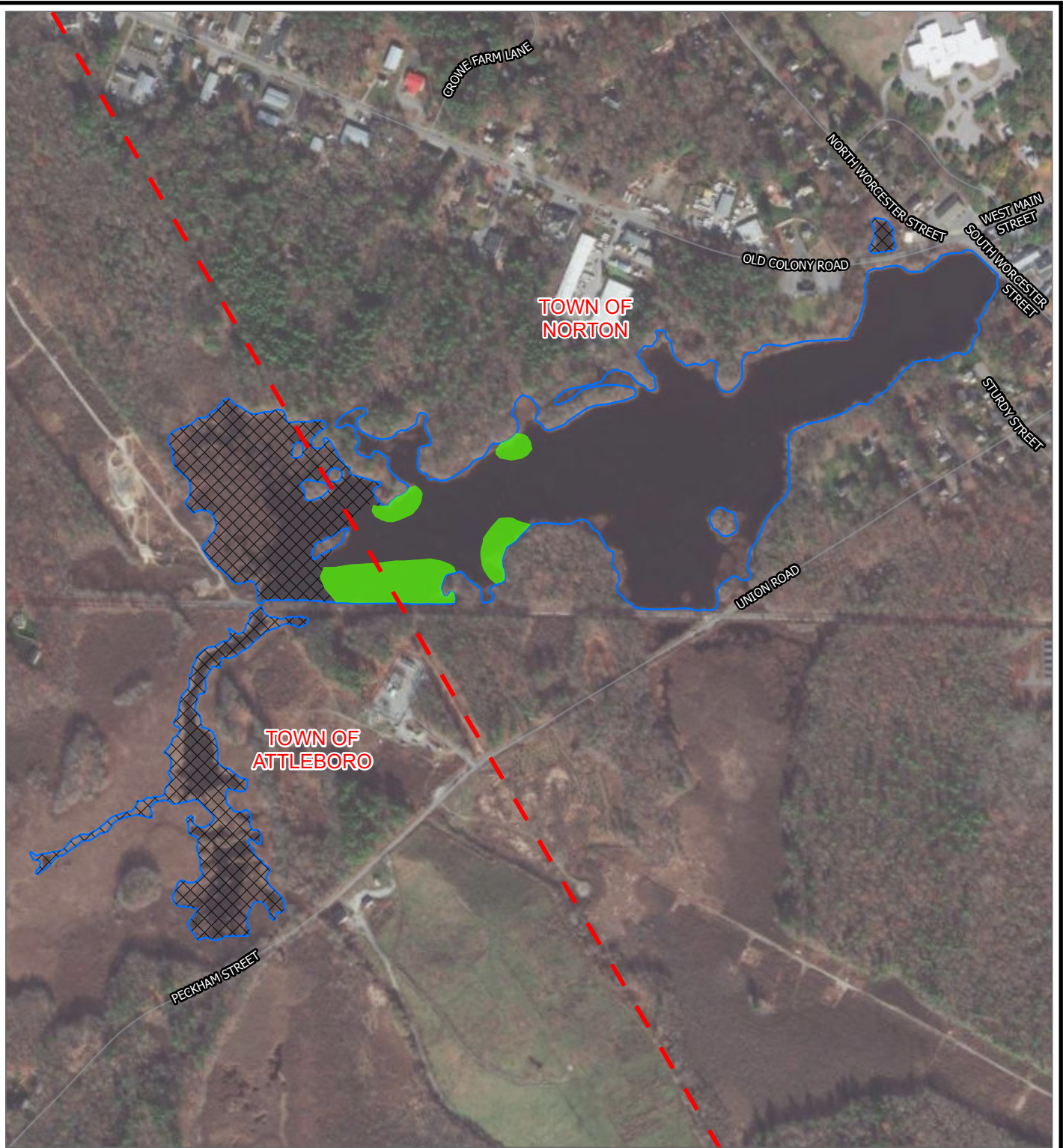
VARIABLE-LEAF MILFOIL COVERAGE	SHORELINE
SPARSE (0.53 ACRES)	TOWN BOUNDARY
PATCHY (0.0 ACRES)	
DENSE (0.0 ACRES)	
NOT SURVEYED	

