



Lake Assessment and Management Recommendations - 2022

November 15, 2022

Cedar Meadow Lake

Prepared For:

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1.0 Introduction

TRC Companies (TRC, formerly ESS Group, LLC) is pleased to present the Cedar Meadow Lake Watershed District (the District) with this report summarizing the assessment of Cedar Meadow Lake completed by TRC this year and our corresponding management recommendations.

Cedar Meadow Lake is an approximately 151-acre impoundment of Burncoat Brook located entirely within the Town of Leicester, Massachusetts. The main basin of the lake is located south of Rawson Street; a small, shallow cove is located north of Rawson Street. Burncoat Brook enters this cove from Burncoat Pond, located approximately 1,200 feet upstream of Rawson Street. Burncoat Brook exits Cedar Meadow Lake over the dam spillway at the southeastern end and feeds a small waterbody, Bouchard Pond. Cedar Meadow Lake has a relatively flat bottom with a maximum depth of approximately 12 feet. Most of the lake's shoreline is developed as residential properties. Land use in the vicinity of the lake includes low-density residential, forest, and agricultural fields.

The invasive aquatic species variable-leaf milfoil (*Myriophyllum heterophyllum*) and fanwort (*Cabomba caroliniana*) are present in Cedar Meadow Lake. A summary of management actions completed in 2022 is presented below.

- May 24, 2022 - TRC conducted a pre-treatment aquatic plant mapping and water quality sampling event.
- June 14, 2022 – The Pond and Lake Connection completed a Clipper (flumioxazin) and Reward (diquat dibromide) treatment of approximately 15 acres of Cedar Meadow Lake for control of fanwort and variable-leaf milfoil.
- August 16, 2022 – TRC conducted a post-treatment aquatic plant mapping and water quality sampling event.

2.0 Aquatic Plant Mapping Results

TRC documented 16 species of aquatic macrophytes, including two aquatic invasive species, fanwort and variable-leaf milfoil, that were observed in Cedar Meadow Lake during surveys completed in 2022 (Table 1). This represents a slight decrease in overall species diversity compared the last comparable mapping event, conducted in August of 2020, when 22 species (including 18 native species) were observed. Brittle naiad (*Najas minor*) and water chestnut (*Trapa natans*), invasive species which were last observed in Cedar Meadow Lake in 2020, were not detected during the 2022 surveys.

Table 1. Aquatic Plant Species Observed During 2022 Pre-treatment and Post-treatment Aquatic Macrophyte Surveys

Common Name	Scientific Name	Pre-Treatment	Post-Treatment
Watershield	<i>Brasenia schreberi</i>	X	X
Fanwort	<i>Cabomba caroliniana</i>	X	X
Muskwort	<i>Chara Spp.</i>	X	
Spikerush	<i>Eleocharis Spp.</i>	X	
Canadian Waterweed	<i>Elodea canadensis</i>	X	
Variable-leaf milfoil	<i>Myriophyllum heterophyllum</i>	X	X
Bushy Naiad	<i>Najas flexilis</i>		X
Southern Naiad	<i>Najas guadalupensis</i>		X
Stonewort	<i>Nitella spp.</i>	X	X
Yellow water lily	<i>Nuphar lutea</i>		X
White water lily	<i>Nymphaea odorata</i>	X	X
Bigleaf Pondweed	<i>Potamogeton amplifolius</i>	X	
Spiral pondweed	<i>Potamogeton spirillus</i>	X	X
Common bladderwort	<i>Utricularia macrorhiza</i>	X	X
Purple Bladderwort	<i>Utricularia purpurea</i>	X	
Water Celery	<i>Valisineria americana</i>	X	X

Red text indicates exotic species

2.1 Fanwort (*Cabomba caroliniana*)

In 2022, fanwort was the most widespread and abundant invasive macrophyte species in Cedar Meadow Lake. During pre-treatment mapping this species was present in approximately 49.2 acres of the lake, and coverage exceeded 25% in approximately 9.9 acres (Figure 1). Fanwort was found growing in much of the lake, but growth was generally most dense in the area of the northeastern cove. This species was present in shoreline areas but was also abundant in deeper waters.

Approximately 9.9 acres of fanwort beds (areas mapped as >25% cover) within Cedar Meadow Lake were treated with Clipper (flumioxazin) on June 14, 2022.



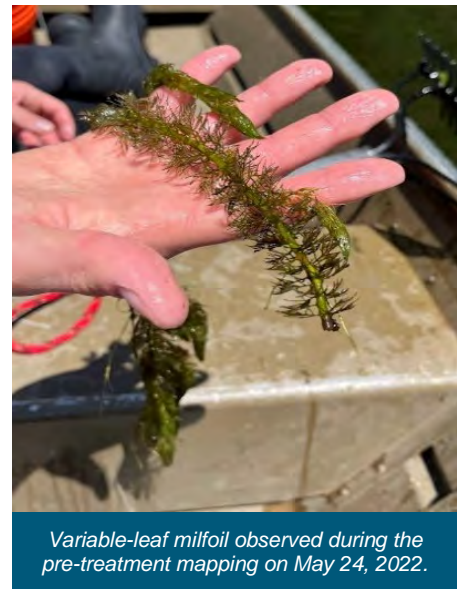
Though post-treatment aquatic macrophyte mapping conducted on August 16 indicated that fanwort density in most treated areas had decreased compared to pre-treatment levels, total fanwort cover in the lake increased (Figure 2). During the post-treatment survey, fanwort was present in approximately 55.7 acres of the lake, an increase of approximately 6.5 acres compared to the pre-treatment survey.

2.2 Variable-Leaf Milfoil (*Myriophyllum heterophyllum*)

Only three acres of variable-leaf milfoil growth was documented in Cedar Meadow Lake during the pre-treatment survey conducted on May 24, 2022 (Figure 3). This represents a notable decrease in density compared to 2021, when this species was present in approximately 11 acres of the waterbody. This shift may indicate that variable-leaf milfoil is being outcompeted by fanwort in Cedar Meadow Lake.

All mapped areas of variable-leaf milfoil growth (approximately 3 acres) were treated with Reward (diquat dibromide) on June 14, 2022.

During the post-treatment mapping event on August 16, variable-leaf milfoil was not observed in any of the treated areas but was found in one small (~0.4 acre) patch located along the western shoreline (Figure 4).



2.3 Overall Plant Cover and Biovolume

Total aquatic plant cover, a measure of the two-dimensional extent of plant growth within the lake, was generally low (1% -25% cover) during the pre-treatment survey (Figure 5). Areas of higher density were most commonly associated with fanwort growth. However, the three locations where plant cover exceeded 75% cover during the May survey were dominated by native species, including stonewort (*Nitella* spp.) and common bladderwort (*Utricularia macrorhiza*). During the post treatment survey, plant cover did not exceed 75% at any sampling location, and fanwort was present at all seven sampling locations where total plant cover ranged from 51% to 75% (Figure 6).

Aquatic plant biovolume, a measure of the three-dimensional extent of plant growth within the water column, was less than 50% at all sites surveyed during both the 2022 pre-treatment and post-treatment vegetation mapping events (Figures 7 and 8). In most cases, areas of relatively higher biovolume (plant material occupying 25% to 50% of the water column) were associated with fanwort and variable-leaf milfoil growth, though native plants, most notably stonewort, also contributed significantly to total biovolume at some locations.

3.0 Water Quality Results

Water temperature, dissolved oxygen, and specific conductance values were collected as vertical profiles through the water column at 0.5-meter intervals at the deep hole of Cedar Meadow Lake during the May 24 pre-treatment and August 16 post-treatment sampling events (Table 2). These parameters were vertically consistent (i.e., from the surface to the bottom) during both events. Consistent water temperatures, and relatively consistent dissolved oxygen values, at all depths sampled indicates that Cedar Meadow Lake was not stratified during the time of pre-treatment or post-treatment sampling events. Stratification occurs in some lakes during the summer months due to a lack of mixing between surface and bottom waters, and results in a warmer, well-oxygenated surface layer and a cooler bottom layer with lower dissolved oxygen concentrations. The shallow depth of Cedar Meadow Lake allows for mixing of the water column through wind action, preventing stratification. A well oxygenated water column can reduce the risk of algae blooms by reducing the potential for phosphorus release from bottom sediments.

Dissolved oxygen concentrations within Cedar Meadow Lake ranged from a low of 5.63 mg/L (during the post-treatment monitoring event) to a high of 8.44 mg/L (during the pre-treatment monitoring event). These dissolved oxygen levels are within the range of expected values for small, shallow ponds and are sufficient for supporting aquatic life. Specific conductance values observed at Cedar Meadow Lake, which are related to the concentration of dissolved solids in water, were within the expected range of values for freshwater lakes in Massachusetts.

Table 2. Water Quality Vertical Profiles at Cedar Meadow Lake During the 2022 Pre-treatment and Post-treatment Sampling Events

Depth (m)	Temperature (°C)		Dissolved Oxygen (mg/L)		Dissolved Oxygen (%)		Specific Conductance (µS/cm)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
0.5	21.8	24.9	8.11	6.05	94.0	73.1	153.1	167.7
1.0	20.9	24.9	8.17	5.80	92.9	70.1	152.7	167.6
1.5	20.9	24.9	8.40	5.72	95.2	69.2	152.3	167.6
2.0	20.6	24.9	8.21	5.63	93.9	68.1	152.2	167.6
2.5	20.6	24.9	8.44	5.71	91.0	68.7	152.2	167.6

Turbidity, pH, water clarity (Secchi depth), and apparent color were measured at the surface and bottom of the deepest part of the lake (Table 3). Surface and bottom water samples were collected and submitted to Phoenix Environmental Laboratories of Manchester, Connecticut for analysis of true color, dissolved organic carbon, nitrogen, and phosphorus (Table 3). An integrated depth sample was also collected during each sampling event and submitted to Aquatic Analysts of Friday Harbor, Washington for algal identification and enumeration (Table 4).

Table 3. Surface Water Quality Parameters at Cedar Meadow Lake During the 2022 Pre-treatment and Post-treatment Sampling Events

Parameter	Units	Pre-Treatment		Post-Treatment	
		Surface	Bottom	Surface	Bottom
Turbidity	NTU	1.60	1.62	0.95	0.79
pH	SU	7.34	7.25	6.69	6.90
Secchi Depth	m	Bottom	-	2.25	-
Total Depth	m	9.7	-	8.8	-
Total Phosphorus	mg/L	0.016	0.022	0.017	0.021

Total phosphorus concentrations are a key water quality parameter because phosphorus is the primary nutrient that fuels growth of aquatic plants and algae. Total phosphorus concentrations in surface water over 0.025 mg/L are of concern, as algae blooms tend to occur more frequently when concentrations are above this threshold. Total phosphorus concentrations in Cedar Meadow Lake remained below this threshold. Turbidity values in the lake were generally low, and pH values were circumneutral, which aligns with expectations.

Total algal density was quite low in the sample collected from Cedar Meadow Lake on May 24, 2022, at just 414 individuals/mL. Multiple types of algae were observed in the sample, including cryptophytes, green algae, bluegreen algae, chrysophytes, and diatoms. The only blue green algae species observed, *Anabaena flos-aquae* was found very low density (347 cells/mL), far below the 70,000 cells/mL public health advisory threshold used by the Massachusetts Department of Public Health. Total algal density was slightly higher, but still low, in the sample collected on August 16, at 555 individuals/mL. Similar to the pre-treatment sample, a variety of species and groups of algae were present in the sample, including cryptophytes, green algae, euglenoids, dinoflagellates, diatoms, and bluegreen algae. Two species of cyanobacteria were present in the sample, but only one, *Aphanizomenon flos-aquae*, was present at high enough densities for cell/mL determination. The total density of this species was very low, at just 59 cells/mL.

4.0 Management Recommendations

Though the Clipper treatment conducted in June of 2022 resulted in some local decreases in fanwort density, overall fanwort cover in the lake increased between the May pre-treatment survey and the August Post-treatment survey. Though disappointing, these results are not surprising, as fanwort is established throughout the waterbody. Contact herbicides like Clipper cause rapid die-back of exposed plant structures, but do not impact roots. Therefore, eventual regrowth is expected, and treated areas are also available for recolonization by invasive plants if nearby beds exist. Coverage of variable-leaf milfoil beds did decrease following spot-treatment in June. However, the results of the 2022 mapping events indicate that fanwort is likely outcompeting and displacing variable-leaf milfoil in Cedar Meadow Lake.

To provide control of fanwort and variable-leaf milfoil within Cedar Meadow Lake, we recommend a whole-lake application of the systemic herbicide fluridone (trade name Sonar) in 2023. Sonar acts as a carotenoid biosynthesis inhibitor, effectively leading to the depletion of chlorophyll. This

results in chlorosis (bleaching) and the eventual starvation of the entire plant, including root structures. Sonar concentrations must be maintained at treatment levels (5 to 20 ppb) for at least 6 to 8 weeks to achieve effective treatment. A 2023 Sonar treatment would involve the application of liquid and slow-release formulations of the herbicide in May, with two follow up evaluations and maintenance applications during the summer. Such a program, including management of the herbicide applicator and acquisition of a Massachusetts license to apply herbicides, would cost approximately \$60,000.