BASE MAP: ESRI, WORLD IMAGERY, 2020
 DATA SOURCES:
 TRC, GPS LOCATIONS, 09/19/22
 MASSGIS, MASSDOT ROADS, 2022

1:7,800 1" = 650'

PROJECT: LAKE MANAGEMENT SERVICES	
CHARTLEY POND TOWN OF NORTON, MA	
TITLE: VARIABLE-LEAF MILFOIL COVERAGE SEPTEMBER 19, 2022 SURVEY	
DRAWN BY: T. LATHAM	PROJ. NO.: 502041.FY23.0000
CHECKED BY: K. BACHAND	FIGURE 15
APPROVED BY: M. LADEWIG	
DATE: OCTOBER 2022	
10 HEMINGWAY DRIVE 2ND FLOOR EAST PROVIDENCE, RI 02915 PHONE: 401.330.1236	
FILE:	502041_CHARTLEYFIGURES

COORDINATE SYSTEM: NAD 1983 2011 STATEPLANE MASSACHUSETTS MIND FIPS 2001 FTUS; MAP ROTATION: 0
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WATER CHESTNUT COVERAGE SPARSE (3.9 ACRES) PATCHY (0.0 ACRES) DENSE (0.0 ACRES) NOT SURVEYED	SHORELINE TOWN BOUNDARY
BASE MAP: ESRI, WORLD IMAGERY, 2020 DATA SOURCES: TRC, GPS LOCATIONS, 09/19/22 MASSGIS, MASSDOT ROADS, 2022	
 1:7,800 1" = 650'	

PROJECT: LAKE MANAGEMENT SERVICES CHARTLEY POND TOWN OF NORTON, MA	
TITLE: WATERCHESTNUT COVERAGE SEPTEMBER 19, 2022 SURVEY	
DRAWN BY: T. LATHAM CHECKED BY: K. BACHAND APPROVED BY: M. LADEWIG DATE: OCTOBER 2022	PROJ. NO.: 502041.FY23.0000 FIGURE 16
10 HEMINGWAY DRIVE 2ND FLOOR EAST PROVIDENCE, RI 02915 PHONE: 401.330.1236	
FILE:	502041_CHARTLEYFIGURES

2.5 Safe Zone Mapping

Safe Zone maps for each pond were established in 2016, before the initiation of the treatment programs, and re-evaluated by a Commission-approved Wildlife Biologist in subsequent years. Herbicides are not directly applied to Safe Zones, as these areas are designated to provide refuge for aquatic life during chemical treatments.

Safe Zones include five-foot buffers from the shorelines of each pond, with forty-foot buffers extending from the shorelines of all islands, as well as identification of wildlife habitat features, including muskrat houses, indigenous emergent and aquatic plant beds, as well as protruding rocks, root systems, trunks, stumps, and limbs. Muskrat houses were given a forty-foot buffer, while all other habitat features were provided a five-foot buffer.

Safe Zone maps are available in the 2021 annual report (ESS 2021).

3.0 RECOMMENDATIONS FOR MANAGEMENT IN 2022

Based on the 2022 vegetation management program results, TRC recommends the management actions presented in Table 6.0 for 2023. TRC also recommends that the selected management contractor work proactively with the Norton Conservation Commission to ensure that the signage, notification process, and testing for any in-pond management work conducted in 2023 comply with permit requirements.

Table 6 Summary of Vegetation Management Recommendations for 2023

Water Body	Description of Treatment	Primary Timing	Area Anticipated for Treatment	Notes
Winnecunnet Pond	ProcellaCOR treatment	Summer	Areas of variable-leaf milfoil regrowth.	Pursue NHESP approval for the use of ProcellaCOR to avoid the development of a fluridone-resistant population of variable-leaf milfoil.
Norton Reservoir	Reward/Clipper spot treatments	Spring to summer	<75 acres	May be used to hold fanwort and exotic milfoil growth at bay in 2023. Beds have trended smaller, so less treatment is anticipated.
	Hand pulling of water chestnut	June to August	As needed	Likely to need three days of hand pulling to maintain progress to date. Must be removed before seed drop at the end of summer.
	Algaecide treatment	As needed	As needed	Has not been required to date.
Chartley Pond	Reward/Clipper spot treatments	Spring to summer	<15 acres	May be used to hold fanwort and exotic milfoil growth at bay in 2023. Beds responded well in 2022.
	Clearcast Treatment	July	<15 acres	May be used to reduce the density and volume of water chestnut prior to hand pulling.
	Hand pulling of water chestnut	August	As needed	Likely to need one or two days of hand pulling if Clearcast is used first.
	Algaecide treatment	As needed	As needed	Has not been required to date.