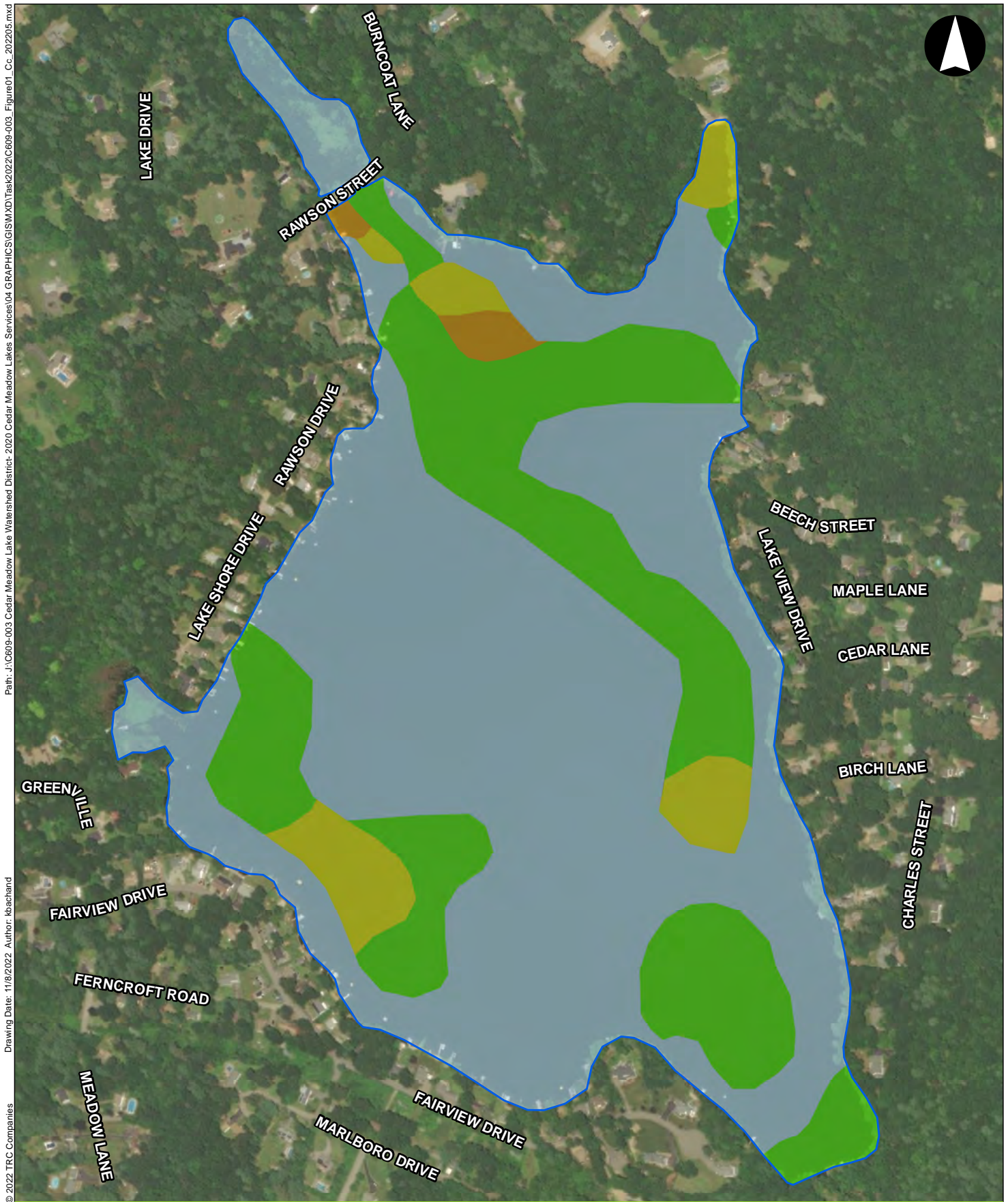
A whole-lake Sonar treatment is expected to provide excellent control of existing infestations through the 2023 season. However, plant fragments entering the pond following the 2023 season (plants arriving in the pond after Sonar levels drop below treatment concentrations) would survive. Limited regrowth of invasives, necessitating spot treatment with contact herbicides (Clipper for fanwort, Reward for variable-leaf milfoil), is to be expected following whole-lake treatment, especially around inlets where herbicide concentrations are harder to maintain. Variable-leaf milfoil is known to be present upstream of Cedar Meadow Lake in Burncoat Pond. However, it is unclear if fanwort is established in upstream waterbodies. Recolonization of variable-leaf milfoil (and potentially fanwort) in Cedar Meadow Lake would be accelerated due to the transport of fragments from upstream.

Alternatively, if whole-lake Sonar treatment is not possible, spot-treatments using contact herbicides could be used to decrease the density of invasive plants in defined areas. The use of contact herbicides in this way would be temporary but could be used to limit invasive plant densities in certain recreationally or aesthetically important areas. However, note that Clipper cannot be applied to the same area more than once every three years. The cost of contact herbicide spot-treatments would depend upon the area targeted, and the species present

TRC recommends that the District conduct two aquatic plant monitoring events during each growing season. Data from early season/pre-treatment surveys and late season/post-treatment surveys are necessary to track trends and changes in the plant community, direct herbicide application, and evaluate the effectiveness of management actions. Surveys can also identify pioneer infestations of new invasive species (water chestnut, *Trapa natans*, was observed and removed by ESS in 2020).

We appreciate the opportunity to continue to provide the Cedar Meadow Lake Watershed District with professional lake management and environmental consulting services. Please contact me at (781) 419-7716 or achase@trccompanies.com if you have any questions.

Figures



Cedar Meadow Lake 2022
Leicester, Massachusetts

Fanwort Cover
May 24, 2022



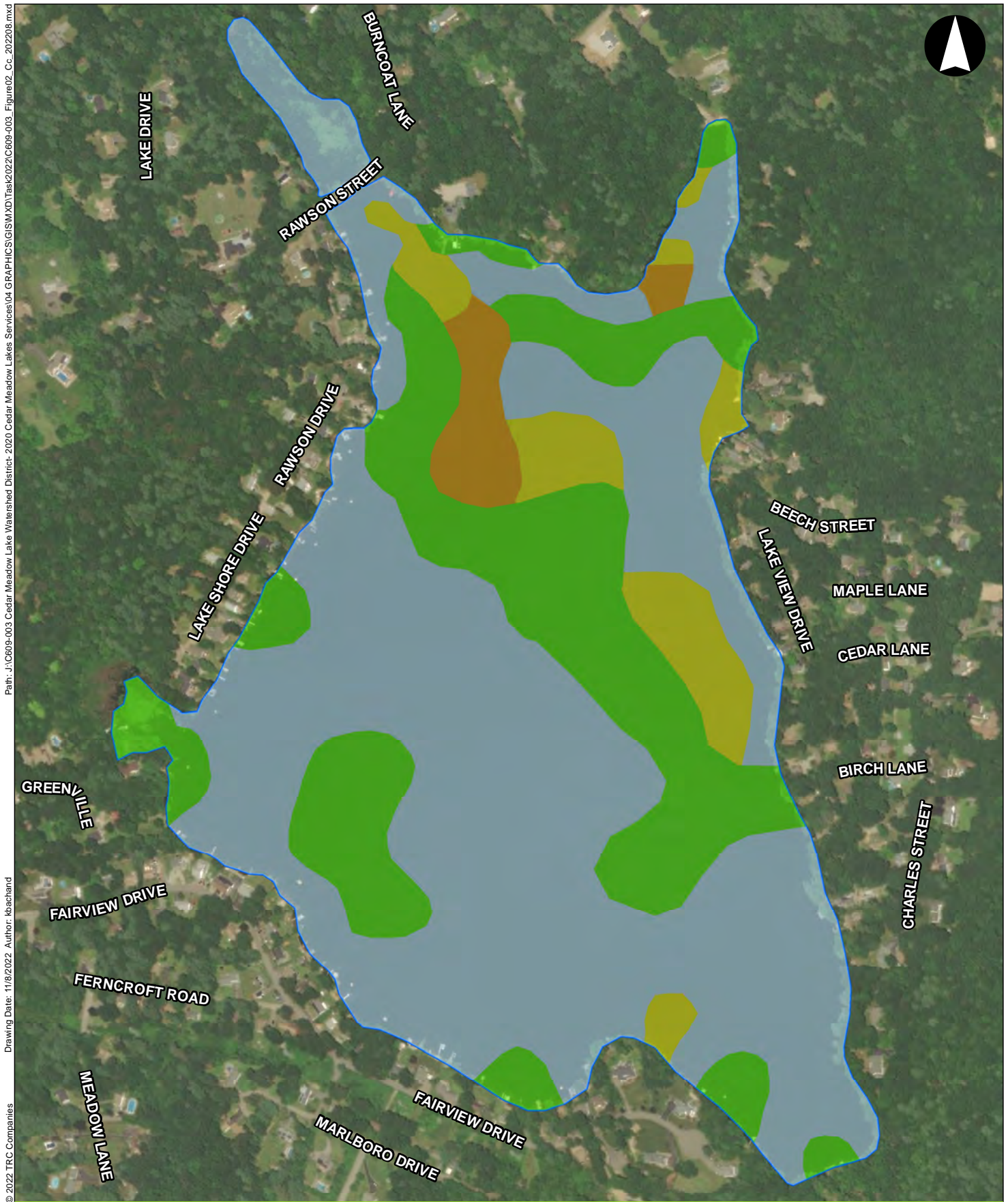
Source:
1) GPS data, ESS 2022
2) ESRI World Imagery, 2021