These recommendations have been adjusted to account for TRC's following post-treatment observations of the ponds in 2022:

- Effective control of fanwort in Winnecunnet Pond.
- Reduced but continued growth of variable-leaf milfoil in Winnecunnet Pond, particularly along southern and western shorelines.
- Introduction of brittle naiad and curly-leaf pondweed to Winnecunnet Pond.
- Continued but reduced growth of fanwort and curly-leaf pondweed in main basin of Norton Reservoir.
- Continued but reduced growth of variable-leaf milfoil and water chestnut in all basins of Norton Reservoir.
- Continued but reduced growth of variable-leaf milfoil and fanwort in Chartley Pond.
- Continued and increased growth of water chestnut in Chartley Pond.



Additionally, the Town should note that consultation with NHESP will be required under the Massachusetts Endangered Species Act (MESA) to request the use of ProcellaCOR for the management of variable-leaf milfoil in Winnecunnet Pond in 2023. If approved by NHESP, this change would also need to be incorporated into the Order of Conditions for Winnecunnet Pond. Therefore, should the Town desire to continue with active management of Winnecunnet Pond, action must be taken as soon as possible to allow the NHESP review process to be completed prior to spring 2023.

4.0 SUMMARY AND CONCLUSIONS

4.1 2022 Updates

Each Order of Conditions associated with the three water bodies was successfully extended in 2021 and now expires in spring 2024. For Norton Reservoir, this includes both the Mansfield and Norton portions.

Pre-treatment conditions in Winnecunnet Pond were characterized by increased target species growth levels compared to the prior year. As a result, Winnecunnet Pond was actively managed in 2022 through the application of permitted herbicides.

Pre-treatment conditions in Norton Reservoir were characterized by decreased fanwort, variable-leaf milfoil, and curly-leaf pondweed growth levels compared to the prior year; however, water chestnut growth levels increased. As a result, Norton Reservoir was actively managed in 2022 through the application of permitted herbicides and hand harvesting.

Pre-treatment conditions in Chartley Pond were characterized by increased fanwort and water chestnut growth levels compared to the prior year; however, variable-leaf milfoil growth levels decreased. As a result, Norton Reservoir was actively managed in 2022 through the application of permitted herbicides and hand harvesting.

Overall, the vegetation management program implemented in 2022 resulted in the general improvement or maintenance of existing conditions at Winnecunnet Pond, Norton Reservoir, and Chartley Pond. However, post-treatment observations at Winnecunnet Pond suggest that changes to the management program, including the possibility of alternative herbicide treatments should be considered moving forward.

Long-Term Progress to Date

The Town's vegetation management program has broadly achieved its goal of reducing aquatic invasive vegetation in Winnecunnet Pond, Norton Reservoir, and Chartley Pond over the last six years. However, continued effort is needed to maintain control and address new challenges. As indicated in Table 7.0, aquatic invasive vegetation was pervasive in each water body at the initiation of the management program in 2017. Significant reductions in the severity of infestation were achieved by 2018, and most of these infestations have largely been kept under control into 2022 through the selection of the most appropriate management tools each year. The vegetation management program has achieved these results while maintaining aquatic habitats for native flora and fauna. The recommended management program for 2023 will focus on maintaining and improving upon target species reductions achieved through 2022.

Table 7 Extent of Aquatic Invasive Species by Water Body, 2017-2022

Water Body	Aquatic Invasive Species	Year					
		2017	2018	2019	2020	2021	2022
Winnecunnet Pond	Brittle Naiad	○	○	○	○	○	●
	Curly-leaf Pondweed	○	○	○	○	○	●
	Fanwort	●	○	●	●	●	●
	Variable-leaf Milfoil	●	●	●	●	●	●
Norton Reservoir	Curly-leaf Pondweed	○	●	●	●	●	●
	Eurasian Milfoil	●	○	●	○	○	○
	Fanwort	●	●	●	●	●	●
	Swollen Bladderwort	●	●	●	○	○	○
	Variable-leaf Milfoil	●	●	●	●	●	●
	Water Chestnut	○	●	●	●	●	●
Chartley Pond	Fanwort	●	i*	●	●	●	●
	Swollen Bladderwort	●	i*	○	○	○	○
	Variable-leaf Milfoil	●	●*	●	●	●	●
	Water Chestnut	●	●*	●	●	●	●

●=Extensive, ●=Moderate, ●=Low, ○=Absent
 *Pond was drawn down for dam repairs over much of the summer.