Fanwort Cover

0% (96.4 Acres)	51% - 75% (1.5 Acres)
1% - 25% (39.3 Acres)	76% - 100% (0 acres)
26% - 50% (8.4 Acres)	

0 250 500
Feet

Figure 1



Cedar Meadow Lake 2022
Leicester, Massachusetts

Fanwort Cover
August 16, 2022



Source:
1) GPS data, ESS 2022
2) ESRI World Imagery, 2021

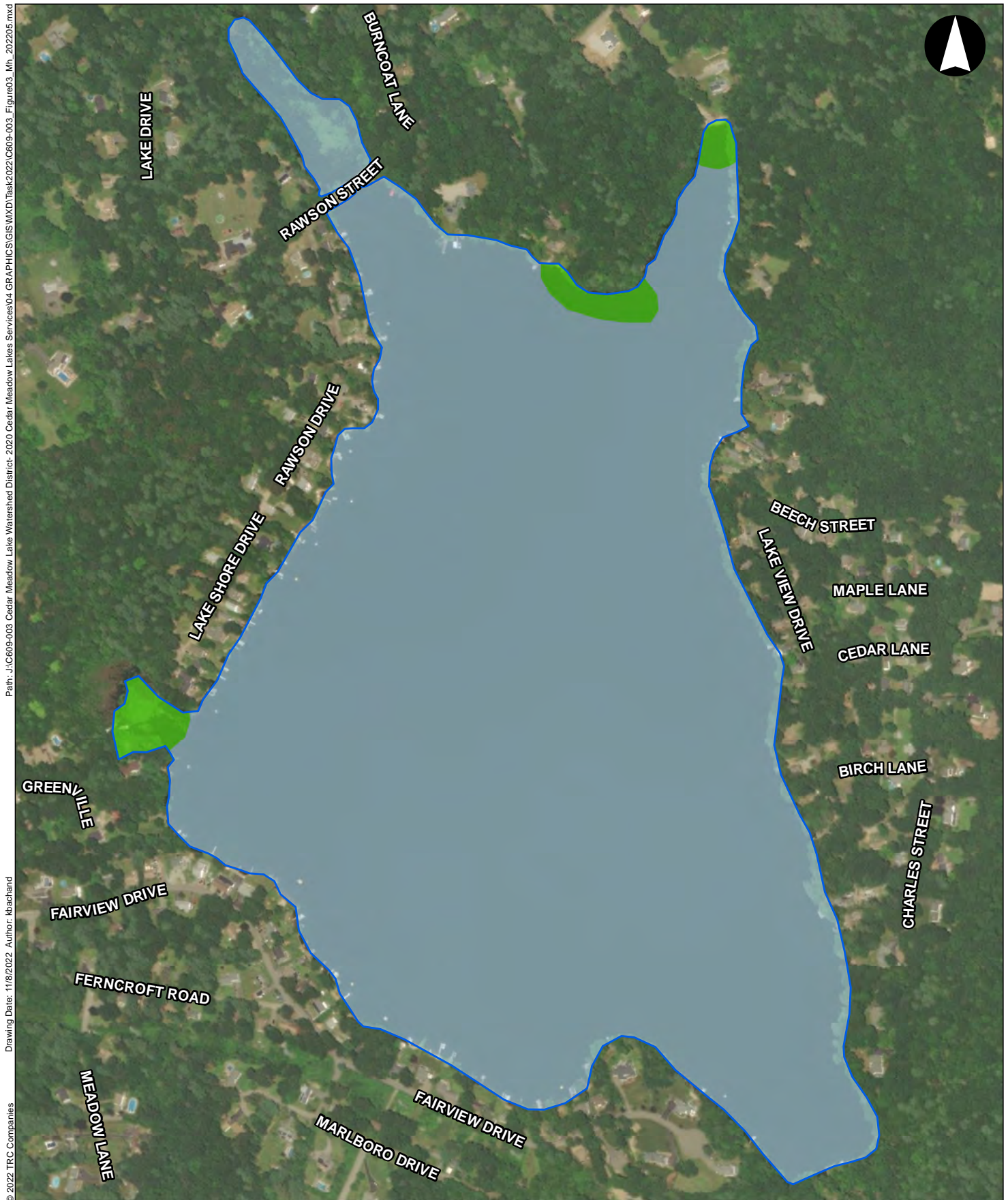
Fanwort

0% (89.8 acres)
1% - 25% (40.5 acres)
26% - 50% (10.4 acres)

51% - 75% (4.77 acres)
76% - 100% (0 acres)

0 250 500
Feet

Figure 2



Cedar Meadow Lake 2022
Leicester, Massachusetts

Variable Leaf Milfoil Cover
May 24, 2022



Source:
1) GPS data, ESS 2022
2) ESRI World Imagery, 2021

Variable Leaf Milfoil (2022 ESS Survey) 76% - 100% (0 acres)

- 0% (142.5 Acres)
- 1% - 25% (3.0 Acres)
- 26% - 50% (0 acres)
- 51% - 75% (0 acres)

0 250 500
Feet

Figure 3



Cedar Meadow Lake 2022
Leicester, Massachusetts

Variable Leaf Milfoil Cover
August 16, 2022



0 250 500
Feet

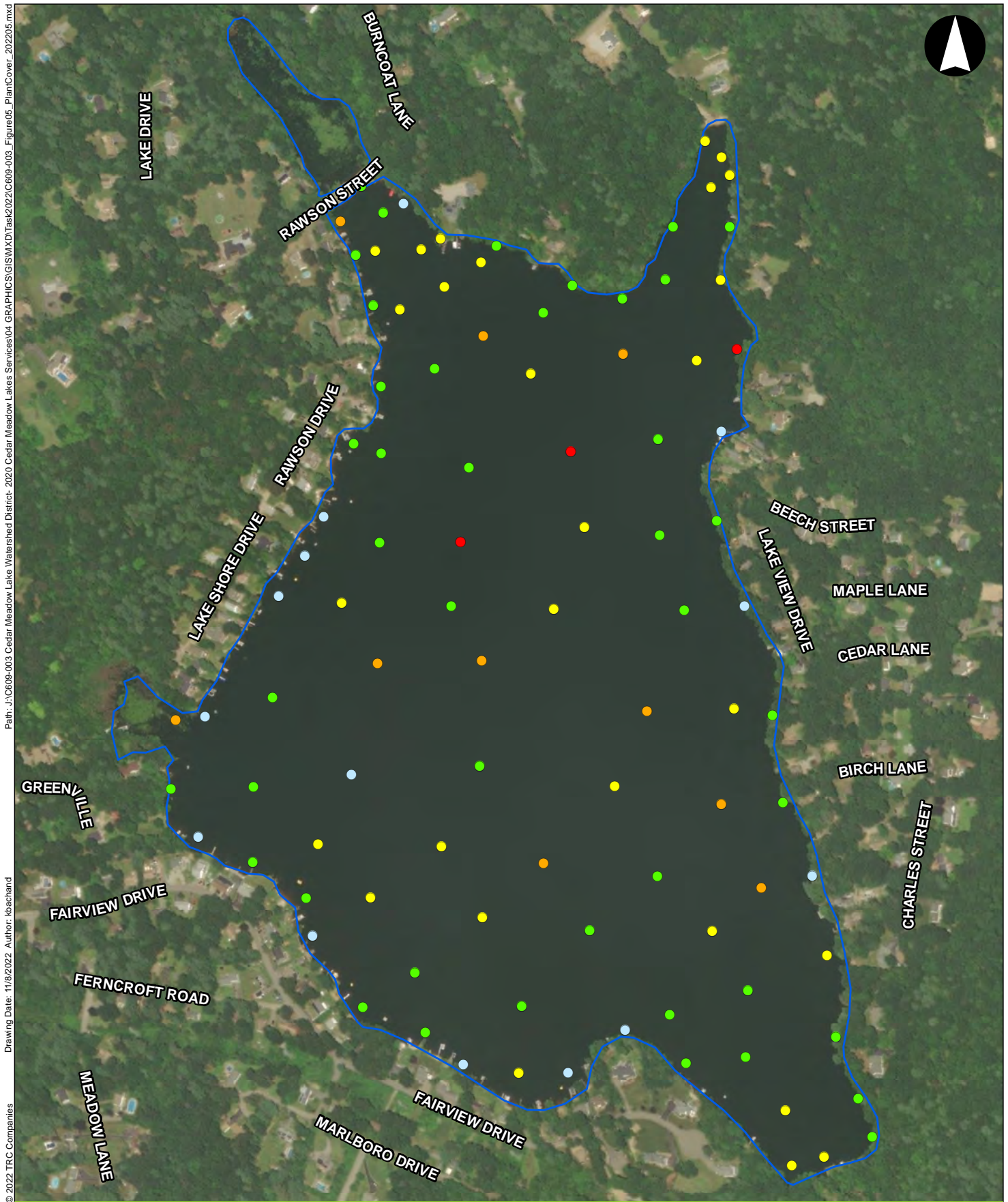
Source:
1) GPS data, ESS 2022
2) ESRI World Imagery, 2021

Variable Leaf Milfoil

- 0% (145.1 acres)
- 1% - 25% (0.4 acres)
- 26% - 50% (0 acres)
- 51% - 75% (0 acres)

76% - 100% (0 acres)

Figure 4



Cedar Meadow Lake 2022
Leicester, Massachusetts

Plant Cover
May 24, 2022



Source:
1) GPS data, ESS 2022
2) ESRI World Imagery, 2021

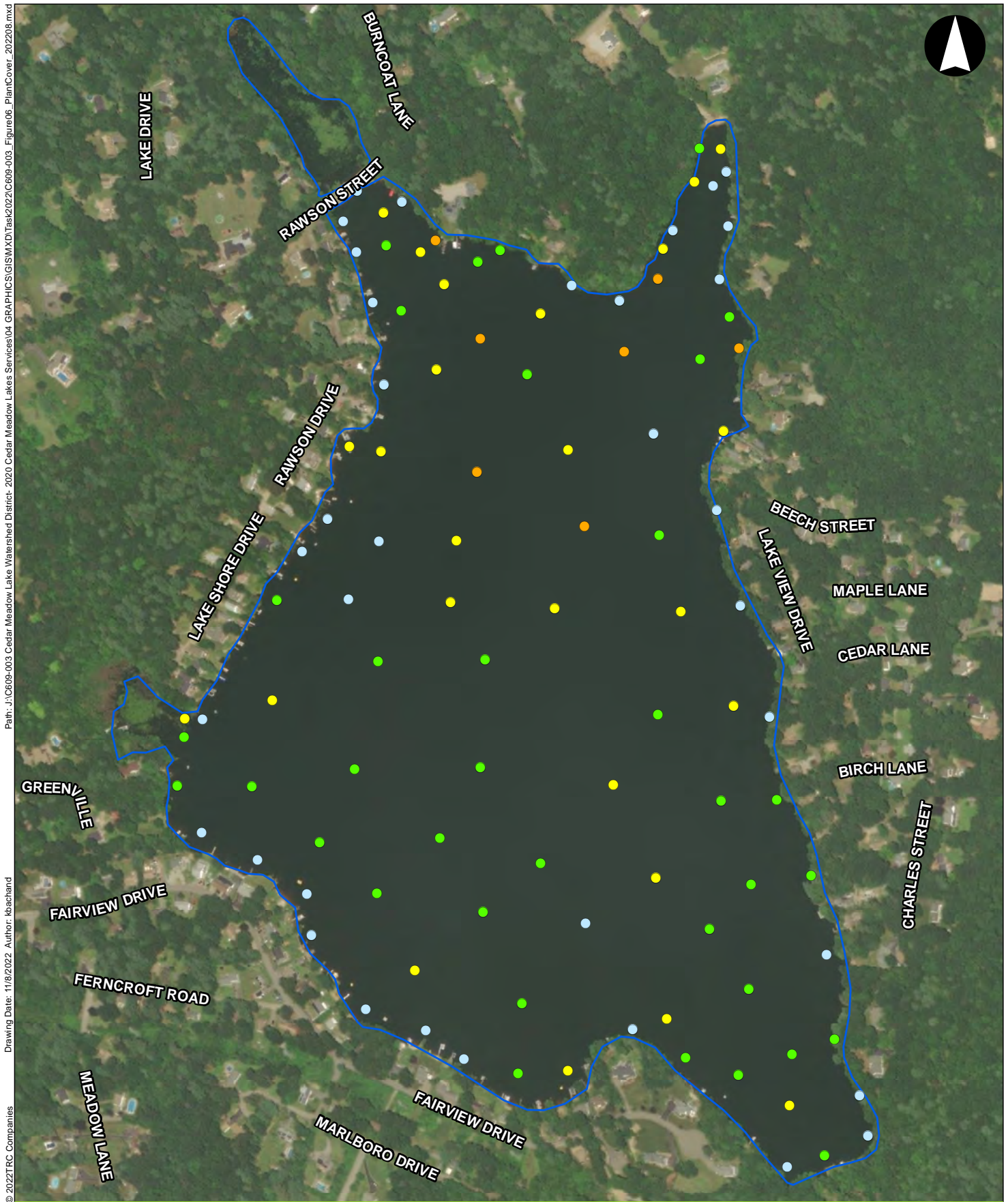
Plant Cover

- 0% (14 points)
- 1% - 25% (43 points)
- 26% - 50% (28 points)

- 51% - 75% (10 points)
- 76% - 100% (3 points)