Looking Ahead to 2023

Multiple management actions are recommended at each of these water bodies for 2022 to ensure that target species control is sustained into the future. A final summary of the recommended actions for 2023 is presented below for each pond.

Winnecunnet Pond

- A ProcellaCOR treatment is recommended to manage the variable-leaf milfoil regrowth observed in 2022.
- The Town will need to pursue NHESP approval for the use of ProcellaCOR to implement the recommended management at Winnecunnet Pond.
- Sonar (fluridone) should not be used in 2023 to avoid the development of resistance in the variable-leaf milfoil population.
- Diver harvesting or DASH may be helpful to control the regrowth of fanwort, if any, in 2023. However, this approach is not recommended for the control of curly-leaf pondweed or brittle naiad due to their annual form of growth. Curly-leaf pondweed is sensitive to Sonar (fluridone) and may have incidentally been controlled by the 2022 treatment. However, the effectiveness of this treatment on curly-leaf pondweed will not be known until the pond is surveyed again in the spring of 2023.



Norton Reservoir

- Diquat dibromide and/or Clipper may be used as spot treatments to keep the regrowth of variable-leaf milfoil and fanwort at bay. These are contact herbicides that will only need to be applied where regrowth of the target species occurs.
- Hand harvesting should be used to address the regrowth of water chestnut in all active beds of the main basin and each of the sub-basins to the south of Route 140. This should be completed by early August 2023 to prevent seed maturation and drop.
- Diver harvesting or DASH may be helpful as a vegetation management method in 2023, primarily to control pioneer infestations of new invasive species, if observed.

Chartley Pond

- Diquat dibromide and/or Clipper may be used as spot treatments to keep the regrowth of variable-leaf milfoil and fanwort at bay. These are contact herbicides that will only need to be applied where regrowth of the target species occurs.
- Clearcast should be used in the spring to hold fanwort and exotic milfoil growth at bay.
- Hand harvesting should be used to address new growth of water chestnut in 2023. This should be completed by early August to prevent seed maturation and drop, which would erase gains made to date.
- Diver harvesting or DASH may be helpful as a vegetation management method in 2022, primarily to control pioneer infestations of new invasive species, if observed.

Finally, this report and associated GIS geodatabase should be shared with the Town's aquatic vegetation management contractor to assist in their preparation for active management of the ponds in 2023.

5.0 REFERENCES

- ESS Group, Inc. 2015. Town of Norton Lake/Pond Management Action Plan – Updated Vegetated Management Recommendations. Prepared for Town of Norton, November 25, 2015.
- ESS Group, Inc. 2016. 2016 Lakes and Ponds Annual Report – Norton, Massachusetts. Prepared for Town of Norton Conservation Commission, October 28, 2016.
- ESS Group, Inc. 2017. 2017 Lakes and Ponds Annual Report – Norton, Massachusetts. Prepared for Town of Norton Conservation Commission, October 30, 2017.
- ESS Group, Inc. 2018. 2018 Lakes and Ponds Annual Report – Norton, Massachusetts. Prepared for Town of Norton Conservation Commission, October 30, 2018.
- ESS Group, Inc. 2019. 2019 Lakes and Ponds Annual Report – Norton, Massachusetts. Prepared for Town of Norton Conservation Commission, October 31, 2019.
- ESS Group, Inc. 2020. 2020 Lakes and Ponds Annual Report – Norton, Massachusetts. Prepared for Town of Norton Conservation Commission, October 30, 2020 (Revised November 23, 2020).



ESS Group, Inc. 2021. 2021 Lakes and Ponds Annual Report – Norton, Massachusetts. Prepared for Town of Norton Conservation Commission, October 29, 2021