0 250 500
Feet

Figure 5



Cedar Meadow Lake 2022
Leicester, Massachusetts

Plant Cover
August 16, 2022



Source:
1) GPS data, ESS 2022
2) ESRI World Imagery, 2021

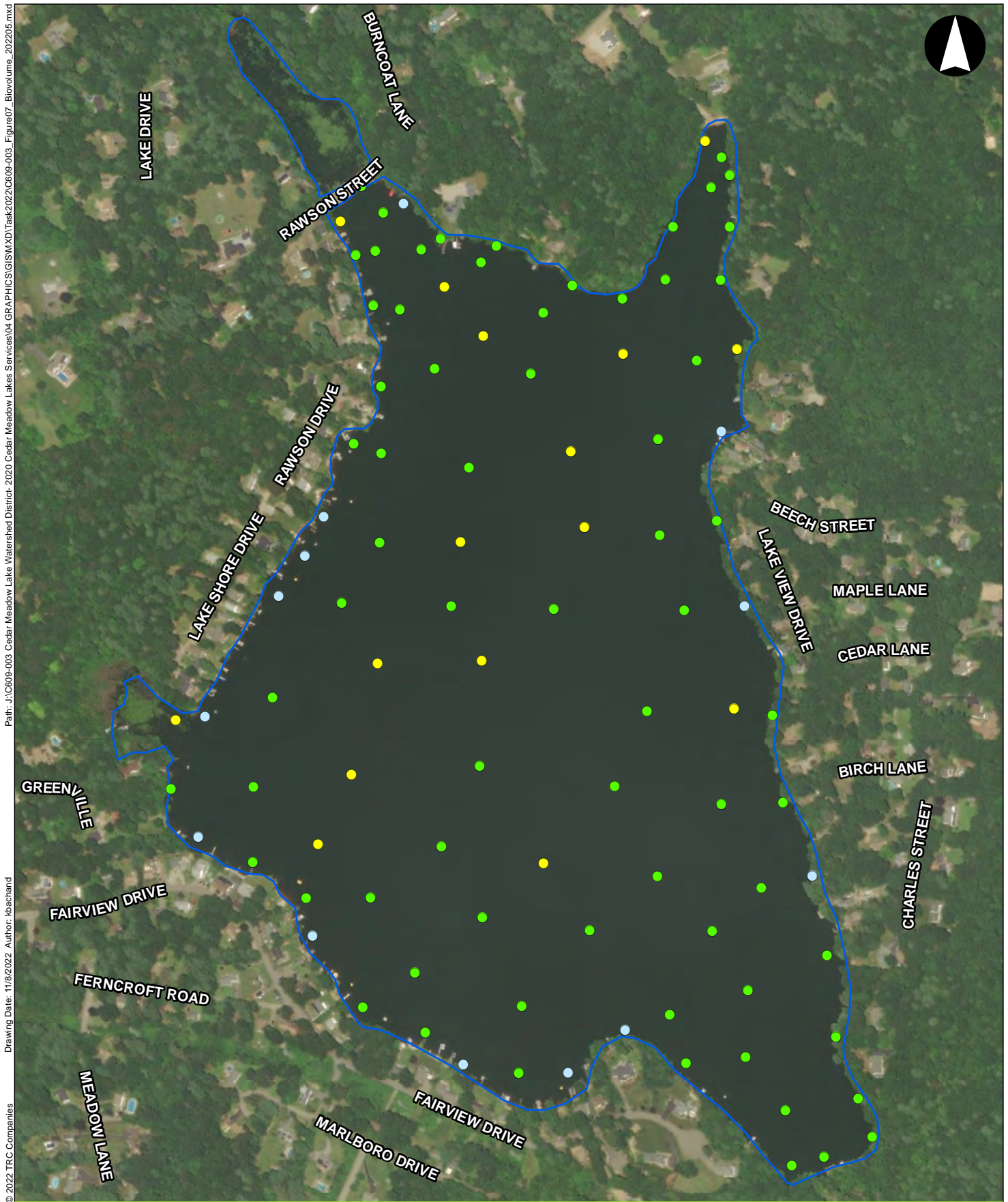
Plant Cover

- 0% (35 points)
- 1% - 25% (36 points)
- 26% - 50% (25 points)

- 51% - 75% (7 points)
- 76% - 100% (0 points)

0 250 500
Feet

Figure 6



Cedar Meadow Lake 2022
Leicester, Massachusetts

Plant Biovolume
May 24, 2022



Source:
1) GPS data, ESS 2022
2) ESRI World Imagery, 2021

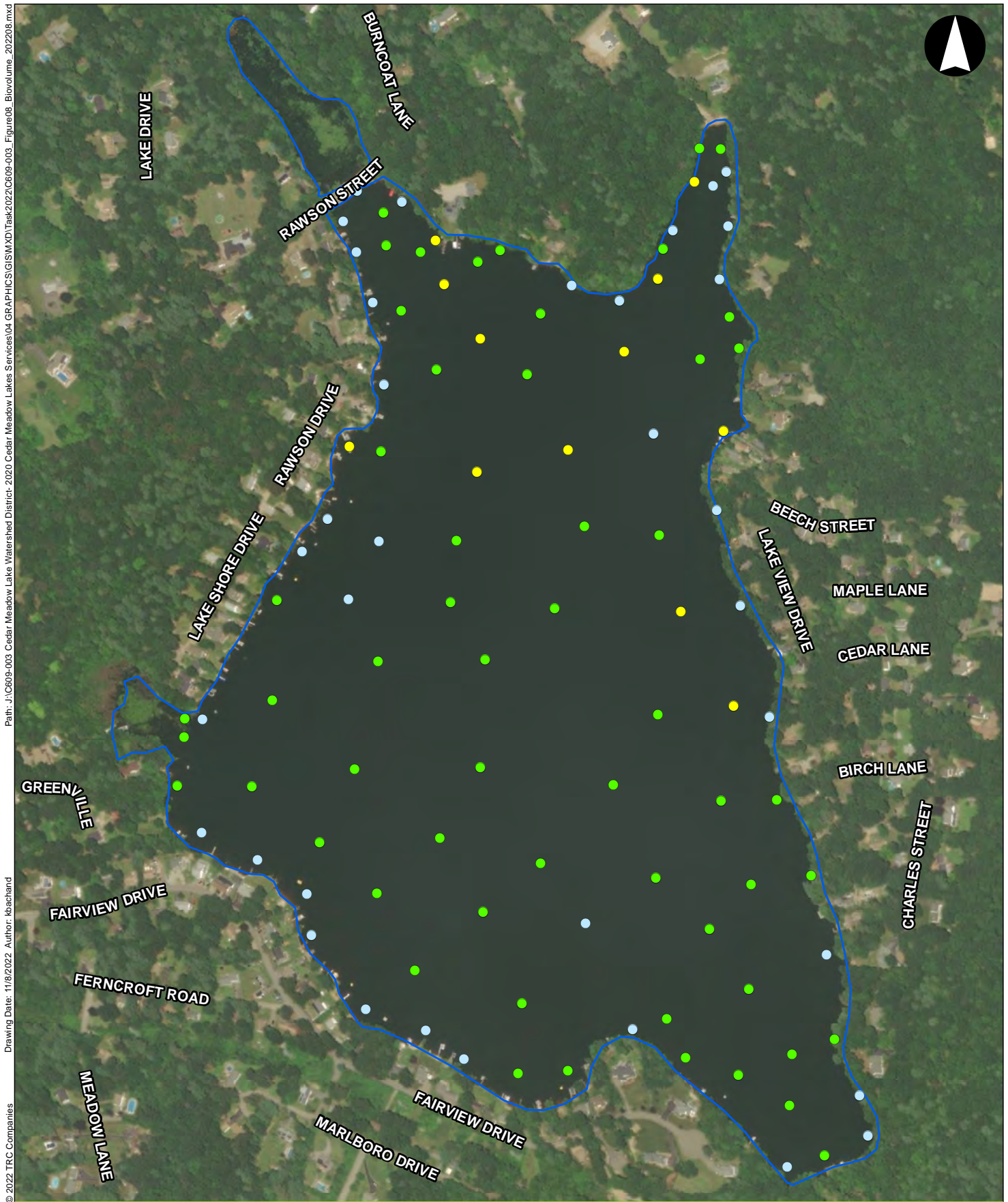
Plant Biovolume

- 0% (13 points)
- 1% - 25% (69 points)
- 26% - 50% (16 points)
- 51% - 75% (0 points)

76% - 100% (0 points)

0 250 500
Feet

Figure 7



Path: J:\C609-003 Cedar Meadow Lake Watershed District- 2020 Cedar Meadow Lakes Services\04 GRAPHICS\GIS\XMD\Task2022\C609-003_Figure08_Biovolume_202208.mxd
 Drawing Date: 11/8/2022 Author: kbachand
 © 2022 TRC Companies

Cedar Meadow Lake 2022
 Leicester, Massachusetts

Plant Biovolume
 August 16, 2022



Source:
 1) GPS data, ESS 2022
 2) ESRI World Imagery, 2021

Plant Biovolume

- 0% (35 points)
- 1% - 25% (56 points)
- 26% - 50% (12 points)
- 51% - 75% (0 points)

76% - 100% (0 points)

0 250 500
 Feet

Figure 8

Appendix A: Laboratory Reports



Tuesday, May 31, 2022

Attn: Mr Matt Ladewig
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Project ID: CEDAR MEADOW LAKE
SDG ID: GCL38039
Sample ID#s: CL38039 - CL38040

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Phyllis Shiller".

Phyllis Shiller

Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
UT Lab Registration #CT00007
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

May 31, 2022

SDG I.D.: GCL38039

Project ID: CEDAR MEADOW LAKE

Client Id	Lab Id	Matrix
CML-S	CL38039	SURFACE WATER
CML-B	CL38040	SURFACE WATER



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

May 31, 2022

FOR: Attn: Mr Matt Ladewig
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information

Matrix: SURFACE WATER
Location Code: ESSGRPRI
Rush Request: Standard
P.O.#:

Custody Information

Collected by:
Received by: B
Analyzed by: see "By" below

Date

05/24/22
05/25/22

Time

13:10
15:48

Laboratory Data

SDG ID: GCL38039
Phoenix ID: CL38039

Project ID: CEDAR MEADOW LAKE
Client ID: CML-S

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Phosphorus, as P	0.016	0.003	mg/L	0.5	05/26/22	MI	SM4500PE-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director

May 31, 2022

Reviewed and Released by: Rashmi Makol, Project Manager



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

May 31, 2022

FOR: Attn: Mr Matt Ladewig
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information

Matrix: SURFACE WATER
Location Code: ESSGRPRI
Rush Request: Standard
P.O.#:

Custody Information

Collected by:
Received by: B
Analyzed by: see "By" below

Date

05/24/22
05/25/22

Time

13:00
15:48

Laboratory Data

SDG ID: GCL38039
Phoenix ID: CL38040

Project ID: CEDAR MEADOW LAKE
Client ID: CML-B

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Phosphorus, as P	0.022	0.003	mg/L	0.5	05/26/22	MI	SM4500PE-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director

May 31, 2022

Reviewed and Released by: Rashmi Makol, Project Manager



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

QA/QC Report

May 31, 2022

QA/QC Data

SDG I.D.: GCL38039

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 626511 (mg/L), QC Sample No: CL38054 (CL38039, CL38040)													
Phosphorus, as P	BRL	0.01	0.021	0.018	NC	103			100			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
May 31, 2022

Tuesday, May 31, 2022

Criteria: None
State: MA

Sample Criteria Exceedances Report
GCL38039 - ESSGRPRI

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
--------	-------	-----------------	----------	--------	----	----------	----------------	-------------------

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

May 31, 2022

SDG I.D.: GCL38039

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: info@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-8726

Customer: ESS Group LLC - TRC
Address: 10 Hemingway Dr 2nd Floor
East Providence, RI
02915

Project: Cedar Meadow Lake
Report to: Anna Chase
Invoice to: Barbara Cabral
QUOTE #

Project P.O.:

This section MUST be completed with Bottle Quantities.

Data Delivery/Contact Options:

Fax: ☐
Phone: ☐
Email: ☒

achase@trcompainies.com

Temp 1.8 °C Pg of

Coolant: Yes ☒ No ☐
Coolant: IPK ☒ ICE ☐

Client Sample - Information - Identification
Sampler's Signature: _____ Date: _____

Matrix Code:
GW=Ground Water SW=Surface Water WW=Waste Water
RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe OIL=Oil
B=Bulk L=Liquid X = _____ (Other)

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled
38039	CML-S SW345-5-24-22			1310
38040	CML-B SW300-5-24-22			1300

Analysis Request
Total phosphorus

MSMSD - 40 ml VOA Vial (Methanol) H2O	
GL Soil container ()	
GL Amber 1000ml ()	
PL H2SO4 250ml ()	
PL HNO3 250ml ()	
PL NaOH 250ml ()	
Bacteria Bottle with 1500ml	

Relinquished by: [Signature] Accepted by: [Signature]
Date: 5-25-22 Time: 9:45
5:25 1548

Comments, Special Requirements or Regulations:
low detect on phos 0.01 mg/L
or better

RI	CT	MA	Data Format
<input type="checkbox"/> (Residential) <input type="checkbox"/> Direct Exposure <input type="checkbox"/> (Comm./Industrial) <input type="checkbox"/> Direct Exposure <input type="checkbox"/> GA Leachability <input type="checkbox"/> GB Leachability <input type="checkbox"/> GA-GW Objectives <input type="checkbox"/> GB-GW Objectives	<input type="checkbox"/> RCP Cert <input type="checkbox"/> GW Protection <input type="checkbox"/> SW Protection <input type="checkbox"/> GA Mobility <input type="checkbox"/> GB Mobility <input type="checkbox"/> Residential DEC <input type="checkbox"/> I/C DEC <input type="checkbox"/> Other	<input type="checkbox"/> MCP Certification <input type="checkbox"/> GW-1 <input type="checkbox"/> MWRA eSMART <input type="checkbox"/> GW-2 <input type="checkbox"/> S-1 10% CALC <input type="checkbox"/> GW-3 <input type="checkbox"/> S-1 GW-1 <input type="checkbox"/> S-1 GW-2 <input type="checkbox"/> S-1 GW-3 <input type="checkbox"/> S-2 GW-1 <input type="checkbox"/> S-2 GW-2 <input type="checkbox"/> S-2 GW-3 <input type="checkbox"/> S-3 GW-1 <input type="checkbox"/> S-3 GW-2 <input type="checkbox"/> S-3 GW-3 <input type="checkbox"/> SW Protection	<input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> PDF <input type="checkbox"/> GIS/Key <input type="checkbox"/> EQUIS <input type="checkbox"/> Other Data Package <input type="checkbox"/> Tier II Checklist <input type="checkbox"/> Full Data Package* <input checked="" type="checkbox"/> Phoenix Std Report <input type="checkbox"/> Other

*MSMSD are considered site samples and will be billed as such in accordance with the prices quoted.

State where samples were collected: MA

* SURCHARGE APPLIES



Friday, August 19, 2022

Attn: Anna Chase
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Project ID: CEDAR MEADOW LAKE 016108.000B.0000
SDG ID: GCM07215
Sample ID#s: CM07215 - CM07216

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Phyllis Shiller".

Phyllis Shiller

Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

August 19, 2022

SDG I.D.: GCM07215

Project ID: CEDAR MEADOW LAKE 016108.000B.0000

Client Id	Lab Id	Matrix
CML-S	CM07215	SURFACE WATER
CML-B	CM07216	SURFACE WATER



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

August 19, 2022

FOR: Attn: Anna Chase
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information

Matrix: SURFACE WATER
Location Code: ESSGRPRI
Rush Request: Standard
P.O.#:

Custody Information

Collected by:
Received by: CP
Analyzed by: see "By" below

Date

08/16/22
08/17/22

Time

13:30
15:45

Laboratory Data

SDG ID: GCM07215
Phoenix ID: CM07215

Project ID: CEDAR MEADOW LAKE 016108.000B.0000
Client ID: CML-S

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Phosphorus, as P	0.017	0.003	mg/L	0.5	08/18/22	JR	SM4500PE-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director

August 19, 2022

Reviewed and Released by: Anil Makol, Project Manager



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

August 19, 2022

FOR: Attn: Anna Chase
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information

Matrix: SURFACE WATER
Location Code: ESSGRPRI
Rush Request: Standard
P.O.#:

Custody Information

Collected by:
Received by: CP
Analyzed by: see "By" below

Date

08/16/22
08/17/22

Time

13:35
15:45

Laboratory Data

SDG ID: GCM07215
Phoenix ID: CM07216

Project ID: CEDAR MEADOW LAKE 016108.000B.0000
Client ID: CML-B

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Phosphorus, as P	0.021	0.003	mg/L	0.5	08/18/22	JR	SM4500PE-11

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director

August 19, 2022

Reviewed and Released by: Anil Makol, Project Manager



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

QA/QC Report

August 19, 2022

QA/QC Data

SDG I.D.: GCM07215

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 638052 (mg/L), QC Sample No: CM07012 (CM07215, CM07216)													
Phosphorus, as P	BRL	0.01	8.09	8.24	1.80	99.8			91.3			85 - 115	20
Comment:													
Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.													

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
August 19, 2022

Friday, August 19, 2022

Criteria: None
State: MA

Sample Criteria Exceedances Report
GCM07215 - ESSGRPRI

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
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*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.



Environmental Laboratories, Inc.
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Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

August 19, 2022

SDG I.D.: GCM07215

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email Makrina Nolan: makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Client Services (860) 645-1102

Project: Cedar Meadow Lake # 016/08, acc. 0000
Project P.O.:

Report to: achase@tricompanies.com

Invoice to: bCabra@tracompanies.com

#QUOTE

Client Sample - Information - Identification

Sampler's Signature: *Joseph Botta* Date: 8/16/2022

Analysis Request

Matrix Code:
 DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
 RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe OIL=Oil
 B=Bulk L=Liquid X=SW (Other)

PHOENIX USE ONLY	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled
07215	CML-S	SW	8/10/22	1330
0746	CML-B	SW	8/16/22	1335

Relinquished by:	Accepted by:	Date:	Time:
Joseph Becker	[Signature]	8/17/24	935
[Signature]	[Signature]	8/17	1545

Comments, Special Requirements or Regulations:

Turnaround Time:

<input type="checkbox"/>	1 Day*
<input type="checkbox"/>	2 Days*
<input type="checkbox"/>	3 Days*
<input checked="" type="checkbox"/>	Standard

****MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.**

- SURCHARGE APPLIES

RI	<input type="checkbox"/>	(Residential) Direct Exposure
	<input type="checkbox"/>	(Commy/Industrial) Direct Exposure
	<input type="checkbox"/>	GA Leachability
	<input type="checkbox"/>	GB Leachability
	<input type="checkbox"/>	GA-GW Objectives
	<input type="checkbox"/>	GB-GW Objectives

CI	<input type="checkbox"/>	RCP Cert	<input type="checkbox"/>	GW Protection	<input type="checkbox"/>	SW Protection	<input type="checkbox"/>	GA Mobility	<input type="checkbox"/>	GB Mobility	<input type="checkbox"/>	Residential DEC	<input type="checkbox"/>	I/C DEC	<input type="checkbox"/>	Other	<input type="checkbox"/>
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<input type="checkbox"/> MA	<input type="checkbox"/> MCP Certification
<input type="checkbox"/>	<input type="checkbox"/> GW-1
<input type="checkbox"/>	<input type="checkbox"/> GW-2
<input type="checkbox"/>	<input type="checkbox"/> GW-3
<input type="checkbox"/>	<input type="checkbox"/> S-1 GW-1
<input type="checkbox"/>	<input type="checkbox"/> S-2 GW-1
<input type="checkbox"/>	<input type="checkbox"/> S-3 GW-1
<input type="checkbox"/>	<input type="checkbox"/> SW Protection

State where samples were collected:

MA

* SURCHARGE APPLIES

REL-126 REV. 03/22

Phytoplankton Sample Analysis

Sample: Cedar Meadows
Sample Site: CML-S
Sample Depth:
Sample Date: 24-May-22

Total Density (#/mL): 414
Total Biovolume ($\mu\text{m}^3/\text{mL}$): 82,691
Trophic State Index: 31.9

Species	Density #/mL	Density Percent	Biovolume $\mu\text{m}^3/\text{mL}$	Biovolume Percent
1 Rhodomonas minuta	198	47.7	3,951	4.8
2 Sphaerocystis schroeteri	34	8.1	7,437	9.0
3 Anabaena flos-aquae	29	7.0	23,244	28.1
4 Cryptomonas erosa	29	7.0	15,033	18.2
5 Mallomonas sp.	29	7.0	10,986	13.3
6 Kephyrion spirale	29	7.0	1,821	2.2
7 Kephyrion littorale	14	3.5	1,373	1.7
8 Achnanthes minutissima	10	2.3	482	0.6
9 Tabellaria fenestrata	5	1.2	11,564	14.0
10 Synedra radians	5	1.2	1,735	2.1
11 Nitzschia frustulum	5	1.2	578	0.7
12 Kephyrion sp.	5	1.2	304	0.4
13 Ankistrodesmus falcatus	5	1.2	482	0.6
14 Chrysococcus rufescens	5	1.2	410	0.5
15 Chlamydomonas sp.	5	1.2	1,566	1.9
16 Nitzschia acicularis	5	1.2	1,349	1.6
17 Oocystis lacustris	5	1.2	376	0.5

Anabaena flos-aquae cells/mL = 347

Phytoplankton Sample Analysis

Sample: Cedar Meadows Pond
Sample Site: CML-S
Sample Depth:
Sample Date: 16-Aug-22 1330

Total Density (#/mL): 555
Total Biovolume ($\mu\text{m}^3/\text{mL}$): 229,524
Trophic State Index: 39.3

Species	Density #/mL	Density Percent	Biovolume $\mu\text{m}^3/\text{mL}$	Biovolume Percent
1 Cryptomonas erosa	104	18.7	54,120	23.6
2 Sphaerocystis Schroeteri	79	14.3	13,877	6.0
3 Crucigenia quadrata	59	10.7	6,066	2.6
4 Trachelomonas volvocina	45	8.0	84,079	36.6
5 Glenodinium sp.	40	7.1	27,754	12.1
6 Rhodomonas minuta	30	5.4	595	0.3
7 Cyclotella stelligera	30	5.4	1,635	0.7
8 Oocystis pusilla	25	4.5	2,275	1.0
9 Chlamydomonas sp.	25	4.5	8,054	3.5
10 Crucigenia tetrapedia	20	3.6	1,685	0.7
11 Euglena sp.	15	2.7	8,624	3.8
12 Synedra radians	15	2.7	5,353	2.3
13 Dinobryon sertularia	10	1.8	1,189	0.5
14 Achnanthes minutissima	10	1.8	496	0.2
15 Aphanizomenon flos-aquae	5	0.9	3,747	1.6
16 Tetraedron regulare	5	0.9	570	0.2
17 Navicula graciloides	5	0.9	2,156	0.9
18 Scenedesmus denticulatus	5	0.9	892	0.4
19 Crucigenia crucifera	5	0.9	843	0.4
20 Mallomonas sp.	5	0.9	1,883	0.8
21 Scenedesmus quadricauda	5	0.9	1,289	0.6
22 Staurastrum dejectum	5	0.9	1,982	0.9
23 Chroococcus minimus	5	0.9	139	0.1
24 Schroederia sp.	5	0.9	223	0.1

Aphanizomenon flos-aquae cells/mL = 59

Aquatic Analysts

Sample ID: ZM14